

DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT OF SAND QUARRY (PALAR RIVER) B1 - 2022

**(As per EIA Notification, 2006 dated 14.09.2006 and Enforcement &
Monitoring of Sand Mining Guidelines, 202**

AREA DETAILS

Extent	–	11.70.0 Ha
S.F No	–	1(P) & 213(P)
Village	–	Kuthambakkam & Ananganallur
Taluk	–	Gudiyatham
District	–	Vellore

PROPONENT

**THE EXECUTIVE ENGINEER
Water resources Department,
Mining and monitoring Division
Chennai District
Tamil Nadu.**



EIA CONSULTANT

**AADHI BOOMI MINING & ENVIRO TECH (P) LTD
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THE EXECUTIVE ENGINEER
Water Resource Department
Mining and Monitoring Division,
Chennai, TamilNadu

To

The District Environmental Engineer,

Tamil Nadu Pollution Control Board,
Auxilium College Road,
(opposite to Auxilium College) Gandhi Nagar,
Vellore – 632 006

Sub: Submission of **Draft Environmental Impact Assessment (EIA) Report** as per EIA Notification, 2006 dated 14.09.2006 and Amendments, Enforcement & Monitoring of Sand Mining Guidelines, 2020 for the proposed Sand Quarry over an extent of 11.70.0 Ha in S.F. No.1 (P) & 213 (P) in Kuthambakkam and Ananganallore Village, Gudiyatham Taluk, Vellore District, Tamil Nadu – reg.

Ref:

- 1) MoEF&CC OM :F.No.L-11011/175/2018-IA-II(M), dated 12.12.2018
- 2) Approval of Mining Plan Vide Rc.No.37/Mines/2021; dated 23.05.2022
- 3) Our application submitted Terms of Reference dated: 22.06.2022
- 4) ToR- Lr.No. SEIAA-TN/F.No.9340/SEAC/ToR-1219/2022 dated: 02.08.2022

Dear Sir,

With reference to the above mentioned subject, we herewith submit the hard copy of the **Draft Environmental Impact Assessment Report** as per the Terms of Reference vide Lr.No.SEIAA-TN/F.No.9340/SEAC/TOR-1219/2022 dated 02.08.2022 for your kind perusal. We kindly request you to process our application for Public Hearing as per EIA Notification, 2006 for obtaining Environment Clearance from SEIAA/SEAC, Tamil Nadu as early as possible.

Thanking You,

Yours faithfully,

(THE EXECUTIVE ENGINEER)

Project Proponent

Enclosure: 1. EIA Report along with the soft copy

DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT.
Proponent: The Executive Engineer, Kuthambakkam and Ananganallore Sand Quarry,
Vellore District

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THE EXECUTIVE ENGINEER
Water Resource Department
Mining and Monitoring Division,
Chennai, TamilNadu

Undertaking

I'm **THE EXECUTIVE ENGINEER, Chennai Division, as Project Proponent**, hereby give this undertaking to the effect that the conditions laid down in Terms of Reference vide Lr.No.SEIAA-TN/F.No.9340/SEAC/TOR-1219/2022 dated 02.08.2022 for our Sand Quarry, in S.F. No.1 (P) & 213 (P) over an extent of 11.70.0 Ha of Kuthambakkam and Ananganallore Village, Gudiyatham Taluk, Vellore District, Tamil Nadu, have been compiled with, and the data submitted and the information presented in this report are true to the best of my knowledge.

Signature and seal of the Project Proponent

Place :

Date :

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

I, Mr. S. Suriyakumar, hereby, confirm that the mentioned experts prepared the EIA Report for Sand Quarry of THE EXECUTIVE ENGINEER, Chennai Division at Kuthambakkam & Ananganallore Village, Gudiyatham Taluk, Vellore District, Tamil Nadu. I hereby, certify that I was a part of the EIA team in the following capacity that developed the above EIA report.

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

Name: **Mr.S.Suriyakumar**

For Aadhi Boomi Mining & Envirotech (P) Ltd.,

Director

Signature

Designation: **Managing Director**

Name of the EIA Consultant Organization: Aadhi Boomi Mining Enviro Tech Private Limited.

RQP/QCI/NABET Accredited Environment Consultancy,

NABET/EIA/2124/RA 0228

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DECLARATION OF EXPERTS - NABET ANNEXURE – VII

S.No	Name of the Expert	Category	Functional Areas	Signature
1.	Mr.S.Suriyakumar	A	EIA Co-ordinator	
		A	Solid and Hazardous Waste SHW*- HW* only	
		A	Risk Assessment and Hazard Management (RH)	
		A	Land Use (LU)	
		A	Soil Conservation (SC)	
2.	Dr. Sudharshan Ramakrishnan	A	Land Use (LU)	
		A	Socio Economics (SE)	
3.	Dr. Nithia Priya P.M	B	Air Pollution, Monitoring, Prevention and Control (AP)	
		B	Water Pollution Monitoring, Prevention and Control (WP)	
4.	Mr. M. Venkatesh Prabhu	B	Meteorology, Air Quality Modelling & Prediction (AQ)	
		B	Noise and Vibration (NV)	
5.	Mr. N. Suresh	B	Geology (GEO)	
		B	Hydrogeology (HG)	
6.	Mr. K. Manuraj		Geology (GEO)	
		B	Hydrogeology (HG)	
Team Member Involved in Report Preparation				
7.	Mrs. S. Santhi	Team Member	Land Use (LU) under EIA Co- ordinator/FAE - Mr.S.Suriyakumar	

Consultant: Aadhi Boomi Mining & Enviro Tech (P) Ltd, Salem, Tamil Nadu

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			Socio Economics (SE) under FAE - Dr. Sudharshan Ramakrishnan	
8.	Mrs. S. Sri Vidhya	Team Member	Water Pollution Monitoring, Prevention and Control (WP) under FAE - Dr. Nithia Priya P.M	
			Meteorology, Air Quality Modelling & Prediction (AQ) under FAE - Mr. M. Venkatesh Prabhu	

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LIST OF ABBREVIATIONS AND ACRONYMS

CAPEXIL	Chemical and Allied Export Promotion Council of India
EIA	Environmental Impact Assessment
EMP	Environment Management Plan
MOEF & CC	Ministry of Environment Forest and Climate Change
TOR	Terms of Reference
EC	Environment Clearance
SEAC	State Expert Appraisal Committee
SEIAA	State Environmental Impact Assessment Authority
TNPCB	Tamil Nadu Pollution Control Board
CPCB	Central Pollution Control Board
DGM	Department of Geology & Mining
NOC	No Objection Certificate
NH	National Highway
SH	State Highway
KM	Kilo Meter
HA	Hectare
DGPS	Differential Global Positioning System
AAQ	Ambient Air Quality
AQI	Air Quality Index
GLC	Ground Level Concentration
SPM	Suspended Particulate Matter
DB	Decibel
LEQ	Equivalent Noise Level
SEIS	Seismograph
KLD	Kilo Litre Per -Day
HSE	Health Safety And Environment
PH	Public Hearing
R & R	Rehabilitation & Resettlement
CSR	Corporate Social Responsibility
EMC	Environmental Management Cell
GOVT	Government of Tamilnadu
WQI	Water Quality Index

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Compliance of ToR

S.No.	ToR	Compliance
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.	It is a new lease Sand quarry. The mining plan was approved by the Assistant Director, Geology and Mining, Vellore vide letter Rc.No.37/Mines/2021; dated 23.05.2022 . Refer Chapter 1 (Page No. 1), Annexure II.
2.	A copy of the document in support of the fact that the proponent is the rightful lease of the mine should be given.	The precise area communication was granted by District Collector Vellore District, vide Rc.No.37/Mines/2021; dated 12.01.2022 . Refer chapter 1 (Pg.No.1), Annexure III.
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.	Contents in all documents are synchronizing with one another in terms of mine lease area, production levels, waste generation, its management and mining technology. The mining plan was approved by the Assistant Director, Geology and Mining, Vellore vide letter Rc.No.37/Mines/2021; dated 23.05.2022 . Refer Chapter 1 (Page No. 1), Annexure II.
4.	All corner coordinates of the mine lease area, superimposed on a High Resolution Imagery/ Toposheet; topographic sheet, geomorphology and geology of the area should be provided. Such an Imagery of the proposed area should clearly show	The study area lies between Northern Latitude of N12°53'25.36" to N12°53'34.90" N and Eastern Longitude from E78°52'22.78" to E78°52'52.13"E. The area is marked in the survey of India Toposheet No. 57L/13. Details are given in clause 1.3.2 of Chapter1

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	the land use and other ecological features of the study area (core and buffer zone).	and Pg. No. 3. Geology & Geomorphology of the mine is given in Clause 3.13.10 & 3.13.11 of Chapter 3 and Fig No: 3.27 (Refer Pg. No: 122). Land Use / Land Cover map of the study area (core and buffer zone) have been prepared on the basis of Satellite imagery using RS & GIS Technique & the same has been incorporated in Fig No: 3.24 (a) & 3.26 of Chapter 3 (Refer Pg. No: 117, 119).
5.	Information should be provided in Survey of India Toposheet in 1:50,000 scale indicating geological map of the area, geomorphology of land forms of the area, existing minerals and mining history of the area, important water bodies, streams and rivers and soil characteristics.	Survey of India Toposheet No. 58 M/11 in 1:50,000 scale indicating physical and surface features of the area, geomorphology of land forms of the area, existing minerals and mining history of the area, important water bodies, streams and rivers and soil characteristics is given in Fig No: 1.2, 1.2, 1.3, 2.2, 2.8, 2.15, 2.16, 3.24 and Refer pages 4, 5, 6, 13, 21, 31, 35, 115 respectively.
6.	Details about the land proposed for mining activities should be given with information as to whether mining conforms to the land use policy of the State; land diversion for mining should have approval from State land use board or the concerned authority.	The land proposed for mining activities is given in Table No.2.5 of Pg. No. 33 In Chapter 2
7.	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	The proponent The Executive Engineer, Chennai Division is very much conscious of implementing Environment management plan with systematic mining. The proponent will submit the compliance the EC conditions with stipulated time.

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	<p>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.</p>	
8.	<p>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.</p>	<p>The depth of mining of sand is just 1m below the theoretical bed level. So the failure of pit slope is not possible. (Refer Pg.No.170 in Chapter 7)</p> <p>This is a sand mining project. The sand is a loose granular material. So there is no need of blasting in the sand quarry.</p> <p>General safe guard measures are given in Chapter - 4</p>
9.	<p>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.</p>	<p>The Study area of the proposed mining project comprises of 10 km zone around the mining Lease boundary has been prepared. Refer Fig No. 1.2-Pg. No. 5.</p> <p>No waste generated during the production of sand.</p> <p>Refer Page No. 151 in Chapter 4. Also refer</p>

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		Clause. 2.10 in Chapter 2 (Page No. 41)
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.	10 km radius map of the Study area delineating forest area, agricultural land, grazing land, wildlife sanctuary and national park, migratory routes of fauna, water bodies, human settlements, other existing mines/industrial activity and other ecological features are shown in Fig No. 3.24, 3.26 of Chapter 3, Pg. No. 117,119. Land use plan of the mine lease area showing is given in Clause 2.7 of Pg. No. 33.
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 dump proposed for this Sand quarry Refer, Entire sand will be excavated and transported to the PWD stockyard or needy customer. Refer Clause 4.7 in Chapter 4 (Page No.151). Also refer Table No. 2.5 of chapter 2 (Page no.33). No reclamation or re- habitation Plan (R & R) is proposed (Refer Clause 7.5 of Chapter 7, Pg.No:174).
12.	A Certificate from the Competent Authority in the State Forest Department should be provided, confirming the involvement of forest land, if any, in the project area. In the event of any contrary claim by the Project Proponent	The quarry area does not involve forest land and hence there is no requirement of clearance certificate from Forest Department. Refer Table No.2.2 of Chapter 2, (Pg. No. 18). Also Refer Table 11.1 of Chapter 11 (Page No.189)

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	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.	The quarry area does not involve forest land and hence there is no requirement of clearance certificate from Forest Department. Refer Table No.2.2 of Chapter 2, (Pg. No. 18). Also Refer Table 11.1 of Chapter 11 (Page No.189)
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.	There is no reserve forest found within 10km radius. However the details of vegetation within 10km radius are given in Chapter 3, Pg. No.117
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	Eco biodiversity (EB) study has been done for the project which details the impact on surrounding wildlife and mitigation measures are discussed and given in Chapter-4, Clause 4.8,Pg. No. 151

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	surrounding and any other protected area and accordingly, detailed mitigative measures required, should be worked out with cost implications and submitted.	
17.	Location of National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar site Tiger/Elephant Reserves/(existing as well as proposed), if any, within 10 km of the mine lease should be clearly indicated, supported by a location map duly authenticated by Chief Wildlife Warden. Necessary clearance, as may be applicable to such projects due to proximity of the ecologically sensitive areas as mentioned above, should be obtained from the Standing Committee of National Board of Wildlife and copy furnished.	There is no reserve forest or Social forest and wild life Sanctuaries found around 10km radius. It is Govt. Land, PWD.
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	Details of Flora and Fauna found in the study area are given in the clause 3.10 (Pg. No 80-90).

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	<p>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.</p>	
19.	<p>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.</p>	<p>The project site is neither falling under 'Aravalli range' nor it is located in proximity to area declared as Critically Polluted Area.</p>
20.	<p>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</p>	<p>Not Applicable. The mining area is located 105 km from Bay of Bengal (E). Hence, the project doesn't attract the C.R.Z. Notification, 2011. Refer Chapter 11 Table No.11.1 (Pg. No 189).</p>

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	Management Authority).	
21.	<p>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.</p> <p>The issues relating to shifting of village(s) including their R&R and socio-economic aspects should be discussed in the Report.</p>	<p>The mining project does not involve any kind of displacement of the population since the mining will be concentrated only in the quarry area. The impact of mining activity on the population will be insignificant. Hence, Rehabilitation of settlements is not anticipated under this project as it will not be required. (Refer Clause 7.5 Pg. No. 174).</p> <p>The Socio-Economic study detailed in Clause 3.13 of Chapter 3, (Pg.No:90-106 of the EIA report)</p>
22.	<p>One season (non-monsoon) [i.e. March-May (Summer Season); October-December (post monsoon season) ; December-February (winter season)]primary baseline data on ambient air quality as per CPCB Notification of 2009, water quality, noise level, soil and flora</p>	<p>Winter season monitoring data on Air quality for a period of three months and Water quality, and Noise level, Soil and Flora & Fauna in core and buffer zones are detailed in Chapter 3</p>

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	<p>and fauna shall be collected and the AAQ and other data so compiled presented date-wise in the EIA and EMP Report. Site-specific meteorological data should also be collected. The location of the monitoring stations should be such as to represent whole of the study area and justified keeping in view the pre-dominant downwind direction and location of sensitive receptors. There should be at least one monitoring station within 500 m of the mine lease in the pre-dominant downwind direction. The mineralogical composition of PM10, particularly for free silica, should be given.</p>	
23.	<p>Air quality modeling should be carried out for prediction of impact of the project on the air quality of the area. It should also take into account the impact of movement of vehicles for transportation of mineral. The details of the model used and input parameters used for modeling should be provided. The air quality contours may be shown on a location map clearly indicating the location of the site, location of sensitive receptors, if any, and the habitation. The wind roses showing pre-dominant wind direction may also be indicated on</p>	<p>The detail on air quality status predicted is detailed in Clause 4.1 of Chapter 4, Pg. No. 132-140.</p> <p>Wind Rose Pattern is shown in Fig. 3.1, (Pg. No: 46) of Chapter 3.</p>

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	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.	The water requirement for the Project is 3.5 KLD. Refer clause 4.5 of Chapter 4. (Pg.No:145). Water Balance chart in clause 4.3 of chapter 4 & Fig No: 4.3 (Pg. No. 145).
25.	Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided.	Workers requires water for drinking and for water spraying, dust suppression and plantation. Water for drinking will be utilized from the certified supplier of water vendor. Water for dust control shall be taken from the existing bore wells.
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.	The project do not consume any process water except for drinking, dust suppression & plantation. Plantation is proposed in nearby villages, which will increase the water holding capacity & help in recharging of ground water. (Refer Fig 4.3 & Clause 4.5 of Chapter 4, Pg. No. 145)
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.	The impacts of the project on the water quality are assessed and necessary safeguard measures will be provided. (Refer Chapter 4, Pg. No: 146-150).
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	The mining operation will be maximum of 1m Below theoretical bed level. The ground water table is 6 m below the ground level and the proposed mining of sand is just 1m below theoretical bed level. Hence there will not be any intersect of mining operation with ground water table. Refer Fig. No 4.4 of Chapter 4 (Pg.No.147)

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	<p>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>	<p>A detailed Hydro Geological Study has been carried out and furnished in Clause 3.7 of Chapter 3, Pg. No: 65-72.</p>
29.	<p>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.</p>	<p>The proposed sand quarry is itself in the river body (Palar Coleroon). The main purpose of excavating sand is to avoid the diversion of river flow by increasing the river carrying capacity and to save the surrounding crops from drowning. There is no stream crossing inside the mine lease area and no need for modification / diversion.</p>
30.	<p>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.</p>	<p>Site elevated from 264.25m – 266.75m above MSL above MSL is given in Table 2.2 (Pg. No. 18). The mining operation will be just 1m below theoretical bed level. The ground water table at 6m below ground level and mine workings are proposed on higher and will not affect water regime. Hence there will not be any intersect of mining operation with ground water table. (Refer Clause Fig 4.4 of Chapter 4, Pg. No: 147).</p>
31.	<p>A time bound Progressive Greenbelt Development Plan shall be prepared in a tabular form (indicating the linear and quantitative coverage, plant species</p>	<p>Phase-wise plan of plantation and Compensatory afforestation should be charted clearly indicating the area to be covered under plantation and the name of the species is detailed in Table 4.19. Refer pg. No.</p>

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	<p>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.</p>	157
32.	<p>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</p>	<p>The mining activities will be carried out through the existing roadways during leisure hours only, with no increase in the existing traffic pattern. (Refer Fig No 2.9 & 3.25, Page No 22, 118)</p>

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	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.	Onsite shelter and facilities like temporary shed will be provided to the mine workers. Refer Clause 2.13 of chapter 2, Page. No 42. The workers in the mines will be provided rest shed, first aid centre, ambulance facility. The hazardous protecting equipment also will be provided to the employees such as helmet, ear muff, mask etc.
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.	Post-Mining (Conceptual) Land Use with Environment Management has been prepared. Refer Clause 2.11 of Chapter 2, Page No. 41.
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.	Occupational Health impacts of the Project will be anticipated and the proposed preventive measures are detailed in EIA the report. (Refer Clause 4.11 of Chapter 4, Pg. No: 159).
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	All control measure for air emission, noise control, and waste management will be taken as per norms. Hence there will not be any impact on population. (Refer Chapter 4& Pg. No: 132-162).

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	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.	Details of community welfare activities proposed for the local community, along with proposed budget have been incorporated in EIA Report (Refer Clause 8.1 of Chapter 8, Pg. No: 176-180).
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.	Environmental Management Plan for the existing mining project has been prepared and incorporated in Chapter 10. (Pg.No.182-187).
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.	The Draft EIA report has been prepared for conducting PH
40.	Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.	No litigation pending against the project.
41.	The cost of the Project (capital cost and recurring cost) as well as the	Total Cost of the Project is Rs.45.0 and EMP cost 6.0 lakhs (Refer Clause 2.14 Pg. No: 43).

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	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.	A detailed Risk and Disaster Management Plan has been prepared and detailed in clause 7.2 of Chapter 7. (Pg. No: 169).
43.	Benefits of the Project if implemented shall clearly indicate environmental, social, economic, employment potential, etc.	If the Project is implemented, mining activity will help in improving environmental, social, and economic and employment potential directly and indirectly in the study area. Refer Chapter 8 of, Pg. No: 176

General Points to be followed as per ToR

S.No .44	ToR	Compliance
a)	Executive Summary of the EIA/EMP Report	Refer 11 th Chapter of Draft EIA Report
b)	All documents to be properly referenced with index and continuous page numbering.	Yes, all documents are properly referenced with index and continuous page numbering.
c)	Where data are presented in the report especially in Tables, the period in which the data were collected and the sources should be indicated.	Yes. Separate Contents for Tables have been included in EIA Report.
d)	Project Proponent shall enclose all the analysis/testing reports of water, air, soil, noise etc. using the MoEF&CC/NABL accredited laboratories. All the original analysis/testing reports should be available during appraisal of the project.	Baseline Monitoring Report enclosed
e)	Where the documents provided are in a language other than English, an English translation should be provided.	No.
f)	The Questionnaire for environmental	Yes, environmental appraisal of

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	appraisal of mining projects as devised earlier by the Ministry shall also be filled and submitted.	mining projects also submitted along with the EIA report.
g)	While preparing the EIA report, the instructions for the proponents and instructions for the consultants issued by MoEF&CC vide O.M. No. J-11013/41/2006-IA.II (I) dated 4th August, 2009, which are available on the website of this Ministry, should also be followed.	Yes, Followed as per their MoEF&CC vide O.M. No. J-11013/41/2006-IA.II (I) dated 4th August, 2009.
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.	No changes have been made.
i)	As per the circular no. J-11011/618/2010-IA.II (I) dated 30.5.2012, certified Report of the status of compliance of the conditions stipulated in the environment clearance for the existing operations of the project by the Regional Office of Ministry of Environment, Forest and Climate Change, as may be applicable.	It is newly proposed sand quarry
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	All details of lease area and required Maps are included in Draft Report, Fig No: 1.1, 1.2, 1.3, 2.2, 2.8, 2.16, 2.17, 2.18-2.19. and Refer pages 4, 5, 6, 13,

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	sections and (iii) sections of the mine pit and external dumps, if any, clearly showing the land features of the adjoining area.	21, 35, 36, 39-40 respectively.
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Compliance of Specific Condition given in the ToR

S.No	ToR	Compliance
1.	<p>The details of the location to cover land use and ecologically sensitive areas</p> <p>a. Details of open wells, bore wells, and other surface water bodies including the details of ground water levels, Quantity in the 500m radius from the boundary of the Mine lease Area.</p> <p>b. Impacts of this mining activity in the above said water bodies in the 500m radius from the boundary of the Mine lease Area.</p> <p>c. Thickness of Sand and its variation covering the entire area; similarly width of the sand bed, quantification of the shoal formation in that area</p> <p>d. Agricultural land if any, surrounding the quarry site.</p> <p>e. Details of the longitudinal and cross section of the river bed in the proposed mining area.</p> <p>f. Detail of earlier of mining carried out in the 500m radius of the mine</p>	<p>Details of ground water tables are in given Chapter 3. Refer Page No.65-72</p> <p>Details of ground water tables are in given Chapter 3. Refer Page No.65-72</p> <p>Thickness of sand and width of the sand bed are given in chapter 2.</p> <p>There is no agricultural land within lease area.</p> <p>Details given in chapter -2, Fig 2.3-2.5 page no. 14-16</p> <p>This is a fresh Quarry.</p>

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	lease area including the location, quantity of sand mined out, depth of the mining, etc., shall be furnished.	
2.	Reclamation of the sand area site mining needs to be submitted.	Reclamation of the sand area is given in Draft Report in Chapter 2
3.	Adequate plan for traffic management AS PER the Guidelines for Sustainable Sand Mining issued in 2016 by the MoEF & CC, GOI, New Delhi for the loaded vehicles passing through nearby habitation.	The transporting of sand will be taking place in existing road in Chapter 4 page no. 161. Refer Fig 2.9 in Page No.22 Chapter 2.
4.	The PWD has to furnish the details regarding agricultural activities that are taking place around the project area.	No Agricultural activities are taking place within the lease area. The agricultural activities around the lease area are given in fig No 4.4 in Chapter 4. Refer Page no 160-161
5.	Details of the structures available within 1km from the mine lease area boundary (both upstream and downstream and also Study the Impact of sand mining on the structures located in the said area.	The Details will be furnished in Final EIA report
6.	The route map for the Lorries for accessing the project area and for transporting mined sand should be specified.	The route map for the Lorries for accessing the project area is given in Chapter 4 page no. 161. Refer Fig 2.9 in Page No.22 Chapter 2.
7.	Suitable working methodology to prevent dust pollution needs to be prepared taking wind direction into consideration.	The Suitable control measures has been given in Chapter -4, Page no. 139
8.	The mining area must be demarcated leaving at least 50m from the river embankment on either side,	Yes, The mining area is 50m away from the river embankment on either side
9.	Wherever irrigation channels take off from the River within the boundary of the mining project, the mining	The mining activity will be taking during summer season and away from the flow of water.

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	operation should not affect the flow of water in the irrigation channels. In such a way a plan of action should be submitted.	
10.	EMP should contain break up details such as tools, labor and environmental monitoring cost, cost for the ground water monitoring in the surrounding area shall be part of the EMP cost, Variation of depth of ground water and quality shall be monitored during the project period by conducting survey once in 3 months. This cost shall also be included in EMP.	The EMP is given in Chapter 10 with cost for all monitoring like water quality, air etc. Refer Page No. 182. The budget for post monitoring will be included in final EIA report
11.	Since there are many proposals for sand mining under the River Coleroon. It is necessary to model the overall impact on sand mining on regional ground water.	Details of impact and mitigation in ground water is given in Chapter 4
12.	<p>The proposal for CER shall be furnished with time frame as per office memorandum of MoEF & CC dated 01.05 2018</p> <p>In addition to following details to be furnished</p> <p>i) Quantity estimated to be mined through machineries with extent</p> <p>ii) Certificate from the VAO stating the details of habitation located within 300 m radius from the boundary of the proposed site along</p>	<p>The CER cost and activity for the proposed sand quarry is given in Chapter 8 Refer Page No. 180</p> <p>Quantity to be excavated is given in Chapter 2.</p> <p>The habitation located within 300m radius attested by VAO is given in Draft EIA report</p>

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	<p>with FMB sketch.</p> <p>iii) The project proponent has to furnish the affidavit stating that there are no bridges, culverts, cross masonaries, water head works within 500m of the proposed quarry</p> <p>iv)The RL upstream, RL downstream, RL starting, RL Ending, Chainage Starting, Ending KM details shall be furnished</p> <p>v)Geological sections map should be furnished</p> <p>vi) 500m, 1km, &5km radius of clear google images showing all the features like agricultural activities, habitations etc</p>	<p>Affidavit will be submitted in Final EIA reprt</p> <p>RL of upstream and downstream, Starting and Ending KM is given Chapter 2.</p> <p>500m, radius of clear google images showing all the features like agricultural activities, habitations is given in Chapter 1. Refer Page No1.3 in Page No.6</p>
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Additional ToR

S.No	ToR	Compliance
1.	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 Environmental Management Plan.	Agreed
2.	The Project Proponent shall study and report in detail the following as provided in Sustainable Sand Mining Management Guidelines, 2016 and Enforcement and Monitoring Guidelines for sand mining, MoEF & CC 2020.	Agreed
3.	Furnish the Details with route map and the transportation route.	Transportation map given in Chapter -2 (fig No. 2.9, pg.no.22)
4.	The details of maximum production from the mines.	Production details given in Chapter -2, Pg. no 38
5.	Demarcation of mining area with pillars and geo-referencing shall be made by furnishing photographs taken on site prior to the start of mining.	Photographs will be furnished in Final EIA report
6.	The Environmental Impact Assessment shall study in detail the carbon emission and also suggest the measures to mitigate carbon emission including development of carbon sinks and temperature	carbon emission details has been given in Chapter – 4, in Clause 4.2, pg. No. 140

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	reduction including control of other emission and climate mitigation activities.	
7.	The Environmental Impact Assessment should study the biodiversity, the natural ecosystem, the soil micro flora, fauna and soil seed banks and suggest measures to maintain the natural Ecosystem.	The Environmental Impact Assessment should study the biodiversity, the natural ecosystem, the soil micro flora, fauna has been given in Chapter – 4, in Clause 4.8, pg. No. 151
8.	Action should specifically suggest for sustainable management of the area and restoration of ecosystem for flow of goods and services.	sustainable management of the area and restoration of ecosystem is given in Chapter - 4
9.	The project proponent shall study impact on indigenous flora and fauna.	Detail study on Flora and fauna is given in Chapter -3 (page No.80-90)
10.	The project proponent shall study impact on fish habitats and the web food was/ food chain in the water body and Reservoir.	Fish habitats and the web food was/ food chain in the water body and Reservoir is given in Chapter – 4, Table 4.18, page no 156

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CHAPTER – 1: INTRODUCTION

1.1 PURPOSE OF THE REPORT

The Executive Engineer, Water Resources Department, Mining and Monitoring Division, Chennai, Tamil Nadu, has applied for grant of sand Quarrying in Palar River over an extent of 11.70.0 Hectares in S.F. No.1 (P) & 213 (P) in Kuthambakkam and Ananganallore Village, Gudiyatham Taluk, Vellore District, Tamil Nadu.

The District Collector, Vellore has directed the applicant vide his precise area communication letter **Rc.No.37/Mines/2021; dated 12.01.2022** to get approved Mining plan and Environmental Clearance from the state Environmental Impact Assessment Authority (SEIAA) for grant of Sand Quarry in Palar River over on extent of S.F. No.1 (P) & 213 (P), Kuthambakkam and Ananganallore Village, Gudiyatham Taluk, Vellore District, Tamil Nadu for a period of **One Year**.

Accordingly, Mining Plan is prepared by Thiru. S.Suriyakumar, Qualified Person under the provisions of Rule 41 of TNMMCR, 1959 with due consideration of environmental parameters so as to obtain Environmental clearance (EC) from Environment Impact Assessment Authority (SEIAA) as per EIA Notification, 2006 and approved by Assistant Director of Dept of Geology and Mining, Vellore vide letter **Rc.No.37/Mines/2021; dated 23.05.2022**.

As per the Environmental Impact Assessment (EIA) Notification dated 14th September 2006 and its amendments, the project falls under 1(a) Mining of minerals, Category – B1 in view of lease area >5 and <100 Ha. Hence, it is necessary to obtain Terms of Reference from State Environmental Impact Assessment Authority (SEIAA) to carry out EIA studies for the proposed project.

Therefore, the applicant, The Executive Engineer applied for ToR through Parivesh website vide online proposal no. SIA/TN/MIN/78182/2022 Dated 11.06.2022. The ToR proposal was placed in 293th SEAC meeting, dt 08.07.2022 and 538th SEIAA meeting, dated 08.07.2022. Then ToR has been issued by the SEIAA vide Lr.No.SEIAA-TN/F.No.9340/SEAC/TOR-1219/2022 dated 02.08.2022. The draft EIA report has been prepared based on the recommended Standard ToR and Specific ToR.

1.2. IDENTIFICATION OF PROJECT AND PROJECT PROPONENT

1.2.1. IDENTIFICATION OF PROJECT

The applicant, The Executive Engineer, WRD proposed to start new sand quarry located in S.F. No.1 (P) & 213 (P) over an Extent of 11.70.0 Ha in Kuthambakkam and

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Ananganallore Village, Gudiyatham Taluk, Vellore District, Tamil Nadu. The District Collector, Vellore has directed the applicant, The Executive Engineer through his precise area communication letter Rc.No.37/Mines/2021; dated 12.01.2022 to get AMP and obtain EC form SEIAA as per the EIA Notification, 2006.

1.2.2. IDENTIFICATION OF PROJECT PROPONENT

Table. 1.1 Identification of Project	
Particulars	Details
Applicant	The Executive Engineer
Lease Area	11.70.0 Hectares (Government land – River body)
Site Location	Kuthambakkam and Ananganallore Village, Gudiyatham Taluk, Vellore District, Tamil Nadu
Precise Area Communication	Rc.No.37/Mines/2021; dated 12.01.2022
Period of Lease	One year
Mining Plan Approval Details	Mining plan approved by AD, Dept of Geology and Mining, Vellore Vide Rc.No.37/Mines/2021; dated 23.05.2022.
Table. 1.2 Identification of Project Proponent	
Address of the Project Proponent	THE EXECUTIVE ENGINEER, Water Resources Department, Mining and Monitoring Division, Chennai, Tamil Nadu.
Status	Tamil Nadu State Government

Table No: 1.3 Land Particulars

District & State	Taluk	Village	S.F.No	Area (Ha)
Vellore & Tamil Nadu	Gudiyatham	Kuthambakkam and Ananganallore	1 (P) & 213 (P)	11.70.0Ha

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1.3. BRIEF DESCRIPTION OF THE PROJECT

1.3.1. Nature and Size of the Project

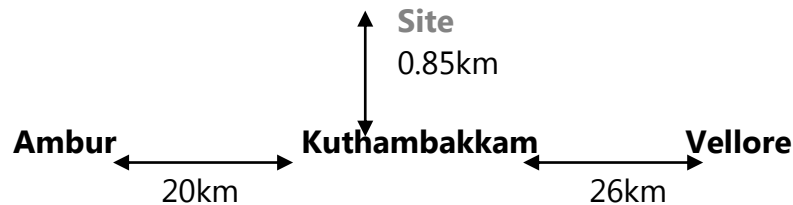
Opencast manual method of quarrying is proposed. The sand shall be excavated to a depth of 1.0m below theoretical bed level. All shall be loaded directly into the Tippers from site to PWD stock yard.

Drone and Photogrammetry were used for aerial surveying and analysis of resources. Geological resources of sand in the proposed lease area are estimated as 351618m³ up to the depth of 3m below theoretical bed level and mineable reserves is estimated as 117618m³ of sand up to the depth 1m below theoretical bed level. Production schedule is proposed as 117618m³ of sand @100% for one year. The above said reserves and productions are as per Approved mining plan.

1.3.2. LOCATION OF THE PROJECT

The area is easily accessible from Vellore. By travelling from Vellore to Ambur via NH 48 accessible, the Kuthambakkam village is reached at the distance of 26km. From the kuthambakkam village, the project site can be reached at the distance of 850m in the north direction.

Route:



The area is represented by Geological Survey of India Toposheet No.57L/13. It is given fig no 1.2. The location map is given in fig no 1.1. The area lies in the northern Latitude of N12°53'25.36" to N12°53'34.90" and eastern longitude of Longitude of E78°52'22.78" to E78°52'52.13".

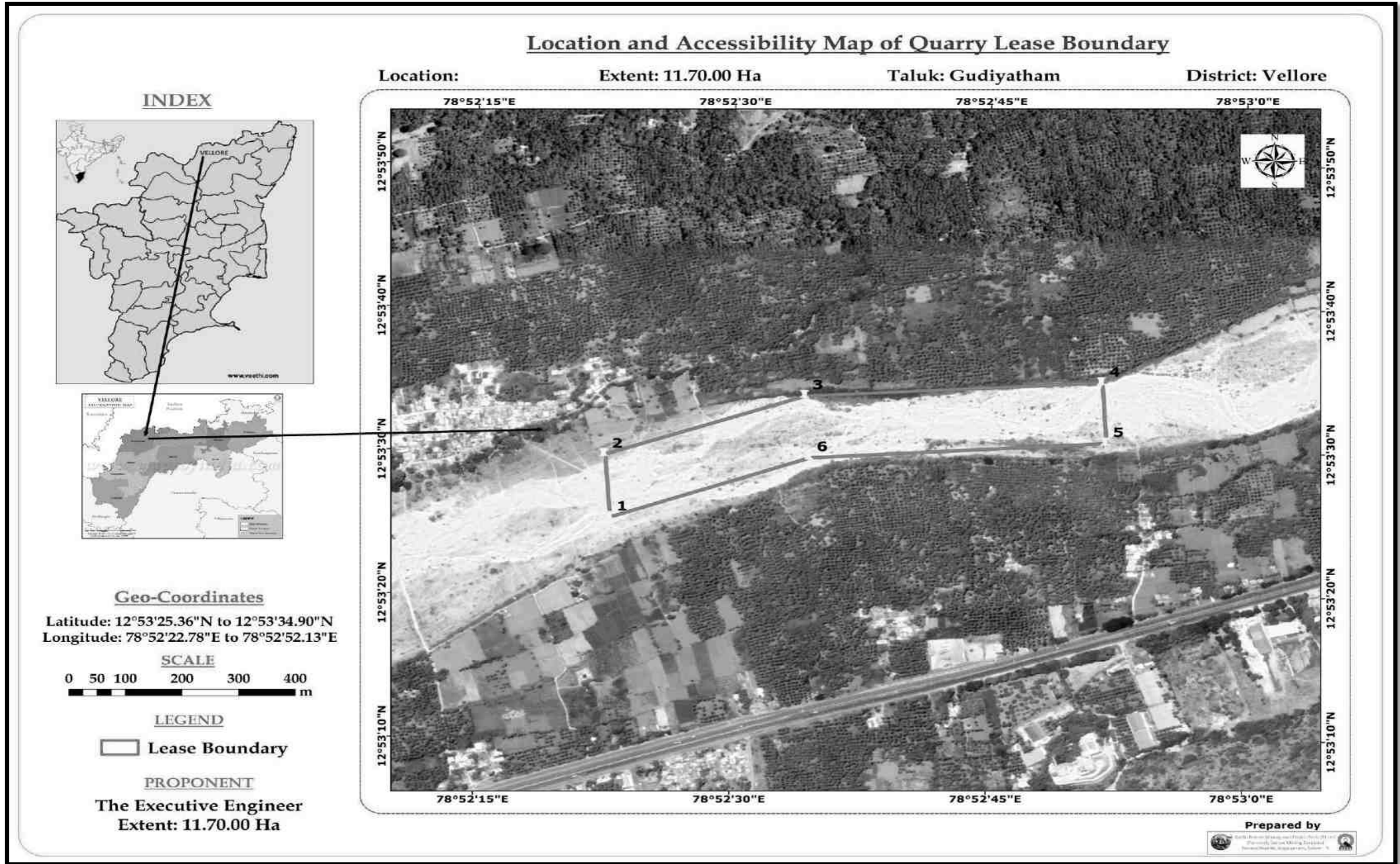
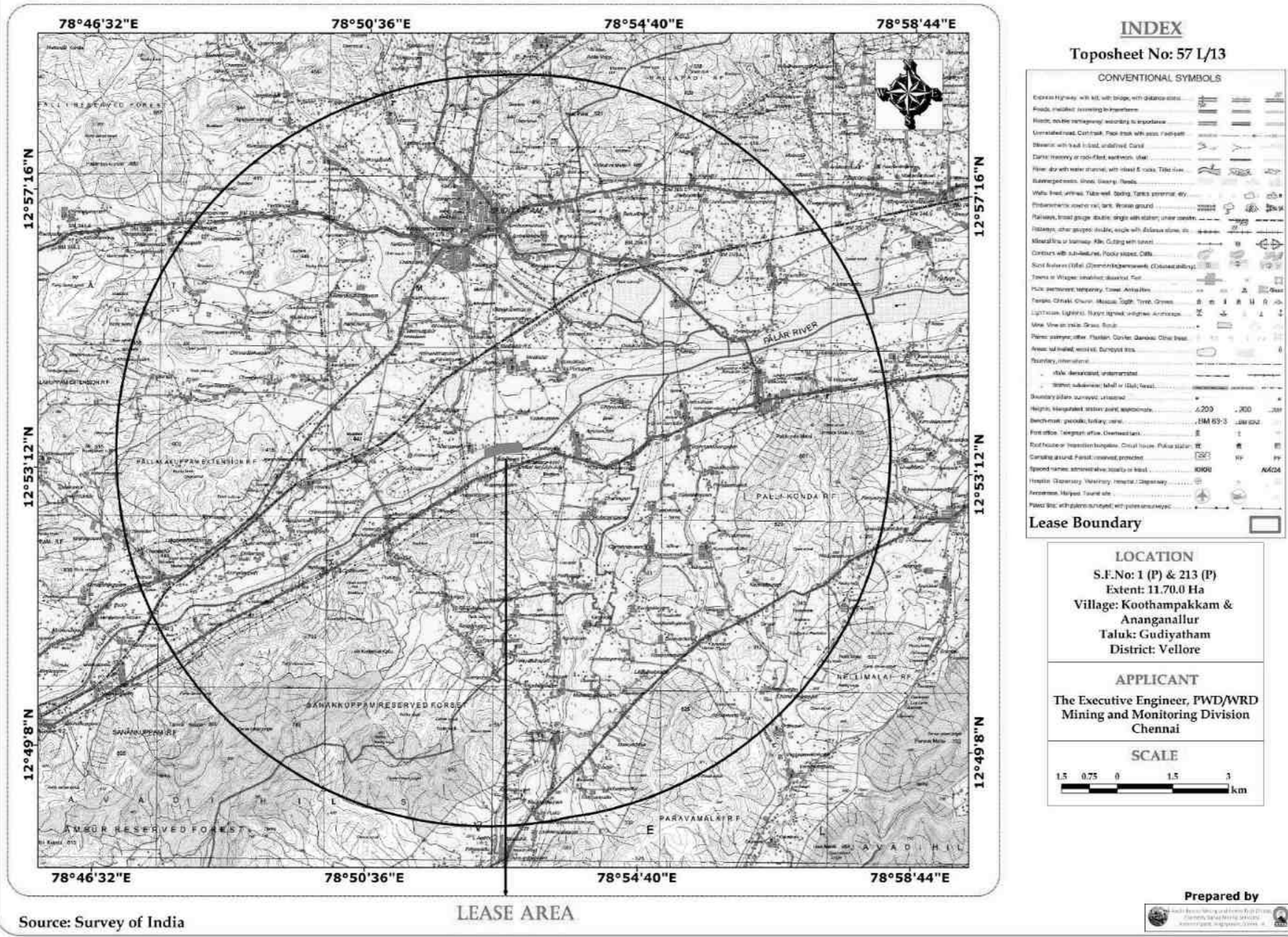


Fig.No.1.1: Showing Location and route map of Proposed quarry lease area

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Toposheet Showing location of Quarry Lease Boundary around 10km Radius

PLATE NO: I



INDEX
Toposheet No: 57 I/13

CONVENTIONAL SYMBOLS

Express Highway with KIL with bridge with distance scale	
Roads, including according to Proportions	
Unmetalled road, Cart track, Foot track with cross, path etc.	
Stream with head, island, undivided Canal	
Dam, Heavy or rock-filled, earthwork, steel	
River, dry with water channel, with island & rocks, Tidal flow	
Water courses, canal, weirs, fields	
Wells, hand, tube well, Boring, Tanks, perennial, dry	
Embankments, levees, rail, bank, Broken ground	
Railways, broad gauge, double, single with station, inner station	
Restroom, other gauges, double, single with station, inner station	
Miscellaneous or boundary, KIL, Cutting with signal	
Contours with sub-features, Rocky slopes, Cliffs	
Spot heights (feet), (meters) (kilometers) (Celsius) (Celsius)	
Towns or Village, unincorporated, Municipal, Town	
Place, permanent, temporary, Town, Amal, Hill	
Temples, Church, Mosque, Ghat, Tank, Shrine	
Lighthouses, Lighted, Buoy, Lighted, unlighted, Amalgam	
Mine, Mine in situ, Grass, Sand	
Power, atomic, other, Flaming, Curlew, Damodar, Other, Power	
Areas of interest, reserved, Dotted, etc.	
Boundary, international	
State, demarcated, undemarcated	
Station, sub-station, (Mile or Kil) (feet)	
Boundary, village, surveyed, un-surveyed	
Height, Mean Sea Level, station, point, approximate	
Bench mark, geodetic, leveling, aneroid	
Fortification, Telegraph office, Disturbance, etc.	
Rail, Road, or Inland, boundary, Canal, House, Police station	
Canals, ground, Forest, reserved, protected	
Speed, names, administrative, locally or local	
Health, Dispensary, Veterinary, Hospital, Dispensary	
Residence, Village, Town, etc.	
Power, line, with poles, surveyed, with poles, unsurveyed	

Lease Boundary

LOCATION
S.F.No: 1 (P) & 213 (P)
Extent: 11.70.0 Ha
Village: Koothampakkam &
Ananganallur
Taluk: Gudiyatham
District: Vellore

APPLICANT
The Executive Engineer, PWD/WRD
Mining and Monitoring Division
Chennai

SCALE

Prepared by

Source: Survey of India

LEASE AREA

Fig.No.1.2: Toposheet showing Location of the Mines

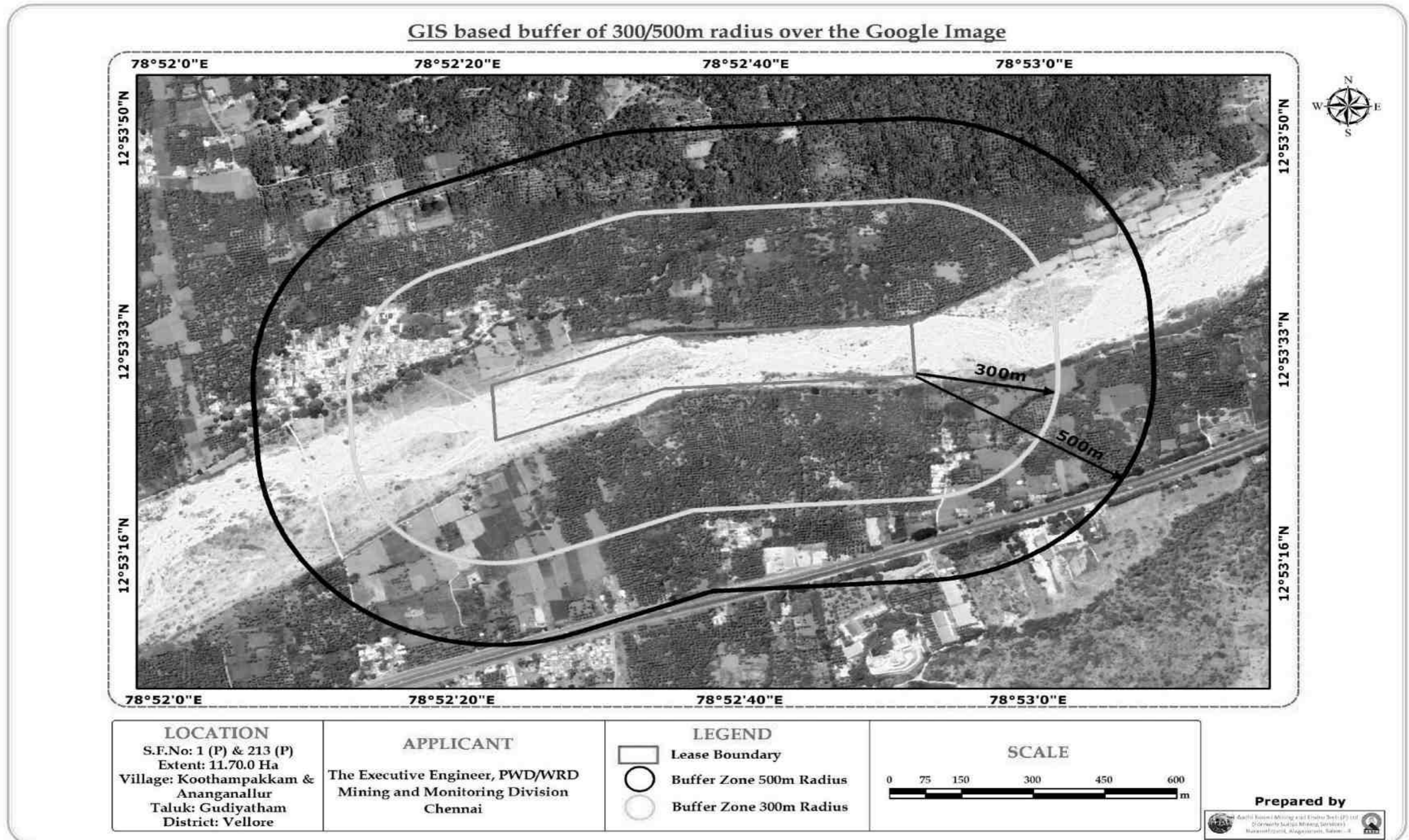


Fig.No.1.3: Google Earth Image showing 300m and 500m radius around lease area

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1.4. SCOPE OF THE PROJECT

The proposal for Environment Clearance of Sand quarry lease of **The Executive Engineer**, requires Environmental Impact Assessment (EIA) study to be carried out as per Standard, Specific and additional TOR specified by the SEAC/SEIAA. Based on the documents furnished for TOR, the Committee observed that the project falls under the category B1 and schedule 1(a) of the EIA Notification, 2006 as the lease area is greater than 5 Ha and less than 250 Ha. This is primarily to ascertain the potential impacts of the mining activity on environmental components, prediction and evaluation of environmental impacts to delineate Environment Management Plan.

The EIA/EMP report also includes an independent chapter prepared by an Accredited Consultant. The collection and analysis of air, water and soil sample required for preparation of EIA report data will be done by an Environmental Laboratory duly notified under the Environment (Protection) Act, 1986, accredited by NABET/NABL.

The scope of the study includes a detailed characterization of the environment in an area of 10km radius from the mine lease Area. The EIA covers one season baseline environmental data, as per the standard generic model given by the MoEFCC, New Delhi.

In order to assess the likely impacts arising out of this project on the surrounding environment and evaluating the quantum of likely negative impacts, if any, from this mine, the proponent has selected Aadhi Boomi Mining and Enviro Tech Pvt. Ltd., Salem as their EIA consultant for this project. ABM prepared an Environmental Impact Assessment (EIA) report and made an effective Environment management Plan (EMP) for various environmental components likely to be affected.

The scope covers all the conditions along with the specific and additional TOR prescribed by SEAC/SEIAA, Tamil Nadu vide Lr.No.SEIAA-TN/F.No.9340/SEAC/TOR-1219/2022 dated 02.08.2022.

1.5 METHODOLOGY OF EIA STUDY

The EIA study includes detailed baseline data generation and characterization of existing status of environment in an area of 10km radius with the project as its Centre for various environmental components viz. air, noise, water, land, geo-

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hydrology, Noise & Vibration, biological and socio-economic components and other parameters of interest. The envisaged scope of EIA is as follows:

- To assess the present status of air, biota, water, land, biological and socio-economic components of environment within 10km radius of study area from the project site.
- To identify and quantify the significant positive and negative impacts due to various mining operation in various components of the environment through identification and prediction of impacts
- To identify the impact and description of the impact with quantitative and qualitative data
- To prepare a detailed Environment Management Plan for implementation of mitigate measures
- To suggest a monitoring program to evaluate the effectiveness of mitigate measures
- Post-project environmental quality monitoring program to be followed

The baseline monitoring study has been carried out during the March to May 2022 for various environmental components so as to assess the anticipated impact on the environment and suggest suitable mitigation measures for likely adverse impacts due to the project. Environmental attributes, source and frequency of monitoring are outlined in Table No 1.4.

Table: 1.4 Environment Attributes

S. No	Attributes	Parameters	Source and Frequency
1	Meteorology	Temperature, Wind Speed, Wind Direction, Rain fall, Relative Humidity,	Secondary sources of IMD station, Virinjipuram kvk, Vellore. Hourly recorded data for the period of 3months.
2	Ambient Air Quality	PM ₁₀ , PM _{2.5} , SO ₂ , NO _x	8 hour samples twice in a week for three months at 5 locations.
3	Water Quality	Physical, Chemical and Biological parameters	Grab sampling at 3 locations once during study period.
4	Noise levels	Noise levels in dB(A)	At 5 locations data monitored once in a Month for three months for 24 hours during EIA study.

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5	Soil Characteristics	Physical and Chemical parameters	Once at 3 locations during study period
6	Hydrogeology	Drainage area and pattern, nature of streams, aquifer characteristics, recharge and discharge areas	Based on data collected through field investigation devices once in a study.
7	Land use	Existing land use for different categories	Based on Survey of India Toposheet and Google Earth imagery
8	Ecology and Biodiversity	Existing terrestrial flora and fauna within 10Km radius	Field observation and utilization of Secondary data.
9	Socio–Economic aspects	Socio–economic and demographic characteristics, worker characteristics	Based on collection of primary data through questionnaire analyses and utilization of Secondary data from census records (2001 –2011), statistical hand books, topo sheets, health records and relevant official records.
10	Risk assessment and Disaster Management Plan	Identify areas where disaster can occur by fires and explosions and release of toxic substances if any	Based on the findings of risk associated with explosives, landslides, slips and fire/explosion during blasting etc.,

The impacts of the project activities on environmental components can be quantified through EIA Studies within the impact zone of the project activities. The results of EIA Studies form the basis for the preparation of a viable EMP for mitigation of the adverse impacts.

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CHAPTER – 2: PROJECT DESCRIPTION

2.1. NEED FOR THE PROJECT

The applicant, **The Executive Engineer**, Water Resources Department, Mining and Monitoring Division, Chennai, Tamil Nadu has applied for quarry lease sand quarry in a Government land (Rive body) over an area of 11.70.0 hectares, located in S.F. No.1 (P) & 213 (P) in Kuthambakkam and Ananganallore Village, Gudiyatham Taluk, Vellore District, Tamil Nadu

The mining plan was approved by Assistant Director, Department of Geology and Mining, Vellore vide letter Rc.No.37/Mines/2021; dated 23.05.2022. The proposed rate of production of Rough Stone is about 117618m³ up to the depth of 1m below TBD.

River Sand is one of the important raw materials for the building construction. The fine aggregate are essential for preparing concrete which is used in foundation, beam, column, roof slab work of the buildings. The infrastructure is the sign of development of nation. So it is very need to excavate the sand for economic and infrastructure development of our Nation.

2.2 DEMAND – SUPPLY GAP

The fine aggregate are the basic raw material for the building construction and the road formation. It takes place in all villages, towns, cities and metropolitan cities. There is great demand in availability of river sand. So it is necessary to fulfill the demand by starting the proposed sand quarry.

2.3 LOCATION

The area is represented by Geological Survey of India Toposheet No.57L/13. The lease boundary with Geo Co-ordinates is shown in Fig no 2.1. The area lies in the northern latitude of N12°53'25.36" to N12°53'34.90" and eastern longitude of E78°52'22.78" to E78°52'52.13". Latitude and Longitude of all boundary Pillars are given below table 2.1.

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Table No-2.1 Co-ordinates of Quarry lease Boundary Pillars

P.No	Latitude	Longitude
1	12°53'25.36"N	78°52'23.12"E
2	12°53'29.72"N	78°52'22.78"E
3	12°53'33.88"N	78°52'34.49"E
4	12°53'34.90"N	78°52'51.86"E
5	12°53'30.70"N	78°52'52.13"E
6	12°53'29.59"N	78°52'34.79"E

- No Trees will be uprooted due to this quarrying operation.
- The existing road from the main road to quarry is in good condition and the same will be maintained and utilized for Transportation of sand.
- There will be no Export of this quarrying sand

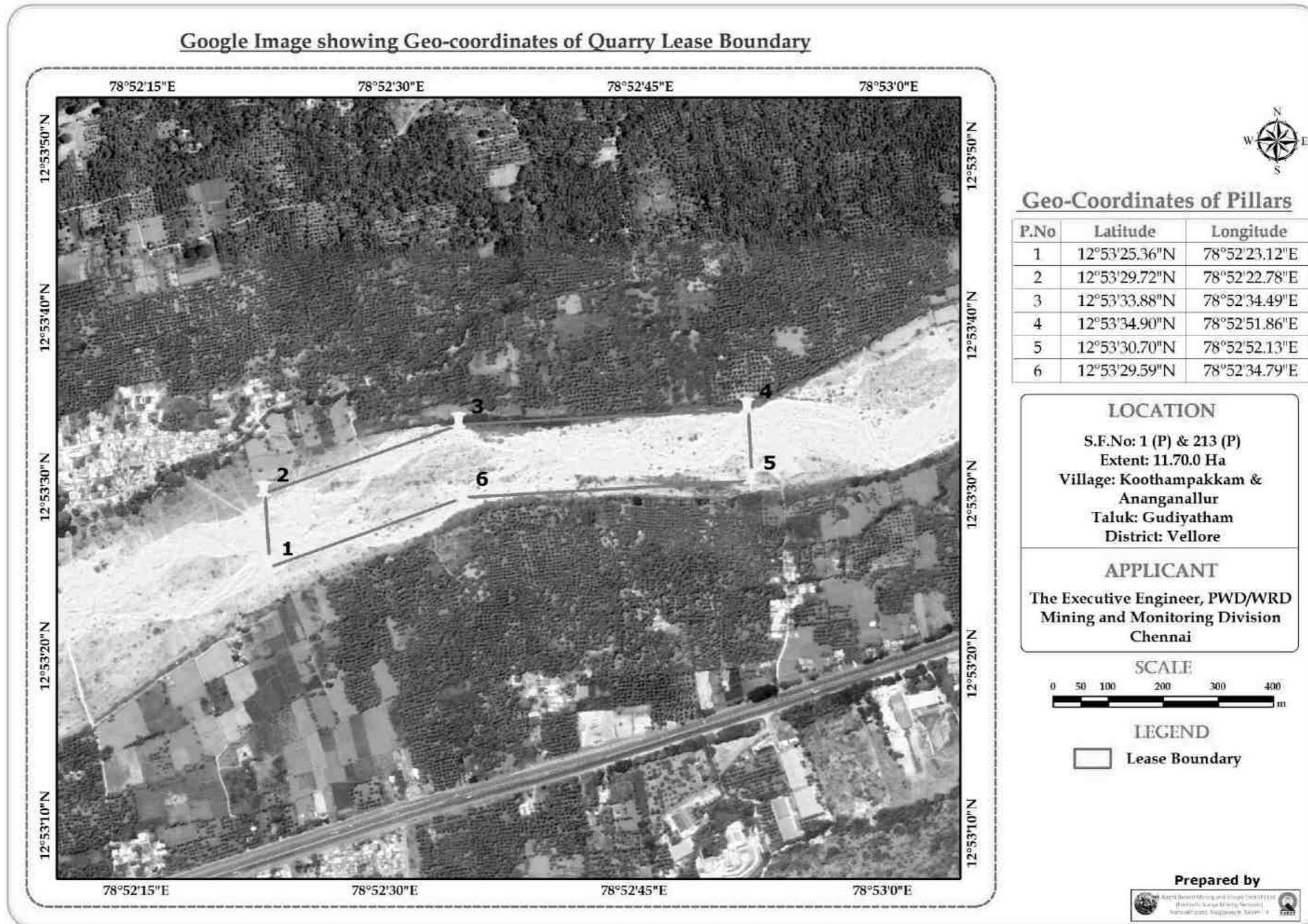


Fig.No.2.1: Google image showing lease boundary and Coordinates of the Quarry

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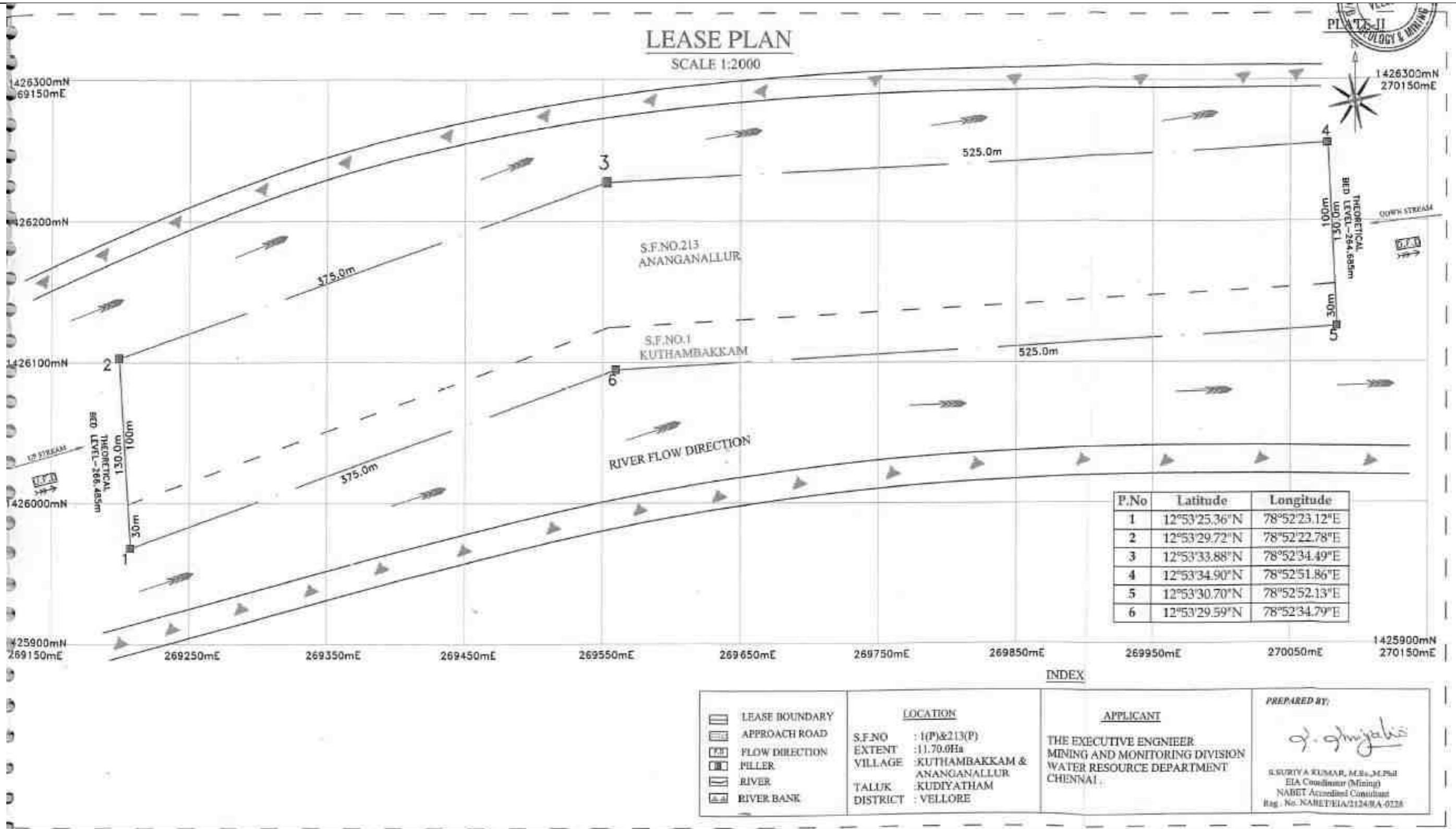


Fig.No.2.2: Lease Plan

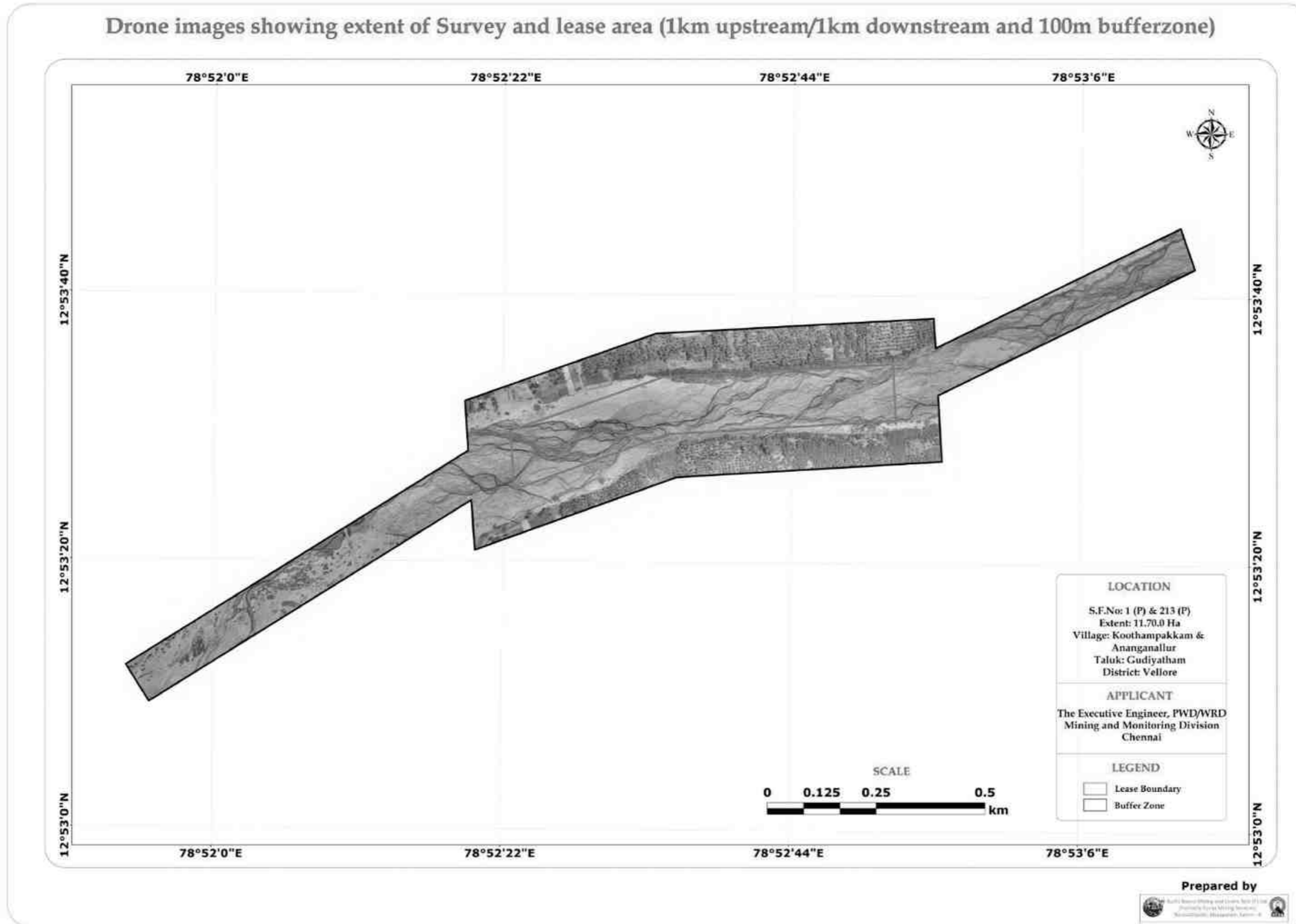


Fig.No.2.3: Drone image showing extent of survey and lease area

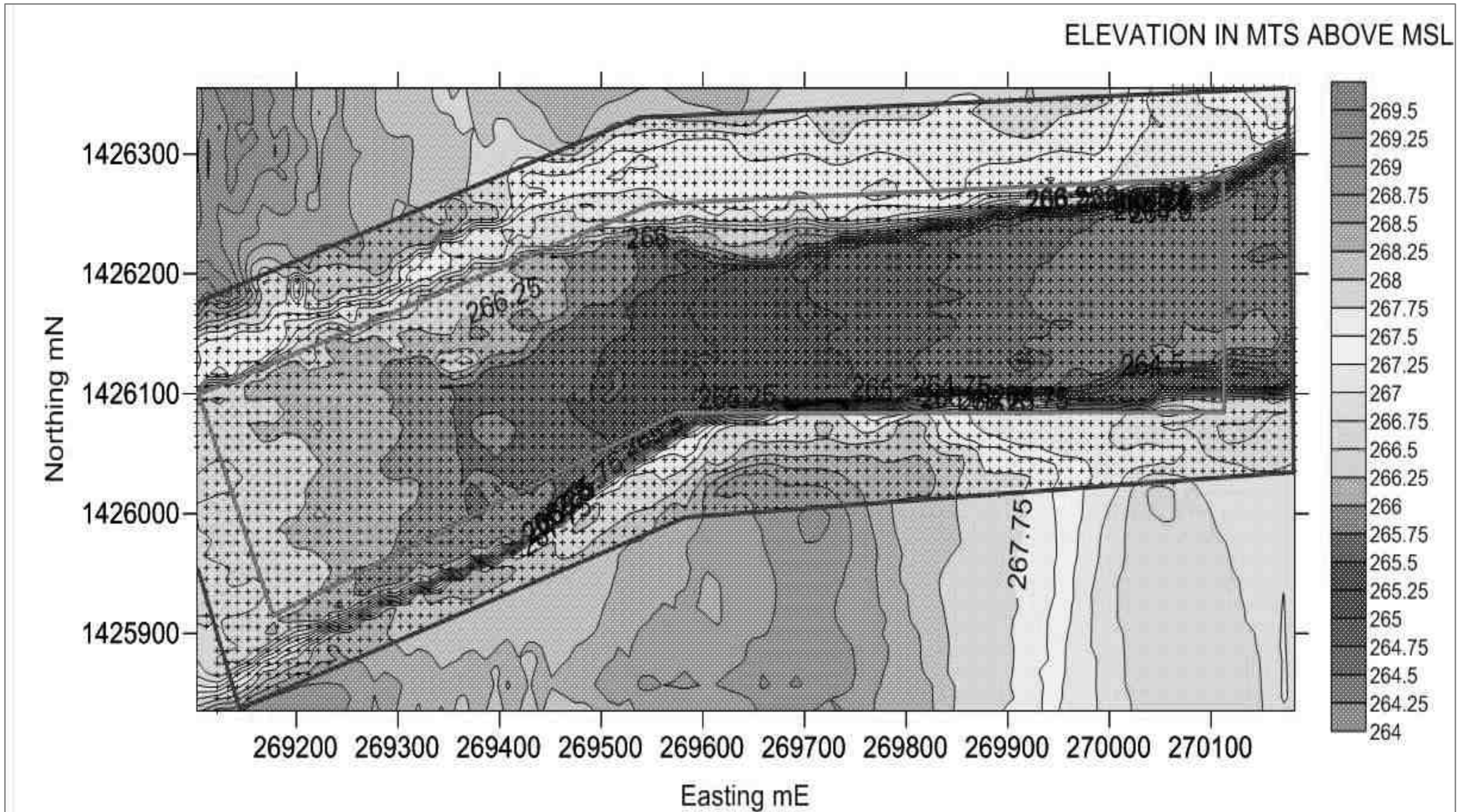


Fig.No.2.4 - 2D Map with contours of 0.25m

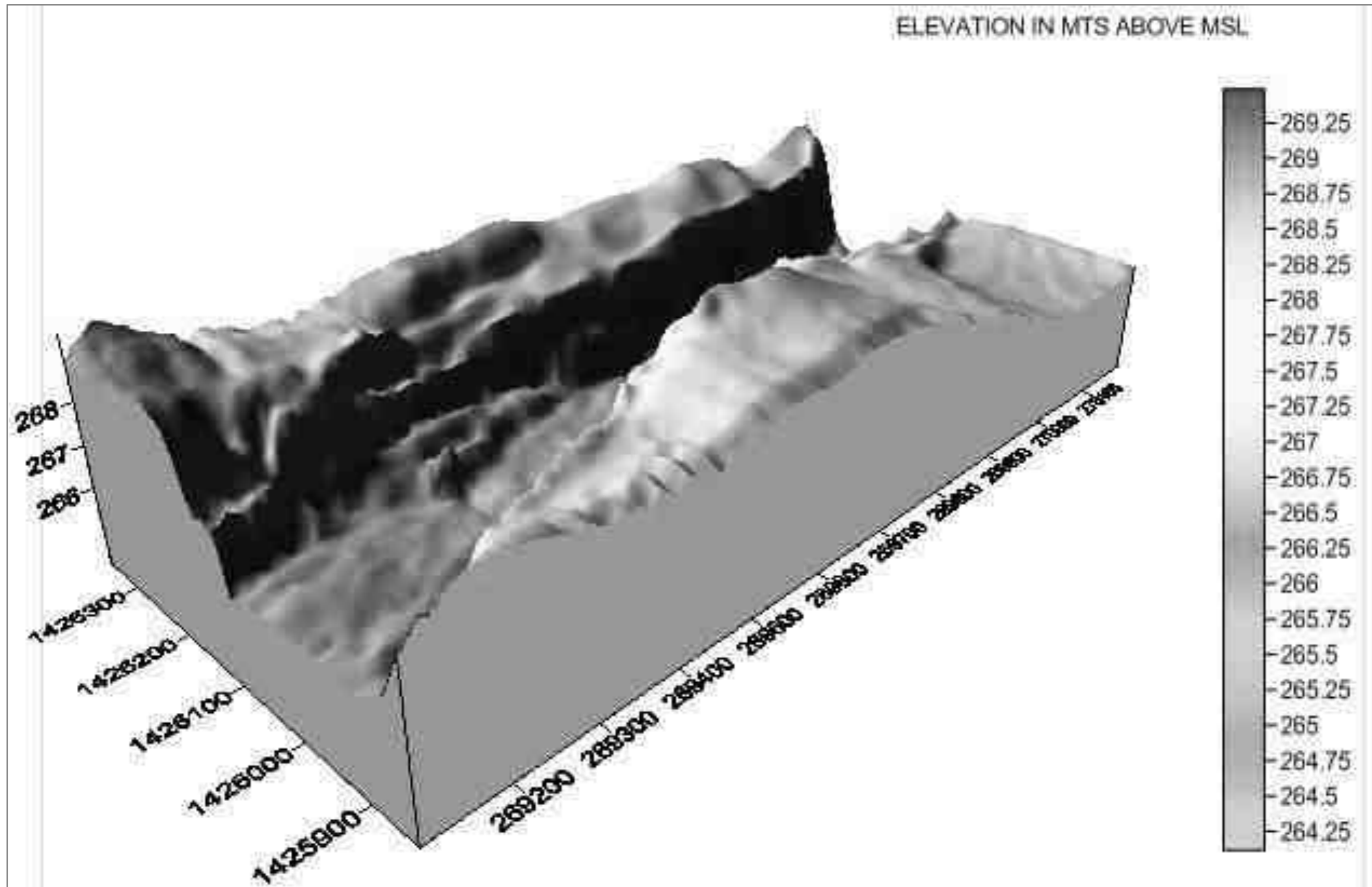


Fig.No.2.5 3D Block Diagram of Lease Area and 100m Buffer showing elevation difference Showing shoal and sand.

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Fig. No. 2.6 Photograph shows general view of project site



Fig. No 2.7 Photo showing DGPS survey to fix boundary pillars and GCP and Drone used for Aerial Surveying

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Table 2.2.: Environmental Settings

Project Details				
Proponent	The Executive Engineer , Water Resources Department, Mining and Monitoring Division, Chennai			
Total Mine Lease Area	11.70.0 Ha - sand quarry			
Survey No.	1 (P) & 213 (P)			
Site Location	Kuthambakkam and Ananganallore Village, Gudiyatham Taluk, Vellore District, Tamil Nadu			
Geographical Co-ordinates	Latitude: N12°53'25.36" to N12°53'34.90" Longitude: E78°52'22.78" to E78°52'52.13"			
Toposheet No.	57L/13			
Elevation	264.25m – 266.75m above MSL			
Accessibility				
Nearest Habitation	105m - N			
Nearest Village	Ananganallore – 105m - N			
Nearest Settlement	Direction	Name of Village	Distance in km	Population
	N	Ananganallore	0.105	1739
	S	Koothampakkam	0.47	2556
	E	Agaramcheri	1.5	5885
	NW	Singalpadi	2.0	2311
Nearest Town	Gudiyatham – 4.7km - N			
Nearest Roadway	NH 48 – 440m - Bangalore to Chennai - S SH 130 – 3.7km - Gudiyatham to Vaniyambadi - NW MDR 1028 – 23km – Thirumalaikodi to Sathumadurai - SE Village road – 400m - W			
Nearest Railway station	Melalathur Railway Station - 2.8 km– N			
Nearest Airport	Chennai International Airport – 139km - E			
Environmental Sensitiveness				
Interstate Boundary	Tamil Nadu – Andhra Pradesh Interstate boundary is located 15 km away from lease area in North direction.			
Coastal Zone	Bay of Bengal is located 150 km away from lease area in E direction.			
Reserve Forest	There is no Reserve forest and wild life sanctuaries found within 1km radius.			

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	<ol style="list-style-type: none"> 1. Pallalakuppam Extension Reserve Forest – 5.7km - W 2. Pallikonda Reserve Forest – 6km – SE 3. Sanankuppam Reserve Forest – 5.3km- SW 4. Paravamalai Reserve Forest – 7.3 – S 5. Kallapadi Reserve Forest – 7.7km – N 6. Raddanaickanur & Charakkal Reserve Forest -19.0km – W 7. Ambur Reserve Forest – 18km - SW 8. Gundalapalli Reserve forest is - 11.5Km- North West 9. Chenji R.F – 2 km – NE 10. Bomminayakkanpalayam R.F – 19km – NE 11. Nallimalai R.F – 10km – SE 12. Virinjipuram Plantation R.F – 14km – E 13. Appukal R.F – 14km - SE <p>The proposed project site does not attract Forest Conservation Act, 1980.</p>
Wildlife sanctuary	<p>Nil within 10km radius. The Proposed project site does not the Wildlife (Protection) Act, 1972.</p> <p>Koundinya wildlife sanctuary-21Km-North West</p>
Water bodies	<p>The project site itself located in River body (Palar River)</p> <ol style="list-style-type: none"> 1. Nellorepet lake – 5km – NW 2. Ammanankuppam lake – 4.4km – NE 3. Agaramachi lake – 1.8km – E 4. Gollamangalam lake – 2.7km – SE 5. Tippasamudram lake – 4km – SE 6. Periya lake – 5km – SE 7. Agaram River – 3.3km – SE 8. Kavundinya river- 4.0 km – N 9. Seruvangi lake – 5.0 km – N 10. A lake near Settuvandai– 6.8km – NE 11. A lake near Veppur– 5.9km – NE 12. A lake near Netteri– 6.9km – NE 13. A lake near Pasumattur– 9.4km – NE 14. Chenakkam lake – 5.0km – NE 15. Odiyathur and Rajapuram lake – 6.1km – SE 16. A lake in Pallikonda village – 5.50km – E 17. Periya Stream from Pallikonda lake – 4.9km - E

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Defense Installations	Nil within 10km radius
Critically Polluted area	Nil within 10km radius
Quarries around 500m radius	No quarries found within 500m radius of the proposed lease area. AD Cluster Letter: Rc.No.37/2021(Mines) dated 27.05.2022
Seismic zone	Zone-II, Low damage risk zone as per BMTPC, Vulnerability atlas Seismic zone of India IS: 1893-2002

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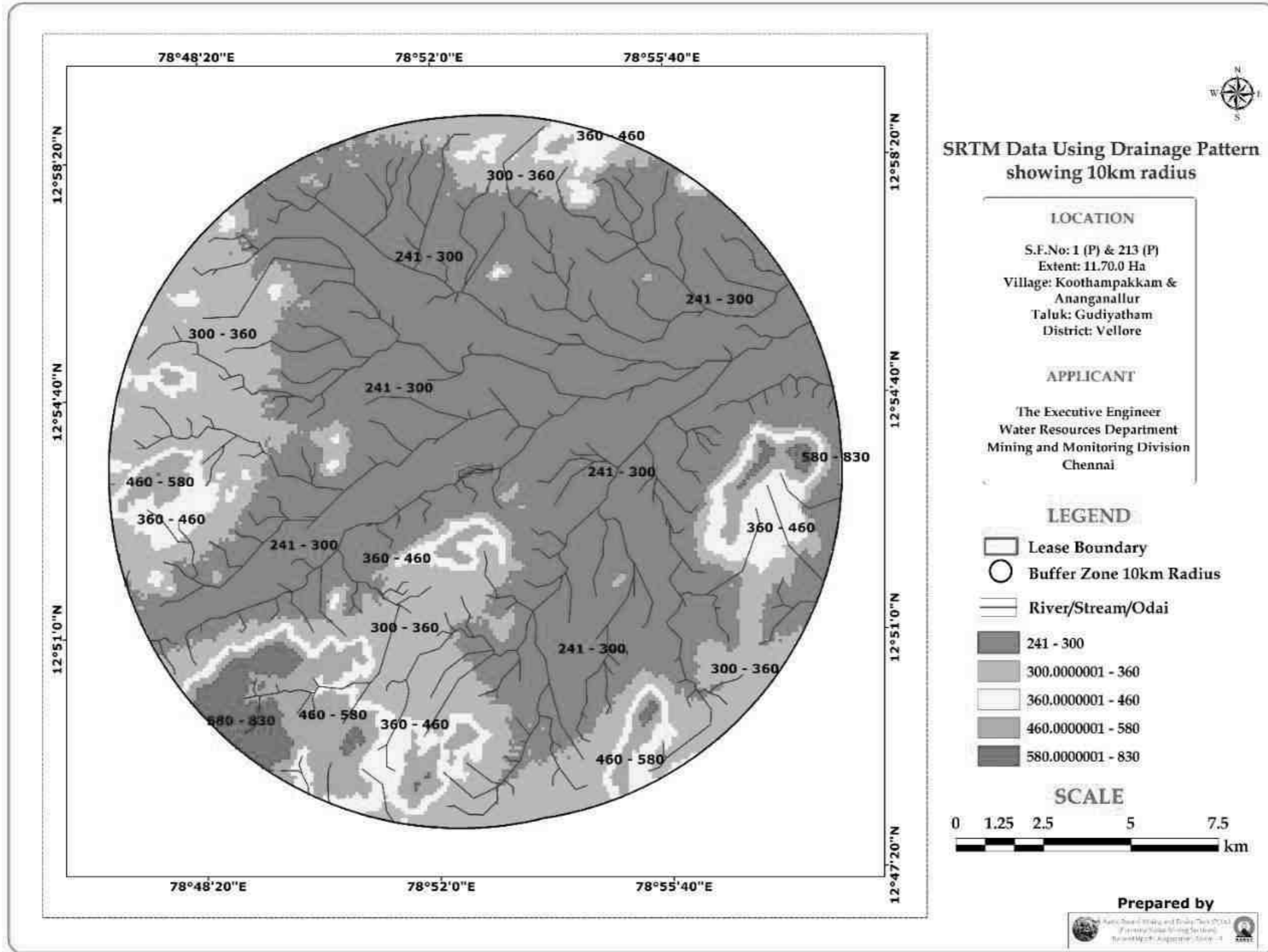


Fig No.2.8 Drainage Map of 10 km radius around Proposed Project site

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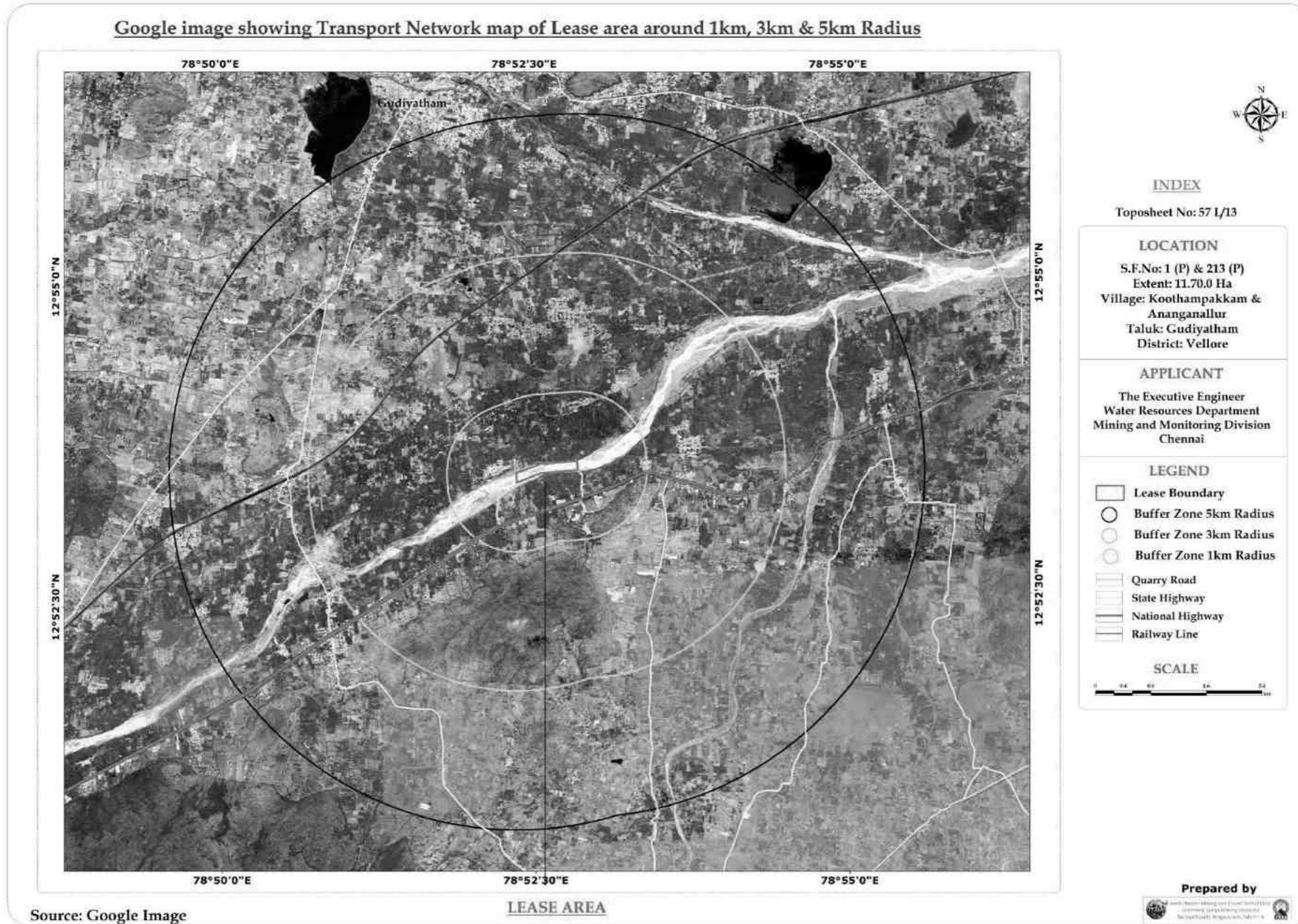


Fig.No.2.9: Google Earth Image showing Transport Network of 10 km radius around Proposed Project Site

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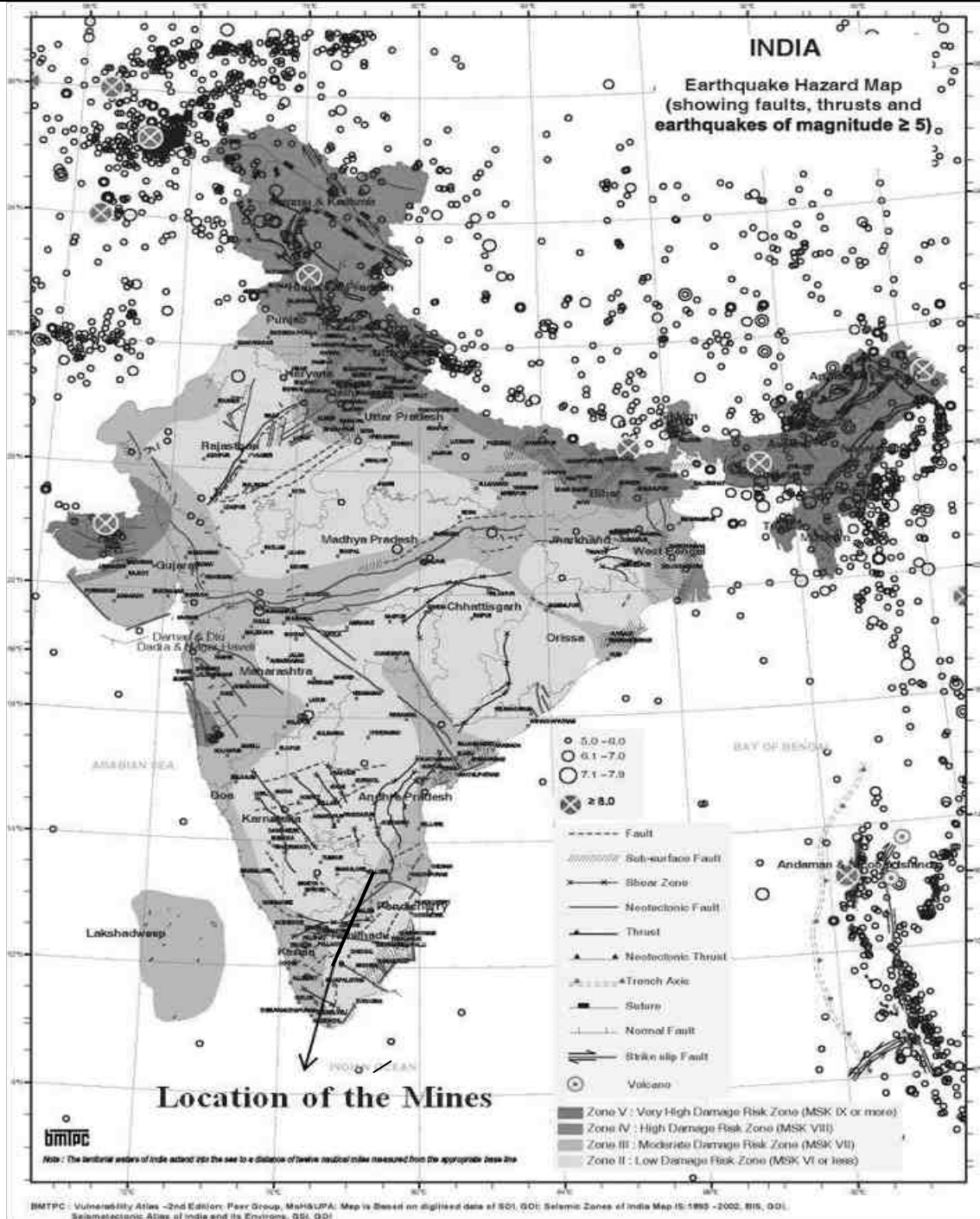


Fig No: 2.10 Earthquake Hazard Map

The area falls under Zone-III, Moderate damage risk zone as per BMTPC, Vulnerability atlas Seismic zone of India IS: 1893-2002.

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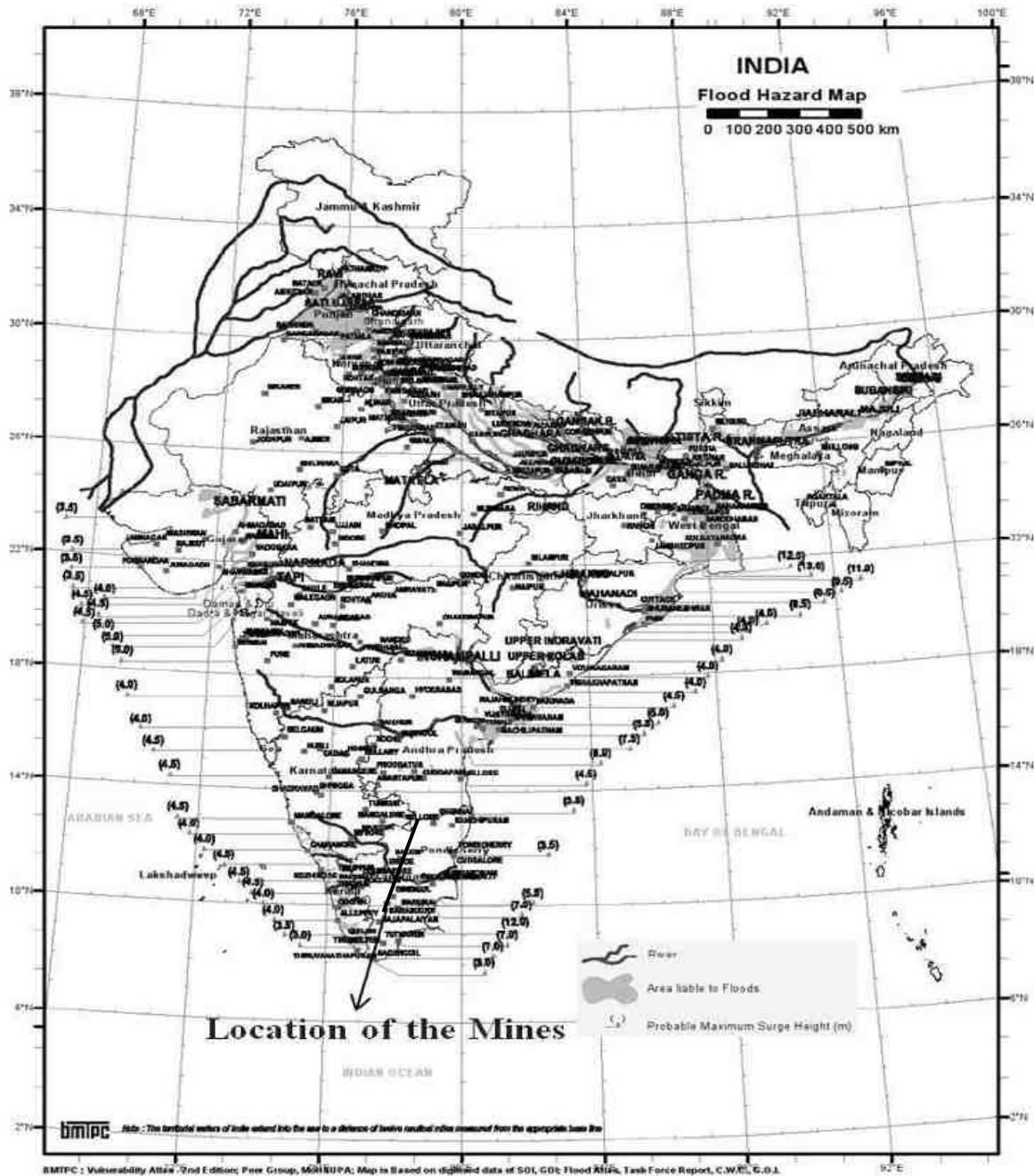


Fig No: 2.11 Flood Hazard Map

The area falls under Probable Maximum Surge Height of 5m.

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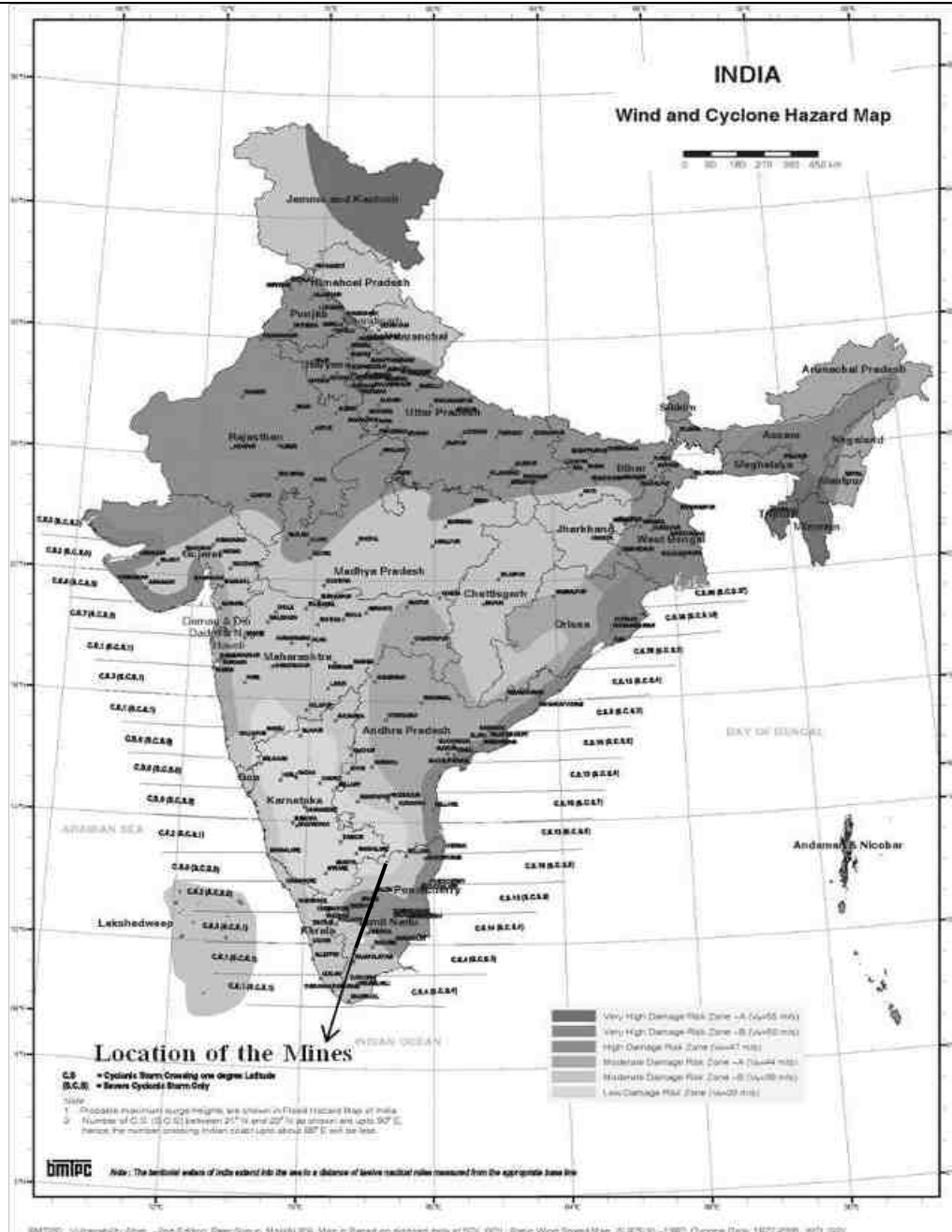


Fig No: 2.12 Winds and Cyclone Hazard Map

The area falls under Low Damage Risk Zone-B ($V_b = 33 \text{ m/s}$).

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2.4 Size or Magnitude of Operation

Table 2.3: Mining Details

Particulars	Details
Method of Mining	Open cast Manual Method of Mining and Transportation by Tipper & Tractor combination
Geological resources	351618m ³ (Shoal - 618m ³ & 351000m ³ below TBL)
Mineable reserves	117618m ³ of sand (Shoal - 618m ³ & 117000m ³ below TBL)
Production (100%)	117618m ³ of sand (Shoal - 618m ³ & 117000m ³ below TBL)
Top soil	-
Ore: Waste ratio	1: 0
Depth of Mining	1m below Theoretical bed level (0.005m – Shoal height)
Water Table	6 m depth as observed in the nearby bore wells.
Road design	1: 10 inside the pit and ramp 1:16 for transport
Overall Pit Slope	45°
Period of Lease	1 Years(To be granted)

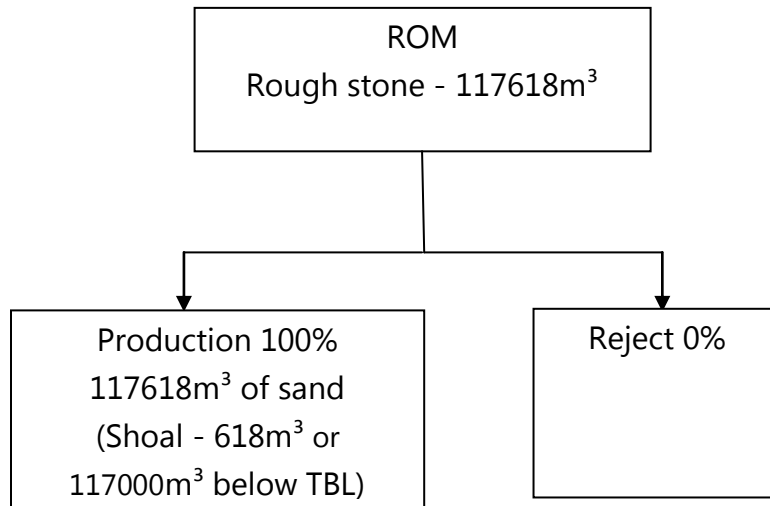


Fig.2.13: Material Balance

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2.5 Proposed schedule for approval and implementation

The proposed activity will be commenced only after obtaining Environment Clearance from SEAC/SEIAA, Tamil Nadu and CTE/CTO from TNPCB and other necessary clearance from concerned departments.

2.6 Technology and process description

2.6.1 Regional Geology

The major part of the district is covered by metamorphosed crystalline rocks of the Charnockite Group and the Migmatite Complex of Archaean age. South of Palar River, the area where the Charnockite Group of rocks is spread over comprises charnockite, pyroxene granulite, magnetite quartzites and younger basic dykes intruding into them. The Migmatite Complex comprising biotite gneisses, agmatitic gneisses, sub-augen gneiss, quartzofeldspathic gneisses and gneissic granites with pink permeation is seen around Elagiri and Koratti hills.

The Peninsular Gneissic Complex consisting of fissile hornblende gneiss, granite ode gneiss and younger granites occur to the north of Palar River. Younger dykes are profusely noted in these gneisses. The Proterozoic Alkaline group of rocks occurs in the Koratti and Elagiri hills.

The Alkaline carbonatite complexes located in a 250 km long and 25 km wide belt, trending NNE-SSW, extend from Gudiyattam in the north to Bhavani in the south. The Late Proterozoic period in Tamil Nadu witnessed large-scale extensional tectonism with the formation of deep crustal fractures with intrusion of alkaline related plutons and granites. The alkaline related plutonism was widespread in the north in parts of Vellore, Dharmapuri and Salem Districts, where a number of ultramafic-syenite-carbonatite bodies of Elagiri, Koratti, Samalpatti and Pakkanadu occur in a NNE-SSW trending zone extending from Gudiyattam in the north to Bhavani in the south over about 200km. A number of smaller ultramafic-syenite-carbonatite bodies also occur along sub-parallel NNE-SSW trending fault/shear zones on both sides of the main zone of alkaline activity. Recent studies indicate that the alkaline plutonic activity extends further NNE, beyond River Palar. The complexes are emplaced into the charnockite group of rocks and their

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migmatitic equivalents of amphibolite facies grade. These complexes have formed the locci of mineralisation. The major lithounits forming the alkaline group are epidote hornblende gneiss, pyroxenite, gabbro, gabbroic anorthosite, syenite, carbonatite with lamprophyre dykes and quartz-barytes veins. Banded magnetite quartzite, charnockite and pyroxene granulite occur as enclaves.

The Koratti syenite carbonatite complex occurring in near the Koratti Village is an inverted pear shaped body extending into Krishnagiri district. The Elagiri syenite comprises porphyritic, pink grey syenite and medium grained quartz syenite. These are emplaced into the charnockites and Peninsular Gneissic Complex comprising white silvery granitic gneiss, granitoid gneiss, agmatitic gneiss and amphibolite. Lamprophyre and dolerite dykes occur as basic intrusives in the gneisses. The Younger intrusives in this area are quartz veins, quartz baryte veins and aplite veins. In northern part of Arakkonam, Savudu Formation is exposed comprising conglomerate, sandstone and clay of lower Cretaceous age. Quaternary formations are represented by the Palar Alluvium which increases in thickness towards east, comprising sand, silt and clay admixtures.

The foliation of the gneiss varies from N15°E-S15°W to N80°E-S80°W. F2 folds are prominent in the Javadi hills. The patterns of the feldspars show inward dips suggesting a basal structure. The Pambar Shear trends NNE-SSW to NE- SW and extends on the western side of the area along the river course. Three generations of folds have been established in the area with minor, younger folds.

Elagiri Syenites: The Elagiri Syenite Complex comprises ultramafic, mafic and a variety of syenites with injections of carbonatite, felsite, lamprophyre, pegmatite and quartz / barite veins. Very coarse, grey syenite occupy the southeastern part of the hill and the plains to the south are the oldest unit within the syenite complex. Grey and pink porphyritic syenite and medium grained syenite occur in succession to the north in an arcuate shape. Pegmatoidal syenite is exposed in the lower slopes on the northwestern part of the massif and leuco syenite in the lower slopes of the NE and ESE parts. Porphyritic hornblende syenite is found near the contact between grey porphyritic syenite and pyroxenite. Aplitic syenite veins are seen at many places in the eastern plains. A number of thin pegmatite veins are exposed along the southern slopes and quartz veins on the plains to the northeast of the hill. Carbonatite boulders are seen

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along the southern slopes. A diatreme igneous breccia is exposed to the north of the hill. Shearing effects are observed all along the peripheries of the Elagirihill, besides some minor shears within the syenite. Different generation of alkaline ultrabasic rocks, syenite and their xenoliths suggest multiple tectonic episodes in the formation of the Elagiri syenite pluton. The contact between the alkaline pluton and the country is not exposed due to thick soil cover. Nevertheless, at places particularly in the western and southern margin close spaced intense fracturing in both alkaline pluton and the country rock has been observed. Primary flow banding defined by orientation of feldspars megacrysts is developed in the syenites in the southern and western part of the complex.

These primary foliations/ flow bandings show a steep inward dip (i.e. towards the center of the complex), signifying a conical shape of the intrusions. There are number of shear planes cutting across the syenites, noted in the complex. The pyroxenites show effect of feldspathisation near the southern contact with syenites.

"Teardrop" structure of pyroxenites has been reported in the syenites more particularly in the southern margin and in the very coarse pink syenites. The xenoliths of pyroxenites are about a few cm in diameter to as much as 10 cm in length and mostly are lenticular. It shows chilled margin around the individual xenoliths and a portion of it shows protrusion into the syenite mass.

The central portion of the area is plain and the remaining area is hilly and undulating with isolated high hills reaching up to 703 m above msl. The easterly flowing Palar River drains the plain. The river has wide alluvial cover on either side. Kavundinya Nadi from the northwest and Agaram Ar from the south join the Palar River. Two major tributaries Kallparai Ar and Uttalum Ar join the Agaram Ar. The Vellore-Ambur section of National Highway No. 46 passes through the area. The Chennai-Bangalore railway line of the Southern Railway passes through the central part of the area.

2.6.2. Geology of the lease area

The proposed site for sand quarrying situated in Palar River, which contains fine sand with little soil mixing and waste debris. This sand was formed by the continuous

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mechanical action of river erosion of weathered particles transported and deposited when the gravity loses. The elevation of the proposed site is 264.25m – 266.75 above MSL. The major constituent of the sand is quartz with clay.

2.6.2.1 Exploration

The Water Resource Department has conducted study on this river basin and maintains the basin from encroachments. The sand in the area has about shoal and more than 3m depth of sand as proved in the test pit. However the quarrying is proposed to a depth of 1m below the Theoretical bed level. The sand formation is clearly visible right from the surface.



Fig No 2.14 Photo shows general view of the lease area

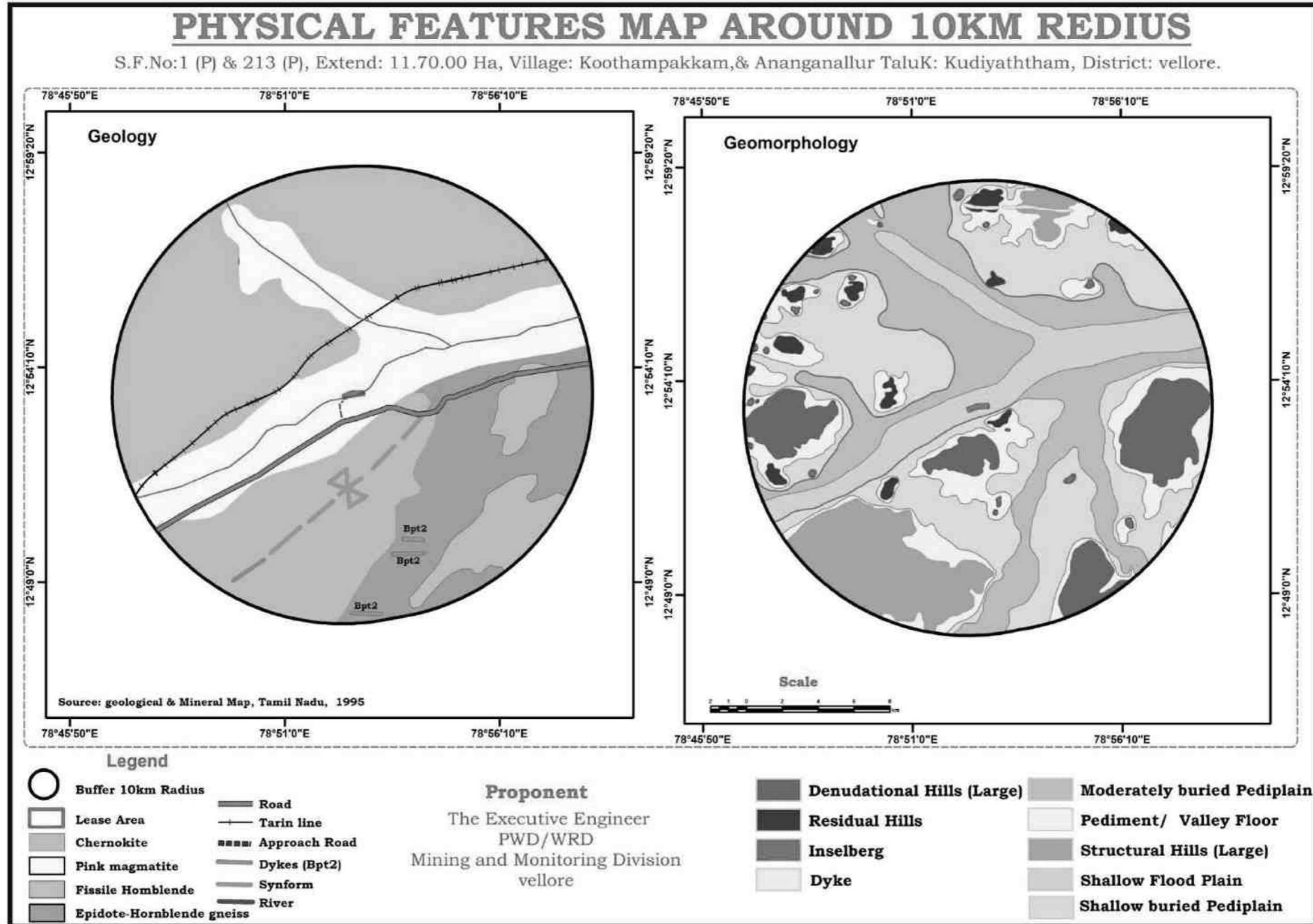


Fig.No.2.15: Regional Geology and Geomorphology Map

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2.6.3 Method of Mining

a) Open cast working:

Mining would be carried out by opencast method by manual excavation and transportation by tipper and tractor combinations.

b) Mode of working:

Being loose and soft material, it is proposed to remove the materials by a system of manual excavation and tipper & tractor transportation. No separate top soil or any overburden shall be removed. The Excavated sand shall be loaded into the PWD stock yard.

c) Proposed Bench Height & Width

It is a shallow quarrying to a depth of 1.0m and there is no benches shall be formed. The area shall be replenished during the next rainy season naturally.

2.6.4 Extent of Mechanization

The following machinery is proposed to be exclusively for the development and production work at this quarry. The machinery is proposed to be purchased or engaged on hire basis.

i) Loading Equipment:

Loading of sand shall be done with hand shovel, spade and basket manually

ii) Transportation:

Haulage of minerals will be done by tippers directly from the mining site to the government sand stack yard.

Table No 2.4 Details of Transportations

Type	No	Size/ Capacity	Make	Motive Power	H.P
Tipper	20	15M.T	AMW	Diesel	110

iii) Blasting Pattern

No blasting shall be practiced as sand is loose and granular material.

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2.7 Land Use Pattern of the Core Zone

The land applied for sand mining is Government river poramboke land (PWD), completely covered with sand and sand shoal with little amount clay and debris. The land use pattern in the lease area is given in below table 2.5.

Table No 2.5: Computation of present and proposed land use pattern

S.No.	Description	Area of Land Use (In Hec.)	
		As at Present	At the end of One Year
1.	Mining	0.0	11.70.0
2.	Waste Dump	0.0	0.00.0
3.	Safety zone & Plantation	Nil	Nil
4.	Undisturbed area	11.70.0	0.00
Total		11.70.0	11.70.0

2.8 ESTIMATION OF RESERVES

a) GEOLOGICAL RESOURCES

The geological resource is estimated as 351618m³ up to a depth of 3m below River bed level including Shoal (Avg. height 0.005m) from within the permissible area for quarrying. The reserve is calculated by Cross Sectional method. A detail of estimation of geological resources is given in the Table no –2.6.

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TABLE NO-2.6: Computation of Geological Resources and Reserves

S.NO	Existing Level (m)	Theoretical Bed level	Difference (m)	Mean Difference	CS Length (m)	CS-Area M2
X1-X1'	266.250	266.485	-0.235			
	266.250	266.485	-0.235	-0.235	130	-30.550
X2-X2'	266.000	266.285	-0.285			
	266.250	266.285	-0.035	-0.160	130	-20.800
X3-X3'	265.750	266.085	-0.335			
	266.250	266.085	0.165	-0.085	130	-11.050
X4-X4'	265.500	265.885	-0.385			
	266.000	265.885	0.115	-0.135	130	-17.550
X5-X5'	265.250	265.685	-0.435			
	266.000	265.685	0.315	-0.060	130	-7.800
X6-X6'	265.250	265.485	-0.235			
	266.250	265.485	0.765	0.265	130	34.450
X7-X7'	265.000	265.285	-0.285			
	266.500	265.285	1.215	0.465	130	60.450
X8-X8'	264.750	265.085	-0.335			
	265.500	265.085	0.415	0.040	130	5.200
X9-X9'	264.500	264.885	-0.385			
	265.000	264.885	0.115	-0.135	130	-17.550
X10-X10'	264.500	264.685	-0.185			
	264.750	264.685	0.065	-0.060	130	-7.800

Average height of Shoals = $618\text{m}^3/117000\text{m}^3 = 0.005\text{m}$

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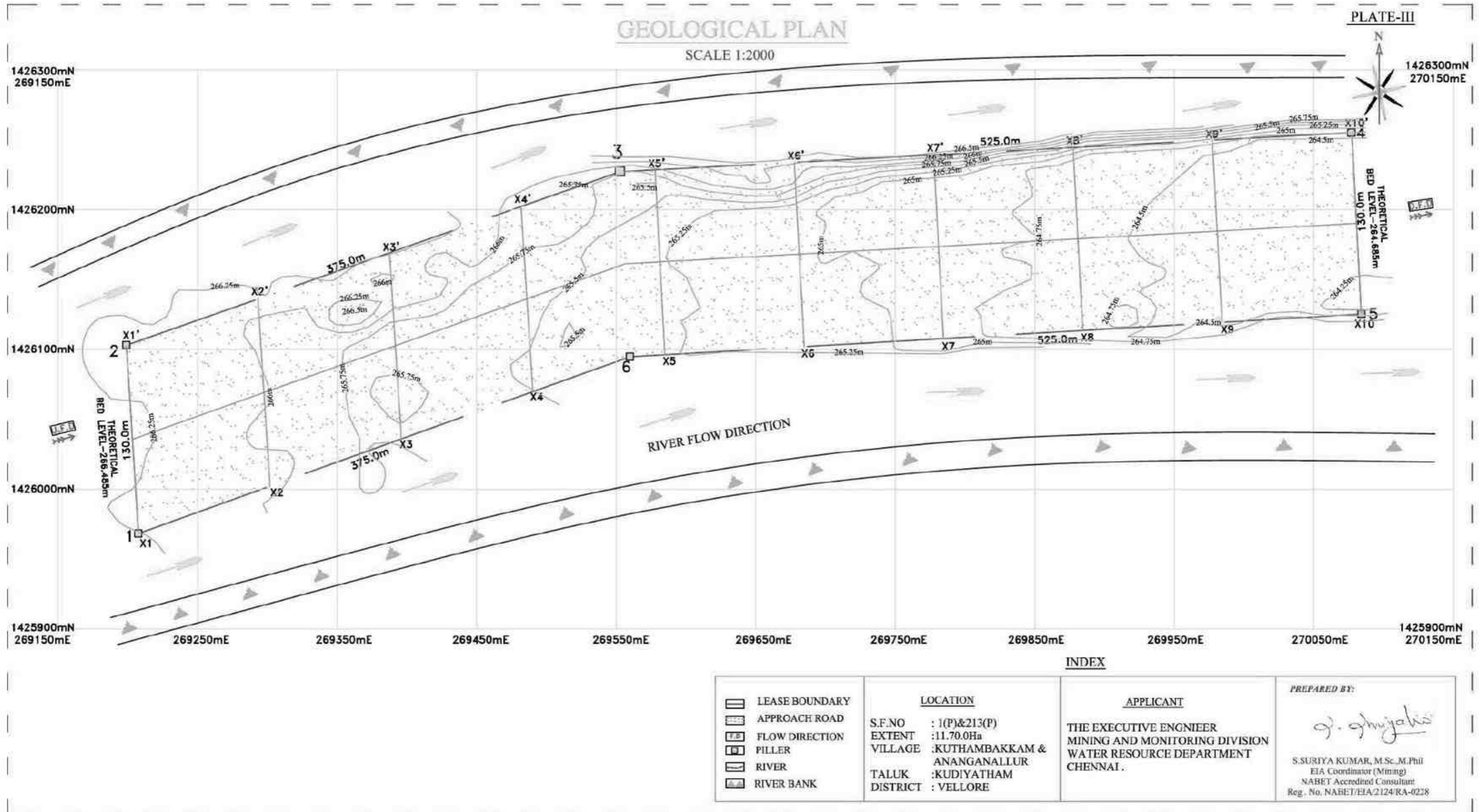


Fig.No.2.16: Geological Plan (Plate - III)

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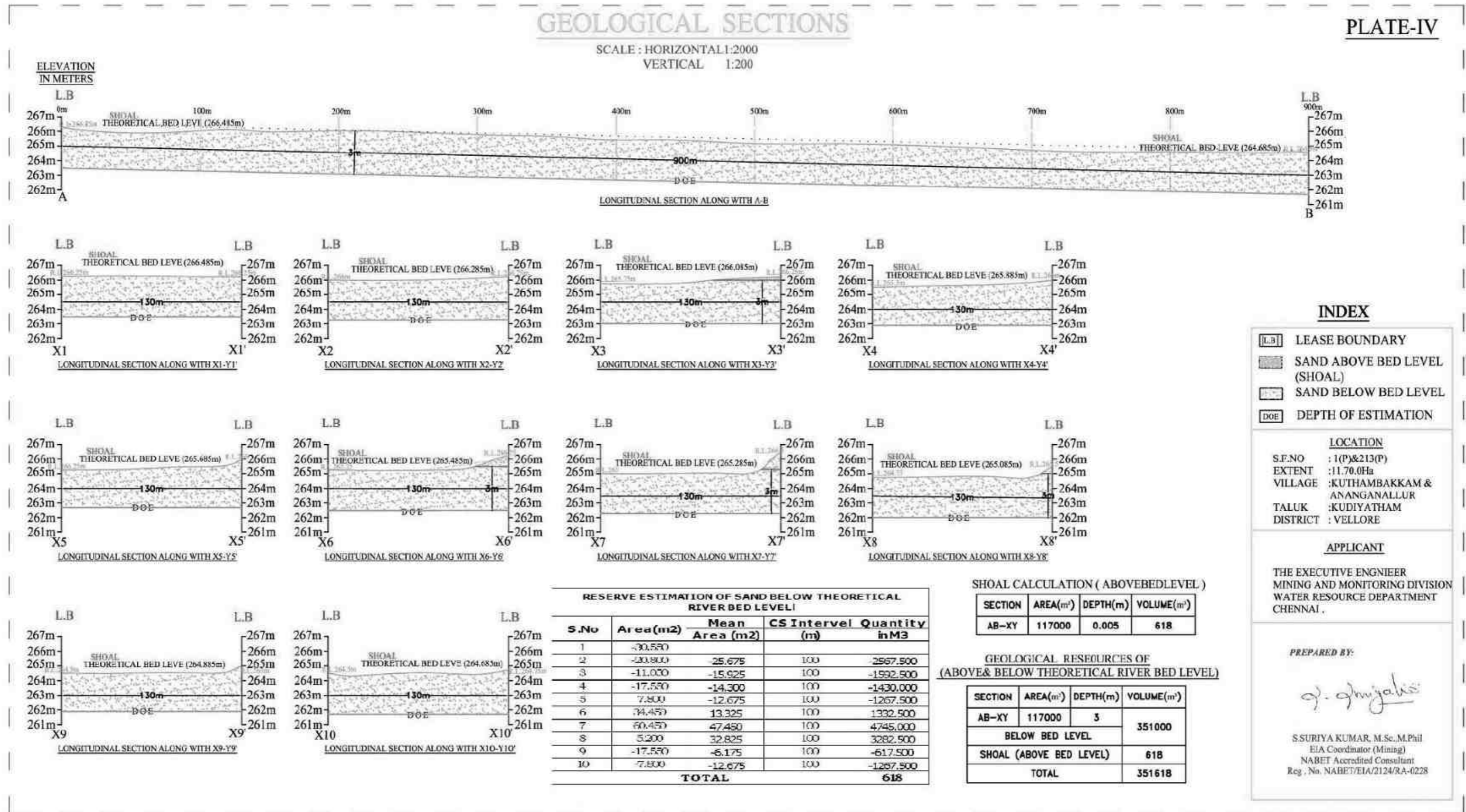


Fig.No.2.17: Geological Section (Plate – IV)

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b) MINEABLE/RECOVERABLE RESERVES:

The mineable reserve is estimated as 117618m³ up to 1m below the River bed level including Shoal with an Average thickness of 0.005m. Details of estimation of mineable reserves are given in Table no. 2.7.

TABLE NO-2.7: Computation of Mineable/Recoverable Reserves

S.NO	Existing Level (m)	Theoretical Bed level	Difference (m)	Mean Difference	CS Length (m)	CS-Area M2
X1-X1'	266.250	266.485	-0.235			
	266.250	266.485	-0.235	-0.235	130	-30.550
X2-X2'	266.000	266.285	-0.285			
	266.250	266.285	-0.035	-0.160	130	-20.800
X3-X3'	265.750	266.085	-0.335			
	266.250	266.085	0.165	-0.085	130	-11.050
X4-X4'	265.500	265.885	-0.385			
	266.000	265.885	0.115	-0.135	130	-17.550
X5-X5'	265.250	265.685	-0.435			
	266.000	265.685	0.315	-0.060	130	-7.800
X6-X6'	265.250	265.485	-0.235			
	266.250	265.485	0.765	0.265	130	34.450
X7-X7'	265.000	265.285	-0.285			
	266.500	265.285	1.215	0.465	130	60.450
X8-X8'	264.750	265.085	-0.335			
	265.500	265.085	0.415	0.040	130	5.200
X9-X9'	264.500	264.885	-0.385			
	265.000	264.885	0.115	-0.135	130	-17.550
X10-X10'	264.500	264.685	-0.185			
	264.750	264.685	0.065	-0.060	130	-7.800

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**Table No. 2.7 (A). Mineable/Production reserves of shoal and sand
RESERVE ESTIMATION OF SHOALS**

S.No	Area(m ²)	Mean Area(m ²)	CS Interval (m)	Quantity in m ³
1	-30.550			
2	-20.800	-25.675	100	-2567.500
3	-11.050	-15.925	100	-1592.500
4	-17.550	-14.300	100	-1430.000
5	-7.800	-12.675	100	-1267.500
6	34.450	13.325	100	1332.500
7	60.450	47.450	100	4745.000
8	5.200	32.825	100	3282.500
9	-17.550	-6.175	100	-617.500
10	-7.800	-12.675	100	-1267.500
TOTAL				618

$$11.70.0 \text{ Ha} \times 1\text{m} = 117000 \text{ m}^3$$

$$\text{Average height} = 618\text{m}^3 / 117000\text{m}^3 = 0.005\text{m}$$

Table No. 2.7 (B). Mineable/Production reserves sand (Including shoals)

Method	Mineable Reserves (m ³)		Total Mineable Reserves (Shoal + Reserves) (m ³)
Photogrammetric contour method	Shoal above Theoretical bed level (0.005m height Avg)	618	117618
	Reserves 1m below Theoretical Bed Level	117000	

2.9 Year Wise Production and Development

The production and developmental works to be carried out for one year is given in the table below 2.8.

Table No. 2.8 Year wise production

Year	Shoal portion (m ³)	ROM of sand (m ³)	Saleable sand (m ³)	Sub grade ore / mineral	Mineral Rejects	Ore to overburden ratio
1 st	618	117000	117618	0	0	1:0
Total	618	117000	117618	0	0	1:0

$$\text{Total production for One year} = 117618\text{m}^3$$

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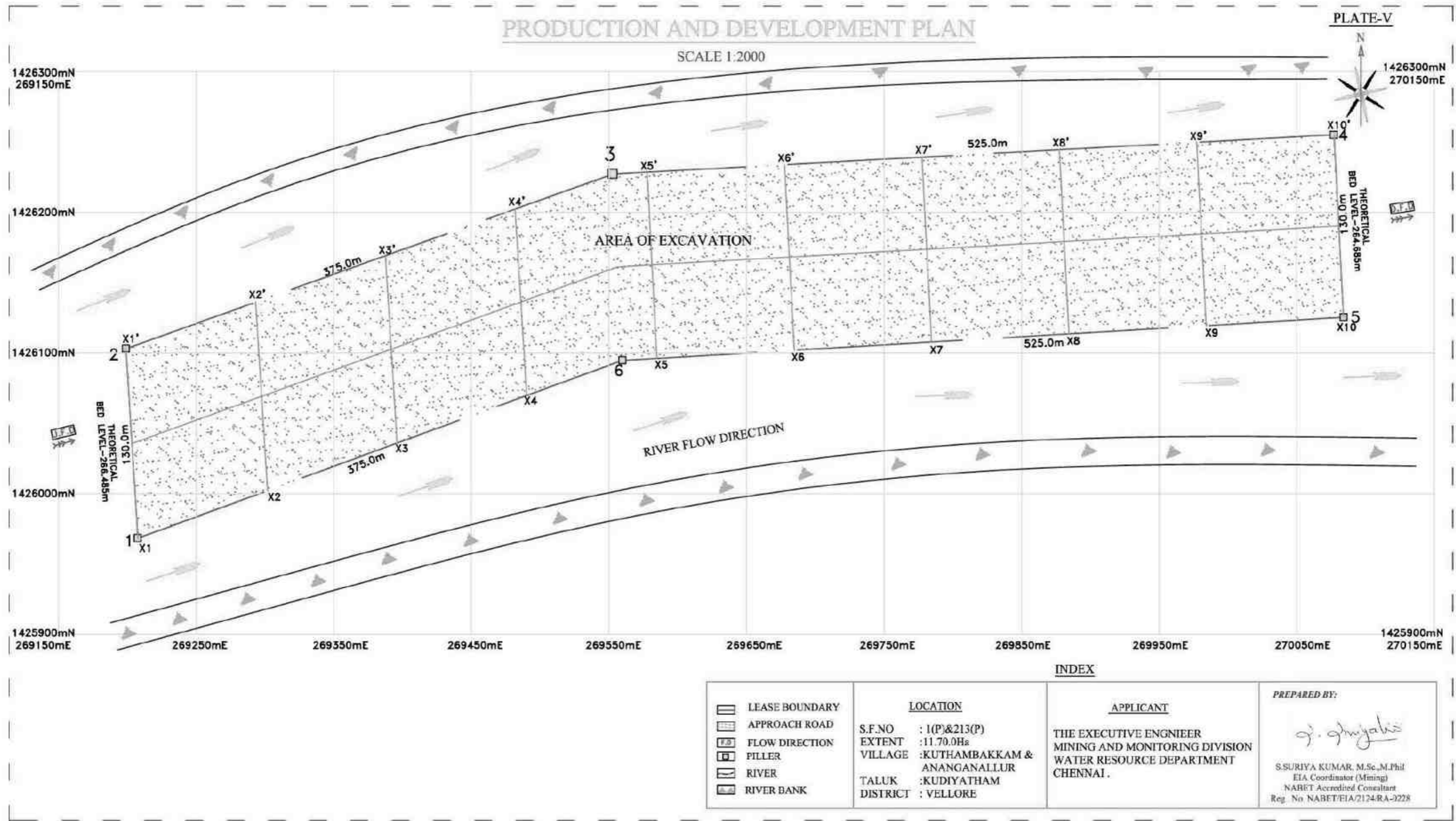


Fig.No.2.18: Year Wise Development and Production Plan for one year

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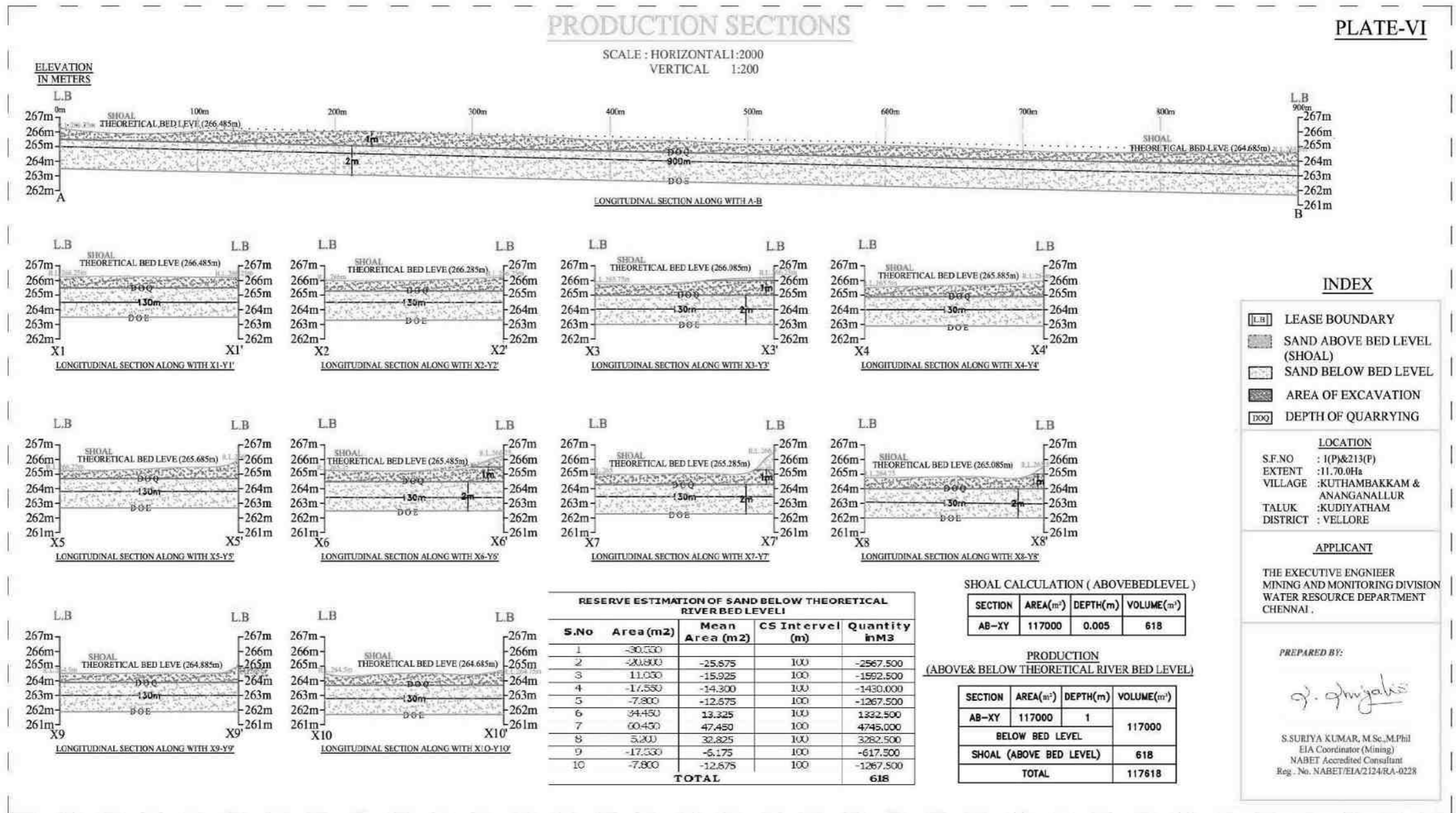


Fig.No.2.19: Section of Production and Development Plan (Plate – VI)

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2.10 Disposal of Waste/overburden

No over burden is anticipated however shoal containing more debris and clay sand shall be dumped over the bank of river to increase the bank height and protect the neighbor area from inundation.

2.11 Conceptual Mining Plan/ Final Mine Closure Plan

The anticipated life of the mine shall be One year. The size of the ultimate pit boundary shall be as follows:

Table No 2.9: Computation of ultimate pit dimension

LENGTH(m)	WIDTH(m)	DEPTH(m)
900	130	1

The mining pit of 1m depth will be replenished during next monsoon season.

2.12 Employment Potential (Management & Supervisory personal)

**Table No 2.10: Employment Potential of the Executive Engineer,
Sand quarry**

Supervisory & Skilled Persons			
S.No	Designation	Nos	
1	WRO/MMD Assistant Engineer	1	
2	Technical Assistant	1	
Total		2	
Unskilled			
S.No	Designation	Nos	
3	Permit Slip issuer	3	
4	Traffic Regulator	Entrance	2
		Exist	2
		Quarrying Site	3
5	Loading workers	40	
6	Office Helper	1	
7	Spotter	6	
8	Watchman(Two Shift)	4	
Total		61	
Grand Total		63	

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Table No 2.11: Water Requirements (5.0KLD)

Domestic & Sanitary	Drinking Water- 0.5KLD Domestic Purposes- 1.5KLD
Dust suppression & Green Belt	Green belt purpose -1.5KLD water sprinkling on haul roads – 1.5KLD
Source	Drinking water - Mineral water industries by water canes. Dust suppression, Green belt - water tank

2.13 Amenities

2.13.1 Sanitary facilities

Semi-permanent latrines & urinals shall be maintained at convenient places for use of labours as per the provisions of Rule (33) of the main rules, 1955 separately for males and Females. Washing facilities shall also be arranged as per rule (36) of the mines Rules, 1955.

2.13.2 First Aid facility

First Aid station as per provisions under Rule (44) of the Mines Rules, 1955 will be provided and First aid kits kept in mines office room, the qualified first aid personnel should be appointed or nominated to attend emergency first aid treatment.

2.13.3 Labour Health

Periodic medical examination has to be made for occupational health once in a year in addition to attending medical treatment of occupational injuries under Rule 45(A).

2.13.4 Precautionary safety measures to the Labourers

Safety provisions like helmet, goggles, safety belt, safety shoes etc have to be provided as per the circulars and amendments made for Mine labours under guidance of DGMS.

2.13.5 The Child labor Employment

As per the Mines Act, 1952, no child labours below 18 years of old were engaged for any work in the quarry.

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2.14 Proposed financial estimate / budget for (EMP) Environment Management

a) Project cost / investment

i) Land Cost	:	Nil
ii) Machinery (Hire)	:	Rs 30,00,000
iii) Construction of Bank of river	:	Rs 10,00,000
iv) Laboures Shed	:	Rs 2,00,000
v) Sanitary facility	:	Rs 2,00,000
vi) Other items	:	Rs 1,00,000
Total	:	Rs 45.0 lakhs

b) EMP

i) Environmental Monitoring	=	Rs 200,000
ii) Dust Control	=	Rs 100,000
iii) Safety kits,	=	Rs 100,000
iv) Internal road & Maintenance	=	Rs 100,000
v) Afforestation etc.	=	Rs 100,000
Total	=	Rs 6.0 lakhs

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CHAPTER – 3: DESCRIPTION OF THE ENVIRONMENT

3.0 BASELINE ENVIRONMENTAL STATUS

3.1 INTRODUCTION

The chapter describes the existing environmental settings in the study area and is based upon the secondary information collected from the published sources, reconnaissance survey, primary socio-economic and environmental monitoring of air, noise, soil, ground and surface water in the study area.

For the purpose of EIA studies, mine lease area was considered as the core zone and area outside the mine lease boundary up to 10km radius from the lease boundary was considered as buffer zone. Collection of base line data is an integral part of the preparation of environmental impact assessment reports. The baseline monitoring study has been carried out during March 1st, 2022 – May 31st, 2022 to assess the existing environmental scenario in this area.

The Various environmental components studied as a part of the baseline study are discussed in the following projects activities are:

- Air Environment
- Noise Environment
- Soil Environment
- Water Environment
- Flora and Fauna
- Socio-economic

3.2 Methodology

The guiding factors of the present baseline study are the requirements laid down by the Central Pollution Control Board (CPCB) and guidelines as per the Environmental Impact Assessment Notification.

- In order to assess the Ambient Air Quality (AAQ), samples of ambient air were collected by installation of Respirable Dust Sampler and Fine Particulate Matter Sample at different locations within the study area and analyzed to find out the existing status of air quality.

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- Ground water samples were collected from the existing tube wells, while samples for surface water were collected from river & small ponds. The samples were analyzed for parameters necessary to determine water quality (based on IS: 10500 criteria) and those, which are relevant from environmental impact point of view of the proposed river bed mining project.
- Soil samples were collected and analyzed for relevant physical and chemical characteristics in order to assess the impact of the proposed mining on soil.
- Inventory of flora and fauna species present in the area was made through field visits and survey by ecologists.
- Socio-economic data was collected from primary sources through village – level surveys and household visits.
- The land use patterns of the study area were assessed through latest satellite imaging and topographical sheets of Survey of India.

Appropriate methodologies have been followed in preparing the EIA-EMP report. The methodology adopted for the study is outlined below. The sampling locations were selected on the basis of the following:

- Predominant wind directions recorded by the India Meteorological Department (IMD), Virinjipuram observatory, Vellore district;
- Existing topography;
- Drainage pattern and location of existing surface water bodies like lakes/ponds, rivers and streams;
- Location of villages/towns/sensitive areas, and;
- Areas, which represent baseline conditions;

3.3 METEOROLOGICAL DATA RECORDED AT IMD STATION, VIRINJIPURAM OBSERVATORY, VELLORE DISTRICT

The meteorology of the project area plays very important role in dispersion of pollutants and build-up of pollution within the air atmosphere. In the present study, in the month of March 1st, 2022 – May 31st, 2022 meteorological data for site specific has been taken to find the dispersion of pollutant concentration. The mixing height, which is an important parameter to express the dispersive potential of atmosphere, has been taken from the atlas of hourly mixing height and assimilative capacity of atmosphere in India.

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3.3.1 Wind Rose

Wind speed and wind direction data is useful in identifying the influence of meteorology on the air quality of the area. The observed wind pattern during the study period is described below. The predominant wind patterns for the overall area are from Predominantly to North direction. Wind-rose diagram for pre - monsoon season, 2022 meteorological data is used for modeling and is given in Fig No.3.1

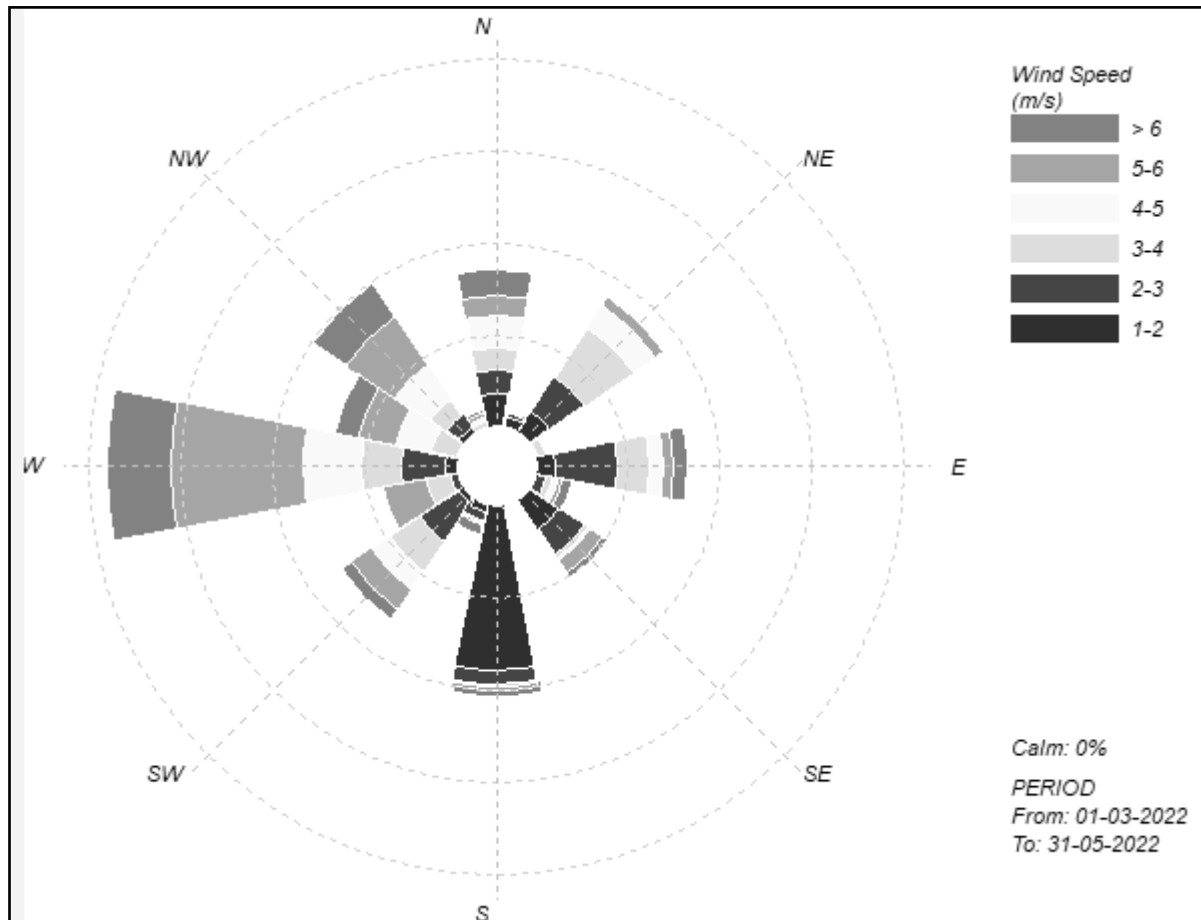


Fig No: 3.1 Wind Rose Pattern for the Study period

3.4 AIR ENVIRONMENT

Prevailing air environment i.e. baseline conditions in an area is primarily governed by many factors activities going on in that area. The pollutant level in atmosphere is also governed by the meteorology, topography, natural settings in terms of plantation, forest cover, vegetation etc. as these factors in combination with each other are

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responsible for dispersion, diffusion, transportation and assimilation of pollutants in the local air shed.

3.4.1 Ambient Air Monitoring

The prime objective of baseline air quality study (10km radius) is to assess the existing air quality of the area to form base line information. The study area represents mostly rural environment. Ambient air monitoring was carried out at 5 locations. The locations were identified keeping in view of predominant wind directions prevailing during study period, sensitive receptors, human settlements and mining activities around. The details about sampling locations are mentioned below in Fig No. 3.2, 3.3 and presented in Table No. 3.1.

The existing Ambient Air Quality status (AAQ) has been monitored for parameters PM₁₀, PM_{2.5}, SO₂ and NO_x. Ambient air quality monitoring was carried out at a frequency of two days per week at each location for three months at 8 hour continuously. Respirable dust samplers have been used for monitoring the existing PM₁₀ status and fine dust samplers are used for monitoring PM_{2.5} status in the study area. Methodologies adopted for sampling and analysis were carried out, as per the approved methods of Central Pollution Control Board (CPCB).

Table No: 3.1 Ambient Air Quality Monitoring Locations

S. No	Sample Location	Station Code	Direction/ Distance (w.r.t. mine)	Core Zone/ Buffer Zone	Latitude	Longitude
1	Lease area	AAQ-1	--	Core	12°53'33.44" N	78°52'22.45" E
2	Gudiyatham	AAQ-2	4.71Km (N)	Buffer	12°56'2.87" N	78°51'55.87" E
3	Pallikonda	AAQ-3	6.68 Km (E)	Buffer	12°54'21.39" N	78°56'28.21" E
4	Madhanur	AAQ-4	3.47Km (SW)	Buffer	12°52'10.72" N	78°50'56.82" E
5	Pallikuppam	AAQ-5	3.52 Km (S)	Buffer	12°51'40.60" N	78°53'24.53" E

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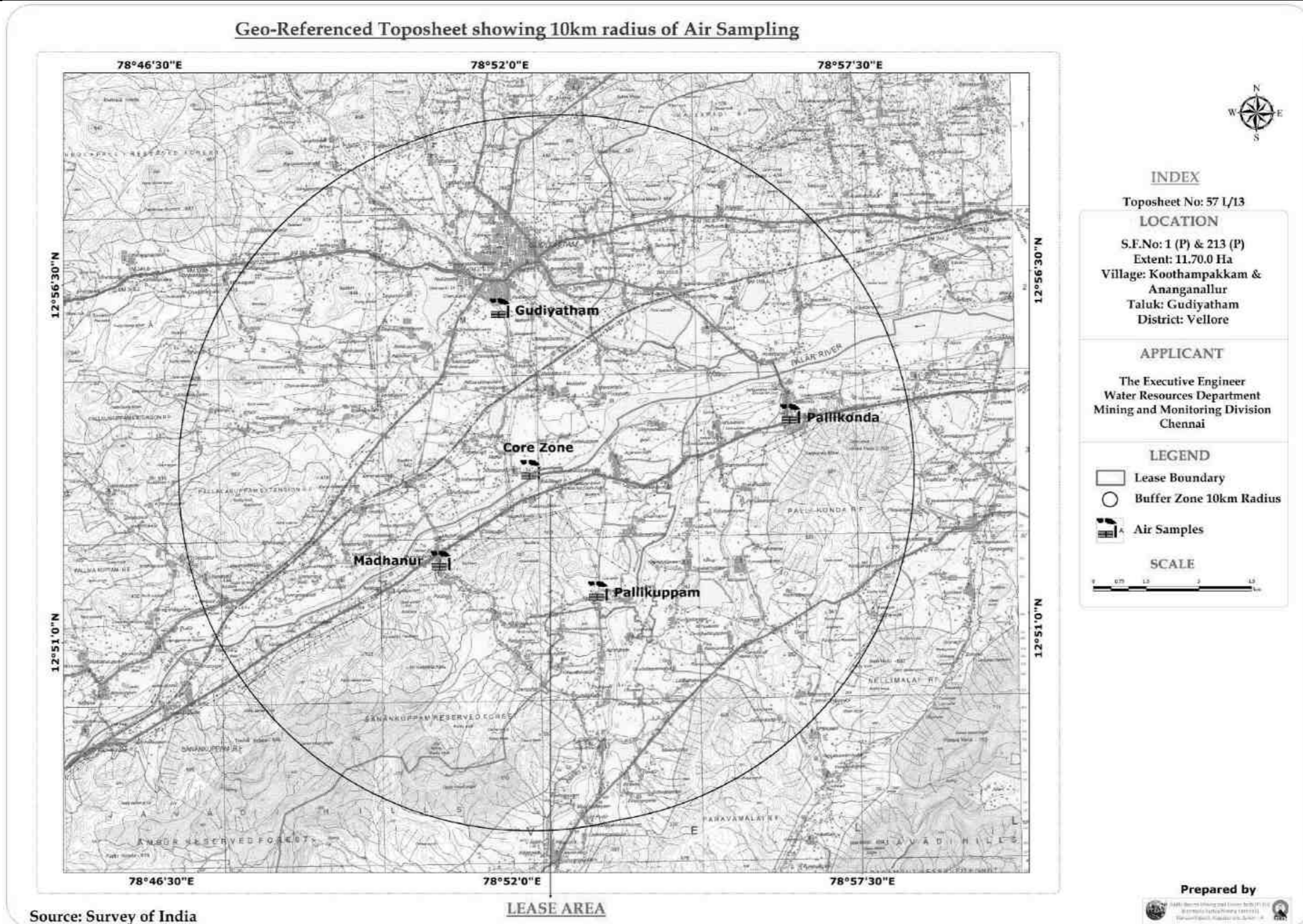


Fig No: 3.2 Geo Referenced Toposheet showing Air Sampling station around 10km radius

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(a) Air sampling location at Core zone



(b) Air sampling locations at Buffer zone

Fig No: 3.3 Air Monitoring locations

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3.4.2 Monitoring Result

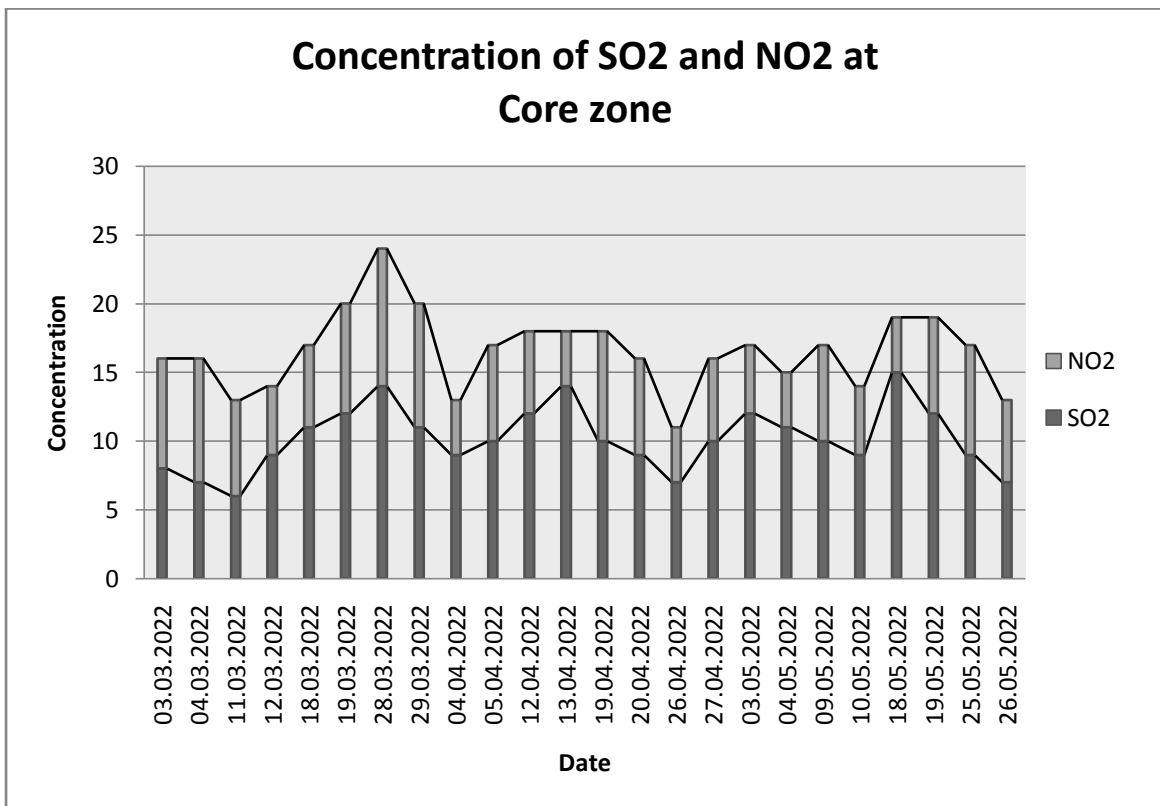
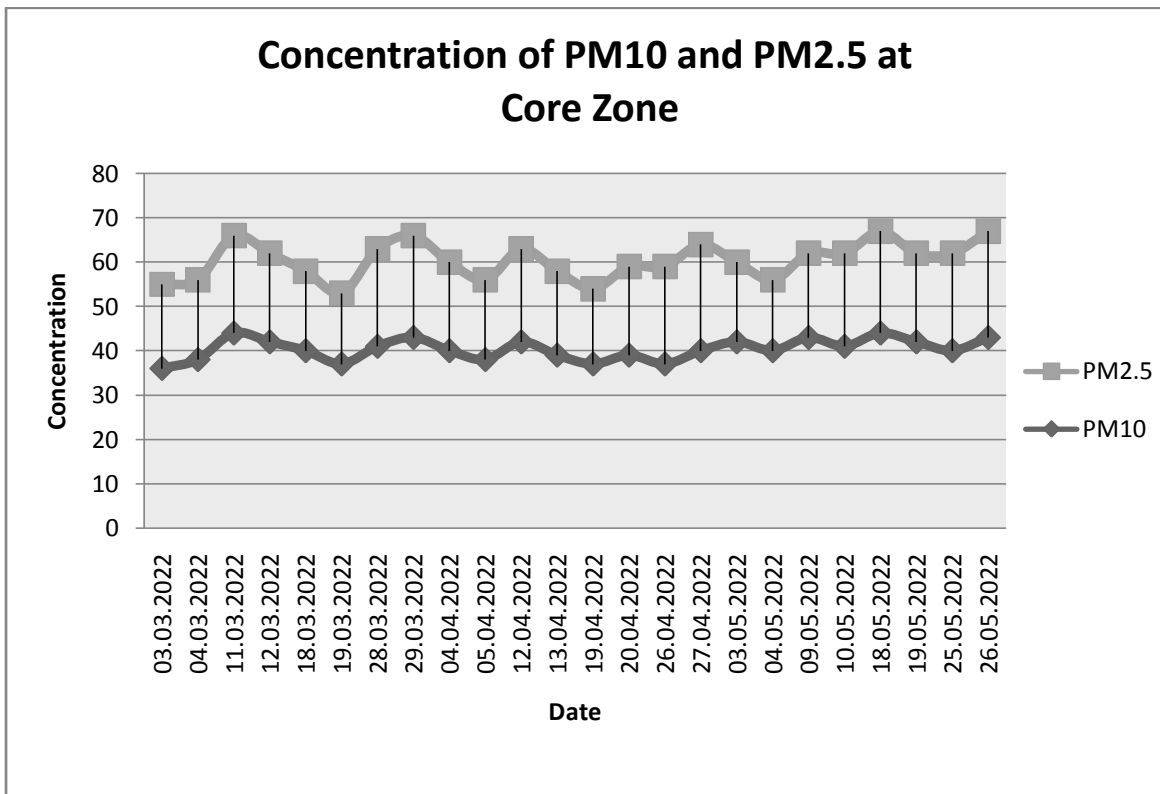
Statistical Analysis of Ambient Air Quality in the study area for the monitoring period are shown parameter wise in Table No 3.2

Table No: 3.2 Summaries of Ambient Air Quality Results

Code	Locations	Parameters	PM₁₀ (µg/m³)	PM_{2.5} (µg/m³)	SO₂ (µg/m³)	NO₂ (µg/m³)
AAQ 1	Lease Area	Minimum	36	16	4	6
		Maximum	44	24	10	15
		Average	40	20	6	10
		98%	44	24	9.5	14.5
AAQ 2	Gudiyatham	Minimum	43	22	6	11
		Maximum	52	30	14	18
		Average	47	26	9	14
		98%	51	30	14	17
AAQ 3	Pallikonda	Minimum	41	20	5	6
		Maximum	49	29	11	15
		Average	45	24	8	10
		98%	48	28.5	11	14
AAQ 4	Madhanur	Minimum	39	18	5	9
		Maximum	47	27	11	16
		Average	42	22	8	12
		98%	46	26.5	10.5	15.5
AAQ 5	Pallikuppam	Minimum	35	16	4	7
		Maximum	43	24	11	16
		Average	39	20	7	11
		98%	42.5	24	10.5	16
NAAQS			100	60	80	80

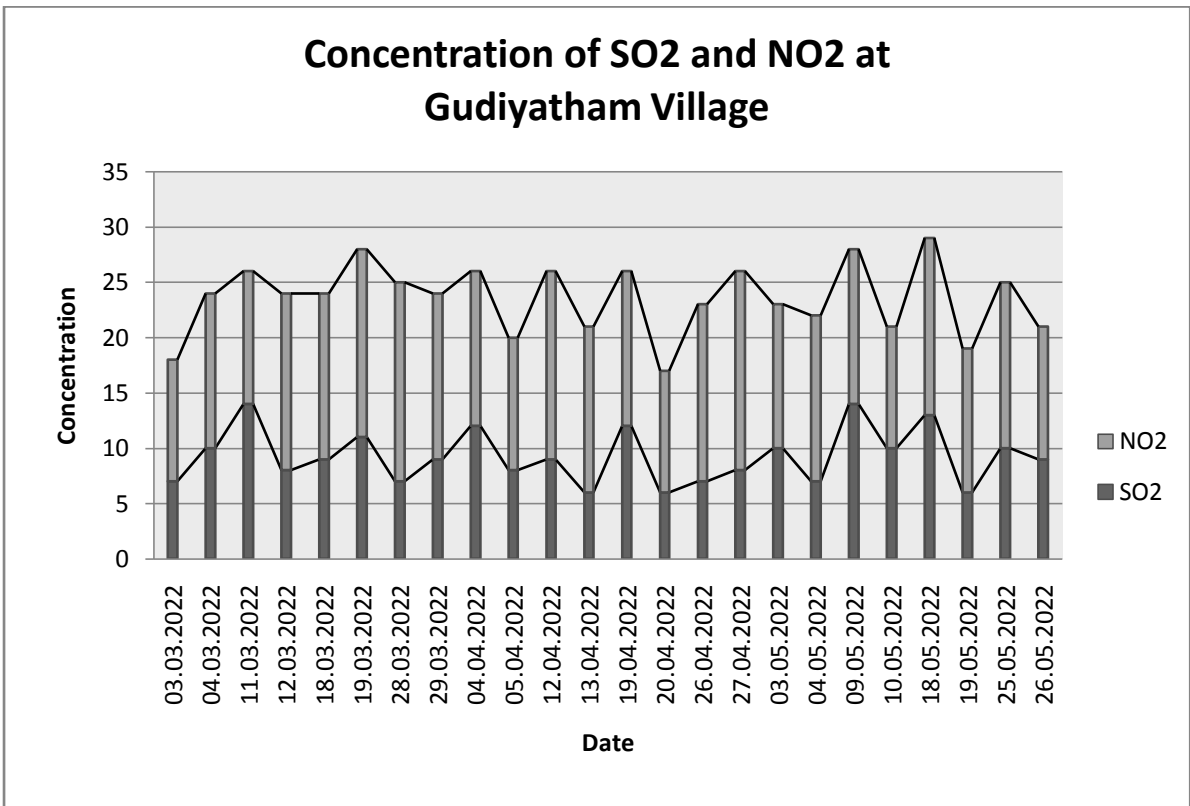
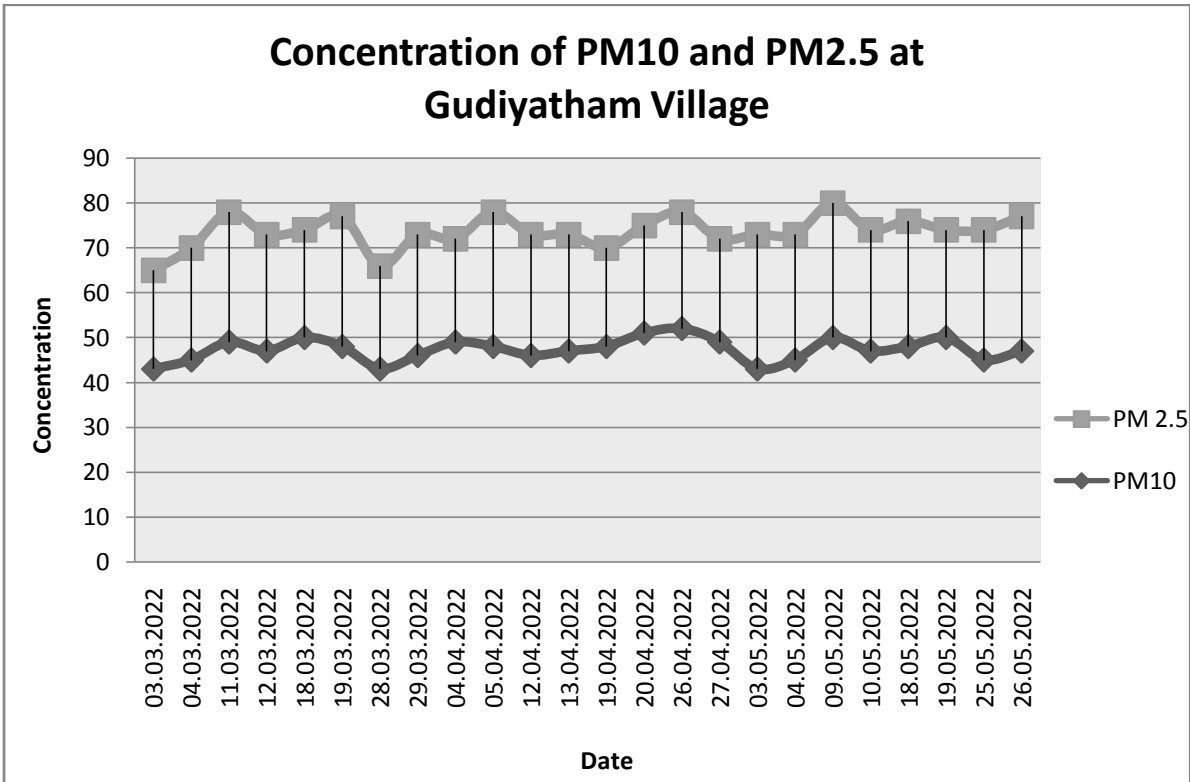
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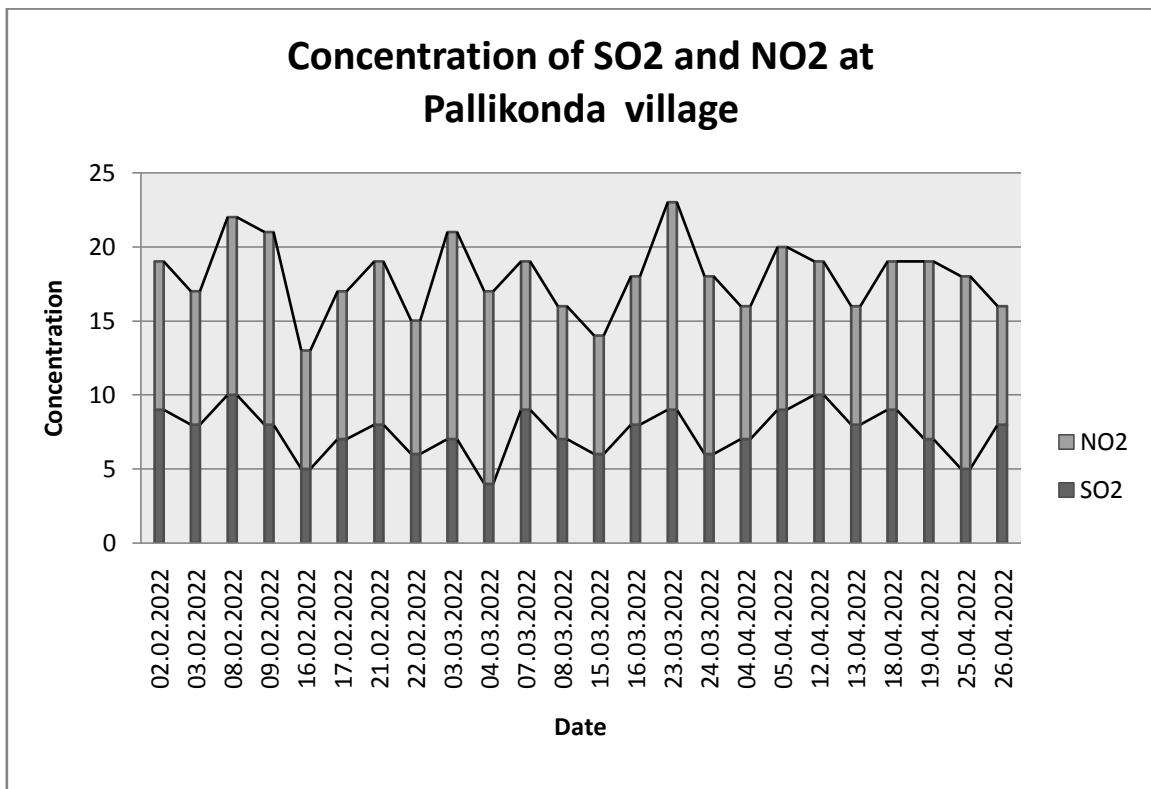
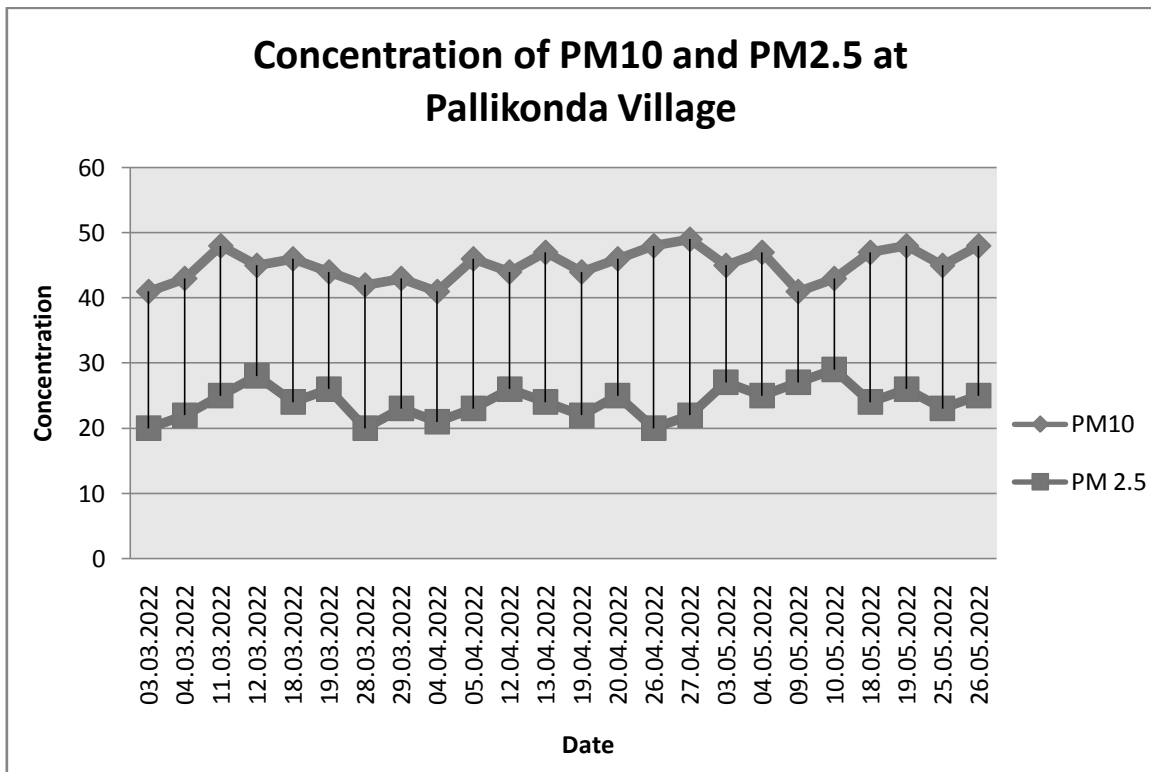
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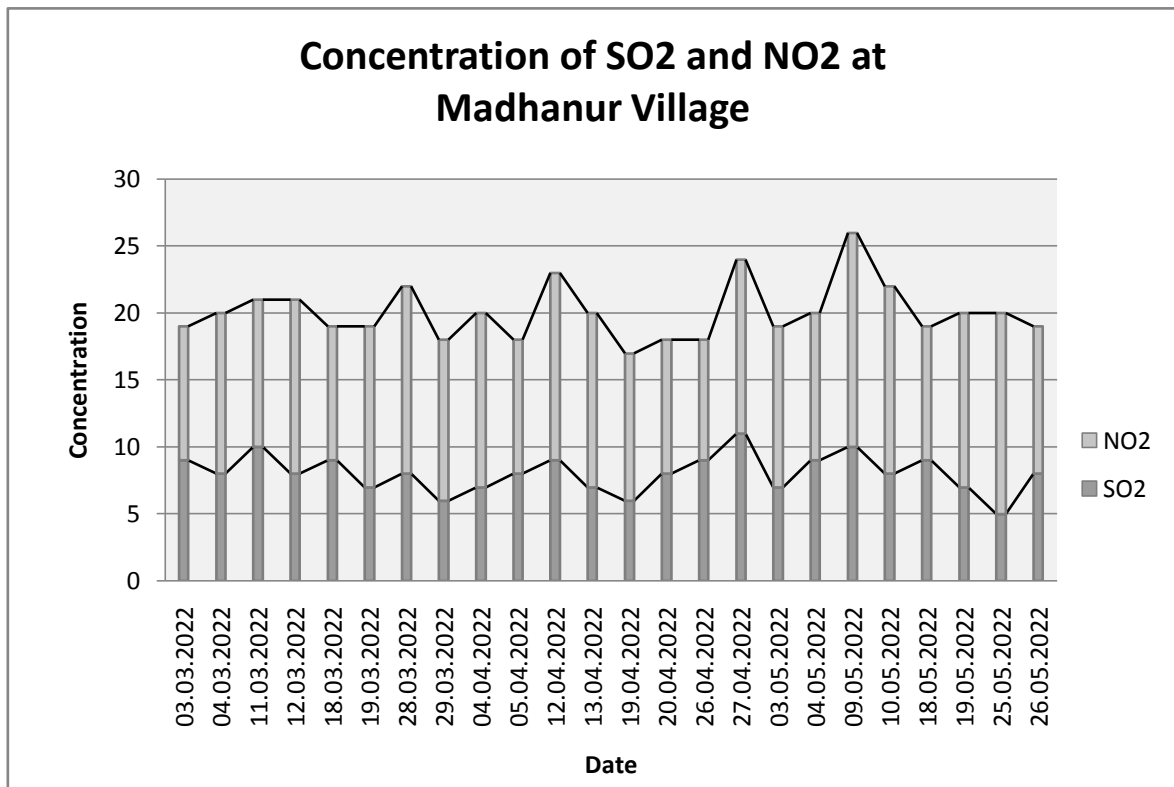
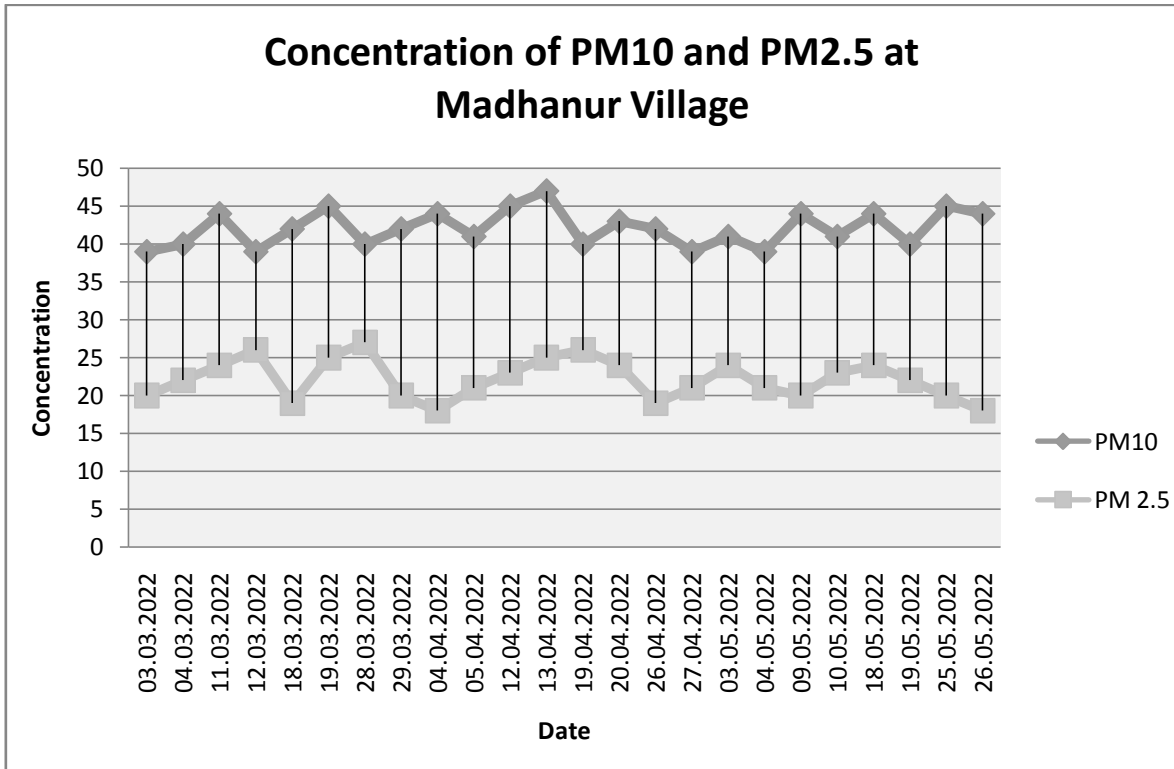
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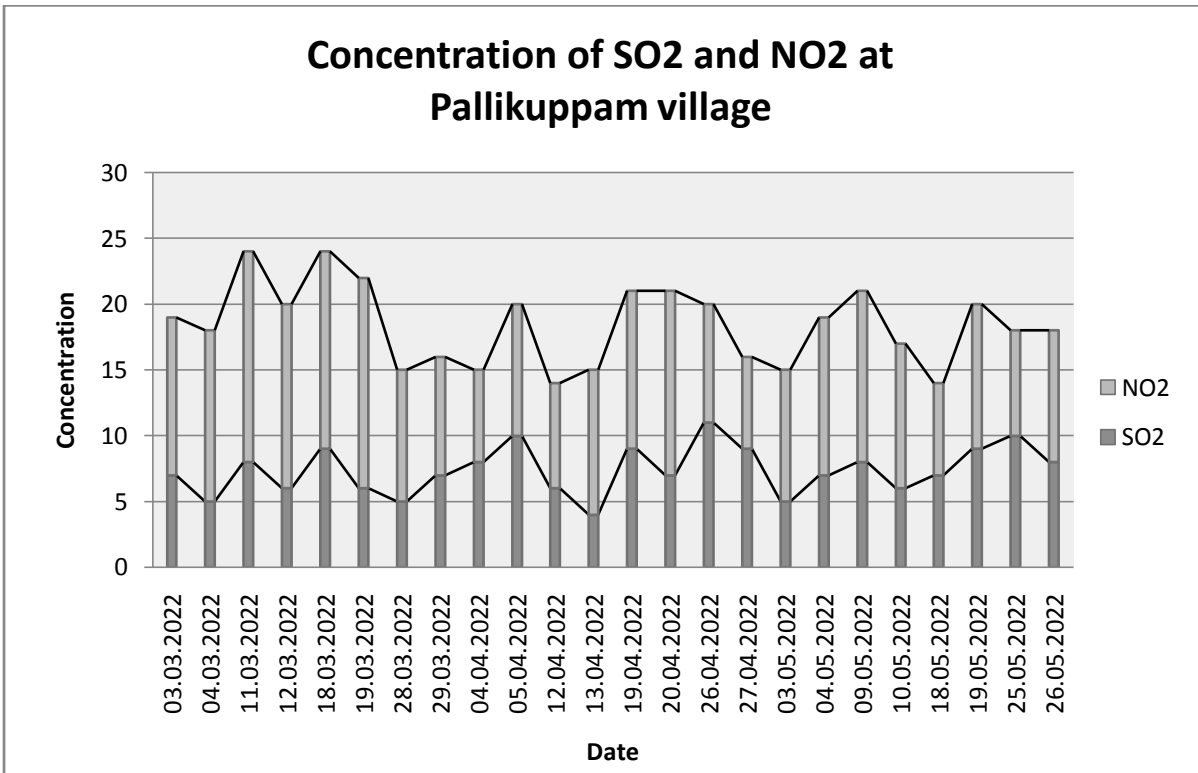
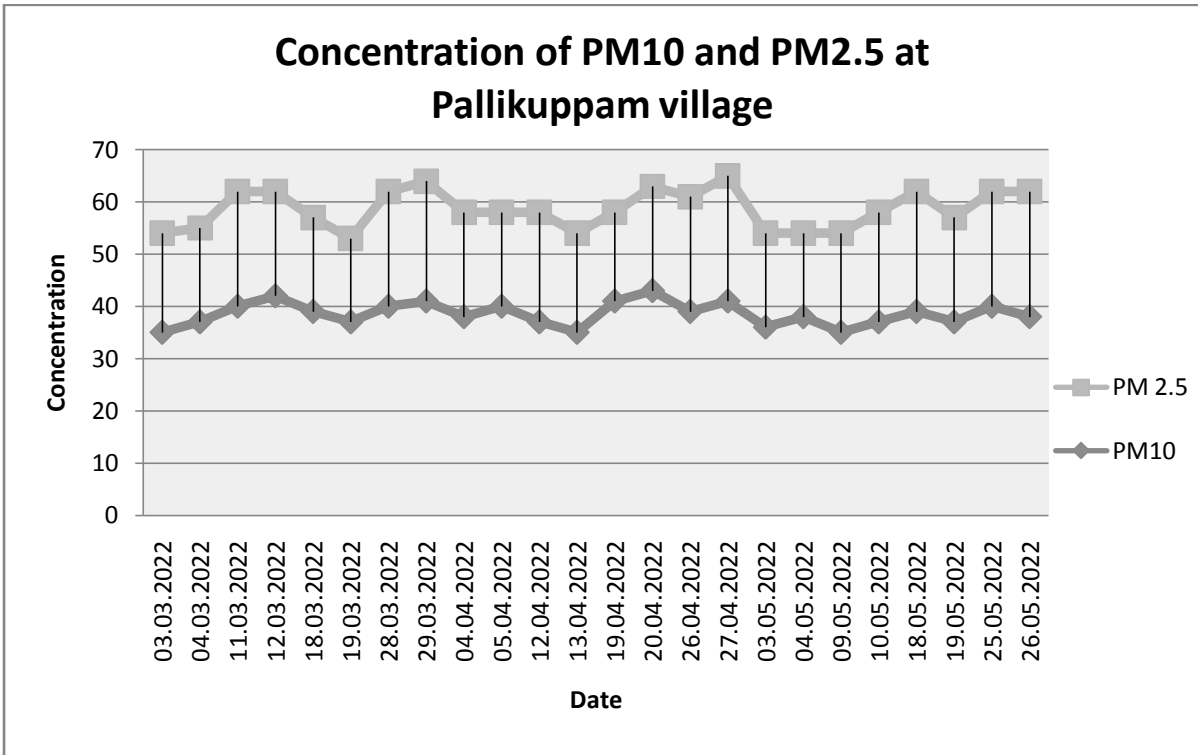


Fig No: 3.4 Variation in Concentration of air pollutants

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3.4.3 Observations of Primary Data

The area generally has low levels of pollutants in ambient air, which is well within the National Ambient Air Quality Standards for industrial or rural areas. This is due to the absence of any major pollution-generating source in the vicinity.

- ✚ Ambient Air Quality Monitoring (AAQM) reveals that the minimum & maximum concentrations of PM₁₀ for all the 5 stations were found to be 35µg/m³ at Pallikuppam village and 52µg/m³ at Gudiyatham.
- ✚ The minimum concentrations of PM_{2.5} for all the 5 stations were found to be 16µg/m³ at Pallikuppam village and at Lease area. The maximum concentration was found to be 30µg/m³ at Gudiyatham.
- ✚ The maximum concentrations of SO₂ were found to be 4µg/m³ at Pallikuppam village and at Lease area. The maximum concentration was found to be 14µg/m³ at Gudiyatham.
- ✚ The minimum NO_x concentrations were recorded as 6µg/m³ at core area and Pallikonda village. The maximum concentration was found to be 18µg/m³ at Gudiyatham. The concentration levels of the above criteria pollutants were observed to be well within the limits of AAQS prescribed by CPCB.

3.5 NOISE ENVIRONMENT

A preliminary reconnaissance was undertaken to identify the major noise generating sources in the area. Five locations (Core Zone & 4 in Buffer Zone) were identified based on the activities in the study area, traffic and sensitive areas like hospitals and schools. The noise monitoring locations are shown in Fig No. 3.5 & 3.6. The sampling locations are shown in Table No. 3.3.

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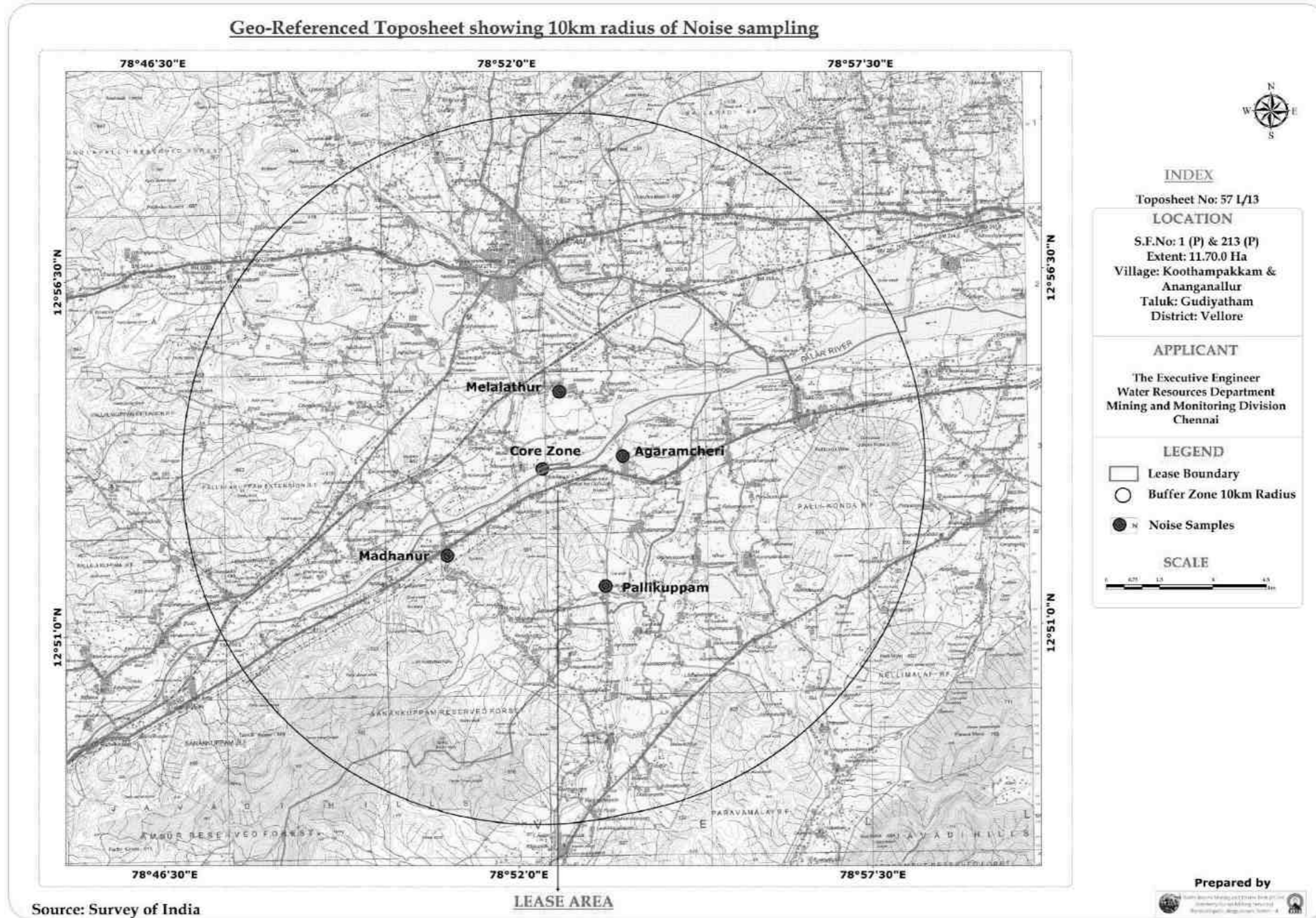


Fig No: 3.5 Geo Referenced Toposheet showing Noise sampling stations around 10km radius

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Table No: 3.3 Noise Sampling Locations

Sl. No	Location	Station code	Distance (km)	Direction
1	Lease area	NQ1	--	--
	Lease boundary pillar (North)	NQ2	0.1	N
	Lease boundary pillar (South)	NQ3	0.1	S
	Lease boundary pillar (East)	NQ4	0.1	E
	Lease boundary pillar (West)	NQ5	0.1	W
2	Melalathur	NQ6	2.06	N
3	Madhanur	NQ7	3.45	SW
4	Agaramcheri	NQ8	1.53	E
5	Pallikuppam	NQ9	3.52	S

3.5.1 Method of Monitoring

Sound Pressure Level (SPL) was measured at nine locations; one reading per hour was taken for 24 hours. The day time noise levels were monitored during 6 am to 10 pm and night time levels during 10 pm to 6 am at all the monitoring locations within the study area (Table No. 3.4).

Table No: 3.4 Noise Monitoring Results in Core and Buffer Zone

Sample code	Location	Decibel dB (A)		TNPCCB Standards
		Day Time	Night Time	
NQ1	Lease area	42.6	34.5	Industrial – 75 dB(A) Residential – 55 dB(A)
NQ2	Lease boundary pillar (North)	41.4	36.6	
NQ3	Lease boundary pillar (South)	43.1	35.4	
NQ4	Lease boundary pillar (East)	42.0	36.2	
NQ5	Lease boundary pillar (West)	43.5	37.5	
NQ6	Melalathur (N)	46.1	37.6	
NQ7	Madhanur (SW)	45.7	35.6	
NQ8	Agaramcheri (E)	43.4	37.3	
NQ9	Pallikuppam (S)	41.0	33.2	
Remarks	Day Time	Leq (6.00 AM to 10.00 PM)		
	Night Time	Leq (10.00 PM to 6.00 AM)		

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(a) Noise monitoring location at Core Zone



(b) Noise monitoring locations at Buffer Zone

Fig No: 3.6 Noise Sampling locations

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3.5.2 Observations

3.5.2.1 Day Time Noise Levels

Noise Monitoring reveals that the maximum & minimum noise levels at day time were recorded as 46.1dB (A) at Melalathur (NQ-6) & 41.0dB (A) at Pallikuppam (NQ-9) respectively in buffer zone. The minimum and maximum noise level at core is 41.4 dB (A) and 43.5 dB (A). The Noise level measured is found within the permissible limits during day time as specified by CPCB Standard.

3.5.2.2 Night Time Noise Levels

The night time noise levels, the maximum & minimum noise levels at Night time were recorded as 37.6 dB (A) at Melalathur (NQ-6) & 33.2 dB (A) at Pallikuppam (NQ-9) respectively. The minimum and maximum noise level at core is 34.5 dB (A) and 37.5 dB (A). The Noise level measured is found within the permissible limits during night time as specified by CPCB Standard.

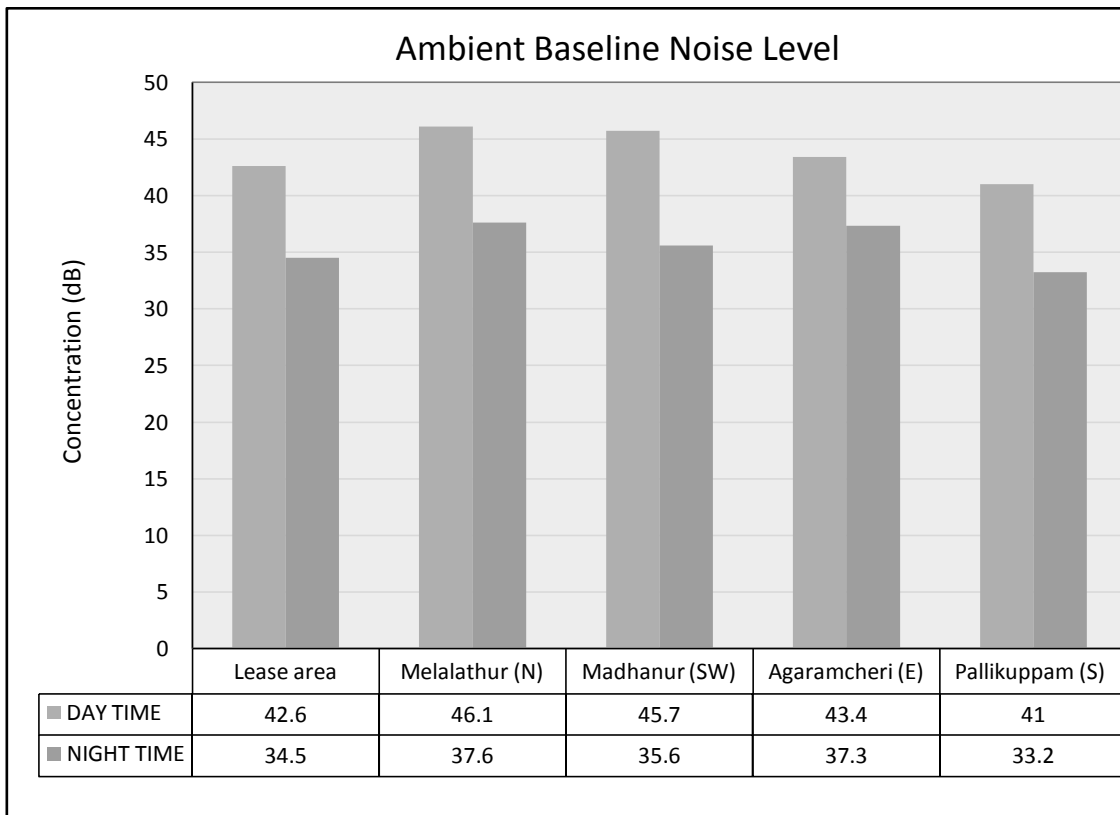


Fig No: 3.7 Noise Level of the Study Area

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3.6 Water Environment

Assessment of baseline data on Water environment includes:

- Identification of surface and ground water sources
- Collection of water samples
- Analyzing water samples collected for Physico-chemical and biological parameters

3.6.1 Selection of Sampling Stations

The samplings were taken from the identified monitoring locations within the 10km radius of the study area. Three water samples were collected to study the water quality of the study area.

3.6.2 Water Quality

Source of water for the proposed project is Palar River. Parameters for analysis of water quality were selected based on the utility of the particular source of water as per MoEF & CC guidance. Methodologies adopted for sampling and analysis of water in according to the Bureau of Indian Standards. The parameters thus analyzed were compared with IS 10500:2012. Core and Buffer Zone water samples are given in the Figure No. 3.8. Details of water sampling locations are present in Table No. 3.5. In addition, water qualities details are given in the Table No. 3.6. The following image of Geo referenced Topomap showing locations of water samples are given in the Figure No. 3.8.

Table No: 3.5 Water Sampling Locations

Sampling Code	Location	Surface/ Ground water	Latitude	Longitude	Distance (km)	Direction
WQ1	Core Zone	Surface Water	12°53'33.14"	78°52'36.67"	-	-
WQ 2	Anangannallore	Ground Water	12°53'29.59"	78°52'12.08"	0.32	NW
WQ 3	Kuthambakkam		0.57	S		
WQ1	Agaramcheri		1.53	E		

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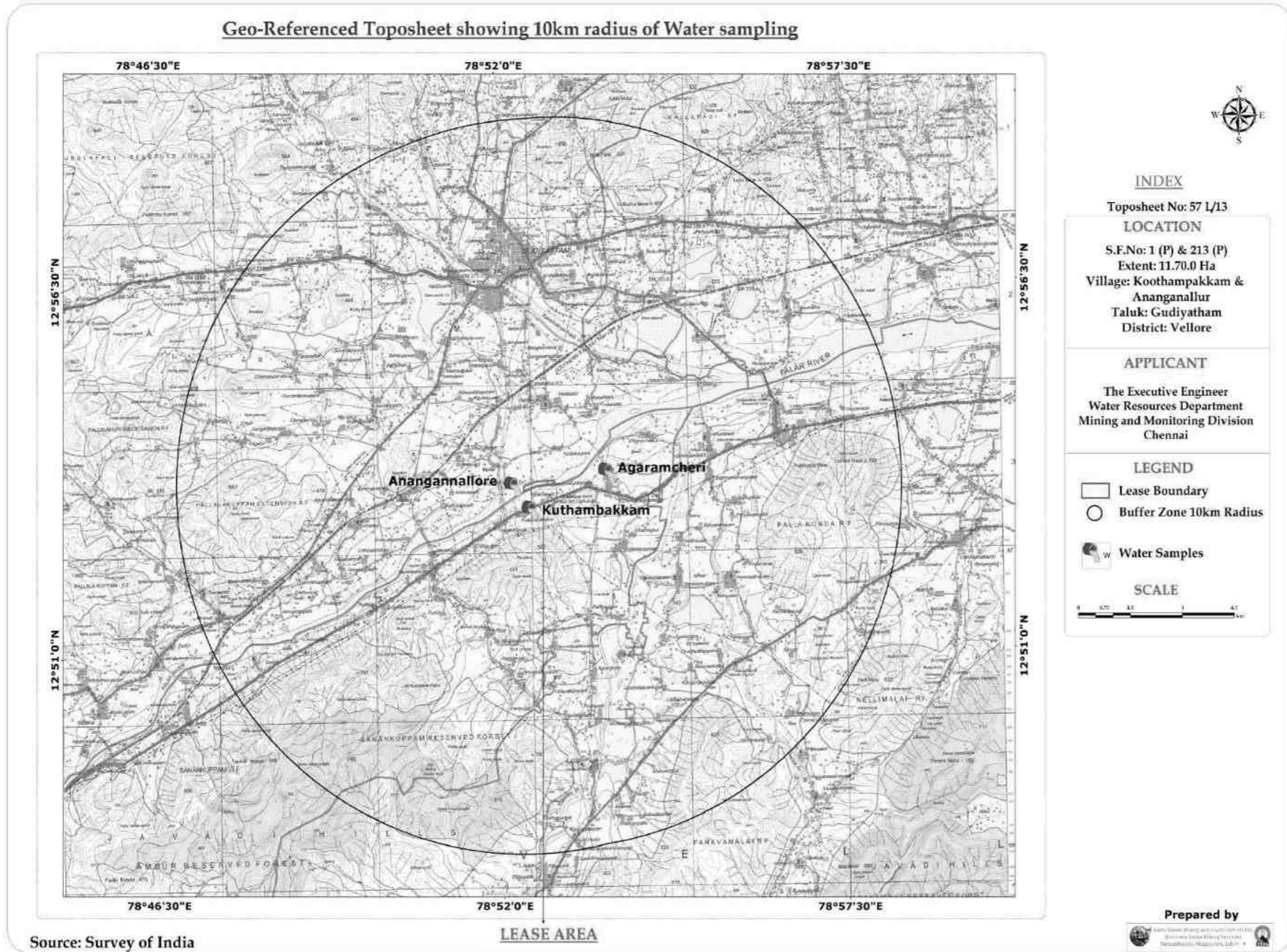


Fig No: 3.8 Geo Referenced Toposheet showing water sampling station around 10km radius

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Fig No: 3.9 Ground Water Sampling

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Table No: 3.6 Result of Water Quality Analysis

Parameters	Units	As Per IS 10500: 2012		Ground water		
		Requirement (Acceptable limit)	Permissible limit in the absence of alternate source	Anangana-llore	Kuthambakkam	Agaramcheri
pH value at 25°C	-	6.5 – 8.5	6.5 – 8.5	7.20	6.48	7.14
Turbidity	NTU	1	5	BDL (DL=0.1)	BDL (DL=0.1)	BDL (DL=0.1)
Electrical conductivity at 25°C	Micro mhos/cm	-	-	1140	1220	1324
Total Suspended Solids	mg/l	-	-	4	2	4
Total Dissolved Solids	mg/l	500	2000	762	796	820
Total Hardness as CaCO ₃	mg/l	200	600	182	236	260
Chlorides as Cl	mg/l	250	1000	92	120	180
Sulfates as SO ₄	mg/l	200	400	14	26	44
Total Iron as Fe	mg/l	0.3	0.3	0.05	0.08	0.06
Total Coli forms	MPN / 100ml	Shall not be detectable in any 100 ml		56	34	50
E.coli	MPN / 100ml	Shall not be detectable in any 100 ml		<2	<2	<2

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3.6.3 Interpretation of Water Quality Data

Ground Water Quality results were compared with Acceptable limits for Drinking Water as per the Standard IS 10500:2012. Some parameters of Water samples did not meet the acceptable limits of IS 10500: 2012, as the values of few tested parameters in each source exceed the limits.

- pH of the water samples ranged from 6.48 - 7.20. Sulphates, pH in water samples collected from all the locations are within the acceptable limit.
- Iron in water samples collected from both core and buffer locations were observed to be Below Detectable Limit.
- Total Dissolved Solids is found in the range of 762 - 820 mg/l from all the locations. The maximum TDS value of 820 mg/l was observed at Agaramcheri Village. Values observed in all the three locations exceed the acceptable limit.
- Total Hardness of water sample varied between 182-260 mg/l and the maximum value was recorded at Agaramcheri Village. In all the three samples TH exceeds the acceptable limits.
- Chloride in the water samples ranged from 92- 180 mg/l. Chlorides in water samples observed is to be well within the acceptable limits.
- Turbidity from the water samples was observed to be Below Detectable Limit.
- On Microbiological parameters, the water sample from all the villages has few counts of Total Coliform as the count is observed as 34-56 MPN/ml. E.coli was found to be <2 MPN/ml in all the water samples.

3.7 Hydro Geology

3.7.1 Geo-hydrogeological Status of the District

Vellore district is underlain by geological formations ranging in age from Archaean to Recent. In the crystalline formations comprising charnockites, gneisses and granites. In the consolidated formations, primary depositional features such as grain size are the major controlling factors. Ground water occurs under phreatic conditions in

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the weathered zone and under semi-confined conditions in the fractures. The thickness of weathered zone varies from less than a metre to about 15m in the area depending on the topography. Potential aquifer zones are also developed in these rocks by fractures persisting to depths, particularly along lineaments and their inter sections. The depth of dug wells in crystalline formations varies from 8 – 19.5m bgl. Fracture zones have been encountered in the well down to a depth of 116 m bgl in the borehole drilled by CGWB. The thickness of alluvium along the course of Palar River ranges from 8 – 12 m. In Gondwana formations, ground water abstraction is through dug wells and dug cum bore wells. These formations have considerably low yield potentials compared to both hard rock and alluvium. Depth of dug wells in Gondwana sediments varies from 6 – 15m bgl with extension of bores at the bottom ranging in depth from 15 – 25 m.

Dug wells are the most common structures in recent alluvial formations too. The depth of dug wells tapping Palar alluvium ranges from 4 – 18.70m bgl. These formations have moderate to good yield potential in the district and can sustain pumping for 3-4 hrs even during peak summer months and have yield up to 4.6 lps. Filter points of 10 – 15m bgl depth are also being used in these formations for tapping ground water for domestic purposes.

The yield of dug wells is less than <1 lps in massive crystalline rocks whereas it is up to 2.3 lps in highly weathered gneisses. The specific capacity of wells tested in the district ranged from 18.82 to 80.58 lpm/m/dd.

The yield of exploratory wells drilled in crystalline rock areas of the district ranged from 0.27 to 10.55 lps. The specific capacity of bore wells ranged from 0.738 to 23.41 lps/m/dd. While the exploratory wells in alluvium have yields in the range of 3 – 7 lps.

During May 2006, the depth to water levels in observation wells tapping shallow aquifer ranged from 1.15 – 18.60 m bgl. Shallow ground water levels i.e. less than 5 m bgl were prominently observed in observation wells at Arcot, Girisamudram, Rangavaram, Ranipet and Vishram, and comparatively deeper ground water levels (10 – 20m bgl) at Asanampatti, Kandhili, K.V.Kuppam, Madhanur, Paradarami, Thirupathur and Thimiri.

The depth to piezometric surface of the deeper fractured aquifers ranged from 3.78 – 21.70m bgl during pre monsoon and 2.08 to 8.02m bgl during post monsoon period.

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3.7.2 Geophysical Electrical Resistivity Survey of Study Area around 500m radius:

The Schlumberger Array

Geophysical Electrical Resistivity survey conducted in schlumberger Configuration (VES) method using IPI2win Software. The Schlumberger array is an array where four electrodes are placed in line around a common midpoint. The two outer electrodes, A and B, are current electrodes, and the two inner electrodes, M and N, are potential electrodes placed close together. With the Schlumberger array, for each measurement the current electrodes A and B are moved outward to a greater separation throughout the survey, while the potential electrodes M and N stay in the same position until the observed voltage becomes too small to measure (source). At this point, the potential electrodes M and N are moved outward to a new spacing. As a rule of the thumb, the reasonable distance between M and N should be equal or less than one-fifth of the distance between A and B at the beginning. This ratio goes about up to one-tenth or one-fifteenth depending on the signal strength. The Schlumberger array is commonly used for vertical electrical sounding (VES) for groundwater and aggregate minerals. Vertical electrical sounding (VES) using the Schlumberger array provides better resolution.

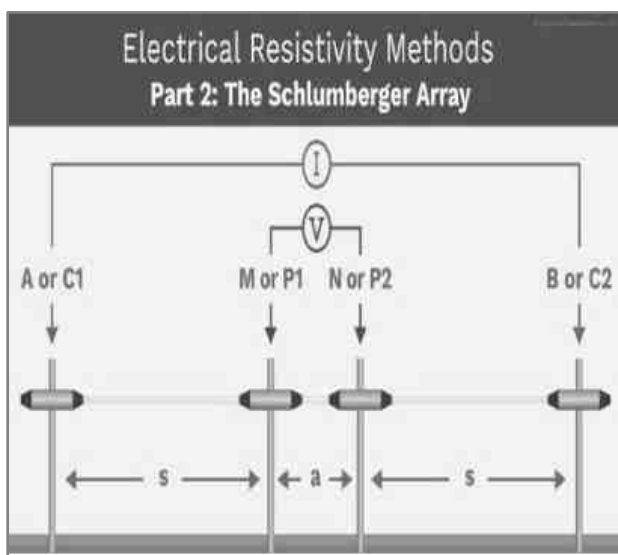


Fig No: 3.10 Schlumberger Array



Fig No: 3.11 Model DDR-3 Electrical Resistivity Meter

The resistivity surveys were carried by the consultants in the site at selected one point at Tested in the proposed Project site. The vertical electrical sounding (VES)

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using digital resistivity meter is carried out and the apparent resistivity curves are obtained. Ipi2win software is used and the data are interpreted. The computer output of geo-electric layers are given in fig-7-8 which gives the apparent resistivity curve, depth wise resistance and interpreted layers with corresponding resistivity.

The study area of lies in the Northern latitude of 12°53'14.93"N, Eastern longitude 78°52'24.26"E which is represented by Toposheet No. 57 L/13. The applied area is mostly plain, elevation of 267m above mean sea level.



Fig No: 3.12 Photos showing Electrical Resistivity survey conducted at near Palar River in Kuthambakkam village

3.7.3 Pump Test

The proposed site for sand quarrying situated in Palar River, which contains fine sand with little soil mixing and waste debris. The Pump test site is located is a flat ground with deposit in clay with hornblende biotite gneiss. There are few bore wells in the around 500m radius buffer zone. One of the well is located which is reported total depth to be 3.5m in depth and gives moderate yield. The bore well is fitted with 7.5 HP submergible pumps and water is pumped at intervals for Agriculture purpose.

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The well recorded static water level of 3.5m and pumping level goes below 5.8m in 60 minutes pumping. In order to avoid dry run of well and ensure sustainability of yield, the well is pumped at intervals. The discharge of the well is measured by volumetric method from the time taken to fill the ground level sump and the estimated discharge is 70 litres per minute (LPM). The pumping test is conducted in the bore well on 18th March 2022 and the drawdown and recovery data are given in Table 3.7 (a) and 3.7 (b)

The pumping head is more than 18.5m and the water level sounder with cable length of 105m were used for recording the fluctuation in water level during pumping and recovery period. The observed recovery data is used to get aquifer characteristics by applying the is recovery formula. The semi-log plot is given in Fig No: 3.14 and the estimated Transmissivity value of 7.7 m²/day.



Fig No: 3.13 Photograph showing measured by discharge water (LPM) in well

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3.7 (a) Table No: Pump Test

Site name with coordinates	Sand quarry in Palar River near Kuthambakkam village, 12°53'15.50"N , 78°52'21.80"E			
Location details	Kuthambakkam and Ananganallore Village Gudiyatham Taluk, Vellore District			
Block	Gudiyatham			
District & State	Vellore & Tamil Nadu			
Type of Well	Bore well : 18.5m			
Date of test & start time	15.10.2022 ; 11.00 hours			
Diameter of well(mm)	-			
Distance from the observation well (mm)	No observation well			
Capacity of pump	7.5 HP			
Discharge (LPM)	70 LPM			
Measuring point (m)	Ground level			
SWL in m below measuring point	3.5m			
Clock Time (HH/MM)	Time since pumping started (Mints)	Pumping Water Level (m bmp)	Draw down (m)	Remarks
11.00	0	3.50	0	Pump started
11.01	1	3.50	0	
11.02	2	3.50	0	
11.03	3	3.51	0.01	
11.04	4	3.51	0.01	
11.05	5	3.52	0.02	
11.06	6	3.52	0.02	
11.07	7	3.53	0.03	
11.08	8	3.53	0.03	
11.09	9	3.54	0.04	
11.10	10	3.54	0.04	
11.12	12	3.55	0.05	
11.14	14	3.56	0.06	
11.16	16	3.57	0.07	70 LPM
11.18	18	3.58	0.08	
11.20	20	3.59	0.09	

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11.25	25	3.65	0.15	
11.30	30	3.70	0.2	
11.35	35	3.80	0.3	
11.40	40	3.90	0.4	
11.45	45	4.0	0.5	
11.50	50	4.10	0.6	
11.55	55	4.20	0.7	
12.00	60	4.30	0.8	Pump stopped

Table No: 3.7 (b) Recuperation Test

Time in Hours	Time since pump stopped (min) (t')	Time since starting of pumping (min) (t)	Water Level (m bmp)	Residual Drawdown RDD (m)	t/t'
12.00	0	100	4.30	0.8	0
12.01	1	101	4.30	0.8	101
12.02	2	102	4.29	0.79	51
12.03	3	103	4.29	0.79	34.33
12.04	4	104	4.28	0.78	26
12.05	5	105	4.27	0.77	21
12.06	6	106	4.26	0.76	17.66
12.07	7	107	4.25	0.75	15.28
12.08	8	108	4.24	0.74	13.5
12.09	9	109	4.23	0.73	12.11
12.10	10	110	4.22	0.72	11
12.12	12	112	4.21	0.71	9.33
12.14	14	114	4.19	0.69	8.14
12.16	16	116	4.15	0.65	7.25
12.18	18	118	4.08	0.58	6.55
12.20	20	120	4.04	0.54	6
12.25	25	125	3.90	0.4	5
12.30	30	130	3.80	0.3	4.33
12.35	35	135	3.75	0.25	3.85
12.40	40	140	3.70	0.2	3.5
12.45	45	145	3.67	0.17	3.22
12.50	50	150	3.65	0.15	3
12.55	55	155	3.65	0.15	2.81
13.00	60	160	3.65	0.15	2.66

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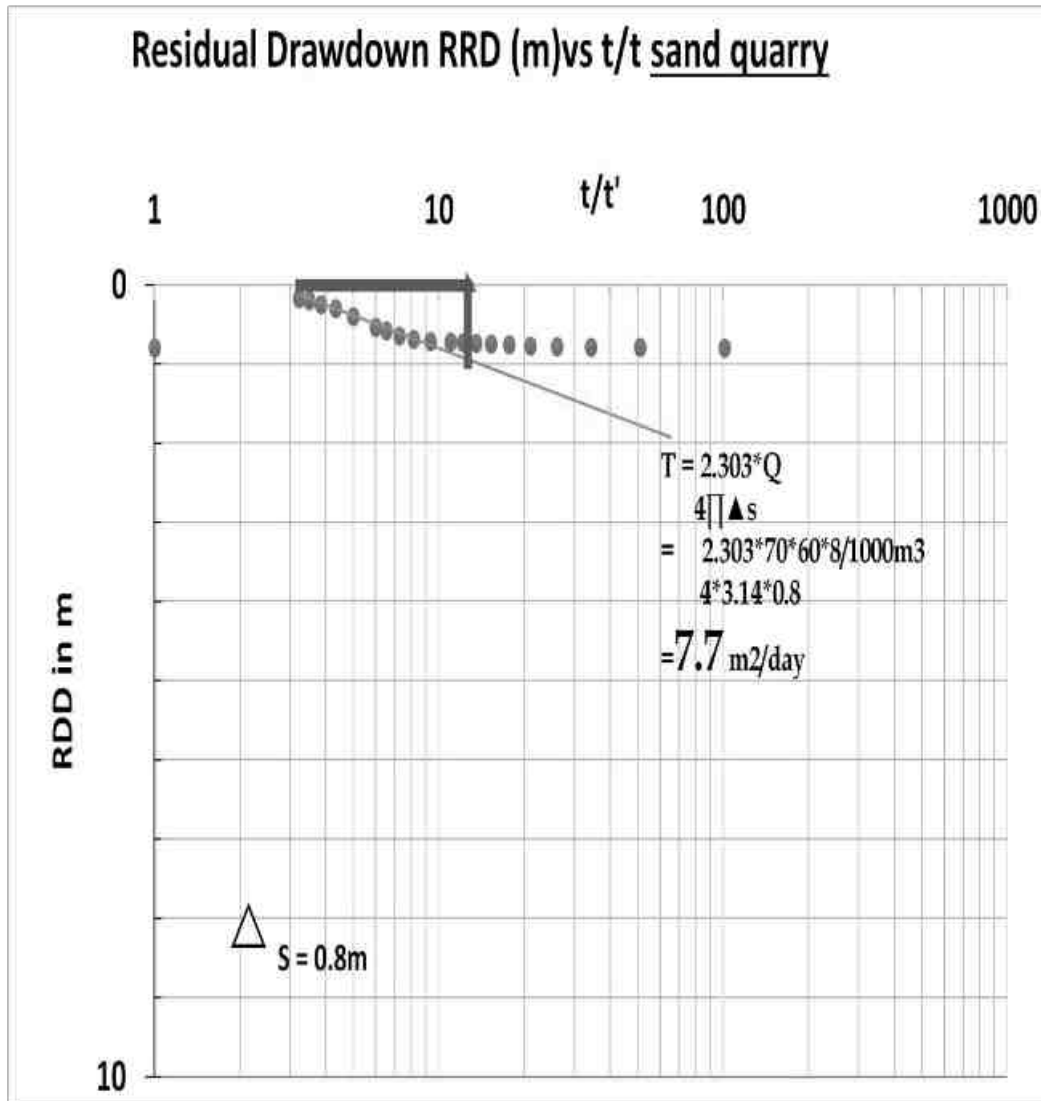


Fig No: 3.14 Residual Drawdown RRD

3.8 Soil Environment

Soil samples were collected from 3 sampling locations within an area of 10 km radius around the project for analysis of the Physico-chemical characteristics of the soil quality. Fig No. 3.15 shows the location of soil sampling stations and Table 3.8 presents the soil quality monitoring locations of the study area. The sampling was carried out once in the study period. The sampling locations have been identified with the following objectives.

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3.8.1 Methodology of Soil Environment

Soil samples were collected from different depth below the surface. The samples were homogenized and the quality was reduced using the coning and quartering method to provide a respective sample for analysis. The samples were analyzed as per Indian Standards IS: 2720 (Revised Parts).

- ❖ To determine the baseline soil characteristics of the study area
- ❖ To determine the impact of the project on soil characteristics and
- ❖ To determine the impact on soils more importantly loss of fertility from agricultural productivity point of view

Table No: 3.8 Soil Sampling Locations

CODE	Place	Latitude (N)	Longitude (E)	Distance w.r.t to Mine Site	Direction w.r.t to Mine Site
SQ1	Lease area	12°53'30.08"	78°52'27.18"	--	--
SQ2	Melalathur	12°54'41.53"	78°52'43.87"	2.06	N
SQ3	Madhanur	12°52'10.74"	78°50'57.37"	3.45	SW

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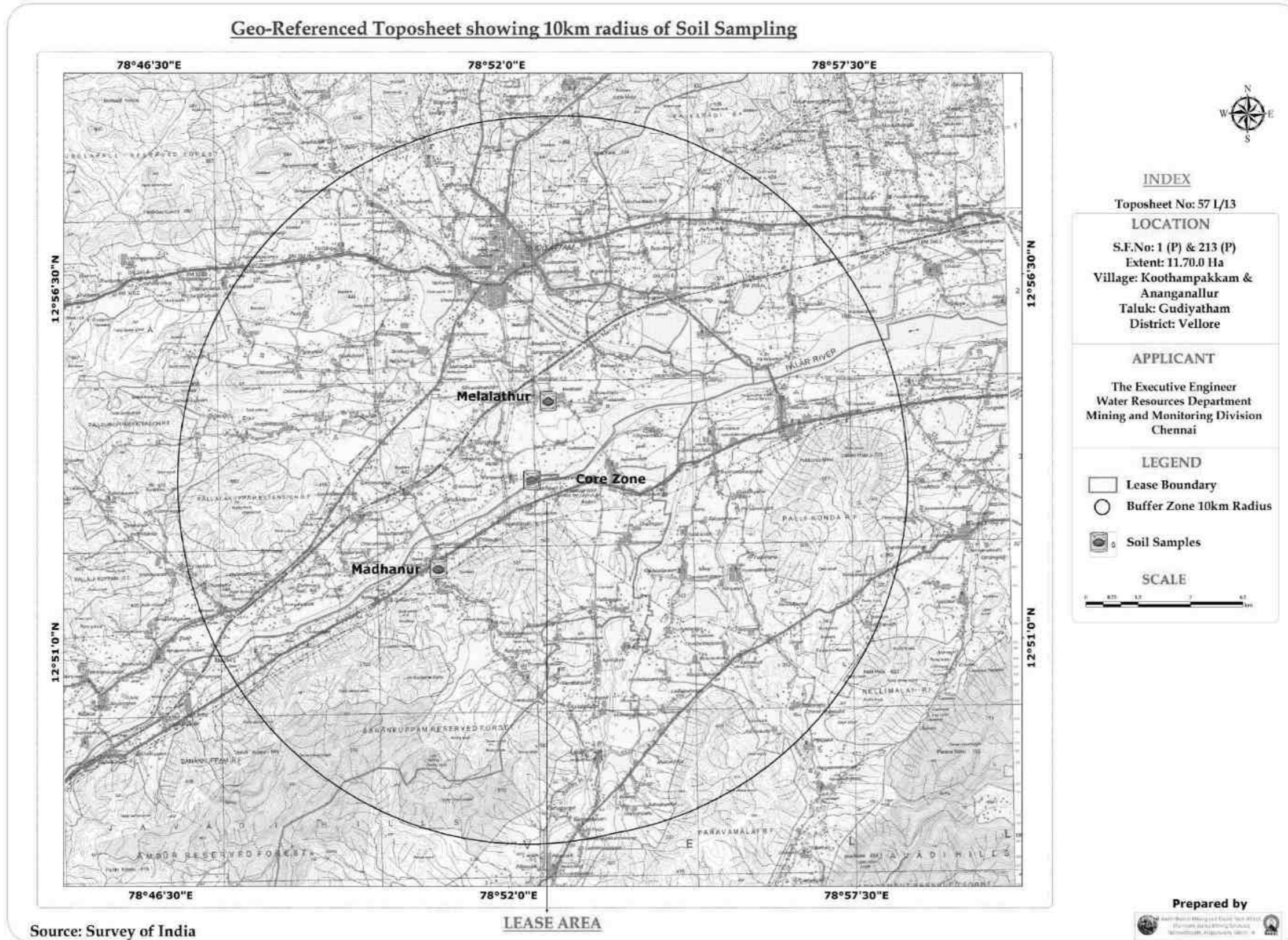


Fig No: 3.15 Geo referenced Toposheet showing Soil sampling Locations around 10km radius

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(a) Soil Sampling at Core Zone



(b) Soil Sampling Locations at Buffer Zones

Fig No: 3.16 Soil Sampling Locations

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Table No 3.9 Result of Soil Sample Analysis

S.No	Parameters	Core Zone	Melalathur	Madhanur
1	pH value	6.60	8.69	8.25
2	EC@ 25°C (Micromhos/cm)	112	146	170
3	Moisture%	0.419	0.36	0.89
4	Bulk Density g/cc	1.38	1.27	1.06
5	Texture %	Sand =56 Silt =32 Clay=12 Sandy Loam	Sand =40 Silt =32 Clay=28 Sandy Loam	Sand =48 Silt =40 Clay=12 Sandy Loam
6	Calcium %	0.54	0.16	0.37
7	Organic Matter %	0.37	0.69	0.97
8	Magnesium %	0.32	0.12	0.77
9	Chloride%	0.4	0.9	0.7
10	Water Holding Capacity%	48	44	72

3.8.2 Observations

Soil characteristics were delineated through specific parameters viz. moisture, bulk density, texture, water holding capacity, organic matter and other parameters as depicted in Table No. 3.9.

pH is an important parameter indicative of alkaline or acidic nature of soil. It greatly affects the microbial population as well as solubility of metal ions and regulates nutrient availability. The pH varies from 7.60 to 8.69 in all the three soil samples.

Electrical conductivity (EC), a measure of soluble salts in the soil was in the range of 112 $\mu\text{S/cm}$ to 170 $\mu\text{S/cm}$ in all the samples.

Regular cultivation practices increase the **bulk density** of soils thus inducing compaction. This results in reduction in water percolation rate and penetration of roots through soils. The soils with low bulk density have favorable physical conditions

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whereas those with high bulk density exhibit poor physical conditions for agriculture crops. The bulk density of the soil samples are in the range of 1.06 g/cc to 1.38 g/cc respectively, which indicate favorable physical condition for plant growth.

Water holding capacity was found to be in the range of 44 % & 72 % whereas the **texture** of soil was found to be Sandy Loam.

Organic matter present in soil influences its physical and chemical properties and is responsible for stability of soil aggregates. Organic matter was found to be in the range of 0.37% – 0.97%. This shows that soil was deficient in organic matter content.

3.9 ECOLOGY AND BIOLOGICAL ENVIRONMENT

3.9.1 Description of Vellore District Environment

Biological diversity is the variability among living organisms from all sources, including genes, species and ecosystems level and is very crucial for maintaining the basic processes on which the life depends. The Biological study was under taken by ecology & biodiversity expert, as a part of the EIA studies. In study area, to understand the present status of the ecosystem, this is to compare it with the past ecosystem. This is help to predict changes in the biological environment.

The average annual rainfall is 795mm, out of which Northeast monsoon contributes to 535mm and the Southwest monsoon contributed to 442mm. The Southwest monsoon, with an onset in June and lasting up to August, brings scanty rainfall. The bulk of the rainfall is received during the Northeast monsoon in October, November and December. The humidity ranges from 40%–63% during summer and 67%–86% during winter.

Soils have been classified into 1) Sandy soil 2) Sandy loam 3) Red loam 4) Clay 5) Clayey loam and 6) Black cotton soils. The red loamy soils are generally observed at the highest elevations whereas the black cotton soils invariably occupy the valley areas. Other types of soils are found at Intermediate elevations

3.9.2 Agriculture activities in Vellore District

Rice, Maize, Ragi, Sugarcane, Pulses, Groundnut, Banana and Coconut, are cultivated extensively in Vellore district, while Cotton is cultivated in a few places. The total land

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used for cultivation of these crops is 2, 76,062 ha. The major crop in Vellore District/ Palar basin is paddy.

Table No 10 Details of Important crops in Vellore district

Sl. No	Common name	Scientific name	Family
1.	Paddy	Oryza sativa	Poaceae
2.	Cholam	Sorgham bicolor	Poaceae
3.	Cumbu	Pennisetum glaucum	Poaceae
4.	Sugarcane	Saccharum officinarum	Poaceae
5.	Onion	Allium cepa	Amaryllidaceae
6.	Gingelly	Sesamum indicum	Pedaliaceae
7.	Maize	Zea mays	Poaceae
8.	Coconut	Cocus nucifera	Arecaceae
9.	Groundnut	Arachis hypogaea	Fabaceae
10.	Sunflower	Helianthus annus	Asteraceae
11.	Cotton	Gossypium herbaceum	Malvaceae
12.	Green gram	Vigna radiata	Fabaceae
13.	Black gram	Vigna mungo	Fabaceae
14.	Chillies	Capsicum annum	Solanaceae
15.	Turmeric	Curcuma longa	Aingiberaceae

3.9.3 Forest resources

The geographical area of the Vellore District is about 6077 Sq. Km in which Vellore Forest Division covers an extent of 1002.722 Sq.Km (100272.22 Ha). Vellore forest division comprises of territorial ranges such as Vellore, Arcot, Gudiyatham, Odugathur, Amirdhi, Pernampet and Rowing Check Post Range.

Forest types ranging from tropical southern dry mixed deciduous types to tropical dry evergreen scrub forest types are found distributed in the division. The sandal wood, Terminalia spp, Albizzia spp, Zyziphus, bamboo are the principal species found distributed in the region.etc., The forests are rich in Avifauna and reptiles which

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includes monitor lizard, varieties of vipers, kraits etc., Wild animals such as Indian gaur, Sloth bear, leopard, wild boar etc., are commonly found in the division.

Amirthi Mini Zoo is located about 25km from Vellore City; inside the Thellai Reserve Forest of Amirthi range with a semi-perennial falls nearby is the only Eco-tourism place present in Vellore Forest Division.

3.9.4 Water resources

Major part of the district falls in Palar river basin. Palar River is the major river draining the district, flowing towards east for a distance of about 295 km. It runs parallel to the hill ranges of the Eastern Ghats for a major part of its course. It has a vast flood plain in the lower reaches, but is dry for major part of the year. Ponnaiyar, Cheyyar, Pambar and Malattar are some of the major tributaries of Palar draining the district. Almost all the streams are ephemeral in nature and are mostly structurally controlled. The Palar is the longest of the rivers in the districts bordering Chennai and has been a major source of drinking water for the State capital and its suburbs.

3.9.5 Study Area Ecology

A survey was conducted to study the flora around 10 km radius. Some of the information was gathered from the local habitants. All the collected data were classified to interpret the impact of pollution on the flora and fauna of that region. Survey of the wild plants as well as cultivated crop plants was made and all the available information was recorded. The primary data collected was compared with the Secondary data collected from Forest Department. There are no ecologically sensitive areas such as Biosphere reserves, Wildlife Sanctuaries, national Parks and other protected areas in or around the project site in a radius of 10 km. Generate Baseline Data from field observations.

3.9.6 Methodology of Sampling

A methodology of Sampling Flora and fauna studies were carried out during the winter season to assess the list of terrestrial plant and animal species that occur in the core area and the buffer area up to 10 km radius from the project site. No damage is created to flora and fauna during the sampling. None of the specimens were collected as voucher specimens and for the herbarium. It is basically done through field observations only. The study of flora is conducted as per the guidelines

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of the Ministry of Environment Forest and Climate Change (MoEFCC) and Botanical Survey of India (BSI).

The study involved in the collection of primary data by conducting a survey in the field, examination of flora and fauna records in previously published reports and records. Analysis of the information is the view of the possible alteration in the environment of the project site. For the survey of fauna, both direct and indirect observation methods were used.

3.10 Flora

The present study on the floral assessment for the existing project activity is based on extensive field survey of the area. The plant species were identified with the help of plant taxonomy manual, literatures and Botanical Survey of India website (efloraindia.nic.in). In addition besides the collection of plant species, information was also collected with vernacular names of plant species made by local inhabitants.

3.10.1. Flora in Core Zone

The Core zone comprises of Palar River bed, where mining operation is proposed. Most among them are weeds. Taxonomically a total of 13 species distributed in 8 families have been recorded from the core mining lease area. Based on habitat classification & their families of the enumerated plants there were tree - 2 followed by herbs 5 and shrubs - 3 (Fig No. 3.17).

No ecologically sensitive plant species has been reported from this area. The vegetation shown in Table No. 3.11 and Fig No. 3.17.

Table No 3.11 Flora in Core area (The Executive Engineer, Kuthambakkam & Ananganallore, Vellore, Tamilnadu, India)

Sl. No.	Common name/English name	Local name	Family	Scientific name
TREES				
1.	South West Thorn	Mullu Maram	Fabaceae	<i>Prosopis Juliflora</i>
2.	Casuarina	Savukku	Casuarineaceae	<i>Casuarina equisetifolia.</i>
SHRUBS				
3.	Crown Flower,	Erukku Plant	Apocynaceae	<i>Calotropis gigantea</i>

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4.	Feather Reed Grass	Nanal grass	Poaceae	<i>Calamagrostis xacutiflora</i>
5.	Nut grass	Korai	Cyperaceae	<i>Cyperus rotundus</i>
6.	Halopyrum	Uppukarai Pullu	Poaceae	<i>Halopyrum mucronatum</i>
HERBS				
7.	Indian doab	Arugampul	Poaceae	<i>Cynodon dactylon</i>
8.	Kusha grass	Kusha grass	Poaceae	<i>Desmosta chyabipinnata</i>
9.	AervaLanta	Poolai poo	Amaranthaceae	<i>Aerva Lanata</i>
10.	Poppy	Bramma thandu	Papaveraceae	<i>Argemone maxicana</i>
11.	purple nuts	Nut grasses	Cyperaceae	<i>Bulbostyli spuberula</i>
12.	Ravanna's Moustache	Ravannan meesai	Poaceae	<i>Spinifex littoreus</i>
13.	Gisekia	Manal Keera	Molluginacea	<i>Gisekia pharnaceoids</i>

3.10.2. Flora in Buffer Zone

Taxonomically a total of 35 species distributed among 21 families have been recorded from the buffer area. Based on habitat classification of the enumerated plants the majority of species were tree 12 followed by Herbs & grasses – 6 and shrubs 4 (Fig No. 3.17). Details of flora with the scientific name were mentioned in Table No. 3.12.

Table No 3.12 Flora in Buffer area (The Executive Engineer, Kuthambakkam & Anangannallore, Vellore, Tamilnadu, India)

Sl. No	Common Name/English Name	Tamil Local Name	Scientific Name	Family Name
TREES				
1.	Mango	Manga	Mangifera indica	Anacardiaceae
2.	Casuarina	Savukku	Casuarina equisetifolia	Casureneiaceae
3.	Neem	Vembu	Azadirachta indica	Meliaceae
4.	Palmyra palm	Panai	Borassus flabellifer	Arecaceae
5.	South West Thorn	Seemai karuvellam	Prosopis juliflora	Fabaceae

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6.	Tamarind	Puliyamaram	Tamarindus indica	Fabaceae
7.	Teak tree	Thekkumaram	Tectona grandis	Lamiaceac
8.	Papaya Tree	Papalimaram	Carica Papaya	Caricaceae
9.	Coconut tree	Thennai	Cocos nucifera	Arecaceae
10.	Bamboo tree	Mungilmaram	Bambuso ideae	Poaceae
11.	Banana Tree	Vazhaimaram	Musa Acuminata	Musaceae
12.	Eucalyptus	ThailaMaram	Eucalyptus obliqua	Myrtaceae
13.	Drumstick tree	Murungai	Moringa oleifera	Moringaceae
SHRUBS				
14.	Crown flower	Eukkampu	Calotropis gigantea	Asclepiadaceae
15.	Hibiscus	Cembarutti	Hibiscus rosanaceae	Malvaceae
16.	Coat buttons/ tridax- daisy	Thatha herb	Tridax procumbens	Asteraceae
17.	Halopyrum	Uppukarai Pullu	Halopyrum mucronatum	Poaceae
HERBS & GRASSES				
18.	Indian Copper leaf	Kuppaimeni	Acalypha indica	Euphorbiaceae
19.	Bristly starbur	Kombumul Mullicheddi	Acanthospermum hispidum	Asteraceae
20.	Indian doab	Arugampul	Cynodon dactylon	Poaceae
21.	Poolai poo	Cri pulai ulinai	Aerva lanata	Amaranthaceae
22.	Budda pea	Netti vagai kothiram	Aeschynomene indica	Fabaceae
23.	Indian joint vetch	chadai	Alysicarpus monilifer	Fabaceae
24.	Poppy	Bramman Thandu	Argemone maxicana	Papaveraceae
25.	palisade grass	Pala pul	Brachiaria ramosa	Poaceae
26.	purple nuts	Nut grasses	Bulbostylis barbata	Cyperaceae
27.	Dense tuft hair sedge	Thread leaf beak seed	Bulbostylis puberula	Cyperaceae
28.	swollen finger grass	purpletop chloris	Chloris barbata	Poaceae
29.	Vennai thiratti pul	Vennai thiratti pul	Trachys muricat	Poaceae
30.	Ravanna's	Ravannan meesai	Spinifex littoreus	Poaceae

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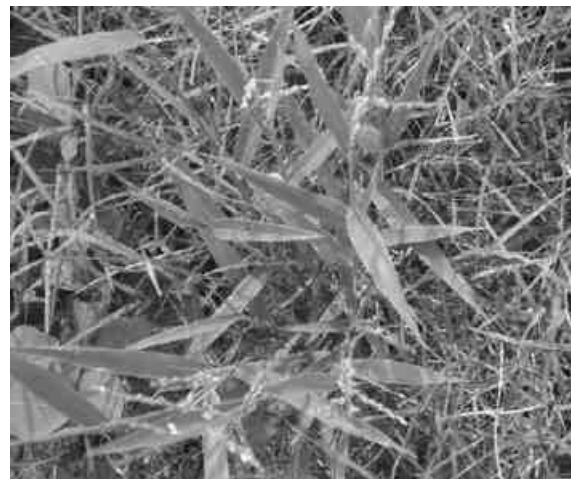
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	Moustache			
31.	Beach Launaea	chentham	Launaea sarmentosa	Asteraceae
32.	Gisekia	Manal Keera	Gisekia pharnaceoids	Molluginaceae
33.	Queensland Flatsedge	Cyperus hyalinus Vahl	Kyllinga hyalina	Cyperaceae
34.	sensitive plant,	thottacininki	Mimosa pudica	Mimosaceae
CLIMBER				
35.	Canavalia cathartica	Kaattu thammattai	Canavalia catharticaThouars	Fabaceae



(a) Ravannan meesai - Spinifex littoreus

(b) Brama thandu- Argemone Mexicana



(c) Kaattamani- Ipomoea carnea

(d) pala pul - *Brachiaria ramosa*

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(e) Seemai karuvellam- *Prosopis juliflora*



(f) Thumbai- *Leucas aspera*



(g) Thailamaram- *Eucalyptus globules*



(h) Panai maram- *Borassus flabellifer*



(i) Kusha grass- *Desmosta chyabipinnata*



(j) Ammannia waterwort – *Bergia Sps.*

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(k) Eurukkampu - *Calotropis gigantea*



(l) Umatham poo – *Datura stramonium*



(m) Korai Pull - *Cyperus rotundus*



(m) Veppa maram – *Azadirachta indica*

Figure No: 3.17 Flora in Core and Buffer Area

3.11. Fauna

The fauna survey has been carried out as per the methodology cited and listed out Mammals, birds, Reptiles, Amphibians, and Butterflies. All the listed species were compared with Red Data Book and Indian Wildlife Protection Act, 1972.

3.11.1. Fauna methodology

The study of fauna takes a substantial amount of time to understand the specific fauna characteristics of the area. The assessment of fauna has been done on the bases of primary data collected from the lease sites. The presence was also

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confirmed from the local inhabitants depending on the animal sightings and the frequency of their visits in the project area. In addition officials, local peoples were another source of information for studying the fauna of the area. Field activities are physical/active search, covering rocks, burrows, hollow inspection and location of nesting sites and habitat assessment etc. Taxonomical identification was done by the field guide book and wildlife envis database ([wiienvi.nic.in/Database/Schedule Species Database](http://wiienvi.nic.in/Database/ScheduleSpeciesDatabase)) and Zoological Survey of India (ZSI).

Table No: 3.13 Methodology applied during survey of fauna

S. No	Taxa	Method of Sampling	References
1	Insects	Random walk, Opportunistic observations	Pollard (1977); Kunte (2000)
2	Reptiles	Visual encounter survey (Direct Search)	Daniel J.C (2002)
3	Amphibians	Visual encounter survey (Direct Search)	
4	Mammals	Tracks and Signs	Menon V (2014)
5	Avian	Random walk, Opportunistic observations	Ali S (1941); Grimmett R (2011); Collins 2015

3.11.2. Fauna in Core Zone

Varieties of species were observed in the core zone (0-2km radius) of the sand mining (Table No.3.14). Number of species decreases towards the mining area this might be due the lack of vegetation and forest cover in mining lease area. None of these species are threatened or endemic.

Table No: 3.14 Fauna in Core area (The Executive Engineer, Kuthambakkam & Ananganallore, Vellore, TamilNadu, India)

Sl. No	Common name	Family name	Scientific name
BIRDS			
1.	White throated king fisher	Alcedinidae	Halcyon smyrnensis
2.	Black Throated	Passerellidae	Amphispiza bilineata

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	Sparrow		
3.	Cattle egret	Ardeidae	Bubulcus ibis
4.	House crow	Corvidae	Corvus splendens
5.	Common cuckoo	Cuculidae	Cuculus canorus
6.	Common myna	Sturnidae	Acridotheres tristis
7.	Eagle	Accipitridae.	Haliaeetus leucocephalus
8.	Rock pigeon	Columbidae	Columba livia
REPTILES			
9.	Chameleon	Chamaeleonidae	Chameleon zeylanicus
10.	Common garden lizard	Agamidae	Calotes versicolor
11.	Common house gecko	Gekkonidae	Hemidactylus frenatus
INSECTS			
12.	Red-veined darter	Libellulidae	Sympetrum fonscolombii
13.	Milkweed butterfly	Nymphalidae	Danaus plexippus
MOLLUSCA			
14.	Freshwater Snail	Mollusca	Gastropod mollusks

3.11.3. Fauna in Buffer Zone

Taxonomically more number of species has been recorded from the buffer mining lease area. Based on habitat classification the majority of species were insects, mammals and Birds (Fig No. 3.18). There were no critically endangered, endangered, vulnerable and endemic species were observed. Details of fauna with the scientific name were mentioned in Table No. 3.15.

Table No: 3.15 Fauna in Buffer area (The Executive Engineer, Kuthambakkam & Ananganallore, Vellore, Tamilnadu, India)

S.No	Common name/English name	Family name	Scientific name
MAMMALS			
1.	Palm squirrel	Sciuridae	<i>Funambulus pennantii</i>
2.	Common mongoose	Herpestidae	<i>Herpestes edwardsii</i>
3.	Common mouse	Muridae	<i>Mus musculus</i>

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4.	Cat	Felidae	<i>Feliscatus</i>
5.	Indian dog	Canidae	<i>Canis lupus familiaris</i>
6.	Indian cow	Bovidae	<i>Bosindicus</i>
7.	Buffalo	Bovidae	<i>Bubalusbubalis</i>
8.	Domestic pig	Suidae	<i>Susscrofadomesticus</i>
BIRDS			
9.	Black kite	Accipitridae	<i>Milvusmigrans</i>
10.	Indian robin	Muscicapidae	<i>Saxicoloidesfulicatus</i>
11.	Red vented bulbul	Pycnonotidae	<i>Pycnonotuscafer</i>
12.	Thick billed warbler	Acrocephalidae	<i>Phragamaticolaaedon</i>
13.	Small mini vert	Campephagidae	<i>Pericrocotus cinnamomeus</i>
14.	koel	Cuculidae	<i>Eudynamysscolopa</i>
15.	Rock pigeon	Columbidae	<i>Columba livia</i>
16.	House crow	Corvidae	<i>Corvussplendens</i>
17.	House sparrow	Passeridae	<i>Passer domesticus</i>
18.	Common hen	Phasianidae	<i>Gallus Gallusdomesticus</i>
19.	Common cuckoo	Cuculidae	<i>Cuculuscanorus</i>
REPTILES			
20.	Common garden lizard	Agamidae	<i>Calotesversicolor</i>
21.	Toad	Bufo	<i>Bufo melanostictus</i>
22.	House lizard	Gekkonidae	<i>Hemidactylus frenatus</i>
INSECTS			
23.	Plain tiger	Nymphalidae	<i>Danauschysippus</i>
24.	Common lime	Papilionidae	<i>Papiliodemoleus</i>
25.	Small grass yellow	Pieridae	<i>Euremabrigitta</i>

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(a) Common lime- *Papilio demoleus*



(b) Thick billed warbler – *Phragmaticolaedon*



(c) Crow - *Corvus splendens*



(d) Common Cow- *Bos indicus*



(e) Dog- *Canis lupus familiaris*



(f) Hen - *Gallus gallus domesticus*

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(g) Sparrow – Passer domestics

Fig No: 3.18 Fauna in Study Area

3.12 SOCIO-ECONOMIC ENVIRONMENT

3.12.1 Introduction

The major developmental activities in industrial sector are required for economic development as well as creation of employment opportunities (direct and indirect) and to meet the basic/modern needs of the society, which ultimately results in overall improvement of the quality of life through upliftment of social, economic, health, education, and nutritional status in the project region, state as well as the country. In this manner all developmental projects have direct as well as indirect relationships with socioeconomic aspects, which also include public acceptability for new developmental projects. Thus the study of socioeconomic component incorporating various facets related to prevailing social and cultural conditions and economic status of the quarry project region is an important part of EIA study. The study of these parameters helps in identification, prediction and evaluation of the likely impacts on the socioeconomics and parameters of human interest due to the project.

3.12.2 Proponent Details

The report deals with the Socio-Economic Impact Assessment of the sand Project promoted by The Executive Engineer, Water Resources Department, Mining and Monitoring Division, Chennai, Tamil Nadu, has applied for grant of sand Quarrying in Palar River over an extent of 11.70.0 Hectares in S.F. No.1 (P) & 213 (P) in

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Kuthambakkam and Ananganallore Village, Gudiyatham Taluk, Vellore District, Tamil Nadu.

The objectives of the socio-economic impact assessment are as follows:

- a) To study the socio-economic status of the people living in the study area of the quarry project.
- b) To assess the impact on socio-economic environment due to the quarry project.
- c) To study the socio economic environment like noise, water due to impact of the quarry project.

3.12.3 Baseline Information

The baseline information is collected in order to define the socio-economic profile of the study area. The process related database thus generated includes:

- Demographic structure
- Infrastructure base in the area
- Economic structure
- Health status
- Cultural attributes
- Public awareness and their concern about the project

3.12.4 Methodology

The methodology adopted for the socio economic impact assessment is as follows:

- a) The details of the activities and population structure have been obtained from Census 2001 and 2011 and analyzed.
- b) Based on the above data, impacts due to quarry operation on the community have been assessed and recommendations for further improvement have been made.

3.12.5 Collection of Data from Secondary Sources:

Data from secondary sources were collected on following aspects:

- Demographic profile of the area
- Social profile of the area
- Economic profile of the area, and
- Land use pattern

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Table 3.16 Type of Information and Sources

Information	Source
Demography	District Census Handbook, Govt. of India
Land use	District Census Handbook, Govt. of India
Social Profile of the area	Google Earth image, Topographic Maps (SOI)
Economic profile of the area	Census of Tamil Nadu
District profile	District Census Handbook, Tamil Nadu

3.12.6 Population Characteristics-Kuthambakkam & Ananganallore Village, Kudiyatham Taluk, Vellore district (2001-2011).

In Kudiyatham taluk, Kuthambakkam village had a total household 424 in 2001 which is increased to 462 in according to census 2011. Village had a total person of 1746 in 2011 census previous census 1881 persons in 2001. There were about 918 men (50 %) according to 2011 census and 840 men (51 %) in 2001 census marking a decrease of 314 men over the previous census. During 2001 there were about 906 women (48 %), which is increase to 963 (50 %) in 2011 census.

Kuthambakkam village had a literate accounted for 1456 persons (77.4 %) in 2001 and increased to 680 persons (52.4 %) in 2011. There were about 61 percent males in 2001 and 67 percent in 2011. There were about 1142 (40 %) females increased to 777 (41.3 %) classes as literates in 2011.

Sex composition is the most important demographic characteristics that affect the incidence of birth and death. The average sex ratio in Gudiyatham Taluk, Kuthambakkam village was 954 during 2001 and increased to 980 the year of 2011. The highest sex ratio may be either due to the migrants for educational purpose and employment opportunities and due to infant birth of female is very high. The population characteristics of Chendarapalli Village (2001-2011) are shown in Table 3.17 and Fig no. 3.19.

Table 3.17 Population Characteristics of Chendarapalli Village (2001-2011)

S.no	Characteristics	2001	%	2011	%
1	Total Household	1179		1507	
2	Rural population	5768	-	6467	-
3	Male Population	2952	51.18	3266	50.50
4	Female Population	2816	48.82	3201	49.50

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5	Rural Literacy	2953	51.20	3817	59.02
6	Male Literacy	1811	61.35	2188	66.99
7	Female Literacy	1142	40.55	1629	50.89
8	Sex Ratio		954		980

Source: Census 2001 & 2011, Kuthambakkam & Ananganallore village, Gudiyatham Taluk, Vellore District, Tamilnadu.

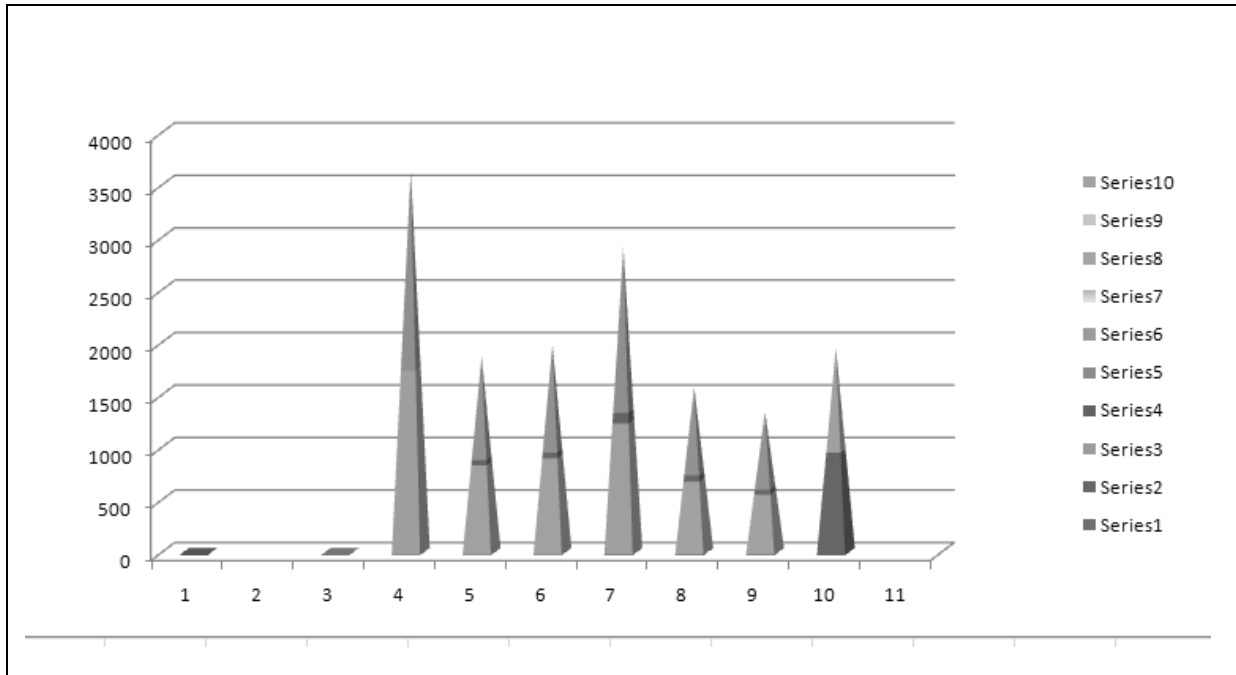


Fig No: 3.19 Population Characteristics of Kuthambakkam Village (2001-2011)

3.12.7 Occupational Characteristics – Kuthambakkam & Ananganallore Village

The term workers denote the population engaged in primary, secondary and tertiary activities classified in the census reports of Indian government. During the year 2001 **Kothampakkam & Ananganallore is a village located in Madhavanur Block in Vellore District, Tamil Nadu.**

The Occupational structure in terms of analyzing the geographical, economic and technological development of various factors among these in this Kuthambakkam village denote the workers population are classified in the census reports in Indian government. Based on the social economic survey primary and secondary data

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collected from the EIA team likely impacts on the socio-economic scenario from the mining site in 10 km buffer zone implemented in this surrounding villages where its monitoring and analyzing the social consequences in this mine site area.

In Kuthambakkam & Ananganallore village in 2001 total main workers 771 and in 2011 the total main workers are 544 where the male workers are in 2001 (497) and the Female workers (274) and in 2011 the male workers (383)and the female workers (161)and the total Non-workers in 2001(o)and in 2011 the non-workers are 1007 where the male non-workers are 339and the female non-workers are 668.

There are three phases of occupational distributions and economic development and growth rate of populations in census of Indian government. In First phase the agriculture proportions of people are working in this site, the second phase where the populations are continuing in this agro-based industries and as well as migrating one place to another place for manufacturing or employ engaged, the third phase the distributions of the occupational characteristics growth rate of working population becomes greater than or differentiates in the secondary census data wise.

The study area has experienced a change in the occupational structure in the form of a decline in the proportion of cultivators, agricultural laborers and an increase in the proportion of tertiary workers.

As per the occupational pattern differentiated in 2001 and 2011 census the workers are classified main workers, marginal workers, non-workers, cultivators and agricultural workers, marginal house hold workers. More opportunities' nearby villages for giving employing the local people for getting income and not for searching coolie job faraway. It will increase their household income. From the data it was observed that occupational population decreased where the government and private entrepreneurs' should give an opportunity to develop an occupational pattern is restructure itself.

Table 3.18 Occupational Characteristics of Population - Kuthambakkam & Ananganallore Village (2001-2011)

S.No	Census Parameters	Census Data 2001	%	Census Data 2011	%
1	Total Population	1746	100	1881	100
2	Male Population	840	48.10	918	48.80
3	Female Population	906	51.80	963	51.10

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4	Total Literacy	1236	100.00	1456	100.00
5	Male Literacy	680	55.01	777	53.36
6	Female Literacy	556	44.90	679	46.60
7	Total Workers	772	100.00	874	100.00
8	Male Workers	498	64.50	579	66.24
9	Female Workers	274	35.49	295	33.75
10	Total Main workers	771	100.00	544	100.00
11	Male Main workers	497	64.46	383	70.40
12	Female Main Workers	274	35.53	161	29.59
13	Total Cultivators	153	100.00	81	100.00
14	Male Cultivators	123	80.39	67	82.72
15	Female Cultivators	30	19.60	14	17.28
16	Total Main Agricultural Labourers	290	100.00	137	100.00
17	Male Agri.Labourers	138	47.59	71	51.82
18	Female Agri.Labourers	152	52.41	66	48.18
19	Total Main House Holeder	5	100.00	10	100.00
20	Male House Holeder	3	60.00	5	50.00
21	Female House Holeder	2	40.00	5	50.00
22	Total Main Other Tertiary workers	323	100.00	316	100.00
23	Male OT	233	72.14	240	75.95
24	Female OT	90	27.86	76	24.05
25	Total Nonworkers			1007	100.00
26	Male Nonworkers			339	33.66
27	Female Non workers			668	66.34
28	Marginal workers	1		330	100.00
29	Male Marginal workers	1		196	59.39
30	Female Marginal Workers	0		134	40.61
31	Total Marginal Cultivators	0		5	100.00
32	Male Marginal Cultivators	0		4	80.00
33	Female Marginal Cultivators	0		1	20.00
34	Total Marginal Agricultural Labourers	1		11	100.00
35	Male Marginal Agri.Labourers	1		9	81.82
36	Female Marginal Agricultural Labourers	0		2	18.18
37	Total Marginal House Holder	0		0	
38	Male Marginal House Holder	0		0	
39	Female Marginal House Holder	0		0	
40	Total Marginal Other Tertiary workers	0		314	100.00
41	Male Marginal OT	0		183	58.28

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42	Female Marginal OT	0		131	41.72
43	Total Marginal Nonworkers	974	100.00	327	100.00
44	Male Marginal Nonworkers	342	35.11	193	59.02
45	Female Marginal Non workers	632	64.89	134	40.98

Source: Census 2001 & 2011, Gudiyatham District, Tamilnadu

The occupational characteristics of Kuthambakkam & Ananganallore village population are given in Table 3.18 & Fig no. 3.20

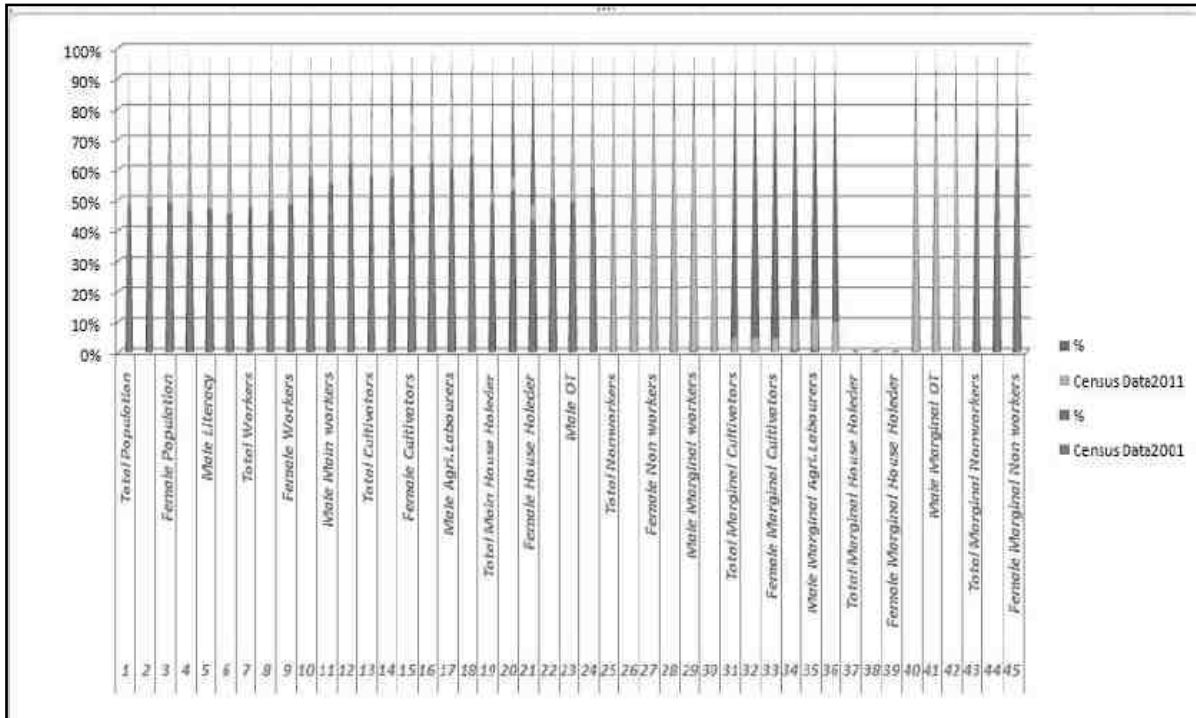


Fig No: 3.20 Occupational characteristics of Kuthambakkam & Ananganallore village

3.12.8 Infrastructure Improvements

There can be significant infrastructure improvements with the construction of a quarry. Most mining operations of any size are served by roads, water supplies, sanitation systems, and electricity. If these are restricted to use by the company, and designed solely for company objectives, they may be of little relevance to anyone else.

With some advanced planning and willingness to consult with the community, these can bring lasting benefits at little or no added cost. The development of infrastructure may facilitate development of other forms of economic activities such as business centre and tourism.

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Table 3.19 Details of Infrastructure & Communication of the Village in core and Buffer Zone

S.No	Description	Place	Distance (km)	Direction
1	Railway	Melalathur	4.6	NE
2	Post office	Kuthambakkam	1	SW
3	Airport	Vellore Airport	23.1	NE
4	Police station	Pallikonda	8.7	E
5	Fire Station	Kudiyatham	8.7	N
6	Primary Health centre	Kuthambakkam	1	SW
7	DSP Office	Gudiyatham	16.5	NE
8	School	Kudiyatham	0.9	SW
9	Nearest Town	Gudiyatham	8.3	NE
10	Villages			
	i)	Ananganallore	0.5	NE
	ii)	Koothampakkam	0.9	SW
	iii)	A.mottur	1.3	NW
	iv)	Singalpadi	2.7	NW

a) Road

The area is accessible to a distance of Village metal road is available to reach the quarry about 648m south.

b) Water Bodies

Cheyar river is the main tributary site. Water table is located at depth of 6m bgl.

c) Education

As with health, access to educational services and facilities can improve dramatically for communities close to or around large mines, particularly for mines in remote areas of developing countries. The mining company is often involved in the provision of educational facilities – either directly or indirectly through the redistribution of revenues by the state. Other developments of educational opportunities are through scholarships.

d) Place of worship

There is no place of worship like Temple, Mosque Church, etc., around 300m radius from mine lease area.

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3.12.9 Corporate Social Responsibility (CSR)

The lessee will be arranging medical camps and will be providing better roads. Agricultural area considering 50m on each side of the approach road, in maximum up to 2 km distance to reach PWD road for crop damage compensation has been proposed. The damage compensation criteria of minimum Rs.0.6/sq.m and maximum Rs. 2.0/sq.m as per local govt. rules have been proposed.

The villages in the buffer zone depend upon agriculture and mining. Mining will be done with the vision of positive impacts on socio-economics of people living in nearby villages. All the provisions as per the Mines Act 1952 shall be strictly adhered during temporary discontinuation.

3.12.9.1 Socio-economic Developmental Activities

- Drinking water and drainage facilities are provided to the local villages nearby the quarry
- Helped in construction of school buildings and Primary health centre
- Formed an Educational Committee for the improvement of the villages
- Provided sports materials
- Arranged medical camps to improve the village people
- Vocational Employment training program given to local villagers
- Provided employment to the local village persons of around 34 nos. in the quarry
- Road facilities are provided to the villages.

3.12.9.2 Impacts on Socio Economy and Mitigation Measures

Mostly **positive impacts** result from the long-term quarry unit. In this case, provision of job opportunities, business, transport, communication, laborers etc. are the major outcome due to this project. Thus, this unit highly favors the poor and landless people. Employment generation due to the project has generated direct employment for 34 persons, in which 5 people are working for administrative and supervisory purpose and remaining are contract employees for production. Preference will be to the local population for employment in all categories including semi-skilled and unskilled. The skilled employees are recruited through open recruitment process to meet competency required to operate the quarry. The villages and their inhabitants in the buffer zone will not be disturbed in their settlements due to the quarry

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operations. The Survey was conducted by SE expert Dr. R. Sudharsan (FAE) along with his team Member Mrs. S.Santhi (Team member in SE Division)



Fig No: 3.21 Primary Survey Photographs of Village wise- Kuthambakkam and Ananganallore Village, Gudiyatham Taluk, Vellore District

3.12.9.3 Economic Impacts

Agricultural yield is positively benefitted due to the halt on quarrying. To ascertain the extent of the financial crisis and improvement in agriculture, horticulture, dairy, fishery, handicraft and tourism if any; the following parameters emerged:

There are some people who are engaged in trading of sand. Therefore due to quarrying, the per capita income of local people has been improved. The local people have been provided with either direct employment or indirect employment such as business, contract works and development work like roads, etc. and other welfare amenities such as medical facilities, conveyance, free education, drinking water supply etc. The job/ business opportunities have improved the economic

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conditions of the persons. They are in a position to utilize this money for purchase of tractors, trucks, jeeps, etc. which may be invested into use for business purposes. Part of money has also been utilized in starting of some business as per personal skills.

3.12.9.4 Present economic scenario

1. Loss of income
2. Employees
3. Truck owners/ drivers
4. Trading sector
5. Service sector
6. Mine/Lease owners
7. The State
8. Other sectors

However, the quarry operations can be managed with the following measures to reduce the negative impacts:

- Blasting, drilling activities would be used while running quarry in high noise area. During operations time, the noise generating equipment will be provided with acoustic enclosures to control the noise levels within the prescribed limit.
- Good maintenance practices will be adopted for plant machinery and equipment, which will help to avert potential noise problems. Green belt will be developed in and around the project site as per Central Pollution Control Board (CPCB) guidelines.
- Drilling, bomb blasting etc are carried out at specified location with proper chain and shed. The emergency kit, covering and pull system are to be followed by scrubbers. Sufficient treatment will be provided to wastewater generated and appropriate air pollution control measures will be installed so as to minimize the adverse impacts on water and air quality in surrounding areas.
- Up gradation of the quarry project and quarry workers has created some community development programs in the project.

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The required medicines, antidotes and first-aid box have been procured under the guidance of an appointed Doctor as per guidelines of Factories Act. For the safety of workers, personal protective equipment like hand gloves, helmets, safety shoes, goggles, aprons, nose masks and ear protecting devices have been provided which meet the 'BIS' (Bureau of Indian Standards). Thus, no significant impacts on health and safety will occur due to the existing quarry activity.

Mining offers not only employment but also supports the respective provincial economies. In the communities where mining firms operate, they have built schools, clinics, and other social infrastructure such as roads and housing for employees, thus improving the quality of life of community members.. The mining industry produces a trained workforce and small businesses that can service communities and may initiate related businesses. Mining often gives stimulus to local economy and increase population income and business opportunity. Aside from supporting thousands of jobs, the mining industry provides raw materials, and minerals to our economy. They provide the foundations for modern living, innovation and engineering achievements.

The impacts on socio economy and the mitigation measures are summarized in Table 3.20.

Table 3.20 Impacts on Socio Economy and Mitigation Measures

S. No.	Impact	Mitigation Measures	Budget
1	The quarrying and transportation of rough stones will generate small shops, dhabas, garage, restaurant, and vegetable shops etc. along the road which generate direct employment.	Positive Impact	-

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2	Quarry activity will generate direct employment by recruiting 34 people who will be employed locally and preference will be given to local people.	Positive Impact	-
3	Such shops along the roads will generate solid waste and wastewater which will have adverse impacts on human health.	Garbage bins shall be provided for proper disposal of solid waste. The municipal wastewater will be disposed of properly.	The costs for this activity will be utilized from 'Mines and Mineral Development, Restoration and Rehabilitation fund' Rs. 1,00,000
4	Quarrying activities and the resultant generation of fugitive dust cause workers of the quarry to suffer from occupational health hazards like skin allergies, eye and respiratory problems etc.	Dust masks will be provided to the workers engaged at dust generation points like excavation and loading points. Regular water sprinkling to be undertaken on unpaved roads to avoid dust generation. Environmental monitoring shall be undertaken.	Rs. 20,000 Rs. 1.0 Lakh
5	The major source of socio health impacts of transportation will generate from tipper	Planning of transportation routes of quarried material so as to reach the nearest paved roads by	

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	trucks, dust etc. Increase in accidents as a result of rash driving of dumpers carrying minerals through the roads may be possible.	the shortest route (minimize transportation over unpaved road). Alternatively, graveled road may be constructed between quarry lease area and the nearest paved road connectivity. The speed of trucks plying on the haul roads should be limited to avoid generation of dust; and covering of materials during transportation on trucks to prevent spillage of rough stones from the trucks. The trucks will be covered by Tarpaulin sheet. Overloading will be avoided. Regular water sprinkling to be on unpaved roads to avoid dust generation during transportation.	
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3.12.10 Primary survey

Primary survey conducted 10 villages total population is 25011. This village has approximately 1 percent of total population of the village area. This calculation is total sample size has 250 around 10km radius core and buffer zone from mine lease boundary.

3.12.11.1 Primary survey methodology

The study was carried out with a participatory approach by involving the stakeholders, particularly the project beneficiaries and probable affected persons

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through a series of consultative process. The population groups that were consulted include beneficiary group of people in the project influence area, particularly the shopkeepers, farmers, Gram Panchayat members, village elders etc. Proportionate and purposive sampling methods were used for selecting respondents for household survey. Male and female respondents, both were selected for household survey. Structured questioners were used for survey.

3.12.11.2 Data structures

The data collected with the help of questionnaire survey for list of villages of Bargur Taluk were suitably converted into uni-variate, bi-variate and multivariate tables. The selection of these blocks were meaningfully done in order to get complete details of the surveyed population, their living environment, socio economic and socio-cultural and healthcare practices so as to conceptualize the findings with the help of interrelationships between Occupation and income status. the surveyed population were examined and interpreted with reference to socioeconomic living area, family structure and Educational, Sanitation etc.,

3.12.12 Infrastructure Facilities:

The socio-economic wellbeing of the area and its people is represented by the infrastructure and the social assets available in the area. The study area constituted of various infrastructures related to education, health care, communication, transportation, drinking waters etc.

3.21 Health and Medical Infrastructure

S.no	Health Institution	Distance (0 - 10 km)
1	No. of Allopathic Hospital	0
2	No. of Ayurvedic Hospital	0
3	No. of Allopathic Dispensaries	0
4	No. of Primary healthcare centre	5
5	No. of Primary healthcare sub centre	3

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6	No. of Primary healthcare sub centre paramedical total staff	1
6	No of community health workers	1

Source: Village Directory, 2011, Vellore District, Tamilnadu

The above table shows that health care facilities were available in the area to fulfill the health need of the peoples mostly in the form of primary health sub centers. The health care facilities include both infrastructures and man powers. Within the radius of 10 km there is no hospital allopathic and Ayurvedic hospital. Moreover no primary health center has available in this village. In term of man power, 1governments approved primary health sub centre.

3.12.12.1 Post and Courier services

Post and courier services were available in the area to fulfill need of the peoples mostly in the village post office found in their 10km radius. So, post like ordinary post courier services are normal.

Table No 3.22 Post and Courier Services

S.no	Type Institution	0 -10 km
1	Post office	4
2	Courier	3

Source: Village Directory, 2011, Vellore District, Tamilnadu

3. 12.12.2 Transport facilities

Table No 3.23 Transport facilities

S.no	Type of Transport	Distance (0 -10 km)
1	Public bus service	5
2	Private bus service	3
3	Railway	1

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The above table shows that Transport facility has improved the village. Transport facilities were available in the area; within the radius 10 km as far as no other mode transport utilize the people.

Drinking water is available in all the villages of the study area. The various sources of drinking water are taps, wells, tanks, hand pumps and rivers. Various drinking water sources were available within the study area. Tube wells and river, pond were the major water sources in the area.

3.12.13 Socio- economic Primary survey methodology

The study was carried out with a participatory approach by involving the stakeholders, particularly the project beneficiaries and probable affected persons through a series of consultative process. The population groups that were consulted include beneficiary group of people in the project influence area, particularly the shopkeepers, farmers, Gram Panchayat members, village elders etc. Proportionate and purposive sampling methods were used for selecting respondents for household survey. Male and Female respondents, both were selected for household survey. Structured questioners were used for survey.

3.12.13.1 Data structures

The data collected with the help of questionnaire survey for above list of villages of Kuthambakkam & Ananganallore, Gudiyatham Taluk were suitably converted into uni-variate, bi-variate and multivariate tables. The selection of these blocks were meaningfully done in order to get complete details of the surveyed population, their living environment, social, socio economic and socio-cultural and healthcare practices so as to conceptualize the findings with the help of interrelationships between Occupation and income status. the surveyed population were examined and interpreted with reference to socioeconomic living area, family structure and Educational, Sanitation etc.,

3.13 LAND ENVIRONMENT

3.13.1 Land use of Study Area

The land-use & land cover map of the 10 km radial study area from the periphery of project site has been prepared using Landsat8 having 30 m spatial resolution and

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date of pass 29th September 2022 satellite image with reference to Google Earth data. In order to strengthen the baseline information on existing land use pattern, the following data covering approx. 12°53'25.36"N to 12°53'34.90"N latitude and 78°52'22.78"E to 78°52'52.13"E longitude and elevation 703m are used as per the project site confined within that area. Land use pattern of the study area as well as the catchment area was carried out by standard methods of analysis of remotely sensed data and followed by ground truth collection and interpretation of satellite data. The outcome of land use study is presented below in subsequent tables and figures.

Table No 3.24 Data Specification Used For Present Study

Satellite Image	Sensor	Spatial Resolution	Date of Acquisition
Landsat8	*OLI & TIRS	30m	29 th September 2022

* Operational Land Imager (OLI) and the Thermal Infrared Sensor (TIRS)

	Bands	Wavelength (micrometers)	Resolution (meters)
Landsat 8 Operational Land Imager (OLI) and Thermal Infrared Sensor (TIRS) Launched February 11, 2013	Band 1 - Coastal aerosol	0.43 - 0.45	30
	Band 2 - Blue	0.45 - 0.51	30
	Band 3 - Green	0.53 - 0.59	30
	Band 4 - Red	0.64 - 0.67	30
	Band 5 - Near Infrared (NIR)	0.85 - 0.88	30
	Band 6 - SWIR 1	1.57 - 1.65	30
	Band 7 - SWIR 2	2.11 - 2.29	30
	Band 8 - Panchromatic	0.50 - 0.68	15
	Band 9 - Cirrus	1.36 - 1.38	30
	Band 10 - Thermal Infrared (TIRS) 1	10.60 - 11.19	100
	Band 11 - Thermal Infrared (TIRS) 2	11.50 - 12.51	100

3.13.2. Objective

The objectives of Land use studies are:

- To determine the present land use pattern as per EIA/EMP norms by MoEF.
- To determine the drainage pattern present in the study area.

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3.13.3 Data Used

A. Remote sensing data

- Landsat8-30m Resolution, OLI &TIRS (Sensor)

B. Collateral Data

- Survey of India Toposheet bearing Toposheet No. 57L/13 (1:50,000 Scale) and the Toposheet map representing the project site is shown in Fig No 3.22.

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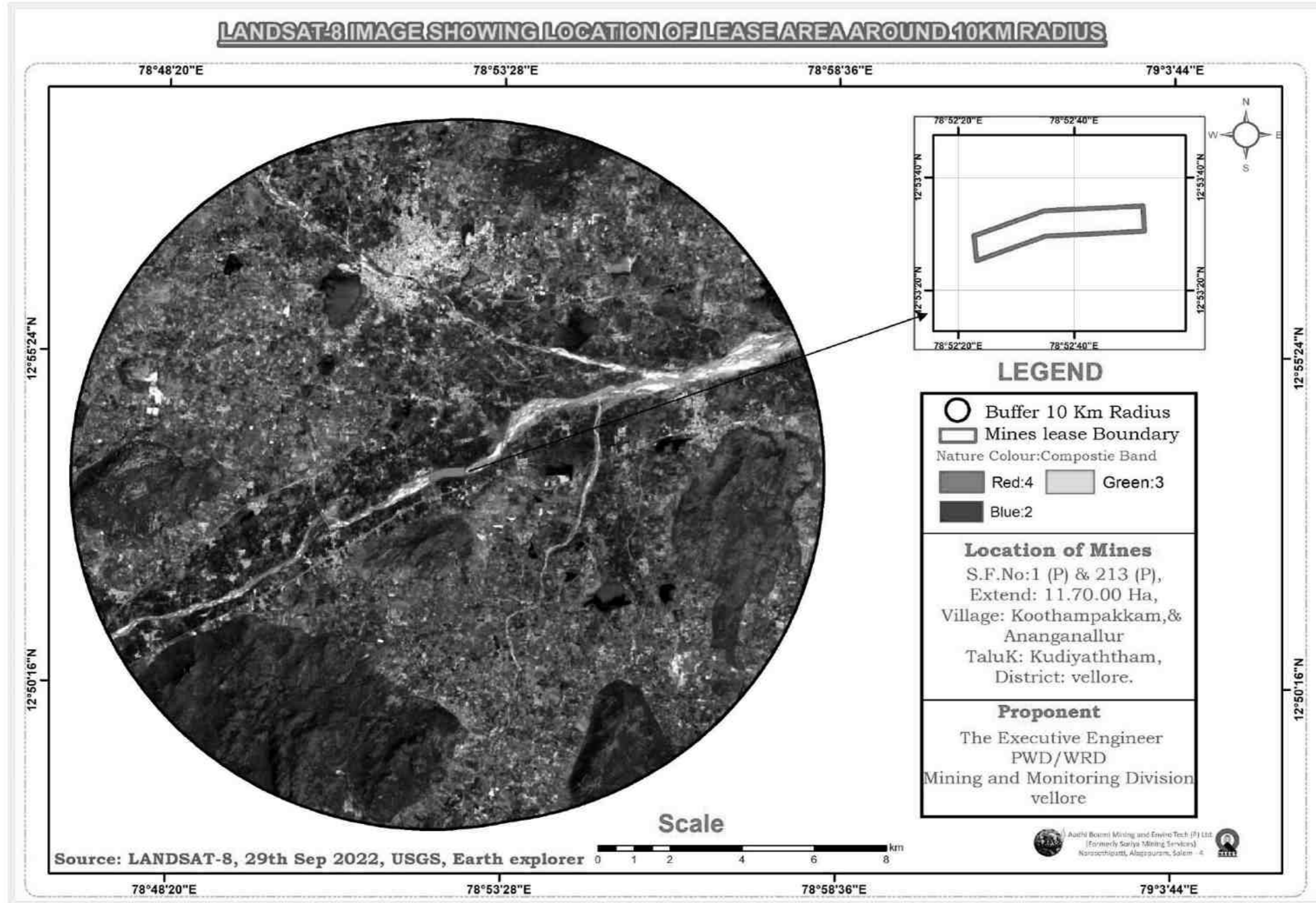


Fig No: 3.23 LANDSAT8 Image showing Location of Lease area around 10km radius

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3.13.4 Methodology

The land use pattern of the study area was studied by analyzing the available secondary data published in the District Primary Census abstract of the year 2001 & 2011. Salient features of the adopted methodology are given below:

- Acquisition of satellite data
- Preparation of base map from Survey of India Toposheet
- Data analysis using visual interpretation techniques
- Ground truth studies or field checks using GPS
- Finalization of the map
- Digitization using head up vectorization method
- Topology construction in GIS
- Area calculation for statistics generation
- Masking

The spatial resolution and the spectral bands in which the sensor collects the remotely sensed data are two important parameters for any land use survey. Landsat8 data offers spatial resolution of 30 m and 185 kilometer (115 mile) wide swath of the Earth in 15-30 meter resolution covering wide areas the data is collected in 11 visible bands namely **Band Number μ m Resolution**

1	0.433–0.453	30 m
2	0.450–0.515	30 m
3	0.525–0.600	30 m
4	0.630–0.680	30 m
5	0.845–0.885	30 m
6	1.560–1.660	30 m
7	2.100–2.300	30 m
8	0.500–0.680	15 m
9	1.360–1.390	30 m
10	10.6-11.2	100 m
11	11.5-12.5	100 m

The shapes, sizes, colours, tone and texture of several features are visible in Landsat8 data. Four spectral bands provide high degree of measurability through band combination including FCC generation, bands rationing, classification etc. These

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Hence, Landsat8 data having 30 m spatial resolution having pan chromatic imagery has been used for land use mapping. The digital image processing was performed on ERDAS Imagine 8.5 and ArcGIS 10.2 software system on high-configured computer. This software package is a collection of image processing functions necessary for pre-processing, rectification, band combination, filtering, statistics, classification, etc. Apart from contrast stretching, there are large numbers of image processing functions that can be performed on this station. Arc map is used for final layout presentation.

The satellite data from the compact disc is loaded on the hard disk and by studying quick look (the sampled image of the appropriate area ;) the sub-scene of the study area is extracted.

Supervised classification using all the spectral bands can separate fairly accurately, the different land use classes at level I on the basis of the spectral responses, which involve the following three steps:

1. Acquisition of ground truth
2. Calculation of the statistics of training area
3. Classification using maximum likelihood algorithm

The training areas for classification were homogeneous, well spread throughout the scene with bordering pixels excluded in processing. Several training sets have been used through the scene for similar land use classes. After evaluating the statistical parameters of training sets, the training areas were rectified by deleting no congruous training sets and creating new ones.

3.13.5 Pre-field Interpretation of Satellite Data

The False Colour Composite (FCC) of Landsat8 imagery having 30 m spatial resolution satellite data at 1:50,000 scale was used for pre-field interpretation work. Taking the help of Toposheet, geology, geomorphology and by using the image elements, the features were identified and delineated the boundaries roughly. Each feature was identified on image by their image elements like tone, texture, colour, shape, size, pattern and association. A tentative legend in terms of land cover and land use was formulated. The sample area for field check is selected covering all the physiographic, land use/land cover feature cum image characteristics. Fig No. 3.24 shows the FCC of 10 km radius of Landsat8 Imagery.

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3.13.6 Ground Truth Collection

Both Toposheet and imagery were carried for field verification and a transverse plan using existing road network was made to cover as many representative sample areas as possible to observe the broad land use features and to adjust the sample areas according to field conditions. Detail field observations and investigations were carried out and noted the land use features on the imagery.

3.13.7 Post Field Work for Land Use/Land Cover Classification

The base maps of the study area were prepared, with the help of Survey of India Toposheet on 1:50,000 scale. Preliminary interpreted land use and the land cover features boundaries from Landsat8 sensor OLI & TIRS having 30m spatial resolution, False Colour Composite were modified in light of field information and the final thematic details were transferred onto the base maps. The final interpreted and classified thematic map was cartograph. The cartographic map was categorically differentiate with standard colour coding and described features with standard symbols. All the classes were identified and marked by the standard legend on the map. The following Land Cover classes were derived and classified as under:

1. Mining/Existing quarry
2. Built-up Land
3. R.F/Hilly Rock area
4. Agriculture Land
5. Barren Land
6. Water bodies like Lake, Kanmoi etc., Total area of 10 km radius is about 561717.3Ha.

3.13.8 Slope and Drainage Interpretation

3.13.8.1 Land Use/Land Cover Classification- Interpretation

The drainage pattern is dendritic (Fig no 3.24) and the flow direction of the streams is southerly direction and controlled by the N-S trending shear zone. The streams originating in the Javadi reserve forest disappear in the colluvium of the bazada zones which is the characteristic feature of the drainage system. The coarse grains/particles allow water to filtrate through smoothly. Furthermore, sand has large air pockets allowing faster water penetration. It prevents dampness in the soil and water puddles in the ground.

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Remote Sensing has the ability of obtaining synoptic view of a large area at one time and very useful in analyzing the drainage morphometry (Rudraiah, 2008). Visual interpretation of satellite imagery in analysis of geological, landforms and land erosion characteristics in conjunction with drainage pattern facilitates effective delineation of distinct features to evaluate the influence of drainage morphometry on landform characteristics and their processes. Horton's law of stream lengths suggests a geometric relationship between the number of stream segments in successive stream orders and landforms (Horton, 1945). The drainage has been delineated using satellite data with the reference of SOI Toposheet of 1:50,000 scale.

3.13.8.2 Linear Aspects of the Drainage system

The linear aspect describes the components of a typical drainage basin as stream order, stream number, bifurcation ratio, and stream length and stream length ratio.

3.13.8.3 Stream Order (u)

The designation of stream order is done following Strahler's method (Strahler 1964), in which two first order streams join a stream segment of order 2; two of orders 2 join a segment of order 3 and so on. Based on the Strahler's method, the stream orders are classified up to four orders in the study area was 10km km radius.

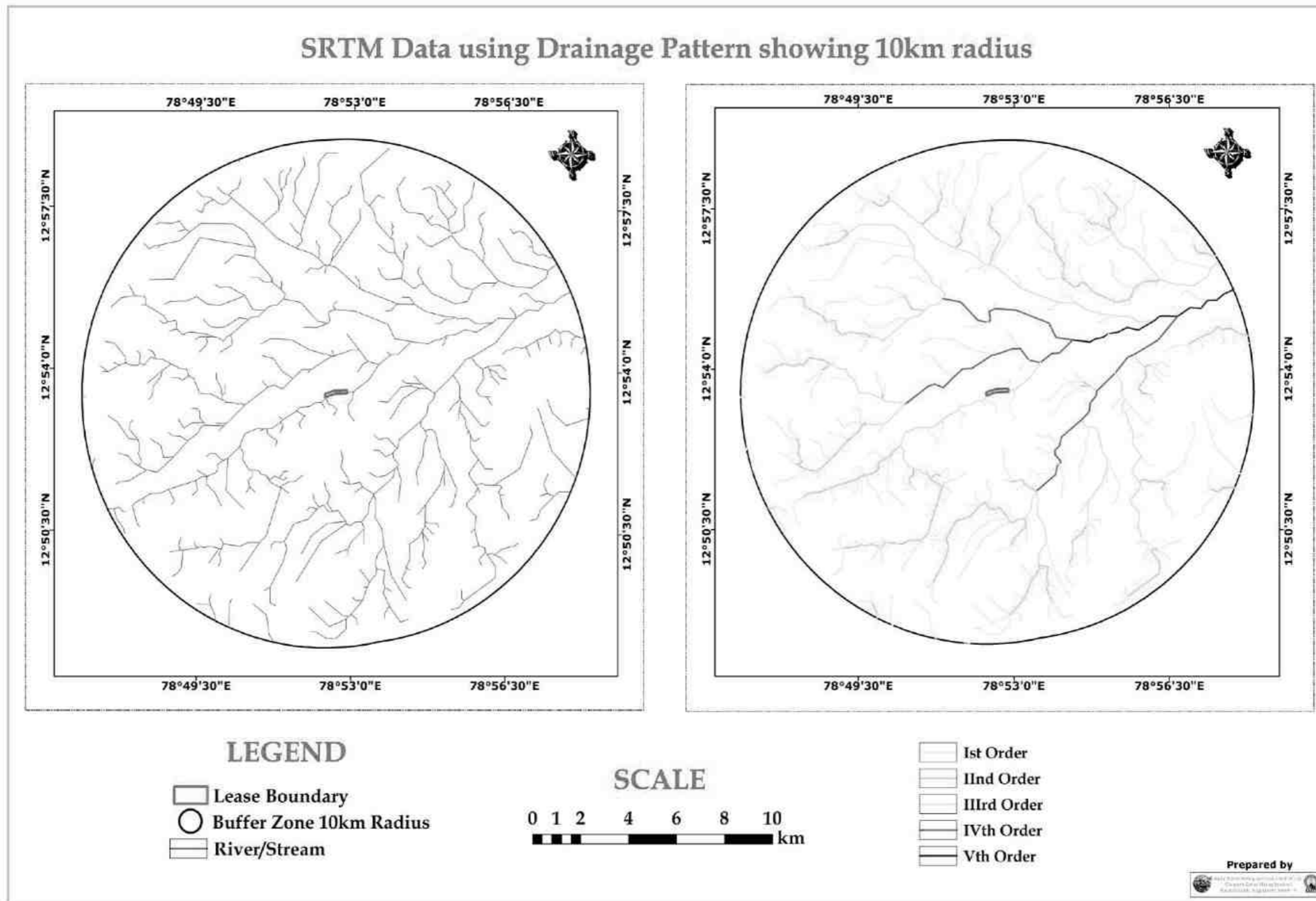


Fig No 3.24 Image Representing the River/Streams (Drainage) of the study area within 10km radius from the project site

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3.13.9 Land Use and Land Cover (LULC) for 00-10 km radius (561717.3 Ha)

The Land Cover classes were extracted following a Visual interpretation method or on screen digitization of the Landsat8, sensor OLI &TIRS having 30 m spatial resolution image. These were later verified by using SOI Toposheet and Google Earth imagery. Polygon layers for each class were digitized and the respective areas were calculated. The Land Cover classes and their coverage can be seen in the following table 3.25 and its distribution is shown in Figure 3.25. The present Land use/ Cover classes are represented in Figure 3.26.

Total Six major land use/ land cover classes were demarcated in the study area and a thematic map of 1:50,000 scales were generated incorporating these classified categories considering the area of the project. Total Seven major land use/land cover classes were demarcated in the study area following Level I&II classification. A thematic map of 1:50,000 scale was generated incorporating these classified categories considering the area of the project. The Quarry area constitutes the dominant category of land use covering as much as 0.02 % (113.76Ha) of the total area and second dominated area Built-up Land covering as much as 2.28 % (12796.11Hec) of the total area which includes the village settlements, railways and roadways of the study area. Sandy soil is made of sand particles that are rough in texture. This prevents them from sticking tightly together. The space between sand particles is large for water to flow through it.

The consistently shifting nature of the Northern and Southern western part bank migration has resulted in large settlement & rural settlement along the active plain area towards the site location. Barren Land is as much as 14.25% (80067.69 Hec) of the total area. Reserved forest area and hilly terrain covered as much as 10.20% (57292.56 Hec) of the total area. Agriculture land like plantation crop and seasonal crop cultivated area occupies with 71.29 % (400476.3 Hec) of the total area. Water bodies covering are as much as 1.95% (10971.48 Hec) of the total area was in the 10km study area.

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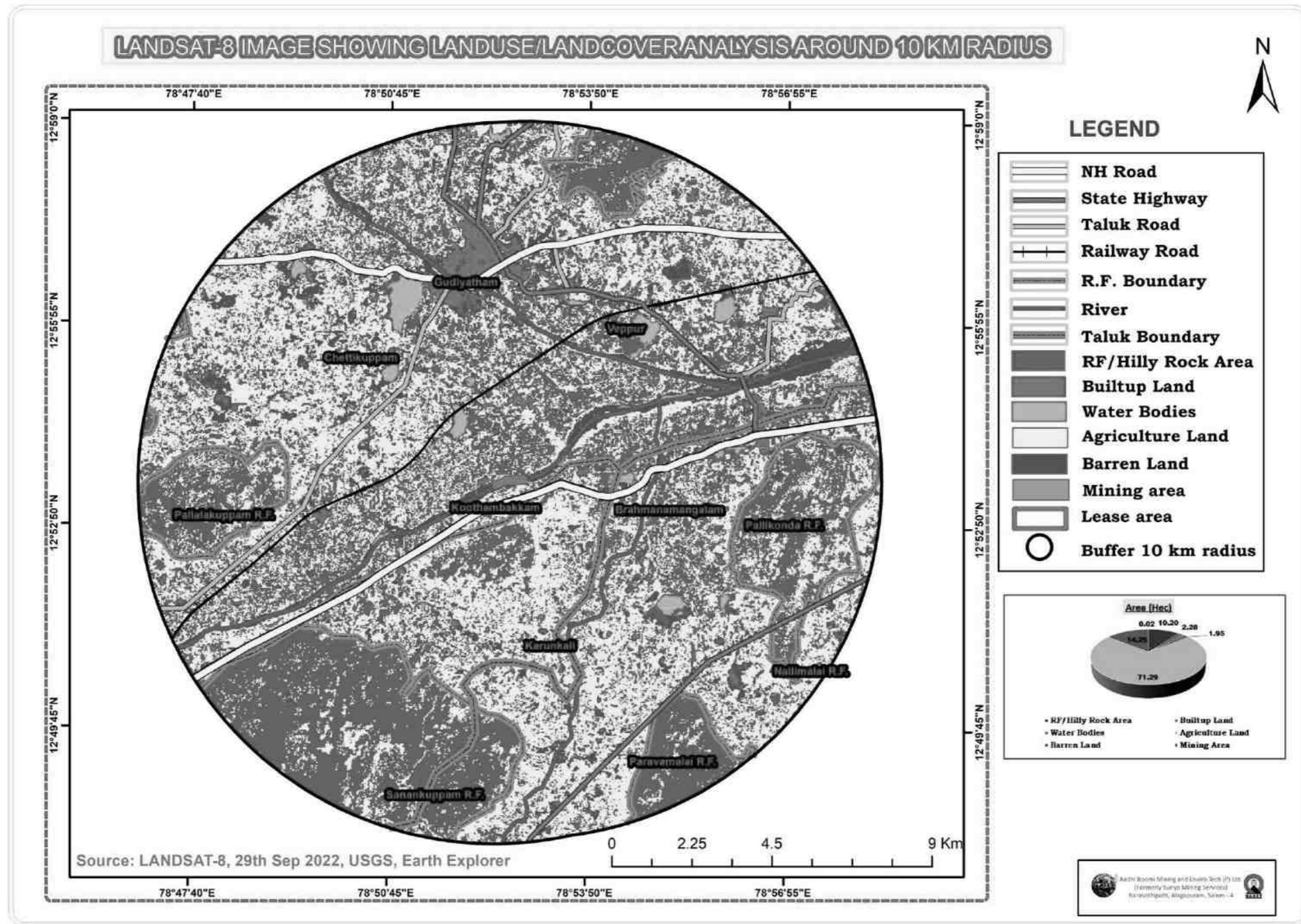


Fig No 3.24: Landsat8 -LU/LC details of 10 Km radius around Lease area

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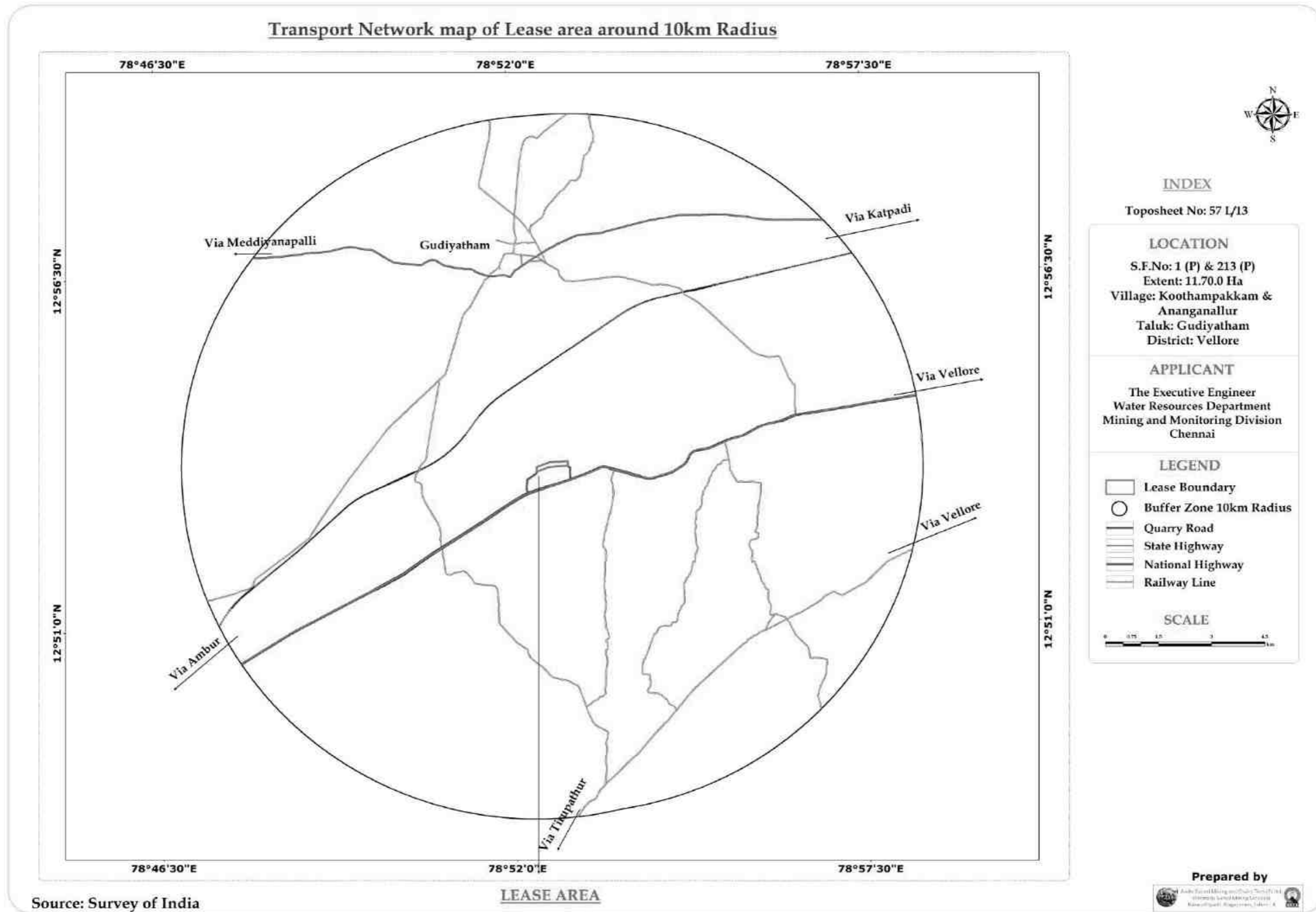


Fig No 3.25: Map showing Road Accessibility details of 10Km Radius around Lease area

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Table No 3.24: Land Cover classes and their coverage

S.No	NAME	AREA(Hec)	%
1	RF/Hilly Rock Area	57292.56	10.20
2	Builtup Land	12796.11	2.28
3	Water Bodies	10971.48	1.95
4	Agriculture Land	400476.3	71.29
5	Barren Land	80067.09	14.25
6	Mining Area	113.76	0.02
	Total	561717.3	100.00

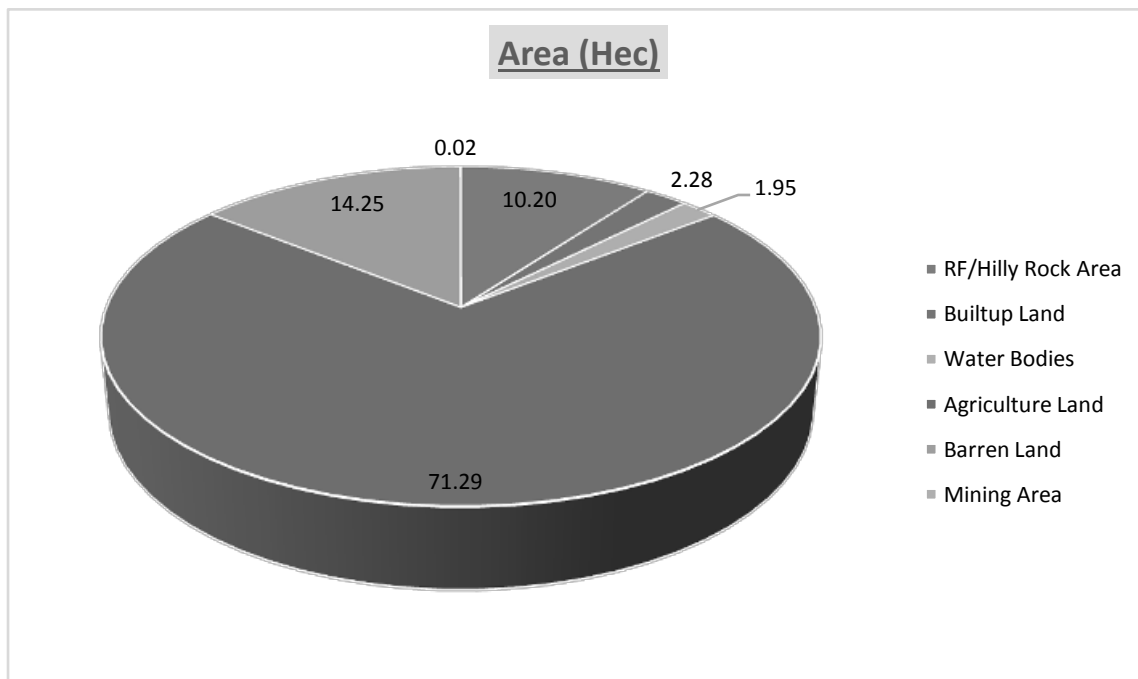


Fig No 3.26: Land use/ Cover classes

3.13.10 Geology & Hydrogeology

Granite, Charnockite, Pegmatite, Gneissic Rocks is found largely found in Krishnagiri area. Sedimentary rocks namely Charnockite, Granitoid gneiss, feldspar gneiss, calcareous gritty (sand stone mixed clay), and quartz vein. Granitoid gneiss is a composition of primary lateritic capping, basement crystalline complex, and conglomerate, which are found along the middle part of the river valley. The younger alluvium formations are seen predominantly in the northern part of the area and are considered as highly permeable. The storage capacity of the rock formations

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depends on the porosity of the rock. In the rock formation the water moves from areas of recharge to areas of discharge under the influence of hydraulic gradients depending on the hydraulic conductivity or permeability.

3.13.11 Geomorphology

The prominent geomorphic units identified in the district through interpretation of satellite imagery are structural hills in the southwestern part of the area, denudational land forms like buried pediments in the plains and inselbergs and plateaus represented by conical hills aligned with major lineaments. Vellore district forms part of the upland plateau region with many hill ranges and undulating plains. The western part of the district has Yelagiri hill ranges with a chain of undulating hills and deep valleys extending in NNE-SSW direction (Fig. 3.28).

3.13.12 Soil

The red loam is very fertile due to its moisture absorbing character. Red soils are seen. In general, the soil in the district is quite loose and fresh with its colour from light brown (Fig.3.27).

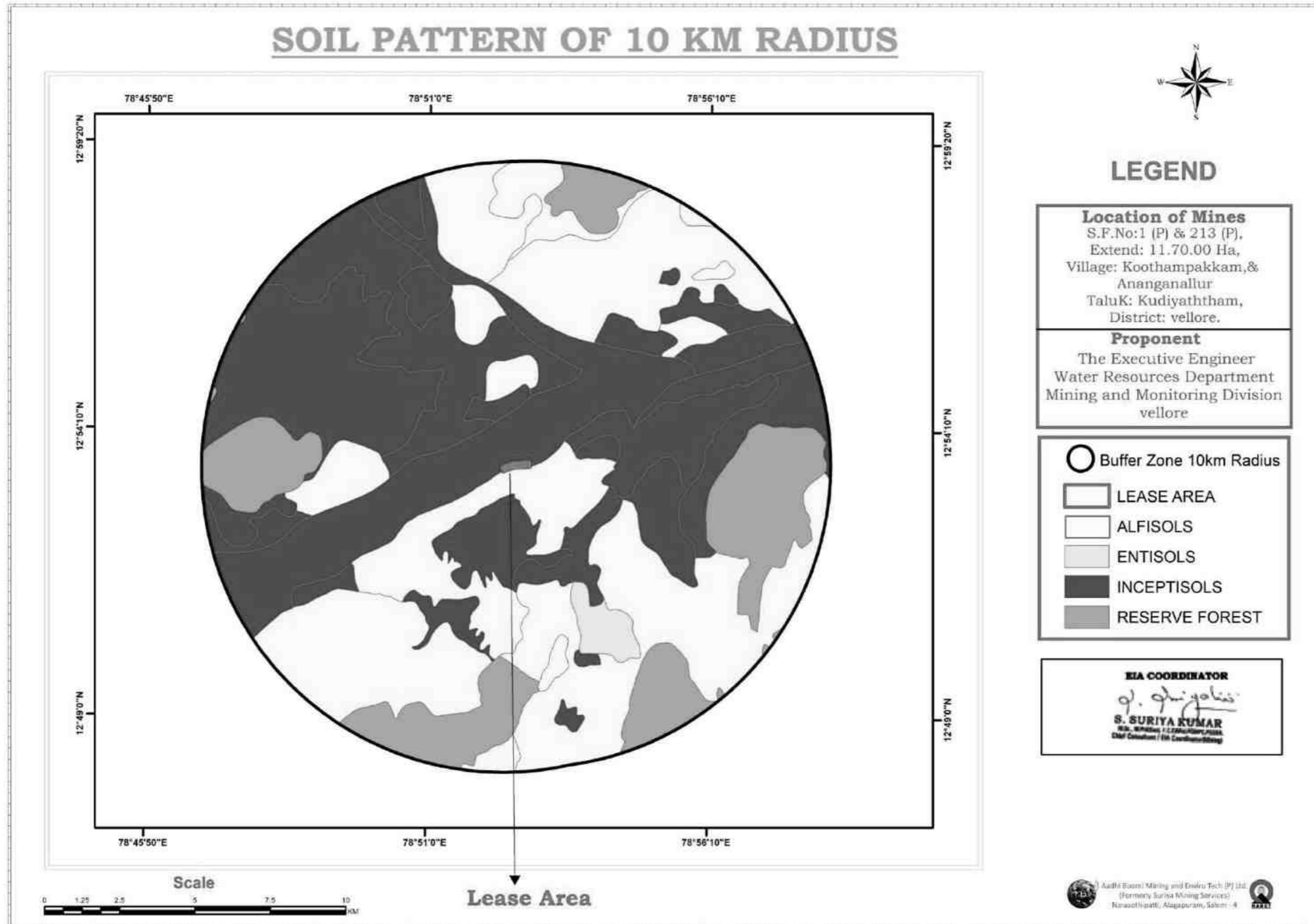


Fig No 3.27: Soil Pattern of 10km Radius around the lease area

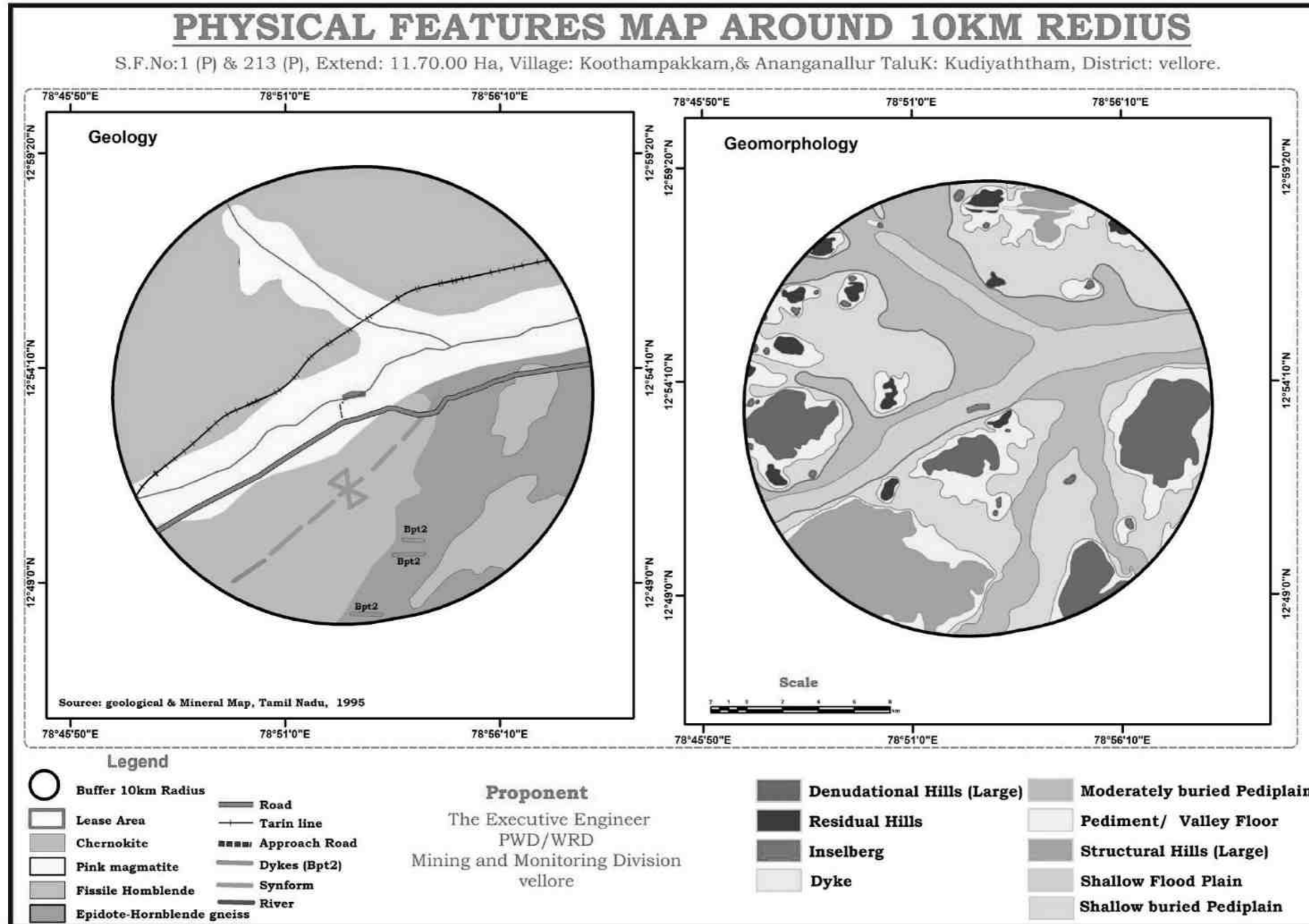


Fig No 3.27: Geology and Geomorphological features of Lease area around 10km Radius

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3.13.13 Contour

Contour lines are the greatest distinguishing feature of a topographic map. Contour lines are lines drawn on a map connecting points of equal elevation, meaning if you physically followed a contour line, elevation would remain constant. Contour lines show elevation and the shape of the terrain in the study area. The contour map was derived from a SRTM data of the study area. Contour interval at 20m, minimum 400m has very plain with fluvial landforms and general terrain is quite elevated at maximum 700m above. To make topographic maps easier to read, because it's impractical to mark the elevation of every contour line on the map, the index contour lines are the only ones labeled. (Fig. 3.28)

3.13.14 Slope

The slope map was derived from a SRTM data of the study area. The slope of the study area was classified into five classes, such as less than 5 Percent/degree gentle, low speed ground motion, sheet erosion and soil erosion, a lot of ground movement and erosion. Slope zone 5-10°, 10-20°, 20-30° slightly steep, a lot of ground movement and erosion, especially landslides that area flat and above 30° very steep, intensive denudation processes and ground movements are common (Fig.3.28).

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Table No 3.25: Slope Nature Process and conditions

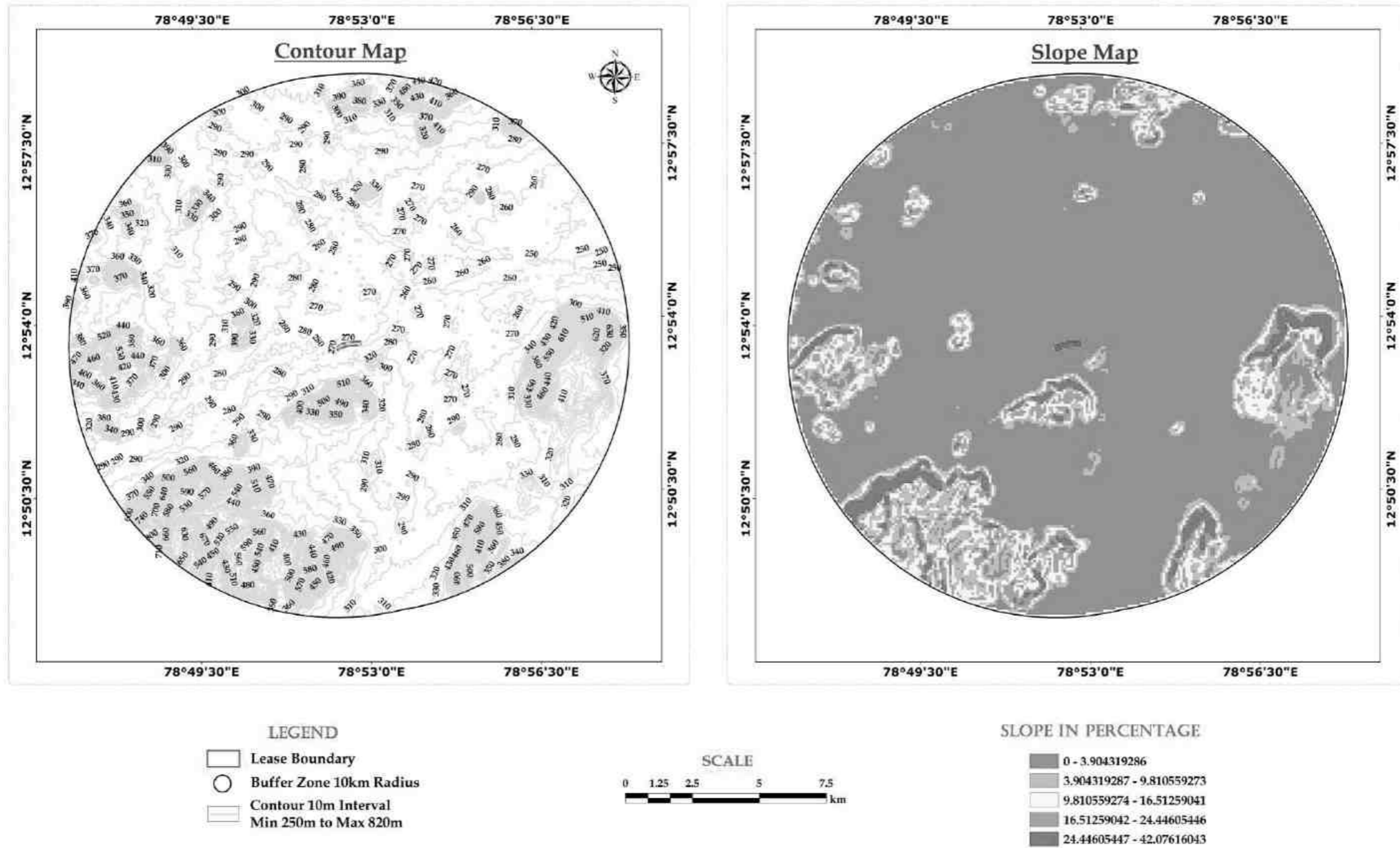
Slope Class	Nature, Process and Natural Conditions
$0^{\circ} - 2^{\circ}$ (0-2%)	Flat to almost flat, no meaningful denudation process
$2^{\circ} - 4^{\circ}$ (2-7%)	Gentle, low-speed ground motion, sheet erosion and soil erosion (sheet & rill erosion), erosion swamps.
$4^{\circ} - 8^{\circ}$ (7-15%)	More Gentle, the same as above, but with a higher magnitude.
$8^{\circ} - 16^{\circ}$ (15-30%)	Slightly steep, a lot of ground movement and erosion, especially landslides that are flat.
$16^{\circ} - 35^{\circ}$ (30-70%)	Steep, intensive denudation processes and ground movements are common.
$35^{\circ} - 55^{\circ}$ (70-140%)	Very steep, rocks generally begin to unfold, a very intensive denudational process, have begun to produce rework material.
$> 55^{\circ}$ >140%	Very steep, exposed rocks, a very strong denudational process and prone to falling rocks, rarely grown plants (limited)

Source: Calculation of this slope using van Zuidam classification, 1985.

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SRTM Data Using Contour and Slope map analysis of around 10km radius




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 AADHI BOOMI MINING & ENVIRO TECH (P) LTD.

Fig No 3.28: Relief features of Lease area around 10km Radius

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3.13.15 CONCLUSION

Most of the land area is the agriculture and barren land, entire quarried land will get replaced every year hence there will be less impact on the land use. It is an eco-friendly mining project land.

Impact on Land Use

The proposed Sand quarry will result in disturbance of the land use pattern of the mine lease area. Land requirement for the project has been assessed considering functional needs. The potential adverse impact of sand quarry is the change in land use pattern.

No adverse impact is anticipated on land use of buffer zone associated due to the proposed mining activity, as all the activities will be confined within the project site.

Impact on Landuse / Land cover

- The mining of natural resources is invariably associated with land use and land cover changes
- Flow of silt from overburden dumps causes degradation of land and disruption of water flow.

3.13.16 Impact of Landuse and Land cover change detection and Land degradation of core zone of mine area:

Preprocessing:

In the detection of land use change, multi-temporal Google images of the same areas mainly serve three purposes:

1) Providing the ground feature distribution; 2) describing the change information; 3) analyzing the LUCC qualitatively and quantitatively. The common ways used in LUCC can be categorized into two types: direct comparison method and post-classification comparison method. The post-classification comparison method can not only give change information of land-use types but also can describe the transition information.

The Google earth image data are used in the detection of land-use change however; the datasets inevitably contain disturbances, such as geometric distortion. Those

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disturbances degrade the data quality. Therefore, we need to do some image preprocessing (geometric rectification, registration, and clipping).

Selecting the region of interest:

First, the images were processed using image processing signed construction, water and vegetation. Among them, the vegetation consists of farmland and green land; construction includes mining area land, habitation land; the water includes natural water, ponds and mining-induced collapse waterlogged zone.

Extraction and analysis:

The vector layers of pond, vegetation and construction areas are extracted to calculate the transformation matrix of land use and land cover pattern. By integrating correlative data about the study area during the period of 2003~2020, this period has Before operation, Pre operation Period, Present Period analysis mining area with agriculture land and Built-up area increase the land use change and the driving forces that cause the change.

The extraction of object information:

1) land-use change analysis in experimental area we used the layer D-value method to analyze the land-use change information in the study area. By using the results of classified maps from 2012 to 2022, the changes in study area can be identified in two different periods: 2012 to 2017 and 2017 to 2022. Through the choice of each sample extracted from classified maps, we can definitely find the change and non-change areas.

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Lease area 2012



Lease area 2017

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Lease area 2022

Firstly, we use the image of 2012 as the base Google image, rectified and registered by using polynomial method. Then the region of interest is clipped according to the range of the study area.

Secondly shows that image of 2017, as the base Google image, using mining area compare to previous year the mines the lease area along with existing quarries. Lease applied area showing do not operation during this period. Agriculture land also dry land previous year.

Recent period 2022 Lease area around quarry zone area. There is no agriculture land in buffer zone when during mining operation period. There is no develop built-up and agriculture land in core zone.

3.13.17 Results and discussion

The data obtained through the incorporated coverage of Google earth of LULC status of three study periods i.e. 2012, 2017 and 2022 depicts land use land cover change in different categories like Agricultural fallow (AF), barren land (BL), Existing Quarry (EQ).

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Table No 3.26: Change detection of Google Images for the years (2012, 2017 and 2022)

S. No.	Description	Satellite Image 2012	Satellite Image 2017	Satellite Image 2022 (Recent Satellite Image)	Ecological Damage
1	Working Pit size	Fresh	Fresh	Fresh	No Damage
2	No. of Quarry Benches	Fresh	Fresh	Fresh	No Damage
3	Waste Dump with stockyards	No Dumps	No Dumps	No Dumps	No Damage
4	Mines Office	No Infrastructure	No Infrastructure	No Infrastructure	No damage
5	Fence	No fence	No fence	No fence	Not done
6	Agriculture land	Dry land	Dry land	Some Agriculture land decreases	No damage. The land increased due to mining activity which has a positive impact.
7	Built up land	Built up land found above 500m radius	Built up land found above 500m radius	Built up land found above 500m radius	No damage. Above 300m radius. No rehabilitation settlement.
8	Approach				

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	road to village	Existing approach road	Existing approach road	Existing approach road	No damage.
9	Deforestation	Plantation existed before operation of quarry	Plantation existed before operation of quarry	Plantation existed before operation of quarry Increase trees	No damage. Afforestation progressed.
10	Water bodies	Water bodies in the core area	Water bodies in the core area	Water bodies in the core area	There is no Impact Water Pollution around buffer zone.

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CHAPTER – 4: ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Open cast mining will be carried out in Palar River by manual excavation and transportation by tractor and tipper combination. As excavation and loading of sand is done by manual, the dust emission will be very negligible. During transportation, the dust will be generated due to the movement of truck in the lease area. Even though there is emission the effect will be within the core zone. The movement of more numbers of tippers/tractors will disturb the surroundings in various ways. Therefore, it is essential to assess the impacts of sand mining on different environmental parameters before starting the mining operations, so that abatement measures could be planned in advance for eco-friendly mining in the area. The likely impacts on various environmental aspects and mitigation measures are discussed below.

4.1 Air Environment

The air borne particulate matter is the main air pollutant by opencast mining. The mining operation will be carried out by manual loading and transportation by tractor and tipper combination.

4.1.1. Anticipated Impact

The air borne particulate matter generated by handling and transportation of river sand are the main air pollutant. The emissions of Sulphur dioxide (SO₂), Oxides of Nitrogen (NO_x) contributed by diesel operated vehicles plying on haul roads are marginal. Prediction of impacts on air environment has been carried out taking into consideration of production of 117618m³ of sand (one year).

4.1.2 Emissions Details

Transportation of sand and wind erosion of the exposed area will be the main polluting source in the sand mining activities that releasing Particulate Matter (PM10) affecting Ambient Air of the area. Emission during manual loading will also be considered as loading person will be affected. Transportation of the sand by trucks operated on the haul road was calculated as the line sources. Details of emission during transportation on the haul road, wind erosion of the exposed area were discussed and combined impact was predicted in the worst case scenario under worst meteorological condition given as follows:

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4.1.2.1 Manual excavation and loading

The dust emission during manual excavation and loading will be negligible but it affects the particular excavating and loading persons when they work for a day. The PPE such as dust protection mask should be provided and the health check up for the workers should be conducted by six months once. An adequate labour should be engaged for excavating and loading of river sand. As more numbers of labors and tippers are engaged, the probable of getting accident during transportations is high. So, all the tippers should be fitted with reverse beep horn and minimum two supervisors have to be engaged for supervising the workers and transportation of sand.

4.1.2.2 Haul Road

Chaulya (2006) was used to calculate emission of particulate matter released into the atmosphere during transportation of sand by truck operated per hour on haul road.

$$E = \{[(100-m) (m)^{-1}]^{0.35} \{(us) (100-s)^{-1}\}^{0.7} \{0.5 + 0.1(f + 0.42v)\} 10^{-3}$$

Table 4.1: Source Parameters (During Vehicle Movement on Haul Road)

S.No	Description	Symbol	Quantity
1	moisture content (%)	m	0.024
2	silt content (%)	s	6
3	wind speed (ms ⁻¹)	u	3.0
4	frequency of transporting (no. h ⁻¹)	f	20 times (maximum)
5	average vehicle speed(ms ⁻¹)	v	4.1
6	Area of line source (m ²)	a	400
7	Controlled emission rate (g s ⁻¹)	CE	0.00128

Emission of PM10 due to transportation of sand on haul road was 0.0005 g/s based on assumption that silt content spread on river bed of 6% and average wind speed of 3.0 m/s as observed with site data. Based on the above consideration there was low emission of PM₁₀ during transportation of sand.

4.1.2.3 Summary of calculated Emission Rates

Table 4.2: Emissions Rates of PM₁₀

Source type	Controlled Emission Rate (g/s/m ²)
Haul Road	3.2 x 10 ⁻⁶

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Table 4.3: Emissions Rates of SO₂

Source type	Average Emission rate for HDDV as per EPA	Emission rate (Proposed Project)
Tippers	0.012 g/mile	1.6×10^{-7} g/s/m ²

Table 4.4: Emissions Rates of NO₂

Source type	Average Emission rate for HDDV as per EPA	Emission rate (Proposed Project)
Tippers	0.725 g/mile	0.00001 g/s/m ²

4.1.3 Frame work of Computation & Model details

By using the above-mentioned inputs, ground level concentrations due to the mining activities have been estimated to know the incremental rise in ambient air quality and impact in the study area. The effect of air pollutants upon receptors are influenced by concentration of pollutants and their dispersion in the atmosphere. Air quality modeling is an important tool for prediction, planning and evaluation of air pollution control activities besides identifying the requirements for emission control to meet the regulatory standards and to apply mitigation measures to reduce impact caused by mining activities.

4.1.3.1 Model Input data

The air pollution modeling carried out represents the normal operating scenarios. As the proposed activity is mining the major source of pollution is particulate matter and gaseous emission. The following data has required as input data for dispersion pattern.

- 1) Baseline data of PM₁₀, SO_x and NO₂ is needed along with meteorological data. Meteorological data preprocessor (AERMET) needs meteorological data which calculates atmospheric turbulence characteristics, mixing heights, surface heat flux for finding the atmospheric dispersion. Site specific data recorded during summer season (1st Mar to 31st May 2022) at project site for executing modeling studies.
- 2) The emission rates of PM₁₀, SO_x and NO₂ from the various sources was taken.
- 3) Location of the project.

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4.1.3.2 Model Results

The Air Quality Impact Prediction has been done by using AERMOD of USEPA". The main sources of air pollution with regard to the proposed project for the purpose of estimation of increase in PM₁₀, SO_x and NO₂ are identified due to –

1. Scenario 1 – PM₁₀

(i) Transportation of sand by trucks on the river bed.

2. Scenario 2 – SO_x and NO₂

i. From movement of transporting vehicle

Scenario1:

Table 4.5: Total predicted GLC of PM₁₀ in core and buffer zone due to Transportation of sand on the river bed.

Location	Location Code	Background value in µg/m ³	Incremental GLC in µg/m ³	Total Predicted GLC in µg/m ³
Mine site	AQ1 - Centre	40	1.4	41.4
Receptor 01	AQ2 – 135m - NW	40	0.39	40.39
Receptor 02	AQ2 – 145m - SE	40	0.23	40.23
Receptor 03	AQ2 – 320m - S	40	0.46	40.46
Receptor 04	AQ2 – 140m - SW	40	0.27	40.27
National Ambient Air Quality Standards (NAAQS)				100

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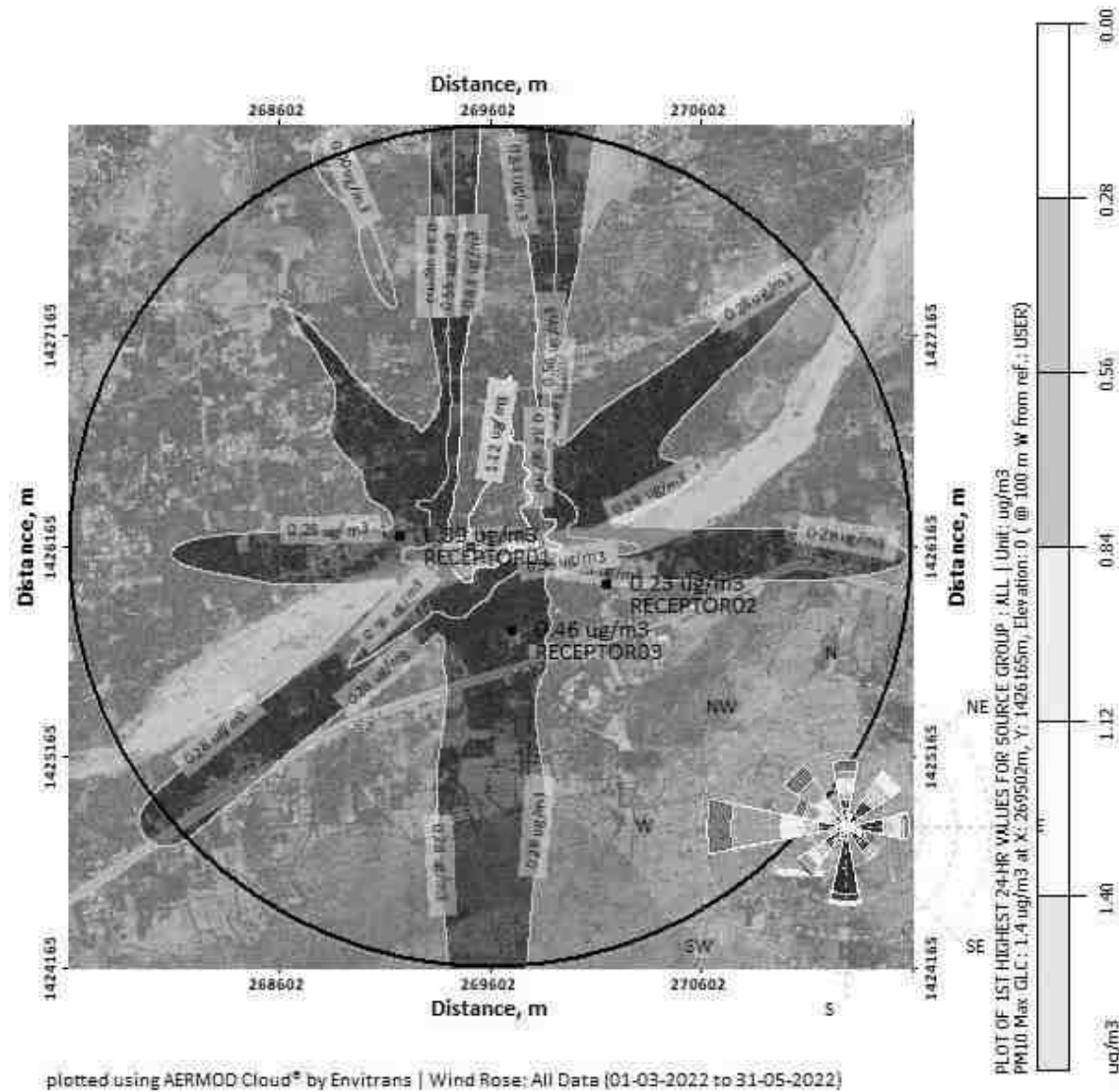


Fig 4.1: Isopleths of PM10 is 1.4 µg/m³(Core) occurred at the project site during i) transportation of sand on river bed

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Scenario 2:**Table 4.6: Impact of SO_x due to Movement of Vehicle in the mining lease area**

Location	Location Code	Background value in µg/m³	Incremental GLC in µg/m³	Total Predicted GLC in µg/m³
Mine site	AQ1 - Centre	6	BDL	6
Receptor 01	AQ2 – 135m - NW	6	BDL	6
Receptor 02	AQ2 – 145m - SE	6	BDL	6
Receptor 03	AQ2 – 320m - S	6	BDL	6
Receptor 04	AQ2 – 140m - SW	6	BDL	6
National Ambient Air Quality Standards (NAAQS)				80

Table 4.7: Impact of NO_x due to Movement of Vehicle in the mining lease area

Location	Location Code	Background value in µg/m³	Incremental GLC in µg/m³	Total Predicted GLC in µg/m³
Mine site	AQ1 - Centre	10	BDL	10
Receptor 01	AQ2 – 135m - NW	10	BDL	10
Receptor 02	AQ2 – 145m - SE	10	BDL	10
Receptor 03	AQ2 – 320m - S	10	BDL	10
Receptor 04	AQ2 – 140m - SW	10	BDL	10
National Ambient Air Quality Standards (NAAQS)				80

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Total predicted 24-h maximum GLC of PM₁₀ at project site for scenario 1 i.e transportation was 41.4µg/m³ after superposition of base-line value 40µg/m³ over the incremental GLC 1.1µg/m³ due to transportation over the river bed.

4.1.4. Air Quality Index

An air quality index is defined as an overall scheme that transforms the weighed values of individual air pollution related parameters (for example, pollutant concentrations) into a single number or set of numbers (Ott, 1978). Air quality standards are the basic foundation that provides a legal framework for air pollution control. The basis of development of standards is to provide a rational for protecting public health from adverse effects of air pollutants, to eliminate or reduce exposure to hazardous air pollutants, and to guide national/ local authorities for pollution control decisions. The objective of an AQI is to quickly disseminate air quality information (almost in real-time) that entails the system to account for pollutants which have short-term impacts. To present status of the air quality and its effects on human health, the following description categories have been adopted for IND-AQI. AQI breakpoints for eight pollutant parameters considered for AQI and these are summarized below in Table with color scheme to represent the AQI bands.

Table 4.8: AQI and its associated Health Impacts

AQI	Associated Health Impacts
Good	Minimal Impact
Satisfactory	May cause minor breathing discomfort to sensitive people
Moderate	May cause breathing discomfort to the people with lung disease such as asthma and discomfort to people with heart disease, children and older adults
Poor	May cause breathing discomfort to the people on prolonged exposure and discomfort to people with heart disease with short exposure
Very Poor	May cause respiratory illness to the people on prolonged exposure. Effect may be more pronounced in people with lung and heart diseases
Severe	May cause respiratory effects even on healthy people and serious health impacts on people with lung/heart diseases. The health impacts may be experienced even during light physical activity

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Table 4.9: Proposed Breakpoints for AQI Scale 0-500
(Units: $\mu\text{g}/\text{m}^3$ unless mentioned otherwise)

AQI Category (Range)	PM ₁₀ 24-hr	PM _{2.5} 24-hr	NO ₂ 24-hr	O ₃ 8-hr	CO 8-hr (mg/m ³)	SO ₂ 24-hr	NH ₃ 24-hr	Pb 24-hr
Good (0-50)	0-50	0-30	0-40	0-50	0-1.0	0-40	0-200	0-0.5
Satisfactory (51-100)	51-100	31-60	41-80	51-100	1.1-2.0	41-80	201-400	0.5-1.0
Moderately polluted (101-200)	101-250	61-90	81-180	101-168	2.1- 10	81-380	401-800	1.1-2.0
Poor (201-300)	251-350	91-120	181-280	169-208	10-17	381-800	801-1200	2.1-3.0
Very poor (301-400)	351-430	121-250	281-400	209-748*	17-34	801-1600	1200-1800	3.1-3.5
Severe (401-500)	430+	250+	400+	748+*	34+	1600+	1800+	3.5+

*One hourly monitoring (for mathematical calculation only)

4.1.5.1. Interpretation of Air quality using IND-AQI:

Table 4.10: Computation of AQI with Baseline data

Air pollutants	Total Predicted GLC due to proposed quarry $\mu\text{g}/\text{m}^3$	AQI	Associated Health Impacts
PM ₁₀	41.4	Satisfactory (0-50)	Good

The above table shows the quality due to total predicted GLC of quarry in core area. PM₁₀ is between 0-50 of AQI which is good and will not cause any effects to the surrounding village people.

4.1.5. Mitigation Measures

The pollutants from proposed mining activities, residential and commercial activities are the primary sources of air pollution. However, in the study area adequate control measures will be implemented in future at the time of mining operation. Mitigate 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. However, to further minimize the pollutant concentration especially PM₁₀, the following control measure should be adopted by the project proponent.

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- ❖ Regular water sprinkling on haul roads at regular intervals will help in reducing considerable dust pollution
- ❖ 0.5 KLD will be used for dust suppression.
- ❖ Covering of material when transport through trucks/dumper
- ❖ The vehicles and machinery will be kept in well maintained condition so that emissions will minimize
- ❖ Cabins for shovel and dumpers and dust masks to workmen will be provided
- ❖ The dust respirators should be provided to all workers working in dusty environment
- ❖ Regular health check-up of workers and nearby villagers in the impacted area should be carried out and also regular occupational health assessment of employees should be carried out as per the Factories Act
- ❖ Ambient Air Quality Monitoring will be conducted on regular basis to assess the quality of ambient air.

As discussed above under each activity, there will be increase in terms of dust load and gaseous emissions. However, it can be stated that these incremental contributions will remain within the prescribed limits/norms. Further, the mitigation measures will further bring down these concentrations making the mining activities more eco-friendly.

4.2 Carbon emission and carbon sinks due to proposed mining activity

4.2.1 Carbon emissions

There are both natural and human sources of carbon emissions. Natural sources include decomposition, ocean release and respiration. Human sources come from industrial activities such as cement production, deforestation as well as the burning of fossil fuels like coal, oil and natural gas.

4.2.1.1 Carbon emission due to natural activity in project site and carbon sinks

a) Carbon from decomposition

As the proposed project site is river with few shrubs which implies there is no much cutting of trees. So the process of decomposition will not take place which emits carbons into the atmosphere.

b) Carbon from ocean release

The project site is located 116km away from the Arabian Sea. Hence the carbon release by ocean to the project site is not possible

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c) Carbon from respiration

The carbon dioxide we exhale does not contribute to global warming for the simple reason. Since all the carbon dioxide we exhale originated in carbon dioxide captured by plants during photosynthesis, we are not disturbing the carbon dioxide content of the atmosphere by breathing.

4.2.1.2 Carbon emission due to human activity in project site and carbon sinks

a) Carbon from Vehicles

The proposed method of mining is manual excavation and transportation by tippers and tractors combination. The burning of fossil fuels used for the tippers will release carbon monoxide, carbon dioxide and nitrogen oxide into the atmosphere. When those gases are emitted into the atmosphere it affects the amount of greenhouse gases, which are linked to climate change and global warming. In average based on the production per day, two tippers can travel 21 miles within the lease area for transporting the rough stone. Plants not only absorb carbon dioxide but also absorb other gases and remove the impurities from it.

Table 4.11: Emission of carbon monoxide from vehicle

Source type	Average Emission rate of CO for HDDV as per EPA	Emission rate of CO
Tippers	2.311 g/mile	0.05 kg/day

Remediation

The project proponent proposed to plant 150 numbers of one year taller tree sapling along the river bank to overcome the emission of carbon gases. Moreover, they will plant trees along the village road and government schools under CER and CSR schemes. BS –VI model of tippers are proposed to use in the quarry for the controlled emission of gases.

4.3 Soil Carbon stock

Soil carbon sequestration is a process in which CO₂ is removed from the atmosphere and stored in the soil carbon pool. This process is primarily mediated by plants through photosynthesis, with carbon stored in the form of SOC. Carbon is the main component of soil organic matter and helps give soil its water-retention capacity, its structure, and its fertility. The dense carbon stocks below and above the soil are

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mostly seen in dense forest where more process of photosynthesis takes place and tons of leaves, branches gets decomposed. The agricultural activity in field can degrade and deplete the SOC levels during the process of tillage in paddy, sugarcane turmeric crop field.

The land use analyst shows that there is Rengamala R.F and Thoppasamymalai R.F located at the distance of 10.20km and 20.90km respectively. As it is mining project which is carried out within lease area it will not affect any soil carbon stock in the reserved forest.

4.4 Noise Environment

Noise survey has been conducted in the study area of five locations to assess the background noise levels in different zones. The anticipated noise level due to proposed mining activity has been assessed considering baseline noise level, distance involving mining site to nearest village and noise generated due to proposed mining activity. Following are the sources of noise in the proposed open cast sand quarry project.

- Vehicular Movement.

Noise pollution poses a major health risk to the mine workers. When noise in the form of waves impinges the eardrum, it begins to vibrate, stimulating other delicate tissues and organs in the ear. If the magnitude of noise exceeds the tolerance limits, it is manifested in the form of discomfort leading to annoyance and in extreme cases to loss of hearing. Detrimental effects of noise pollution are not only related to sound pressure level and frequency, but also on the total duration of exposure and the age of the person.

Table 4.12: Permissible Exposures in Cases of Continuous Noise (CPCB)

Sound Level (dB A)	Continuous Duration (Hours)
85	8
88	4
91	2
94	1
97	0.5
100	0.25

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Table 4.13: Noise Exposure Levels & Its Effects

Noise Levels dB(A)	Exposure Time	Effects
85	Continuous	Safe
85-90	Continuous	Annoyance and Irritation
90-100	Short term	Temporary shift in hearing threshold, generally with complete recovery
Above 100	Continuous	Permanent loss of hearing
100-110	Several years	Permanent deafness
110-120	Few months	Permanent deafness
120	Short term	Extreme discomfort
140	Short term	Discomfort with actual pain
150 and above	Single exposure	Mechanical damage to the ear

Source: Hand Book of EIA, Rao & Wooten

4.4.1 Anticipated Impacts due to Noise in Core Zone

During the operation phase of mining, movement of tipper add some noise level whose impact is being minimized by continuous maintenance of vehicle. The likely generations of noise levels due to movement of tipper is 75-85 dB(A). The noise of continuous movement of tippers in the approach road may disturb the people in nearest habitations, especially school children and elderly people.

4.4.2 Mitigation measures for Control of Noise

The following noise mitigation measures are proposed for control of Noise.

- ❖ Use of personal protective devices i.e., earmuffs and earplugs by workers, who are working in high noise generating areas.
- ❖ Proper and regular maintenance of vehicles, machinery and other equipments.
- ❖ The noise generated by the machinery will be reduced by proper lubrication of the machinery and other equipments.
- ❖ Speed of trucks entering or leaving the mine and while crossing the village road will be limited to moderate speed to prevent undue noise from empty vehicles.
- ❖ Regular medical check-up and proper training to personnel to create awareness about adverse noise level effects.
- ❖ The installation of convex mirrors in all the turning point of road will prevent the horn sound.

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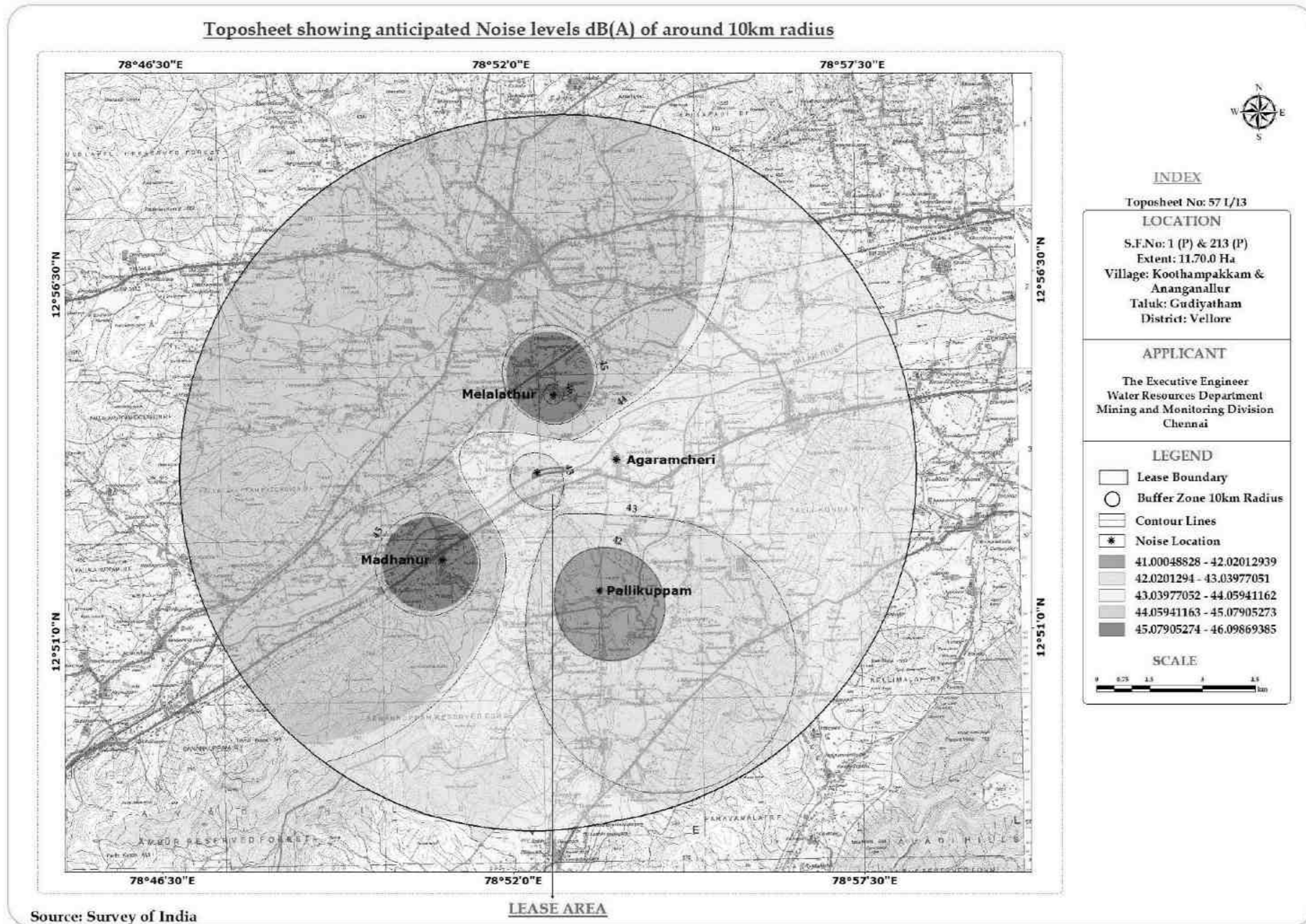


Fig 4.2: Noise dispersion in Buffer zone due to proposed mining activity

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4.5 Water Environment

Mining operations can affect groundwater quality in several ways. The most obvious occurs in mining below the water table, either in underground workings or open pits. This provides a direct conduit to aquifers. Groundwater quality is also affected when waters (natural or process waters or wastewater) infiltrate through surface materials (including overlying waste or other material) into ground water.

Whereas Impacts on surface water include the build-up of sediments or other toxic products, short and long-term reductions in pH levels (particularly for lakes and reservoirs), destruction or degradation of aquatic habitat, and contamination of drinking water supplies and other human health issues. The water balance for the project is presented in Fig 4.3.

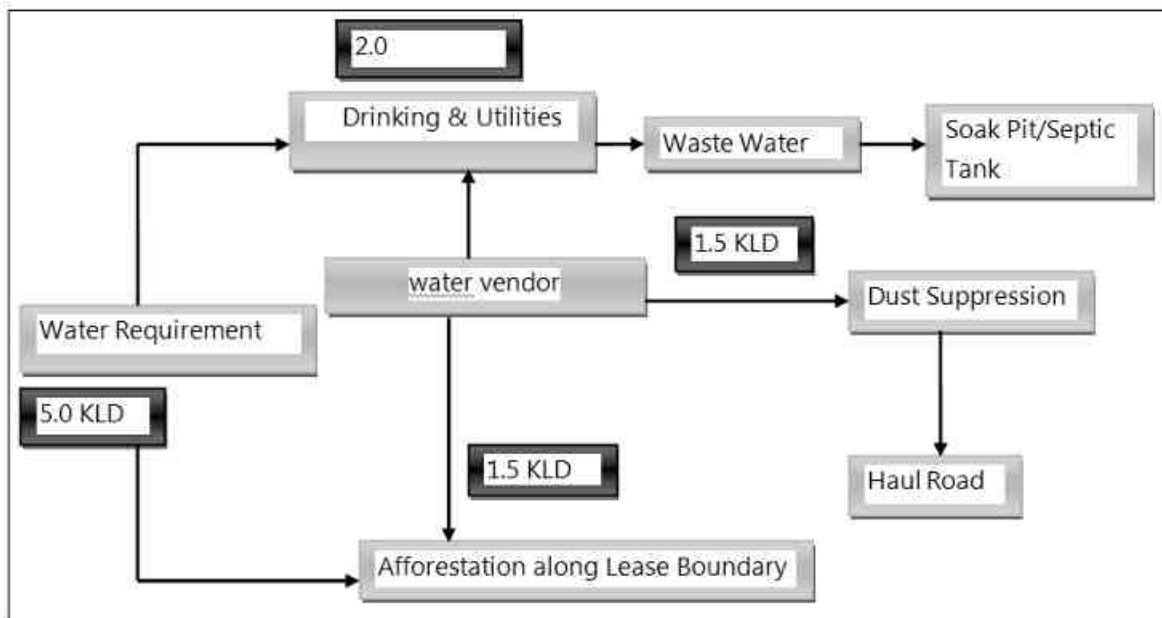


Fig. 4.3 Water Balance

Drinking & Utilities = 2.0 KLD

Wastewater = (2.0 KLD * 75%) = 1.50 KLD

Water required For Dust Suppression, Green Belt = 3.0 KLD

Total Water Requirement = 3.5 KLD

There are no probable sources of liquid effluents in this project. The 1.5 KLD of domestic effluent/ wastewater generated will be discharged into soak pit via septic tank.

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4.5.1. Anticipated Impact on Surface Water body due to proposed project

The proposed project is river sand mining carried out in Palar River. The mining will be carried out for only 150 days during non flow season. There are no any other water bodies like lake, pond located within 1km radius of project site. The nearest water body is Agaramachi Lake which is located 1.8km away from proposed mining lease area. The mining activity will not affect surrounding water bodies in any way but there will be chances of polluting Palar River water due to transportation vehicles and workers worked in the sand quarry.

4.5.1.1 Mitigation Measures:

- i. The repair works of the tippers are strictly prohibited within the lease area to prevent the spillage of grease, oil etc.
- ii. The tippers should be maintained periodically to prevent the unexpected spillages in the river bed.
- iii. The workers should be given awareness about not to use plastic bags and to properly dispose the wastes in bins placed in the lease area.

4.5.2 Anticipated Impact on Ground water due to proposed project

The water table in this region is about 6m bgl. The proposed depth of mining is 1m below theoretical bed level for one year. Thus, the mining activity will not intersect ground water table. No chemical having toxic elements will be used for carrying out mining activity. So the rain water which infiltrates into the ground in the lease area does not affect the quality of ground water. The schematic representation of depth of mining and water table is given in Figure 4.4. The excavation of river sand may affect the ground water table in the surrounding wells.

4.5.2.1 Mitigation Measures:

- i. The depth mining should be strictly restricted to 1m below theoretical bed level as per Sand Mining Guidelines, 2020 to maintain the ground water level in the adjacent wells.
- ii. The excavated sand from the proposed lease area will be replenished within one or two years during monsoon seasons. The detail of annual replenishment is given in Chapter 7.

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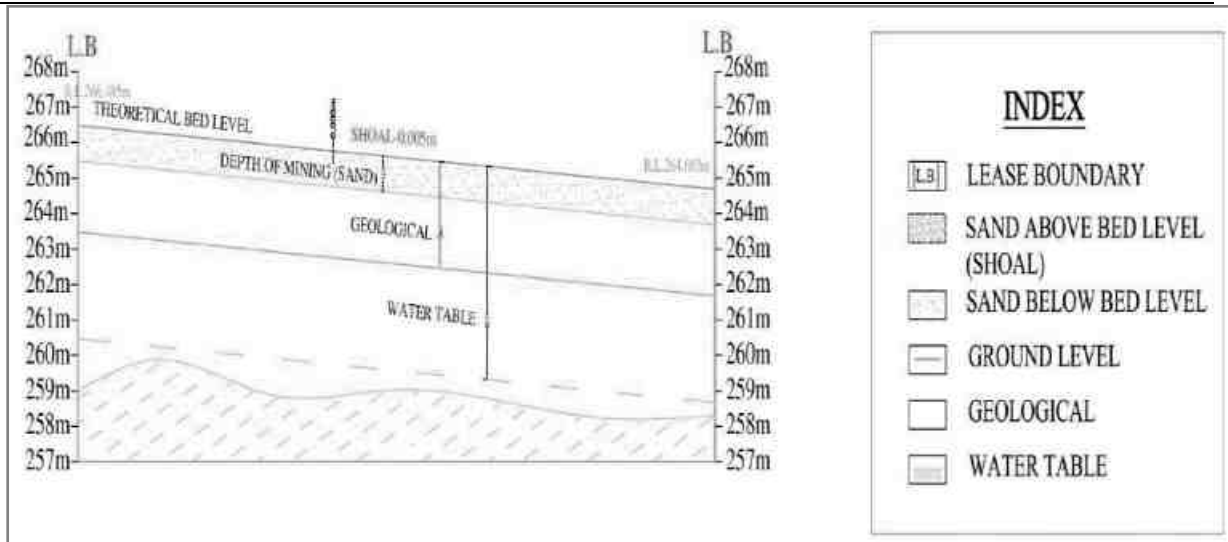


Fig.4.4 Schematic representation of depth of mining and water level

4.5.3 Water Quality Index

Water Quality Index value has been calculated for the observed values and compared with drinking water specification as per IS 10500:2012 and results were discussed. The WQI has been calculated by using the standards of drinking water quality recommended by the World Health Organization (WHO), Bureau of Indian Standards (BIS) and Indian Council for Medical Research (ICMR). The weighted arithmetic index method (Brown et. al.,) has been used for the calculation of WQI of the water body.

$$\text{Water Quality Index} = \frac{\sum q_n W_n}{\sum W_n}$$

Further quality rating or sub-index (q_n) was calculated using the following expression.

$$q_n = 100 * [V_n - V_{io}] / [S_n - V_{io}] \text{ Where,}$$

q_n = Quality rating for the nth water quality parameter.

V_n = Estimated value of the nth parameter at a given sampling station.

S_n = Standard permissible value of the nth parameter.

V_{io} = Ideal value of nth parameter in a pure water.

Ideal value in most cases $V_{io} = 0$ except in certain parameters like PH and dissolved oxygen. V_{io} for PH = 7 and V_{io} for DO = 14.6

W_n = Unit weight for the nth parameter.

The overall Water Quality Index (W.Q.I.) was calculated by aggregating the quality rating with the unit weight linearly.

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**Table 4.14: Water Quality Index (W.Q.I.) and Status of water quality
(Chatterji and Raziuddin 2002)**

Water Quality Index Level	Water Quality Status
0 – 25	Excellent water quality
26 - 50	Good water quality
51 - 75	Poor water quality
76 - 100	Very Poor water quality
>100	Unfit for Drinking

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Table 4.15: Analyses of water quality using Water Quality Index

Parameters	As Per IS 10500:2012	Unit Weight (Wn)	Ananganallore	Kuthambakkam	Agaramcheri
Water Quality Index Level			34	41.4	43.9
Water Quality Status			Good water quality	Good water quality	Good water quality
pH value at 25°C	6.5 – 8.5	0.079	7.20	6.48	7.14
Turbidity , NTU	Max 1 NTU	0.0853	BDL(DL:0.1)	BDL(DL:0.1)	BDL(DL:0.1)
Total Dissolved Solids, mg/L	Max 500 mg/L	0.135	762	796	820
Total Hardness as CaCO ₃ , mg/L	Max 200 mg/L	0.059	182	236	260
Chlorides as Cl, mg/L	Max 250 mg/L	0.132	92	120	180
Sulfates as SO ₄ , mg/L	Max 200, mg/L	0.097	14	26	44
Total Iron as Fe, mg/L	Max 0.3 mg/L	0.088	0.05	0.08	0.06
Total Coliform, MPN/100ml	Shall not be detectable	-	56	34	50
E.coli , MPN/100ml	Shall not be detectable	-	<2	<2	<2

Note: Water Quality is calculated only for Physical and Chemical Parameters

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From the above table, it is seen that the Total Dissolved Solids in water samples of all the villages and Total Hardness in water samples of Kuthambakkam and agarmcheri villages are above the acceptable limits. Based on water quality index calculation, it is analyzed that the water quality in all three above said village are good. The reason is that the values of TDS and TH are not extremely high and also the values of all other parameters are below the acceptable limits. For excellent quality, the water should be treated by reverse osmosis to reduce dissolved solids and total hardness to the required rate. Boiling of water will remove the microorganisms effectively from all waters in the above said villages making the water aseptically fit for drinking purposes.

Total Coliform: The most basic test for bacterial contamination of a water supply is the test for **total coliform bacteria**. Total coliform counts give a general indication of the sanitary condition of a water supply. It includes bacteria that are found in the soil, in water that has been influenced by surface water, and in human or animal waste.

Effects: Drinking water that is contaminated with **coliform** bacteria does not always cause illness. If disease-causing bacteria are present, the most common symptoms are gastrointestinal upset and general flu-like symptoms such as fever, abdominal cramps, and diarrhea.

Solution: To kill the microorganisms (Total Coliform) boiling the water is very easy and effective step.

Escherichia coli (E.coli): It is the major species in the fecal coliform group. E. coli is considered to be the species of coliform bacteria that is the best indicator of fecal pollution and the possible presence of pathogens.

Effects: It Causes intestinal infection include diarrhea, abdominal pain, and fever. More severe cases can lead to bloody diarrhea, dehydration, or even kidney failure.

Solution: E.coli contaminated water can be treated by using chlorine, ultra-violet light, or ozone, all of which act to kill or inactivate E. coli. Chlorine is a cheap and effective disinfectant. It is available in local market.

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4.5.4 Impact on Hydrogeology

i. RESISTIVITY SURVEY ANALYSIS

Electrical Resistivity survey by Schlumberger configuration was conducted to interpret various geological formation and possibility of water spring touch at various depths by Inverse slope method. At a depth of 6-7 there is an indication of seepage of ground water which may yield < 1/2" of water.

The various geological formations and water touch as interpreted is given below,

Table 4.16: Resistivity Survey

Layer	Depth (m)	Nature of formation	Resistivity Value
h1	0-6	Top Soil & clay	Very Low (64'Ω)
h2	6-7	Water table	Medium Value(125'Ω)
h3	7-15	Weathered with clay formation	Medium Value (210'Ω)
h4	>15	Hard Rock Formation	High Value(1235'Ω)

From the results of Resistivity Survey, it is understood that the study area is composed of soil, clay and weathered formation up to the depth of 15m bgl and water table is at the depth of 6-7m. It clearly shows that the excavation of sand to the depth of 1m below TBL will not affect the water table in surrounding villages.

4.6 Soil Environment

4.6.1 Impact on Soil Environment

There is no soil present in the quarry area as it is river bed.

4.7 Waste (overburden/Reject) Dump and Municipal Solid waste Management

There are no wastages anticipated during the quarrying operation. The entire sand and sand shoals will be transported to the needy customer site. Sanitary facility will be constructed as semi-permanent structure. So municipal solid waste will be collected in semi-permanent structure and disposed safely and periodically as per the PCB norms

4.8 Ecology and Biodiversity

4.8.1 Impact on Ecology and Biodiversity

The details and list of flora, fauna, reserved forest and cropping pattern within the 10km radius of study area is given in chapter 3. The impact on ecology and biodiversity due to the proposed mining activity has to be studied in detail to

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prepare the management plan to safeguard the flora, fauna, forest products and aquatic living organism etc.

A detailed anticipated impact of Ecology and Biodiversity due to mining activity is described in Table 4.17 & 4.18.

Table 4.17: Ecological Impact Assessments and Its Mitigations -Part 1

Sl. No	Issues	Assessment	Mitigations
1	Proximity to national park/ wildlife sanctuary / reserve forest / mangroves / coastline/estuary/sea	<p>The proposed project is not a forest land and there is no forest located within 1km radius. The proposed project does not attract Forest Conservation Act, 1980. The forests located beyond 1km radius are given below.</p> <ol style="list-style-type: none">1. Pallalakuppam Extension Reserve Forest – 5.7km - W2. Pallikonda Reserve Forest – 6km – SE3. Sanankuppam Reserve Forest – 5.3km- SW4. Paravamalai Reserve Forest – 7.3 – S5. Kallapadi Reserve Forest – 7.7km – N6. Raddanaickanur & Charakkal Reserve Forest -19.0km – W7. Ambur Reserve Forest – 18km - SW8. Gundalapalli Reserve forest is - 11.5Km- North West9. Chenji R.F – 2 km – NE10. Bomminayakkanpalayam R.F – 19km – NE11. Nallimalai R.F – 10km – SE12. Virinjipuram Plantation R.F – 14km – E13. Appukal R.F – 14km – SE	-

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		<p>The proposed project will affect not the surrounding forests.</p> <p>There is no wild life sanctuaries found around 10km radius. Koundinaya wildlife sanctuary Quarry area is 150km (E) away from the Bay of Bengal.</p> <p>Hence the area does not attract Wildlife Protection Act, 1972 and C.R.Z. Notification, 1991.</p>	
2	Activities of the project affects the breeding/nesting sites of birds and animals	No breeding and nesting site was identified in mining lease site. The fauna sighted mostly migrated from buffer area. The fauna in the buffer zone may be affected by noise generated due to mining activity.	The noise due to the mining activity will be controlled by regular maintenance of tippers, transporting the empty tipper within the speed the 20 km/hr.
3	Located near an area populated by rare or endangered species	No endangered, critically endangered, vulnerable species sighted in core mining lease area and also in buffer zone.	Nil
4	Proposed project restricts access to waterholes for wildlife	No waterholes are in core zone. No Wild life sanctuary within 10km radius.	Nil
5	Proposed mining project impact surface water quality that also provide water to wildlife	'NO' scheduled or threatened wildlife animal sighted regularly in core area.	Nil
6	Proposed mining project increase siltation that would affect nearby Biodiversity area.	The proposed project itself is desiltation of sand in Palar river	Nil
7	Risk of fall/slip or cause death to wild animals due to project activities	The depth of mining is 1m below theoretical bed level. Also, there is no Wild life sanctuary within 10km radius.	Nil
8	The project release effluents into a water body that also supplies water to a wildlife	No. The projects itself will take place in the water body (river) and no effluents will be produced due to this project.	Nil
9	Mining project effect the	No, the proposed project will not	-

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	forest based livelihood/ any specific forest production which local livelihood depended	disturb forest located around the project site.	
10	Project likely to affect migration routes	No migration route observed during monitoring period.	Nil
11	Project likely to affect flora of an area, which have medicinal value	No flora having medicinal value found within the lease area	The flora such as neem having medicinal value found in the study area of buffer zone. Those floras will not be affected by the proposed mining activity as it will be carried out only within the lease area.
12	Forestland is to be diverted, has carbon high sequestration	'NO'. There is no forest land within the lease area.	Nil
13	The project likely to affect wetlands, fish breeding grounds, marine ecology	'NO'. No wetland, fish breeding grounds, marine ecology present in core mining area.	Nil

(Format Source: EIA Guidance Manual-Mining and Minerals, 2010)

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Table 4.18: Ecological Impact Assessments – Part 2

Ecological Criteria	Identified Impacts	Ecological significance of Impact	Magnitude	Duration /Timing/ Frequency	Reversibility	Mitigation	Cumulative Impact
Zone of Influence	Project site Habitat due to Site Clearance.	The proposed mining lease area is located in Palar river in Kuthambakkam and Ananganallore village. There are only few shrubs like crown flowers and herbs like grass were seen in the lease area. Also these floras grow in only non flow season. This flora is not a habitation for any fauna.	Very Low Impact	-	Reversible	The excavated sand will be replenished in next monsoon seasons. Then the shrubs and herbs will grow accordingly.	No Cumulative Impact
Zone of Influence	Ecological Impact Surrounding habitat due to fugitive emission	As the silt content present in river sand is 6% only, there will not be major emission due to transportation of minerals in the river bed.	Very Low Impact	During the mining plan period	Reversible	The sprinkling of water over the haul road will be done. The transportation vehicles will be maintained and serviced Properly.	No Cumulative Impact
Accessibility	Ecological Impact due to road construction	No Road construction is required to assess the project site. The existing village approach road connects the project site to the existing NH.	No Impact		-	-	No Impact
Zone of Influence	Ecological Impact on Surrounding/ Eco sensitive habitat due to waste water generated from the project activity.	Since the proposed project is an mining activity no waste water generation is expected. The municipal solid waste will be generated due to the workers.	No Impact	-	-	The municipal solid waste generated by workers will be properly segregated into biodegradable and non-biodegradable and disposed through	No Impact

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						garbage collector of Vellore Corporation.	
Zone of Influence	Ecological Impact on Surrounding / Eco sensitive habitat due to Noise generated from the project activity.	During transportation of sand, noise will be generated and it may slightly affect the movement of fauna around the lease area.	Temporary impact	Only during transportation period. (1 year)	No	Regular maintenance of vehicles and driving the empty tipper within 20km/hr speed also control the noise generations.	No Impact
Zone of Influence	Ecological Impact On Surrounding/ Eco sensitive habitat due to Transportation	There is no eco sensitive habitat found around the lease area. The fugitive emission from vehicle movement will form layer in leaves thus reducing the gaseous exchange process. This ultimately affects the growth of plants. The animals like dog, cattle may get accident due to truck movement.	Temporary impact	During Operation Phase	No	The truck driver will be advised to drive the vehicle within 20km/hr inside the lease area and 40km/hr outside the lease area. The truck will be covered with tarpaulin. The sprinkling of water over the haul road will be done.	No Impact
Zone of Influence	Ecological Impact on Natural ecosystem, the soil micro flora and fauna and soil seed banks.	There are no wild life sanctuaries within 10km radius of the project site and no forest located within 1km radius. Most of the period, there is no water flow in the river. The habitation for fish around the proposed lease area is nil.	No impact	Nil	--	The mining will be strictly carried out only within the lease area at the depth of 1m TBL	No Impact
Zone of Influence	Fish habitats and the Food web/food chain in the water body and Reservoir	Most of the period, there is no water flow in the river. The habitation for fish around the proposed lease area is nil.	No Impact	Nil	--	The mining will be strictly carried out only within the lease area at the depth of 1m TBL	No Impact

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Table 4.19: Afforestation Plan of the Proposed Sand Quarry in Palar River

Year	Trees	Area
One year	320	Along the river bund and village road

4.9 Socio Economic

4.9.1 Anticipated Impact

Employment generation (Direct and Indirect) due to the project has generated direct and indirect employment for more than 100 persons. Preference will be given to the local population for employment in all categories including semi-skilled and unskilled. The villages and their inhabitants in the buffer zone will not be disturbed from their settlements due to the mining operations.

It is obvious to assume that the activities of the mining operations will improve the socio-economic levels in the study area. The anticipated impact of this project on various aspects is described in the following sections

- Impact on human settlement: Overall, due to employment generation and economic progress, there will be positive changes in the socio-economic condition of the people residing in the vicinity of the project site. The local population will have preference to get an employment. No resettlement occurred due to mining activity. Built up land has been increased marginally.
- Impact on Population Growth: Population rate grows annually and demand of primary needs and employment will increase due to population growth. It will provide some direct and indirect employment to the people in and around the villages.
- Impact on Vegetation: No decline in agricultural land. It has been increased over a period of time by utilizing the water stored in the working pits. No deforestation will be happened.

Therefore due to mining, per capita income of local people will be improved. The local people have been provided with either direct employments or indirect employment such as business, contract works and development work like roads, etc. and other welfare amenities such as Sanitary facilities, Solar Lighting to Govt school, Health Care to the villages in buffer zone, Maintenance of village road or Providing funds to local body or Prime minister's fund on Socio economic Development and

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relief measures. The job/ business opportunities will improve the economic condition of the persons. They are in a position to utilize this money for purchase of tractors, trucks, etc. which may be put into use for business purposes. Many **positive impacts** can be resulted from a long-term mine unit. In this context, provision of job opportunities, business, transport and communication, laborer etc are the major ones. Thus, this unit is highly favorable to poor and landless people.

4.9.2 Mitigation Measures

- Good maintenance practices will be adopted for tippers which will help to avert potential noise problems.
- Green belt will be developed in and around the project site as per Central Pollution Control Board (CPCB) guidelines.
- Appropriate air pollution control measure will be taken so as to minimize the environmental impact within the core zone.
- For the safety of workers, personal protective appliances like hand gloves, helmets, safety shoes, goggles, aprons, nose masks and ear protecting devices has been provided which meet 'BIS' (Bureau of Indian Standards).

Thus, no significant impact on health and safety will be occurred due to this project.

4.10 Land Environment

4.10.1 Anticipated Impact on Land Use / Land Cover

Mining in the riverbed may change complete land use pattern including channel geometry, bed elevation. Land requirement for the project has been assessed considering functional needs. The excavated area shall be replenished during the next rainy season. The removing of sand will have only the positive impacts since it increases the water carrying capacity of the river. 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 site.

The land use analyses show that the area is of predominantly Agriculture followed by buffer zones of the study area. After excavating the sand from proposed quarry, the river carrying capacity gets increased. As a result the river flow direction never gets diverted and does not affect any crops and properties. Some fallow land also increases due to seasonal crop production, which shows a positive impact due to mining activity.

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4.10.2 Mitigation measures

- ❖ The restoration of the degraded land will be done naturally by upcoming rainy season.
- ❖ Fast growing trees and other native shrubs would be planted along the river bank to enhance the binding property of the soil.
- ❖ Mine lease area has been proposed leaving a safety distance of 1/4th of the width of the river from the bank inwards which will protect the banks so channel geometry will not be disturbed.

4.11 Occupational Health Risks

4.11.1 Anticipated Impact

Occupational health and safety hazards occur during the operational phase of mining.

Excessive dusts, Noise are the chief health hazards. Exposure to fine particulates is associated with work in most of the dust generating stages of mining. Workers with long term exposure to fine particulate dust are at risk of pneumoconiosis, emphysema, bronchitis, silicosis and fibrosis. Precautions would be adopted to prevent dust generation at site and dispersing in the environment. Physical injuries may be taken place during movement of tippers within mining lease area.

4.11.2 Anticipated occupational and safety hazards

- ❖ Health Impact due to Physical activity, Extremes of age, poor physical condition, fatigue, Cardiovascular disease, Skin disorders
- ❖ Noise
- ❖ Respiratory hazards due to Dust exposure
- ❖ Physical hazards

4.11.3 Anticipated health impacts on people in nearby villages

The mining activity not only causes health hazards to quarry workers but also affect the health of nearby village people. The fugitive emission during heavy wind period travel along the predominant wind direction and people in village located along predominant wind direction gets affected. The chances of changing water quality in villages due to mining activities lead to causes various diseases in the nearby village people.

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4.11.4 Mitigation measures

For the safety of workers at site, the following mitigation measures are proposed

- ❖ Use of personal breathing protection will be made compulsory
- ❖ Spraying with water on haul roads, by water-sprinkler
- ❖ Regular health monitoring of workers once in 6 months for silicosis
- ❖ Random health check up for village people around the lease area for identify diseases if any due to mining activity
- ❖ No employee will be exposed to a noise level greater than 75 dB(A) for a duration of more than 8 hours per day without hearing protection
- ❖ Ear muffs provided will be capable of reducing sound levels at the ear to at least 75 dB(A).
- ❖ First-aid facilities as per provisions under Rule (44) of Mines Rules 1955
- ❖ Initial and Periodical medical examination shall be conducted for the employees under Rule 29B & 45 (A).
- ❖ Insurance will be taken in the name of the labourers working in the mines.

4.12 Agricultural Environment

4.12.1 Anticipated Impacts of Proposed project on Agriculture, Horticulture and livestock

The land use analyst sighted that there is an agricultural land (Coconut plantation) within 1km radius of lease boundary based on Google earth map. Other than coconut plantation, horticulture like flowering plants, nursery and various other crops that include flowers, spices, vegetables, fruits, landscape have not seen within 1 km radius of the lease area.

As the villages are located around the project site, the people in the villages are farming cattle like goat, cow, and sheep for their livelihood. The frequent transportation of tippers carrying sand may cause accident to cattle while crossing roads. Then excess mining of sand from the river may affect the water table in the wells around the lease area which will cause threat to agricultural activity in this area. So the following mitigation measures will be followed during mining activity.

4.12.2 Mitigation Measures

- Excavation of sand should be strictly restricted to 1m TBL as per sand mining guidelines, 2020 to protect the ground water in adjacent wells.

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- The tippers should be operated at minimum speed while crossing villages, farms, and agricultural lands.
- Regular check up and proper maintenance of Vehicles will be carried out to minimize the emission of pollutants.



Fig No 4.4 Agricultural land within 1km radius of project site

4.13 Traffic Management as per Sustainable Sand Mining Guidelines

After the commencement of project there will be increase in existing traffic and make congestion to local village two wheeler and four wheeler users. Due to continuous movement of tippers, the existing road gets damaged and cause risk to two wheelers. Even though the National Highways (4 lane) is located at a distance of 440m from lease area, the approach road connecting lease area to NH may not withstand the additional traffic. The following mitigation measures have been suggested for traffic management.

4.13.1 Mitigation Measures

- The PWD officers should ensure that whether the width of junction point of main road and approach road withstand the additional traffic or not, if not, the width and geometry of road should be altered at his own cost act accordingly.

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- They should form monitoring committee to manage the traffic from lease area to NH connecting point. The movement of tippers in the approach road should be as per traffic congestion and density.
- Project Proponent shall ensure that the road may not be damaged due to transportation of the mineral. They should be responsible for maintenance of damaged road if any.
- Convex mirrors have to be installed at all turning points to avoid accidents and unnecessary horns.
- Vehicles used for transportation of sand are to be permitted only with of fitness and PUC Certificates.
- No stacking allowed on road side along National Highways.

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CHAPTER – 5: ANALYSIS OF ALTERNATIVES (TECHNOLOGY AND SITE)

5.0 INTRODUCTION

Consideration of alternatives to a project proposal is a requirement of EIA process. During the scoping process, alternatives to a proposal can be considered or refined, either directly or by reference to the key issues identified. A comparison of alternatives help to determine the best method of achieving the project objectives with minimum environmental impacts or indicates the most environmentally friendly and cost effective options.

5.1 ALTERNATIVE FOR MINE LEASE

During monsoon season, when rivers reach high stage, Palar River also bears significant catchment area and it transports river bed material (sand) which gets accumulated at river bed which reduces the carrying capacity of river. Thus, it is evident that the proposed site will be mined for the purpose of preventing diversion of river flow which affects many properties and lives.

The selection of the site is based on the following considerations which are feasible in terms of location, deposit characteristics, availability of reserves, percentage recovery, road facilities, labor availability, requirement of health and safety and environmental concerns, production scheduling, scope of mechanization/automation, land reclamation, and operating and capital cost estimates. Sand (minor mineral) deposits are site specific. It is present in Palar river bed (11.70.0 Ha.). The mining of the material will be done by opencast manual method in riverbed. The mined out area in river bed block will get replenished annually after monsoon.

5.2 ALTERNATIVE FOR TECHNOLOGY AND OTHER PARAMETERS

Some alternatives considered during EIA study are discussed below:

S. No	Particular	Alternative Option 1	Alternative Option 2	Remarks
1	Technology	Opencast semi mechanized	Opencast Manual method	Opencast manual method for Palar river bed Benefits: <ul style="list-style-type: none">• No Excavator requirement

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				<ul style="list-style-type: none"> Minimal noise will be generated
2	Employment	Local employment	Outsource employment	<p>Local employment is preferred</p> <p>Benefits:</p> <ul style="list-style-type: none"> Provides employment to local people along with financial benefits No residential building/housing is Required
3	Labourer's transportation	Public transport	Private transport	<p>Local labours will be deployed so they will either reach mine site by bicycle or by foot.</p> <p>Benefits:</p> <ul style="list-style-type: none"> Cost of transportation of men will be negligible.
4	Material transportation	Public transport	Private transport	<p>Material will be transported through trucks on the contract basis</p> <p>Benefits:</p> <ul style="list-style-type: none"> It will give indirect employment
5	Water requirement	Tanker supplier	Ground water/surface water supply	<p>Tanker supply will be preferred.</p> <p>Benefits:</p> <ul style="list-style-type: none"> No change in the surface water or groundwater quality
6	Road	Haul road	Metallic road	<p>Haul road will be considered for linking mine site from metallic road for transportation purpose. Minimum distance will be measured along with less number of trees for considering optimum haul road roots.</p> <p>Benefits:</p> <ul style="list-style-type: none"> Less distance, less fuel used, minimum or negligible no. of trees will be cut in best opted haul road root

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5.3 SUMMARY

We have analyzed all the option for alternatives of the proposed mine site. This project is sand specific project and existing land use of mine lease classified as River Body which will continue to be so even after the current mining project is over, hence no alternate site is suggested for this project.

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CHAPTER – 6: ENVIRONMENTAL MONITORING PROGRAMME

Environmental Monitoring program is mandatory to check the impact of the mining activity in the core and buffer zone. Hence regular monitoring of various environmental parameters helps in maintaining sound operating practices of the mining in line with mining and environmental regulations. Environmental Monitoring program will be conducted for various environmental components as per conditions stipulated in Environmental Clearance Letter issued by SEIAA & Consent to Operate issued by TNPCB.

6.1 Measurement methodologies

The following instruments will be used for environment monitoring for various environmental parameters.

Table No: 6.1 Instruments used for Monitoring

S. No	Instruments	Purpose of Monitoring
1	Respirable Dust Sampler	Air Pollution
2	Fine Particulate Sampler	Air Pollution
3	Sound level meter	Noise level
4	Water level indicator	Water level
5	Geophysical Instruments (DDR3)	Water table
6	Camera, Binocular & Lens	Flora, Fauna
7	GPS & DGPS	For fixing the coordinates of sampling location
8	Electronic Total station	Reduced level & topography monitoring

In addition to the above, data on land use, socio economics will collected by visiting the field and utilized from secondary sources from Govt. Dept and other source.

6.2 Monitoring Schedule and Frequency

The sampling and analysis of the environmental attributes will be as per the guidelines of Central Pollution Control Board (CPCB). Monitoring program will be followed till the mining operation ceases; as per the schedule below (Table No. 6.2).

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Table 6.2: Monitoring Schedule

S. No.	Environmental Attributes	Location	Monitoring		Remarks
			Duration	Frequency	
1	Meteorology and Air Quality	Continuous monitoring weather station in core zone/ nearest IMD station	24 hours	Monthly Once	Wind speed, direction, Temperature, Relative humidity and Rainfall.
2	Air Pollution Monitoring – PM _{2.5} , PM ₁₀ , SO ₂ and NO ₂	5 locations (One station in the core zone and at least one in nearby residential, area, one in the upwind, two station on the downwind direction and one in cross wind direction).	8 hours	Once in 6 months	Fine Dust Sampler and Respirable Dust Sampler
3	Water Pollution Monitoring	Mine effluents, Set of grab samples during pre and post monsoon for ground and surface water in the vicinity.	–	Once in 6 months	Physico–chemical, microbiological characteristics
4	Hydrogeology	Water level in open wells in buffer zone around 1km at specific wells.	-	Once in 6 months	Water level monitoring devices may be used.
5	Noise	Mine Boundary, high noise generating areas within the lease and at the nearest residential area	24 hours	Monthly Once	Sound level meter
6	Soil	Core Zone and Buffer zone (Grab samples)	–	Once in 6 months	Physical and Chemical characteristics

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6.3 Data Analysis

Data analysis will be done by MoEFCC approved laboratory as per CPCB guidelines & compliance reports shall be submitted to concerned authority (Specified in Environment Clearance Letter issued by SEIAA, Tamil Nadu and Consent issued by TNPCB, Vellore) on regular basis.

6.4 Emergency procedures

The mines manager monitors the emergencies that may occur in opencast mining operations and prepares an emergency plan to deal with emergency situations during the operation of the mine. Preparation of a preventive maintenance schedule program based on recommendations given and maintenance schedules for tippers as per recommendations of the manufacturers user manuals.

6.5 Detailed Budget

Detailed budgetary provisions for monitoring program are detailed in the following Table no. 6.3.

Table 6.3 Environment monitoring budget

S. No	Environmental Monitoring Program	No. of samples per year	Cost per sample	Cost
1	Ambient Air Quality monitoring	6	Rs 4000	Rs 24,000
2	Water quality	6	Rs 3000	Rs 18,000
3	Soil quality	6	Rs 3000	Rs 18,000
4	Noise monitoring	10	Rs 1000	Rs 10,000
5	Hydro-geology (Ground water Monitoring)	6	Rs 5,000	Rs 30,000
Total				Rs 1,00,000

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CHAPTER – 7: ADDITIONAL STUDIES

7.1. Public Consultation

The present draft EIA report is for Public Consultation only. The proceedings of the Public Consultation will be included in the final EIA report.

7.2 Risk assessment and Disaster Management Plan

Risk Assessment is all about prevention of accidents and to take necessary steps to prevent it from happening. The mining operation is carried out under the management control and direction of a qualified mines manager. The DGMS have been issuing a number of standing orders, model standing orders and circulars to be followed by the mine management in case of disaster, if any.

To overcome such risks, help/aid would be sought from emergency services providers like Police station, fire station, Hospital, Ambulance services in the vicinity of the mine site. Their telephone numbers and communication facilities are to be provided and displayed on the board at the mine office as well as mine site. Responsibility of coordinating rescue activities is entrusted to quarry-in-charge at the quarry site in addition to quarry-in-charge is also looking after statutory obligatory under Mines Act,1952. Name and Address of Contact Person coordinating in case of Eventuality is stated below:

Name and Address of the Proponent	THE EXECUTIVE ENGINEER Water Resource Department, Mining & Monitoring Division, Chennai, Tamil Nadu.
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However, the following Natural/industrial hazards may occur during normal operations.

- i. Operational Phase,
- ii. Inundation of mine pit due to flood/excessive rains,
- iii. Accident due to transport equipments,
- iv. Safety and Environmental aspects.

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Table 7.1 Risk Assessment and Disaster Management Plan

S. No	Hazards	Mitigation measures
1	Inundation	➤ During Monsoon Season and flood time the mining activity will be stopped. Therefore problem of inundation is not likely to happen.
2	Failure of Pit Slope	➤ The depth of mining of sand is just 1m below the theoretical bed level. So the failure of pit slope is not possible. If it happens it does not cause any impacts to the workers.
3	Failure of Waste Dumps	➤ There is no waste anticipated in this sand project. Entire sand and sand shoal will be quarried and transported to the PWD stockyard.
4	Accidents due to Transportation	➤ Convex mirrors should be kept at all corners ➤ All vehicles should be fitted with reverse horn with one spotter at every tipping point ➤ Loading according to the vehicle capacity ➤ Regular checking of brakes to avoid failures ➤ Periodical maintenance of vehicles. ➤ Only Trained drivers will be engaged ➤ The maximum permissible speed limit will be ensured
5	Drowning	➤ The quarry of sand will be done away from the surface water. ➤ The mining activity will be stopped during monsoon season. ➤ No workers will be allowed near the water surface. ➤ Also safety jackets, floating tube will be kept at the site to prevent any mishap
6	Quick Sand Condition	➤ Quick Sand Condition occurs when the working crosses the water table at a certain depth and the permeability of the strata is very high ➤ It will not happen since the depth of mining is 1m where the water table 6-7m below the theoretical river bed level
7	Dust	➤ Periodical wetting of land by spraying $MgCl_2$

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		<p>solutions.</p> <ul style="list-style-type: none">➤ Regular water sprinkling on haulage roads➤ Provision of Dust mask to workers➤ Green Belt shall be carried out along the river bank by planting trees, to improve the aesthetics of the area and also to reduce the pollution outside the activity area
8	Noise	<ul style="list-style-type: none">➤ Rotation of workers to minimize exposure time of noise➤ Provision of earmuffs to workers
9	Health Hazards a) Due to light b) Due to heat c) Respiratory problems	<ul style="list-style-type: none">➤ The workers will be provided with cap or helmet to reduce the exposure to sun light which causes eye irritation, headache.➤ During summer season, the workers will be provided with adequate water and water melon to maintain the body heat.➤ Periodical health checkup will be done for the workers as per Factories Act.
10	General measures	<ul style="list-style-type: none">➤ No entry for any unauthorized persons➤ Quarrying as per Approved Plans only➤ Provision of Personal Protective Equipments➤ In case of any closure of mine the compensation under Industrial Dispute Act will be paid as per law

7.3 Care and Maintenance during temporary discontinuance

Watch and ward are provided permanently in the Mine premises to monitor the Mine openings to prevent inadvertent entry. Temporary discontinuance will be minimal as there is good demand for this material in construction industries.

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7.4 ANNUAL REPLENISHMENT OF MINERAL

7.4.1 Sedimentation

Sedimentation, in the geological sciences, is a process of deposition of a solid material from a state of suspension or solution in a fluid (usually air or water). Broadly defined it also includes deposits from accumulations of rock debris at the base of cliffs.

The factors which affects the "Computation of Sediment":

- a) Geomorphology and Drainage Pattern: The following geomorphic units plays important role:
 - Structural Plain
 - Structural Hill
 - Structural Ridge
 - Denudation Ridge and Valley
 - Highly Dissected pediment
 - Un dissected pediment
- b) Distribution of Basin Area River wise (Area in Sq. Km or Sq. Miles)
- c) Drainage System/Pattern of the area Km/Sq. Km of Palar River
- d) Rainfall and Climate: Year wise Rainfall data for previous 10 years of Palar River
- e) As per Dandy and Bolton study "Sediment Yield" can be related to
 - i) Catchment Area and
 - ii) Mean Annual Run-off

Sand is an essential minor mineral used extensively across the country as a useful construction constituent and variety of other uses in sports, agriculture, glass making (a form of sand with high silica content) etc. It is common knowledge that minerals are non-renewable but this form of mineral naturally gets replenished from time to time in a given river system and is very much interrelated to the hydrological cycle in a river basin.

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7.4.2 River Palar

The Palar River Basin is one of the major river basins in Tamilnadu. The main Palar River originates in Nandhi Durg, Kolar district at an elevation of 800 m above MSL in eastern part of Karnataka State, through Kolar and Bangarupet Taluks where it forms the very large Bethamangal tank. It leaves Karnataka border and flows through Andhra Pradesh for a small distance in Kuppam Taluk in Chittoor District and enters Vellore District of Tamil Nadu and passes through west of Vaniambadi Town and flows into the Bay of Bengal, east of Maduranthagam and south of Mahabalipuram.

The total area of Palar River Basin is 17,633.19 sq.km which includes an area of 3,123 sq.km in Karnataka state, 4,267 sq.km in Andhra Pradesh and 10273.19 Sq Km in Tamil Nadu. It lies between 78°24'43" E, 12°36'26" N and 80°09'54" E, 12°31'26" N from east to west and between 79° 14'23"E, 13°10'21" N and 78°41'51" E, 12°14'05" N in north to south.

The basin covers Vellore, Thiruvannamalai, Kancheepuram, Thiruvallur, Villupuram and Krishnagiri districts of Tamilnadu. The important tributaries are 1.Poineyar 2.Kaudinya Nadhi 3.Malattar 4. Cheyyar 5.Agaramar 6.Kamandalar 7.Naganadhiar 8.Killiyar 9.Vegavathiar. In this basin there are 50 blocks either partly or fully falling in the above districts.

7.4.3 Dandy and Bolton formula for calculation of sediment yield

The formula uses catchment area and mean annual runoff as key determinants to give a yield value.

For run off less than 2 inches (Q < 2 in)

$$S=1280*(Q)^{0.46}*[1.43-0.26 \text{ Log (A)}]$$

For run off more than 2 inches (Q > 2 in)

$$S= 1958*(e^{-0.055*Q})*[1.43-0.26 \text{ Log (A)}]$$

Where: S = Sediment yield (tons/mi²/yr)

Q = Mean Annual runoff (inch)

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A = Net drainage area (mi²)

7.4.4 Calculation and Replenishment Capacity

River – Palar

Catchment Area – 6,808.21 square miles (17,633.19km²)

Annual Average Rainfall – 49.13 in

Average Annual Runoff – 34.3 in

For Q > 2 in: S = 1958*(e^{-0.055*Q})*[1.43-0.26 Log (A)]

Here:

Q (in) = Mean Annual run off = 34.3 in (871 mm)

A (km²) = Catchment Area = 17,633.19 km²

Sediment yield S = (tones/yr)

$$S = 1958 e^{-0.055 \times 34.3} [1.43 - 0.26 \text{ Log (A)}]$$

$$S = 45.26 \text{ M.tons/km}^2/\text{yr}$$

Therefore the Total sediment yield for drainage basin of 17633.19 km² will be,

$$17633.19 \times 45.26 = 798078 \text{ M.tons/yr}$$

The maximum annual production is 117618m³ or 176427 (one year) in riverbed block. The amount of sediment regenerated every year derived hypothetically by Dandy-Bolton's equation will be **798078 Tons per annum** for the proposed lease area. Nearly annual replenishment is four and half times higher than the quarrying of sand per year. Therefore, the River Palar will be replenished and will not be affected due to this proposed sand mining.

7.5 Social Impact Assessment, R&R Action Plans

The Sand quarry project of The Executive Engineer does not involve any kind of displacement of the population since the mining will be concentrated only in the mining area only. Not much disturbance in respect of fauna, flora and human settlement of the villages. The impact of mining activity on the population will be

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insignificant. Hence, Rehabilitation of settlements is not anticipated under this project as it will not be required. Thus R&R Action Plans not proposed.

The project proponent will help in uplifting the poor section of the society as part of CSR activity by undertaking social welfare programs. The Project proponent contributes 2.5% of profit towards CSR activities. This project will have a positive impact on the socio economic as it will provide considerable employment to the families in the nearby villages. Improved health care facilities are expected to come-up in the area for catering to the health needs of the miners. The impact of mining on the civic amenities will be substantial after the commencement of mining activities. The local people who are currently depending on forest and agriculture will have new avenue from the mine.

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CHAPTER – 8: PROJECT BENEFITS

Mining activity will help in improving the socio-economic benefits in areas like employment, communication and infrastructure development etc.

8.1 Physical Infrastructure

The Sand project located in Kuthambakkam and Anangannallore Village of Vellore District has well established roads, communications and other facilities.

The following physical infrastructure facilities will further improve due to mine.

- ❖ Afforestation
- ❖ Road Transport facilities
- ❖ Communications
- ❖ Housing facilities
- ❖ Water supply and sanitation
- ❖ Medical, Educational and social benefits will be made available to the nearby civilian population in addition to the workmen employed in the mine.

Under plantation program, it is suggested to develop green belt further all along the river bank. The species to be grown in the areas will be dust tolerant and fast growing species so that a permanent green belt is created. Apart from the green belts and aesthetic plantation for eliminating fugitive emission and noise control, all other massive plantation efforts will be executed with the assistance of experts and co-operation of the local community.

8.2. Social Infrastructure

The mining activity will create rural employment. It has been observed that local people mainly depend upon agricultural, where the income is irregular and low. The mining activity in the region will have positive impact on the social economic condition of the area by way of providing employment to the local in-habitants; wages paid to them will increase the per capita income, housing, education, medical and transportation facilities, economic status, health and agriculture by improving the life style of the people. A major part of the labor force will be mainly from local villagers who are expected to engage themselves both in agriculture and mining activities. Part of the royalty is given to local bodies by the State Govt. for the welfare and development of the village. District Mineral Fund @30% of the Royalty shall be given to the Dept. of Geology and Mining, Vellore

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District. The State Government will also benefit directly from the mine, through increased revenue from royalties, excise duty and etc...

8.3 Employment Potential

The proponent employed about 63 persons for carrying out the mining operations of which 02 are skilled, 61 are unskilled personnel. In addition there will be indirect employment to many more people in the form of contractual jobs like construction of infrastructural facilities, transportation of sand to destinations, sanitation, supply of goods and services to the mine and other community services, etc...The local population will have preference to get an employment. The economic status of the local people will be enhanced due to mining project.

8.4 Other tangible benefits

8.4.1 Corporate Social Responsibility

Corporate Social Responsibility (CSR) refers to voluntary actions undertaken by the project proponent either to improve the living conditions (economic, social, environmental) of local communities or to reduce the negative impacts of mining activity. By definition, voluntary actions are those that go beyond legal obligations, contracts, and license agreements.

CSR programs usually invest in infrastructure (potable water, electricity, schools, roads, hospitals, hospital equipment, drainage repairs, etc.), building social capital (providing high-school and university education, providing information on HIV prevention, workshops on gender issues, information on family planning, improving hygiene, etc.), and building human capital (training local people to be employed by the mining enterprise or to provide outsourced services, promote and provide skills on micro business, aquaculture, crop cultivation, animal rearing, textile production, etc.)

8.4.2 CSR activities

The following activities which may be included by companies in their Corporate Social Responsibility Policies are notified as CSR activities under Schedule VII ((See section 135) of the Companies Act 2013:

- i. Eradicating extreme hunger and poverty;
- ii. Promotion of education;
- iii. Promoting gender equality and empowering women;

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- iv. Reducing child mortality and improving maternal health;
- v. Combating human immunodeficiency virus, acquired immune deficiency syndrome, malaria and other diseases;
- vi. Ensuring environmental sustainability;
- vii. Employment enhancing vocational skills;
- viii. Social business projects;
- ix. contribution to the Prime Minister's National Relief Fund or any other fund set up by the Central Government or the State Governments for socio-economic development and relief and funds for the welfare of the Scheduled Castes, the Scheduled Tribes, other backward classes, minorities and women; and
- x. Such other matters as may be prescribed.

The Board of every company referred to in sub-section (1), shall ensure that the company spends, in every financial year, at least 2% of the average net profits of the company made during the three immediately preceding financial years, in pursuance of its Corporate Social Responsibility Policy. Provided that the company shall give preference to the local area and areas around it where it operates, for spending the amount earmarked for Corporate Social Responsibility activities. Provided further that if the company fails to spend such amount, the Board shall, in its report made under clause (o) of sub-section (3) of section 134, specify the reasons for not spending the amount.

Explanation: For the purposes of this section "average net profit" shall be calculated in accordance with the provisions of section 198.

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8.4.2.1 CSR Cost Estimation

CSR activities will be taken up in the nearby villages mainly contributing to education, health, training of women self-help groups and contribution to infrastructure etc., CSR budget is allocated as 2.5% of the profit.

i.	1 unit	= 2.83 Cum
ii.	Sale value	=Rs 1975 per unit
iii.	Production cost	=Rs 1675 per unit
iv.	Profit	=Rs 300 per unit
v.	Production	=117618/2.83 =41561 unit /year
vi.	Hence, Total Profit	=41561x 300/unit =Rs 1.24 Crores
vii.	CSR @ 2.5 % Profit	=Rs. 1.24 x 2.5% =Rs 3.1 lakhs/per Year

(As per the Companies Act, 2013 and CSR Rules, 2014)

Total CSR amount = Rs 3.1 Lakhs for plan period

Under this programme, the project proponent will take-up following activities for social and economic development of villages through local panchayat.

- ✚ Employment to eligible persons during operational phase of the mine
- ✚ Conducting Medical Camps
- ✚ Infrastructure Development like repair of roads, renovation of ponds, rainwater harvesting schemes, etc...
- ✚ Financial grant to the existing educational institutions for development of physical infrastructures
- ✚ Training for Self Employment
- ✚ Plantation in villages and all along roads.
- ✚ Providing solar lamps to nearby schools and villages by going eco-friendly.

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8.5 Corporate Environment Responsibility (CER)

CER Activity	Project Cost (Rs. In Lakhs)	Cost allocated for CER activity
Developing Library Facilities to Government school, Kuthambakkam and Ananganallore Village	Rs. 45.00 Lakhs	Rs. 2.0 Lakhs
Total Cost Allocation	Rs. 45.00 Lakhs	Rs 2.0 Lakhs

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CHAPTER – 9: ENVIRONMENTAL COST BENEFIT ANALYSIS

9.0 PROJECT COST

After making exhaustive study, it is considered desirable that the mining project may be implemented.

Project cost for the proposed Sand Mining namely “**Kuthambakkam and Anangannallore Sand Quarry**” over an area of **11.70.0 Ha** falling in Village- Kuthambakkam and Anangannallore, Vellore District is **Rs 45.0 Lakhs**.

9.1 ENVIRONMENTAL COST BENEFIT

- This project provide direct employment to 63 persons and indirect employment to nearly 50 person like construction of infrastructural facilities, transportation of sand to destinations, sanitation, supply of goods and services to the mine and other community services, etc., In a family 4 persons, totally about 452 persons will get benefit because of the project.
- Surrounding people will get benefit as they get sand for construction purposes with less transportation cost.
- At the end of the project the river carrying capacity will be increased. Thereby the river flow direction will not get diverted and destroy the properties of villagers. It is indirectly cost benefit to villagers.

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CHAPTER – 10: ENVIRONMENTAL MANAGEMENT PLAN

10.0 INTRODUCTION

The mine development in the ML area needs to be intertwined with judicious utilization of natural resources within the limits of permissible assimilative capacity. The assimilative capacity of the study area is the maximum amount of pollution load that can be discharged in the environment without affecting the designated use and is governed by dilution, dispersion and removal due to natural physicochemical and biological processes.

The environmental management must be integrated into the process of mine planning so that ecological balance of the area is maintained and adverse effects are minimized. An Environmental Management Plan (EMP) is a site specific plan developed to ensure that the project is implemented in an environmentally sustainable manner. An effective EMP ensures the application of best practice environment management to a project. The purpose of an EMP is to:

- ✓ Assists proponent in the preparation of an effective and user friendly EMP.
- ✓ Improve the contribution that an EMP can make to the effectiveness of the environmental management process.
- ✓ Ensure a minimum standard and consistent approach to the preparation of EMP's.
- ✓ Ensure that the commitments made as part of the project's EIA are implemented throughout the project life.
- ✓ Ensure that environment management details is captured and documented at all stages of a project.

10.1 LAND USE PATTERN

Mining in the riverbed may change complete land use pattern including channel geometry, bed elevation. Keeping this in mind, the following management plans are suggested:

- ✓ There will be no mining near the banks. This is to protect the bank erosion and river migration.
- ✓ Proper wide benches in the mining area will be created to prevent any erosion.
- ✓ Slopes of the sides in mine will be at least 45° to prevent any erosion.
- ✓ The excavated area shall be replenished during the next rainy season.

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- ✓ The removing of sand will have only the positive impacts since it increases the water carrying capacity of the river.

10.2 AIR ENVIRONMENT MANAGEMENT

Mitigative measures suggested for air emission control will be based on the baseline ambient air quality monitoring data. From the point of view of maintenance of an acceptable ambient air quality in the region, it is desirable that the air quality needs to be monitored on a regular basis to check it vis-à-vis the NAAQS prescribed by MoEF&CC and in cases of non-compliance, appropriate mitigative measures will be adopted. In order to minimize impacts of mining on air and to maintain it within the prescribed limits of CPCB/ SPCB, an Environmental Management Plan (EMP) has been prepared. This will help in resolving all environmental and ecological issues likely to cause due to mining in the area.

During the course of mining no toxic substances are released into the atmosphere as such there seems to be no potential threat to health of human beings. In the mining activities, the only source of gaseous emissions is from the engines of vehicles. The reasons may be quality of fuel, improper operation of the engine, etc; proper maintenance of engines will improve combustion process and brings reduction in pollution.

10.2.1 Control of Gaseous Pollution

In mining activities, the only source of gaseous emissions is from the engines of transport vehicles. The emissions from the diesel engines of the tippers can be controlled by proper maintenance and monitoring.

10.2.2 Control of Dust Pollution

The main pollutant in air is PM₁₀, which is generated due to various mining activities. However to reduce the impact of dust pollution the following steps have been taken during various mining activities.

a) During loading operation

The method of mining will be manual. So the dust emission during loading of sand is negligible. However, the particular loading person will be affected. All the workers are provided with dust protection mask. The health check up for the workers will be conducted periodically

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b) During Transport operation

- ✓ All the haulage roads including the main ramp be kept wide, leveled, compacted and properly maintained and watered regularly during the shift operation to prevent generation of dust due to movement of tippers and other vehicles.
- ✓ Mineral carrying trucks will be effectively covered by Tarpaulin to avoid escape of fines to atmosphere.
- ✓ Regular Compaction and grading of haul roads to clear accumulation of loose material.
- ✓ Air quality will be regularly monitored both in the core zone and the buffer zone.

c) Monitoring of Air pollution

Periodic air quality survey will be carried out to monitor the changes consequent upon mining activities as per the norms of Tamil Nadu State Pollution Control Board.

10.3 NOISE AND VIBRATION ENVIRONMENT

The ambient noise level monitoring carried out in and around the proposed mine lease area shows that ambient noise levels are well within the stipulated limits of MoEF&CC.

There is no drilling and blasting for mineral extraction. Noise pollution will only be due to transporting tippers. Effective steps will be taken to keep the noise level well below the DGMS prescribed limit of 85 dBA.

10.3.1 Noise Abatement and control

- ✓ Proper maintenance of all tippers will be carried out, which help in reducing generation of noise during operations.
- ✓ Noise generated by transporting vehicle does not cause much adverse impact.
- ✓ Periodical monitoring of noise will be done to adopt corrective actions wherever needed.

10.4 WATER MANAGEMENT

There will be no wastewater generation from the mining operations. Only wastewater generation will be sanitary wastewater, which will be treated in septic tank followed by subsurface dispersion.

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10.4.1 Surface and Ground Water Management

- ✓ Mining will neither intersect the ground water table of the area. So not at all disturbing water environment.
- ✓ Oiling and lubrication of hauling vehicles will be done by using oil tray to prevent spillage of oil. So surface water will not be affected.
- ✓ Also the mining will be carried away from the surface water.

10.4.2 Waste Water Management

No waste water is generated from the mining activity of minor minerals as the project only involves lifting/excavation of Sand and transportation directly to the consumers.

10.4.3 Water Conservation

The project do not consume any process water except for drinking, dust suppression and plantation. Plantation is proposed at school and village roads, which will increase the water holding capacity and help in recharging of ground water. No artificial rainwater harvesting is proposed for the present project.

10.5 SOLID WASTE MANAGEMENT

There is no solid waste during the quarrying operation. The entire Sand and sand shoals will be transported to the needy customer site. Sanitary facility will be constructed as semi-permanent structure. So municipal solid waste will be collected in semi-permanent structure and disposed safely and periodically as per the PCB norms.

10.6 GREEN BELT DEVELOPMENT

The green belt is not proposed inside the quarry lease area. After the completion of project the applicant will plant the native fast growing species such as Arasamaram, Neem etc in the nearby villages, village roads and government school. The plantings will be surrounded by metal wire fencing to safeguard them after consultation with the competent local panchayat authorities.

10.6.1 Plantation Program

Under the plantation plan, plantation in nearby villages and connecting roads will be undertaken. Totally 100 trees such as Pungam, Neem etc. will be planted per year. The total estimated cost for green belt and its maintenance is around Rs.1 lakh/yr.

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10.7 SOCIO-ECONOMIC ENVIRONMENT

10.7.1 Management plan for Socio-Economic Environment

- ✓ In general, socio-economic environment will have positive impact due to the mining project in the area.
- ✓ The deployed laborers will be from nearby villages only as these people are mainly dependent upon such mining activities.
- ✓ In order to further improve the socio-economic conditions of the area, the management will contribute for development works in consultation with local bodies.

10.8 OCCUPATIONAL HEALTH AND SAFETY

Occupational Health and Safety professionals develop and coordinate safety and health systems and strategies within organizations. They identify workplace hazards, assess risks to employee health and safety, and recommend solutions. Increasingly, Health and Safety Professionals are also responsible for many of the environmental aspects of their workplace.

10.8.1 Occupational Health and Safety Professionals in the mineral industry may perform the following tasks:

- ✓ The collection of minor minerals from the Sand mine does not cause any occupational ill effects.
- ✓ Except fugitive dust generation there is no source which can show a probability for health related diseases and proper dust suppression will control dust generation and dispersion.
- ✓ Dust masks will be provided to the workers working in the dust prone areas as additional personal protective equipment.
- ✓ The occupational health hazards have so far not been reported.
- ✓ Awareness program will be conducted about likely occupational health hazards so as to have preventive action in place.
- ✓ Any workers health related problem will be properly addressed.
- ✓ Periodical medical checkup will be conducted.
- ✓ Promote occupational health and safety within their organization and develop safer and healthier ways of working;
- ✓ Develop and implement training sessions for management, supervisors and workers on health and safety practices and legislation;

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10.9 COST OF EMP MEASURES

Following provisions are proposed to be taken for improving, control and monitoring of environment protection measures

Table 10.1 Cost of EMP Measures

S. No.	Particulars	Amount(Rs)
1.	Environmental Monitoring	2,00,000
2.	Dust control	1,00,000
3.	Safety Kids	1,00,000
4.	Internal road & Maintenance	1,00,000
5.	Afforestation etc.	1,00,000
Total		6.0 lakhs

10.10 SUMMARY

It is safe to say that this mining project does not cause any significant impact on the ecology of the area as there are no major polluting sources except the dust generated during transportation of mineral. Besides this adequate preventive measures will be adopted to contain the various pollutants within permissible limits. Plantation development will be carried out along the approach roads, around govt. schools approx. 100 trees per year. It will increase the water holding capacity and help in recharging of ground water. Employment opportunities will be provided to the locals only as providing extraction of minerals from the mine site is the only prevailing occupation for them for their livelihood.

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CHAPTER – 11: SUMMARY AND CONCLUSION

The Sand quarry of Executive Engineer over an extent of 11.70.00 hectare is located in S.F. No: (P) & 213 (P) in Kuthambakkam and Ananganallore village, Gudiyatham Taluk, Vellore District. The area is marked in the survey of India Toposheet No.57L/13. The area lies between Northern latitude of 12°53'25.36" N to 12°53'34.90" N and eastern longitude from 78°52'22.78"E to 78°52'52.13"E. The mining plan was approved in favor the Executive Engineer Rc.No.37/Mines/2021; dated 23.05.2022.

As per the Environmental Impact Assessment (EIA) Notification dated 14th September 2006, the project falls under 1(a) Mining of minerals, Category – B1 in view of lease area >5 and <100 Ha. In view of the above the proponent submitted the application to SEIAA/SEAC on 11.06.2022. The proposal has been placed in 293th STATE APPRAISAL COMMITTEE MEETING on 08.07.2022 and 538th SEIAA meeting, dated 02.08.2022 and granted Terms of Reference vide Lr.No.SEIAA-TN/F.No.9340/SEAC/TOR-1219/2022 dated 02.08.2022.

11.1 SCOPE OF THE PROJECT

The proposal for Environmental Clearance of Proposed Sand quarry of The Executive Engineer requires EIA/EMP Report as per Terms of Reference vide Lr.No.SEIAA-TN/F.No.9340/SEAC/TOR-1219/2022 dated 02.08.2022.

11.2 PROJECT DESCRIPTION

Table No 11. 1 Project Details

Project Details	
Proponent	The Executive Engineer , Water Resources Department, Mining and Monitoring Division, Chennai
Total Mine Lease Area	11.70.0 Hectares (Government land – River body)
Survey No.	1 (P) & 213 (P)
Site Location	Kuthambakkam and Ananganallore Village, Gudiyatham Taluk, Vellore District, Tamil Nadu
Geographical Co-ordinates	Latitude : N12°53'25.36" to N12°53'34.90" Longitude : E78°52'22.78" to E78°52'52.13"
Toposheet No.	57L/13
Elevation	264.25m – 266.75m above MSL
Accessibility	
Nearest Habitation	105m - N
Nearest Town	Gudiyatham-4.7km- N
Nearest Roadway	NH 48 – 440m - Bangalore to Chennai - S

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	SH 130 – 3.7km - Gudiyatham to Vaniyambadi - NW MDR 1028 – 23km – Thirumalaikodi to Sathumadurai - SE Village road – 400m - W
Nearest Railway station	Melalathur Railway Station - 2.8 km– N
Nearest Airport	Chennai International Airport – 139km - E
Environmental Sensitiveness	
Interstate Boundary	Tamil Nadu – Andhra Pradesh Interstate boundary is located 15 km away from lease area in North direction.
Coastal Zone	Bay of Bengal is located 150 km away from lease area in E direction.
Reserve Forest	<p>There is no Reserve forest and wild life sanctuaries found within 10km radius.</p> <ol style="list-style-type: none">1. Pallalakuppam Extension Reserve Forest – 5.7km - W2. Pallikonda Reserve Forest – 6km – SE3. Sanankuppam Reserve Forest – 5.3km- SW4. Paravamalai Reserve Forest – 7.3 – S5. Kallapadi Reserve Forest – 7.7km – N6. Raddanaickanur & Charakkal Reserve Forest -19.0km – W7. Ambur Reserve Forest – 18km - SW8. Gundalapalli Reserve forest is - 11.5Km- North West9. Chenji R.F – 2 km – NE10. Bomminayakkanpalayam R.F – 19km – NE11. Nallimalai R.F – 10km – SE12. Virinjipuram Plantation R.F – 14km – E13. Appukal R.F – 14km – SE <p>The proposed project site does not attract Forest Conservation Act, 1980.</p>
Wildlife sanctuary	<p>Nil within 10km radius.</p> <p>The Proposed project site does not fall under Wildlife (Protection) Act, 1972.</p> <p>Koundinaya wildlife sanctuary-21Km-North West</p>

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Water bodies	The project site itself located in River body (Palar River) 1. Nellorepet lake – 5km – NW 2. Ammanankuppam lake – 4.4km – NE 3. Agaramachi lake – 1.8km – E 4. Gollamangalam lake – 2.7km – SE 5. Tippasamudram lake – 4km – SE 6. Periya lake – 5km – SE 7. Agaram River – 3.3km – SE 8. Kavundinya river- 4.0 km – N 9. Seruvangi lake – 5.0 km – N 10. A lake near Settuvandai– 6.8km – NE 11. A lake near Veppur– 5.9km – NE 12. A lake near Netteri– 6.9km – NE 13. A lake near Pasumattur– 9.4km – NE 14. Chenakkam lake – 5.0km – NE 15. Odiyathur and Rajapuram lake – 6.1km – SE 16. A lake in Pallikonda village – 5.50km – E 17. Periya Stream from Pallikonda lake – 4.9km - E
Defense Installations	Nil within 10km radius
Critically Polluted Area	Nil within 10km radius
Quarries around 500m radius (AD Letter furnished)	No quarries found within 500m radius of the proposed lease area. AD Cluster Letter: Rc.No.37/2021(Mines) dated 27.05.2022
Seismic zone	Zone-II, Low damage risk zone as per BMTPC, Vulnerability atlas Seismic zone of India IS: 1893-2002.

11.3 Description of the environment

11.3.1 Base line environmental study

Collection of base line data is an integral part of the preparation of environmental impact assessment reports. The baseline monitoring study has been carried out during March 1st, 2022 – May 31st, 2022 to assess the existing environmental scenario in the area. For the purpose of EIA studies, mine lease area was considered as the core zone and area outside the mine lease boundary up to 10km radius from the lease boundary was considered as buffer zone.

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Table No 11.2 Baseline Data

Particulars	Details	Standards
Meteorology (March 2022 to May 2022)		
Rainfall (Avg.)	20.2 mm	--
Temperature (Avg.)	13°C (Min) – 39.4°C (Max)	--
Wind speed	3.33 m/s	--
Ambient Air Quality (NAAQS)		
PM ₁₀	35 – 52µg/m ³	100 µg/m ³
PM _{2.5}	16 – 30µg/m ³	60 µg/m ³
SO ₂	4 – 14µg/m ³	80 µg/m ³
NO _x	6 – 18µg /m ³	80 µg/m ³
Noise Level (CPCB Standards)		
Day time (6:00 am - 10:00 pm)	Core zone – 41.4 – 43.5 dB (A) Buffer zone –41.0 – 46.1dB (A)	Industrial Area Day Time - 75 dB (A) Residential Area Day Time – 55 dB (A)
Night time (10:00 pm - 06:00 am)	Core zone –34.5 – 37.5 dB (A) Buffer zone –33.2 – 37.6 dB (A)	Industrial Area Night Time – 70 dB(A) Residential Area Night Time – 45 dB (A)
Water Quality IS 10500:2012 (Desirable limits)		
pH	6.48 – 7.20	6.5 to 8.5
TDS	762- 820 mg/l	500 mg/l
Total Hardness as CaCO ₃	182 - 260mg/l	200 mg/l
Soil Quality		
pH	6.60– 8.69	Neutral to slightly alkaline
Bulk density	1.06 – 1.38 g/cc	Favorable physical condition for plant growth.
Hydro Geology		
Depth of Mining	1m below Theoretical bed level (0.005m – Shoal height)	
Water Table	6m depth as observed in the nearby bore wells.	

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11.4 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

11.4.1 Air Environment

The air borne particulate matter is the main air pollutant by opencast mining. The mining operation will be carried out by adopting manual method of excavation and transportation by tipper and tractor combination.

AERMOD - Model was used for prediction of impact of PM₁₀ during conditions transportation of ore by trucks on Haul roads. Total predicted 24-h maximum GLC of PM₁₀ at project site for scenario 1 i.e transportation was 41.4µg/m³ after superposition of base-line value 40µg/m³ over the incremental GLC 1.4 µg/m³ due to transportation over the river bed. Meteorological data under worst case scenario providing 24-hr maximum average GLC was discussed above and Northerly were dominant. The overall impact on air quality due to proposed mining project is expected to be low.

11.4.2 Noise Environment

Noise pollution poses a major health risk to the mine workers. Transportation of sand by tipper is the only source of noise pollution in this proposed sand mining project. The noise of continuous movement of tippers in the approach road may disturb the people in nearest habitations, especially school children and elderly people.

- Use of personal protective devices i.e., earmuffs and earplugs by workers, who are working in high noise generating areas.
- Proper and regular maintenance of vehicles, machinery and other equipments.
- The noise generated by the machinery will be reduced by proper lubrication of the machinery and other equipments.
- Speed of trucks entering or leaving the mine and while crossing the village road will be limited to moderate speed to prevent undue noise from empty vehicles.
- Regular medical check-up and proper training to personnel to create awareness about adverse noise level effects.
- The installation of convex mirrors in all the turning point of road will prevent the horn sound.

11.4.3 Water Environment

Mining operations can affect groundwater quality in several ways. The most obvious occurs in the mining below the water table, either in underground workings or open pits. This provides a direct conduit to aquifers. Groundwater quality is also affected

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when waters (natural or process waters or wastewater) infiltrate through surface materials (including overlying waste or other material) into ground water. But this Sand quarry is devoid of any such impacts.

The impact due to mining on the water quality is expected to be insignificant because of no use of chemicals or hazardous substances during mining process. The water table in this region is about 6m bgl. The proposed depth of mining is 1m below theoretical bed level for one year. Thus, the mining activity will not intersect ground water table.

Total Dissolved Solids in water samples of all the villages and Total Hardness in water samples of Kuthambakkam and Agaramcheri villages are above the acceptable limits. Based on water quality index calculation, it is analyzed that the water quality in all three villages such as Ananganallore, Kuthambakkam and Agaramcheri were good. The reason is that the values of TDS and TH are not extremely high and also the values of all other parameters are below the acceptable limits. For excellent quality, the water should be treated by reverse osmosis to reduce dissolved solids and total hardness to the required rate. Boiling of water will remove the microorganisms effectively from all waters in the above said villages making the water aseptically fit for drinking purposes.

11.4.4 Soil Environment

There is no soil present in the quarry area as it is river bed.

11.4.5 Waste (overburden/Reject) Dump and Municipal Solid waste Management

There are no wastages anticipated during the quarrying operation. The entire Sand and sand shoals will be transported to the needy customer site. Sanitary facility will be constructed as semi-permanent structure. So municipal solid waste will be collected in semi-permanent structure and disposed safely and periodically as per the PCB norms.

11.4.6 Biological Environment

There are no notified endangered species in the area, which may be affected due to the mining activities; therefore the biological environment will not have significant impact due to mining activity. The impact on the biological environment due to amount of dust generation is minimized by spraying water in and around the lease area.

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11.4.7 Land Environment

Mining in the riverbed may change complete land use pattern including channel geometry, bed elevation. Land requirement for the project has been assessed considering functional needs. The excavated area shall be replenished during the next rainy season. The removing of sand will have only the positive impacts since it increases the water carrying capacity of the river. 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 site.

The land use analyses show that the area is of predominantly Agriculture followed by buffer zones of the study area. After excavating the sand from proposed quarry, the river carrying capacity gets increased. As a result the river flow direction never gets diverted and does not affect any crops and properties. Some fallow land also increases due to seasonal crop production, which shows a positive impact due to mining activity.

11.4.8 Socio Economic Environment

The mining activity will definitely increase the employment opportunity (directly as well as indirectly) in the project area. Some of these impacts would be beneficial. The expectation of the people of the area is concerned towards employment, education, and health facilities. The literacy rate may be increased with the economic benefits may arises from the mining activities.

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Table 11.3 Environmental Management Plan

S.No	Parameters	Mining Activity	Mitigation measures
1		Transportation	<ul style="list-style-type: none">○ Water sprinklers along the sides of haul road shall be fixed to control fly of dust while transporting minerals and waste○ Overloading will be prevented○ Trucks/Dumpers covered by tarpaulin covers
		General measures	<ul style="list-style-type: none">○ Avenue trees along roads along river bank shall be planted as per the norms of MoEF to control fly of dust.○ Labours engaged in such dust prone areas should be provided with safety devices like ear muff, mask and goggles as per the MMR, 1961 amendments and circulars of DGMS.○ Regular health check-up of workers and nearby villagers in the impacted area should be carried out and also regular occupational health assessment of employees should be carried out as per the Factories Act.○ Ambient Air Quality Monitoring will be conducted on regular basis to assess the quality of ambient air.
2	Water Environment	Surface water	<ul style="list-style-type: none">○ There is no waste water produced due to sand quarry.
		Ground water	<ul style="list-style-type: none">○ The mining of sand is 1m depth and the water table is 6m bgl. So the mining activity will not intersect the ground water table
		Storm water	<ul style="list-style-type: none">○ Basically the mining area is river body. During rainy season, the storm water will flow through river body in the river flow direction.○ During river flow, the mining activity will be stopped.

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		General measures	<ul style="list-style-type: none"> ○ Regular monitoring and analyzing the quality of water
3	Noise Environment	Transportation	<ul style="list-style-type: none"> ○ Proper and regular maintenance of transporting vehicles. ○ Speed of trucks entering or leaving the mine will be limited to moderate speed to prevent undue noise from empty vehicles. ○ Adequate silencers will be provided in all the diesel engines of vehicles. ○ Minimum use of horns and speed limit of 10 km/hr in the village area. ○ It will be ensured that all transportation vehicles carry a valid PUC Certificates.
		General measures	<ul style="list-style-type: none"> ○ Use of personal protective devices i.e., earmuffs and earplugs by workers, who are working in high noise generating areas. ○ Provision of Quiet areas, where employees can get relief from workplace noise. ○ The development of green belts along the river bank to attenuate noise. ○ Regular medical check-up and proper training to personnel to create awareness about adverse noise level effects.
4	Socio Economic		<ul style="list-style-type: none"> ○ Good maintenance practices will be adopted for tippers which will help to avert potential noise problems. ○ Green belt will be developed along the river bank as per Central Pollution Control Board (CPCB) guidelines. ○ Appropriate air pollution control measure will be taken so as to minimize the environmental impact within the core zone. ○ An emergency preparedness plan will be prepared in advance, to deal with firefighting, evacuation and local communication. ○ For the safety of workers, personal protective appliances like hand gloves, helmets, safety shoes, goggles, aprons, nose masks and ear

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			<p>protecting devices has been provided which meet 'BIS' (Bureau of Indian Standards).</p> <ul style="list-style-type: none">○ As a part of CSR activities community welfare measures will be taken by Proponent through local Panchayat
5	Occupational Health		<ul style="list-style-type: none">○ First-aid facilities as per provisions under Rule (44) of Mines Rules 1955○ Initial and Periodical medical examination shall be conducted for the employees under Rule 29B & 45 (A).○ Insurance will be taken in the name of the labourers working in the mines○ Workers involved in mining work shall be provided protective equipments such as Thick Gloves, Goggles, ear plugs, safety boot wears etc...

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11.5 ANALYSIS OF ALTERNATIVES

We have analyzed all the option for alternatives of the proposed mine site. This project is sand specific project and existing land use of mine lease classified as River Body which will continue to be so even after the current mining project is over, hence no alternate site is suggested for this project.

11.6 ENVIRONMENTAL MONITORING PROGRAM

Environmental Monitoring program will be conducted for various environmental components as per conditions stipulated in Environmental Clearance Letter issued by SEIAA & Consent to Operate issued by TNPCB.

Table No: 11.4 Post Project Environmental Monitoring Program

S. No.	Environment Attributes	Location	Monitoring		Remarks
			Duration	Frequency	
1	Meteorology and Air Quality	Continuous monitoring weather station in core zone/ nearest IMD station	24 hours	Monthly Once	Wind speed, direction, Temperature, Relative humidity and Rainfall.
2	Air Pollution Monitoring – PM _{2.5} , PM ₁₀ , SO ₂ and NO _x	5 locations (One station in the core zone and at least one in nearby residential, area, one in the upwind, two station on the downwind direction and one in cross wind direction).	8 hours	Six month once	Fine Dust Sampler and Respirable Dust Sampler
3	Water Pollution Monitoring	Mine effluents, Set of grab samples during pre and post monsoon for ground and surface water in the vicinity.	-	Six month once	Physico-chemical, microbiological characteristics
4	Hydrogeology	Water level in open	-	Once in	Water level

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		wells in buffer zone around 1km at specific wells		6months	monitoring devices may be used.
5	Noise	Mine Boundary, high noise generating areas within the lease and at the nearest residential area	24 hours	Monthly Once	Sound level meter
6	Soil	Core Zone and Buffer zone (Grab samples)	-	Six month once	Physical and Chemical characteristics

11.7 PROJECT BENEFITS

The proponent, The Executive Engineer, is very much conscious of their obligations to society at large. Under plantation program, it is suggested to develop green belt in village, govt. school, along village road. Apart from the green belts and aesthetic plantation for eliminating fugitive emission and noise control, all other massive plantation efforts will be executed with the assistance of experts and cooperation of the local community.

The mining activity will create rural employment. In addition there will be indirect employment to many more people in the form of contractual jobs like construction of infrastructural facilities, transportation of to destinations, sanitation, supply of goods and services to the mine and other community services, etc. The local population will have preference to get an employment. Part of the royalty is given to local bodies by the State Govt. for the welfare and development of the village. The proponent help in socio economic development of the village by providing education facilities to children's, procuring sports equipments, welfare amenities like drinking water to school, road facilities to villages and employment opportunities to nearby villagers. CSR budget is allocated as 2.5% of the profit. Other than this social development of village will be considered as per social activities.

11.8 CONCLUSION

As discussed, it is safe to say that the project is not likely to cause significant impact on the ecology and environment of the area, as adequate preventive measures will be adopted to contain the pollutants within permissible limits. The total operation shall be carried out with ease & minimum risk of the workers. The proposed Environmental Management Plan will keep the area in a safe environment with negligible impact on the environment. Plantation will substantiate the impact due to the mining activity. Mining activity will help in improving the socio-economic benefits in areas like employment, communication and infrastructure development etc.

CHAPTER - 12: DISCLOSURE OF CONSULTANTS ENGAGED

AADHI BOOMI MINING AND ENVIRO TECH (P) LTD, a QCI/NABET Accredited EIA Consultant Organization having its Registered Office at Salem and Branch at Porur, Chennai were promoted by a team of professional Geologists\ Mining\ Environment\ Civil\ Mechanical\ Chemical Engineers\ Scientists. The company has vast experience in various disciplines including Exploration and mining of minerals and was incorporated in 2002 in the name of Suriya Mining Services providing expert advice and solutions for clients' requirement in the field of Mineral prospecting, Exploration, Mining, Geo-technical, Techno economic Feasibility reports\evaluation, Mineral Engineering, Environment Impact Assessment (EIA), Environment Management Plan (EMP), Environment Monitoring and related liaison jobs like Environment Clearance, Wild life and Forest clearance from DEIAA/SEIAA/NBWL/CRZ, MoEF& CC etc of all accredited sectors.

12.1 SCOPE

- ✓ EIA & EMP for all accredited sectors and Monitoring as per SPCB/CPCB/MoEF& CC
- ✓ Environment/ Wild life/ CRZ/ Forest Clearance
- ✓ Social Impact Analysis (SIA) and Eco-Biodiversity studies for Mine Closure Plan
- ✓ Remote Sensing & GIS including Satellite data processing, ASTER, DEM etc for application in Forest, Agriculture, Disaster, Mineral Exploration, Environment Modelling, Town planning etc
- ✓ Geological Surveying, Mapping, Exploration and Project Management
- ✓ Geophysical, Geochemical & Geotechnical studies to locate concealed deposit\ formation including structural studies
- ✓ Noise and Vibration studies as per DGMS\MoEF& CC to design controlled blasting where inhabitations are located within 300m
- ✓ Mine Design and costing, selection of Machineries and Project Evaluation
- ✓ Statutory Mine Plans & Sections, Mining Plan and other mandatory projects
- ✓ Design and development of Mineral Beneficiation Plant including mineral separation studies

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12.2 INFRASTRUCTURE

- ✓ Our Human resources are well expertise in all functional areas as per Ver. 3 of NABET\QCI. Our Hi Tech ISO certified Office and Lab are accredited by NABL and MoEFCC.
- ✓ And have latest field Investigation devices like Respirable and Fine Dust Samplers, Digital Seismograph, DDR3 Resistivity Meter, Echo sounder, DGPS, Total Station, Water level monitoring meters, GPS 62S, Sound Level Meter etc...

12.3 DISCLOSURE OF CONSULTANT FOR EIA STUDY

The Executive Engineer, appointed **AADHI BOOMI MINING AND ENVIRO TECH PRIVATE LTD**, having its office at 3/216, K.S.V Nagar, Narasothipatti, Alagapuram, Salem – 636 004, Tamil Nadu, for preparation of EIA/EMP repor augmentation for obtaining Environment Clearance from SEIAA/SEAC, Tamil Nadu.

AADHI BOOMI MINING AND ENVIRO TECH PRIVATE LTD has MOU with **EKDANT ENVIRO SERVICES (P) LTD** laboratory at Chennai and has own Laboratory named **ABM ENVIRONMENTAL AND ANALYTICAL LABORATORY, accredited by NABL** for sampling and testing of air, water, noise and soil samples. The laboratory is recognized by the Ministry of Environment and Forests, Government of India under the relevant provision of Environment (Protection) Act 1986 and Accredited by NABL and NABET, Quality Council of India, New Delhi.

S. No.	Study	Consultants/LAB
1	Generation of Base Line Data	ABM Environmental and Analytical Laboratory, Salem.
2	Remote Sensing and Land use/Land cover Studies	Aadhi Boomi Mining & Enviro Tech P Ltd, Salem
3	Preparation of EIA and EMP Report	Aadhi Boomi Mining & Enviro Tech P Ltd, Salem

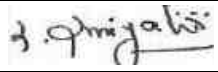
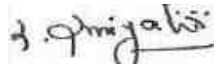
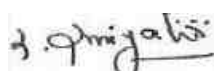
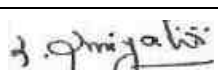
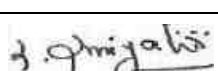


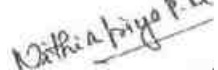
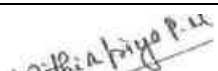

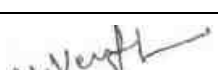

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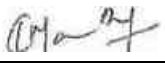
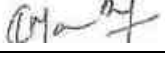




12.4 DECLARATION OF EXPERTS INVOLVED IN THE EIA REPORT PREPARATION

Names of the EIA coordinator, Functional Area Experts and other Team Members engaged and nature of consultancy rendered is provided below. The multidisciplinary team comprises of Environmental Engineers, Geologists and Geographers who involved in preparation of Environmental Impact Assessment Report and Environment Management Plan for various functions like Air quality, Water quality, Noise levels, Soil Conservation, Hydro geology, Ecology and bio-diversity, Land use and Socio-Economics.

Table 12.1: Declaration of Experts

S.No	Name of the Expert	Category	Functional Areas	Signature
1.	Mr.S.Suriyakumar	A	EIA Co-ordinator	
		A	Solid and Hazardous Waste SHW*- HW* only	
		A	Risk Assessment and Hazard Management (RH)	
		A	Land Use (LU)	
		A	Soil Conservation (SC)	
2.	Dr. Sudharshan Ramakrishnan	A	Land Use (LU)	
		A	Socio Economics (SE)	
3.	Dr. Nithia Priya P.M	B	Air Pollution, Monitoring, Prevention and Control (AP)	
		B	Water Pollution Monitoring, Prevention and Control (WP)	
4.	Mr. M. Venkatesh Prabhu	B	Meteorology, Air Quality Modelling & Prediction (AQ)	
		B	Noise and Vibration (NV)	
5.	Mr. N. Suresh	B	Geology (GEO)	

DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT
Proponent: The Executive Engineer, Kuthambakkam and Ananganallore Sand Quarry,
Vellore District

		B	Hydrogeology (HG)	
6.	Mr. K. Manuraj	B	Geology (GEO)	
			Hydrogeology (HG)	
Team Member Involved in Report Preparation				
7.	Mrs. S. Santhi	Team Member	Land Use (LU) under EIA Co-ordinator/FAE - Mr.S.Suriyakumar	
			Socio Economics (SE) under FAE - Dr. Sudharshan Ramakrishnan	
8.	Mrs. S. Sri Vidhya	Team Member	Water Pollution Monitoring, Prevention and Control (WP) under FAE - Dr. Nithia Priya P.M	
			Meteorology, Air Quality Modelling & Prediction (AQ) under FAE - Mr. M. Venkatesh Prabhu	

Annexure I - Terms of Reference



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

STATE LEVEL ENVIRONMENT IMPACT
ASSESSMENT AUTHORITY TAMILNADU
3rd Floor, Panagal Maaligai,
No.1, Jeenis Road, Saidapet,
Chennai - 600 015.
Phone No. 044-24359973
Fax No. 044-24359975

TERMS OF REFERENCE (ToR)

Lr No.SEIAA-TN/F.No.9340/SEAC/ToR-1219/2022 Dated:02.08.2022

To

The Executive Engineer
Water Resources Department
Mining and Monitoring Division
Chennai District

Sir / Madam,

Sub: SEIAA, Tamil Nadu – Terms of Reference with Public Hearing (ToR) for the Proposed Sand quarry over an extent of 11.70.0 Ha in Palar river located at S.F.Nos. 1 (P) & 213 (P) in Kuthambakkam and Ananganallore Village, Gudiyatham Taluk, Vellore District, Tamil Nadu by the Executive Engineer, PWD/WRD, - 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/78182/2022 : Dt. 11.6.2022.
 2. Your application submitted for Terms of Reference dated: 22.06.2022
 3. Minutes of the 293rd Meeting of SEAC held on 08.07.2022
 4. Minutes of the 538th meeting of Authority held on 02.08.2022.

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

The proponent, M/s. The Executive Engineer, PWD/WRD has submitted application for ToR, in Form-I, Pre- Feasibility report for the proposed sand quarry lease over an extent of 11.70.0 Ha at


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S.F.Nos. 1 (P) & 213 (P), Kuthambakkam and Ananganallore Village, Gudiyatham Taluk, Cuddalore District, Tamil Nadu.

Discussion by SEAC and the Remarks:-

Proposed Sand quarry over an extent of 11.70.0 Ha in Palar river located at S.F.Nos. 1 (P) & 213 (P) in Kuthambakkam and Ananganallore Village, Gudiyatham Taluk, Vellore District, Tamil Nadu by the Executive Engineer, PWD/WRD- For Terms of Reference. (SIA/TN/MIN/78182/2022 Dt. 11.6.2022)

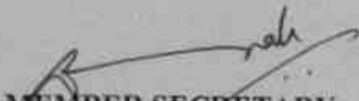
The proposal was placed for appraisal in this 293rdSEAC Meeting held on 8.7.2022. The details of the project furnished by the proponent are given in the website (parivesh.nic.in).

The SEAC noted the following:

1. The Proponent, Executive Engineer, PWD/WRD, has applied for Terms of Reference for the proposed Sand quarry over an extent of 11.70.0 Ha in Palar river located at S.F.Nos. 1 (P) & 213 (P) in Kuthambakkam and Ananganallore Village, Gudiyatham Taluk, Vellore District, Tamil Nadu.
2. The project/activity is covered under category "B1" of Item 1(a) "Mining of Minerals Projects" of the schedule to the EIA Notification, 2006.
3. As per mining plan, the lease period is one year and the mining plan for the period of One year & mining quantity should not exceed 117618 cu.m. of sand. The ultimate depth 1 metres below bed level.

Based on the presentation made by the proponent SEAC recommended to grant of Terms of Reference (TOR) with Public Hearing subject to the following TORs, in addition to the standard terms of reference for EIA study for non-coal mining projects and details issued by the MOEF & CC to be included in EIA/EMP Report:

1. The PP shall carry out the study on drinking water scheme in 5 Km, either side of the bank of the River and the same shall be included in the EIA Report.
 1. The details of the location to cover land use and ecologically sensitive areas.
 - a. Details of the open wells, bore wells, and other surface water bodies including the details of ground water levels, Quantity in the 500m radius from the boundary of the Mine lease Area.


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- b. Impacts of this mining activity in the above said water bodies in the 500m radius from the boundary of the Mine lease Area .
 - c. Thickness of Sand and its variation covering the entire area; similarly the width of the sand bed, quantification of the shoal formation in that area
 - d. Agricultural land if any, surrounding the quarry site.
 - e. Details of the longitudinal and cross section of the river bed in the proposed mining area.
 - f. Detail of earlier of mining carried out in the 500m radius of the mine lease area including the location, quantity of sand mined out, depth of the mining , etc., shall be furnished.
2. Reclamation of the sand area after mining needs to be submitted.
 3. Adequate plan for traffic management as per the Guidelines for Sustainable Sand Mining issued in 2016 by the MoEF& CC, GOI, New Delhi for the loaded vehicles passing through nearby habitation.
 4. The PWD has to furnish the details regarding agricultural activities that are taking place around the project area.
 5. Details of the structures available within 1km from the mine lease area boundary (both upstream and downstream and also Study the Impact of sand mining on the structures located in the said area .
 6. The route map for the Lorries for accessing the project area and for transporting mined sand should be specified.
 7. Suitable working methodology to prevent dust pollution needs to be prepared taking wind direction into consideration.
 8. The mining area must be demarcated leaving at least 50m from the river embankment on either side.
 9. Wherever irrigation channels take off from the river within the boundary of the mining project, the mining operation should not affect the flow of water in the irrigation channels. In such a way a plan of action should be submitted.
 10. EMP should contain break up details such as tools, labor and environmental monitoring cost, cost for the ground water monitoring in the surrounding area shall be part of the EMP cost, variation of depth of ground water and quality shall be monitored during the


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project period by conducting survey once in 3 months. This cost shall also be included in EMP.

11. Since there are many proposals for sand mining under the River Coleroon. It is necessary to model the overall impact on sand mining on regional ground water.
12. The proposal for CER shall be furnished with time frame as per the office memorandum of MoEF&CC dated 01.05.2018.
 - i. The Following details also included in the EIA Report. Quantity estimated to be mined through machineries & manual mining with extent.
 - ii. Certificate from the VAO stating the details of habitation located within 300 m radius from the boundary of the proposed site along with FMB sketch.
 - iii. The project proponent has to furnish the affidavit stating that there are no bridges, culverts, cross masonaries, water head works or any other civil structures within 500 mts., of the proposed quarry site.
 - iv. The RL Upstream, RL Downstream, RL Starting, RL Ending, Chainage Starting KM, Ending KM details shall be furnished.
 - v. Geological sections Map should be furnished.
 - vi. 500m, 1KM & 5KM radius of clear Google Map showing all the features like agricultural activities, habitations, etc

Discussion by SEIAA and the Remarks:-

The proposal was placed in the 538th meeting of Authority held on 02.08.2022. The Authority noted that the proposal was placed in the 293rd meeting of SEAC held on 08.07.2022. SEAC has furnished its recommendations to the Authority for granting Terms of Reference (ToR) along with Public Hearing for the project.


After detailed discussions, the Authority accepted the recommendation of SEAC and decided to **grant Terms of Reference (ToR) along with Public Hearing** under cluster for undertaking the combined Environment Impact Assessment Study and preparation of separate Environment Management Plan subject to the ToR as recommended by SEAC & subject specific standard ToR stipulated by MoEF& CC in addition to the following ToR:


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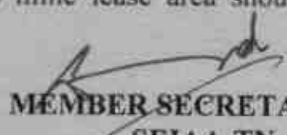
1. As per the MoEF& CC office memorandum F.No.22-65/2017-IA.III dated: 30.09.2020 and 20.10.2020 the proponent shall address the concerns raised during the public consultation and all the activities proposed shall be part of the Environment Management Plan.
2. The Project Proponent shall study and report in detail the following, as provided in Sustainable Sand Mining Management Guidelines, 2016 and Enforcement and Monitoring Guidelines for sand mining, MoEF& CC 2020.
3. Furnish the Details with route map and the transportation route.
4. The details of maximum production from the mines.
5. Demarcation of mining area with pillars and geo-referencing shall be made by furnishing photographs taken on site prior to the start of mining.
6. The Environmental Impact Assessment shall study in detail the carbon emission and also suggest the measures to mitigate carbon emission including development of carbon sinks and temperature reduction including control of other emission and climate mitigation activities.
7. The Environmental Impact Assessment should study the biodiversity, the natural ecosystem, the soil micro flora, fauna and soil seed banks and suggest measures to maintain the natural Ecosystem.
8. Action should specifically suggest for sustainable management of the area and restoration of ecosystem for flow of goods and services.
9. The project proponent shall study impact on indigenous flora and fauna.
10. The project proponent shall study impact on fish habitats and the web food was/ food chain in the water body and Reservoir.

A. STANDARD TERMS OF REFERENCE

- 1) Year-wise production details since 1994 should be given, clearly stating the highest production achieved in any one year prior to 1994. It may also be categorically informed whether there had been any increase in production after the EIA Notification 1994 came into force, w.r.t. the highest production achieved prior to 1994.
- 2) A copy of the document in support of the fact that the Proponent is the rightful lessee of the mine should be given.


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


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prepared to encompass preoperational, operational and post operational phases and submitted. Impact, if any, of change of land use should be given.

- 11) Details of the land for any Over Burden Dumps outside the mine lease, such as extent of land area, distance from mine lease, its land use, R&R issues, if any, should be given.
- 12) Certificate from the Competent Authority in the State Forest Department should be provided, confirming the involvement of forest land, if any, in the project area. In the event of any contrary claim by the Project Proponent regarding the status of forests, the site may be inspected by the State Forest Department along with the Regional Office of the Ministry to ascertain the status of forests, based on which, the Certificate in this regard as mentioned above be issued. In all such cases, it would be desirable for representative of the State Forest Department to assist the Expert Appraisal Committees.
- 13) Status of forestry clearance for the broken up area and virgin forestland involved in the Project including deposition of Net Present Value (NPV) and Compensatory Afforestation (CA) should be indicated. A copy of the forestry clearance should also be furnished.
- 14) Implementation status of recognition of forest rights under the Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 should be indicated.
- 15) The vegetation in the RF / PF areas in the study area, with necessary details, should be given.
- 16) A study shall be got done to ascertain the impact of the Mining Project on wildlife of the study area and details furnished. Impact of the project on the wildlife in the surrounding and any other protected area and accordingly, detailed mitigative measures required, should be worked out with cost implications and submitted.
- 17) Location of National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar site Tiger/ Elephant Reserves/(existing as well as proposed), if any, within 10 km of the mine lease should be clearly indicated, supported by a location map duly authenticated by Chief Wildlife Warden. Necessary clearance, as may be applicable to such projects due to proximity of the ecologically sensitive areas as mentioned above, should be obtained from the Standing 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

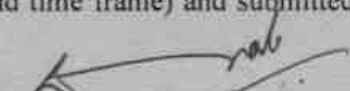

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present. In case of any scheduled-I fauna found in the study area, the necessary plan along with budgetary provisions for their conservation should be prepared in consultation with State Forest and Wildlife Department and details furnished. Necessary allocation of funds for implementing the same should be made as part of the project cost.

- 19) Proximity to Areas declared as 'Critically Polluted' or the Project areas likely to come under the 'Aravali Range', (attracting court restrictions for mining operations), should also be indicated and where so required, clearance certifications from the prescribed Authorities, such as the SPCB or State Mining Department should be secured and furnished to the effect that the proposed mining activities could be considered.
- 20) Similarly, for Coastal Projects, a CRZ map duly authenticated by one of the authorized agencies demarcating LTL, HTL, CRZ area, location of the mine lease with respect to CRZ, coastal features such as mangroves, if any, should be furnished. (Note: The Mining Projects falling under CRZ would also need to obtain approval of the concerned Coastal Zone Management Authority).
- 21) R&R Plan/compensation details for the Project Affected People (PAP) should be furnished. While preparing the R&R Plan, the relevant State/National Rehabilitation & Resettlement Policy should be kept in view. In respect of SCs /STs and other weaker sections of the society in the study area, a need based sample survey, family-wise, should be undertaken to assess their requirements, and action programmes prepared and submitted accordingly, integrating the sectoral programmes of line departments of the State Government. It may be clearly brought out whether the village(s) located in the mine lease area will be shifted or not. The issues relating to shifting of village(s) including their R&R and socio-economic aspects should be discussed in the Report.
- 22) One season (non-monsoon) [i.e. March-May (Summer Season); October-December (post monsoon season) ; December-February (winter season)] primary baseline data on ambient air quality as per CPCB Notification of 2009, water quality, noise level, soil and flora and fauna shall be collected and the AAQ and other data so compiled presented date-wise in the EIA and 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-


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- dominant downwind direction. The mineralogical composition of PM10, particularly for free silica, should be given.
- 23) Air quality modeling should be carried out for prediction of impact of the project on the air quality of the area. It should also take into account the impact of movement of Vehicles for transportation of mineral. The details of the model used and input parameters used for modeling should be provided. The air quality contours may be shown on a location map clearly indicating the location of the site, location of sensitive receptors, if any, and the habitation. The wind roses showing pre-dominant wind direction may also be indicated on the map.
 - 24) The water requirement for the Project, its availability and source should be furnished. A detailed water balance should also be provided. Fresh water requirement for the Project should be indicated.
 - 25) Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided.
 - 26) Description of water conservation measures proposed to be adopted in the Project should be given. Details of rainwater harvesting proposed in the Project, if any, should be provided.
 - 27) Impact of the Project on the water quality, both surface and groundwater, should be assessed and necessary safeguard measures, if any required, should be provided.
 - 28) Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided. In case the working will intersect groundwater table, a detailed Hydro Geological Study should be undertaken and Report furnished. The Report inter-alia, shall include details of the aquifers present and impact of mining activities on these aquifers. Necessary permission from Central Ground Water Authority for working below ground water and for pumping of ground water should also be obtained and copy furnished.
 - 29) Details of any stream, seasonal or otherwise, passing through the lease area and modification / diversion proposed, if any, and the impact of the same on the hydrology should be brought out.
 - 30) Information on site elevation, working depth, groundwater table etc. Should be provided both in AMSL and bgl. A schematic diagram may also be provided for the same.
 - 31) A time bound Progressive Greenbelt Development Plan shall be prepared in a tabular form (indicating the linear and quantitative coverage, plant species and time frame) and submitted,


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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


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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 translation should be provided.
 - f) The Questionnaire for environmental appraisal of mining projects as devised earlier by the Ministry shall also be filled and submitted.
 - g) While preparing the EIA report, the instructions for the Proponents and instructions for the Consultants issued by MoEF&CC vide O.M. No. J-11013/41/2006-IA.II(1) 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


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conducting the PH again with the revised documentation.

- i) As per the circular no. J-11011/618/2010-IA.II(I) dated 30.5.2012, certified report of the status of compliance of the conditions stipulated in the Environment Clearance for the existing operations of the project, should be obtained from the Regional Office of Ministry of Environment, Forest and Climate Change, as may be applicable.
- j) The EIA report should also include (i) surface plan of the area indicating contours of main topographic features, drainage and mining area, (ii) geological maps and sections and (iii) sections of the mine pit and external dumps, if any, clearly showing the land features of the adjoining area.

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

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

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


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


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(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 prepared by them and data provided by other organization/Laboratories including their status of approvals etc. In this regard circular no F. No.J -11013/77/2004-IA-II(I) dated 2nd December, 2009, 18th March 2010, 28th May 2010, 28th June 2010, 31st December 2010 & 30th September 2011 posted on the Ministry's website <http://www.moef.nic.in/> may be referred.
 - After preparing the EIA (as per the generic structure prescribed in Appendix-III of the EIA Notification, 2006) covering the above mentioned points, the proponent will take further necessary action for obtaining environmental clearance in accordance with the procedure prescribed under the EIA Notification, 2006.
 - The final EIA report shall be submitted to the SEIAA, Tamil Nadu for obtaining Environmental Clearance.
 - The TORs with public hearing prescribed shall be **valid for a period of three years** from the date of issue, for submission of the EIA/EMP report as per OMNo.J-11013/41/2006-IA-II(I)(part) dated 29th August, 2017.


MEMBER SECRETARY
SEIAA-TN

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 & CC, Paryavaran Bhavan, CGO Complex, New Delhi 110003
6. The District Collector, Vellore District.
7. Stock File.

Annexure II - Mining Plan Approved Letter

From

Thiru.D.Bernard , M.Sc.,
Assistant Director,
Geology and Mining,
Vellore District.

To

The Executive Engineer,
Public Works Department,
Water Resource Department,
Mining and Monitoring Division,
Chennai

Rc.No.37/2021 (Mines) dated 23.05.2022

Sir,

Sub: Mines and Minerals – Vellore District - Minor Mineral – Sand quarry proposed by the Executive Engineer, WRD, Mining and Monitoring Division, Chennai – Gudiyatham Taluk - SF.No.1 (OAE 2.70.0 Ha.) of Koothampakkam Village and S.F.No.213 (9.00.0 Ha.) Ananganallore Village – OAE of 11.70.0 Ha. - Precise Area Communicated - Mining Plan submitted - Approved - Regarding.

Ref: 1. The Executive Engineer, WRD, Mining and Monitoring Division Rc.No.465/கேள்/2021 dated 11.08.2021.

2. The District Collector,Vellore, Precise Area Communication letter Rc.No.37/2021 (Mines) dated 12.01.2022.

3. The Executive Engineer, WRD, Mining and Monitoring Division, Villupuram letter dated 17.05.2022.

In the reference 1st cited, the Executive Engineer, Water Resources Development, Mining and Monitoring Division, Chennai requested sand quarry permission to quarry 1,17,000 cbm of sand over a total extent of 11.70.0 hectares in River palar falling in S.F.No.1 (2.70.0 Ha.) of Koothampakkam Village and S.F.No.213 (9.00.0 Ha.) of Ananganallur Village in Gudiyatham Taluk, Vellore District in the dimension of 900m length x 130m width x 1m depth.

-Based on the recommendation of the Revenue Divisional Officer, Gudiyatham, Assistant Director (Mines), Vellore and Executive Engineer, TWARD Board, Vellore, the District Collector issued Precise Area Communication letter vide reference 2nd cited requesting the Executive Engineer, Mining and Monitoring Division, Chennai to submit the Mining Plan prepared by Qualified Person for the approval of the Assistant Director of Geology and Mining, Vellore within 90 days and also to submit Environment Clearance for grant of sand quarry permission in the above area.

Accordingly, the Executive Engineer, Water Resource Department, Mining and Monitoring Division, Chennai has submitted three copies of Mining Plan to this office. The draft mining plan has been examined in detail and following observations are made.

- a) It has been proposed for quarry 1,17,618 cbm of sand upto 1m below theoretical bed level including shoal (average height of shoal is 0.005m) for a period of one year in an extent of 11.70.0 hectares in palar river in the dimension of 900m length and 130m. Width shoal is calculated as 618 cbm.
- b) Spot levels at 10 x 10m grid has been taken through at the lease area and incorporated in the mining plan.
- c) No machineries are proposed for mining Sand will be removed manually by labours and directly loaded in the tippers.
- d) Haulage of sand will be done by hired tipper 10/20T capacity, diesel driver (only from quarry yard to the Government depot)
- e) No blasting or drilling is proposed.
- f) Water table in the subject area is reported at 5-10 m depth as observed in nearby boreholes and wells.
- g) The geo-co-ordinates of the sand quarry proposed area.

Geo coordinates:

Sl.No.	Latitude	Longitude
1	12°53'25.36"N	78°52'23.12"E
2	12°53'29.72"N	78°52'22.78"E
3	12°53'33.88"N	78°52'34.49"E
4	12°53'34.90"N	78°52'51.86"E
5	12°53'30.70"N	78°52'52.13"E
6	12°53'29.59"N	78°52'34.79"E

On scrutiny, it is found that, the Mining Plan has been prepared in accordance with Tamil Nadu Minor Mineral Concession Rules 1960 and guidelines / instructions issued by the Commissioner of Geology and Mining vide his letter Rc.No. 3868/LC/2012, dt 19.11.2012. Therefore, in exercise of the powers conferred under Rule 41(2) of Tamil Nadu Minor Mineral Concession Rules 1959, read with G.O.(Ms) No.79 / Industries (MMC1) Department dated 06.04.2015, the mining plan is hereby approved subject to the following conditions:

- (i) 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.

- (ii) This approval of the mining plan does not in any way convey the approval of the Government in terms or 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, Explosives Act, 1884 (Central Act IV of 1884) Minor Mineral Concession and Development Rules, 2010 and the Rules made there under and the Tamil Nadu Minor Mineral Concession Rules, 1959.
- (iii) The mining plan is approved without prejudice to any other order or direction from any court of competent jurisdiction.
- (iv) The validity of the mining plan is co-terminus with the lease period.
- (v) The area recommended for grant of permission should be properly demarcated and before commencing sand quarry operation the area to be granted should be properly fenced within boundary sand.
- (vi) The guidelines and notifications issued by the Government of India in respect of sand mining in the country should be scrupulously followed.
- (vii) Quarrying shall be done in accordance with the approved Mining Plan.
- (viii) If anything is found to be concealed as required by the Mines Act in the contents of the Mining Plan and the proposal for rectification has not been made, the approval shall be deemed to have been withdrawn with immediate effect.

Encl: Approved Mining Plan

7
23/5/22
Assistant Director,
Geology and Mining,
Vellore District.

ton-4
23.5.22

8
BKH

நக.எண்:37/2021 (கனிமம்)

யாவட்ட ஆட்சித் தலைவர் அலுவலகம்
கனிமம் மற்றும் சுரங்கப் பிரிவு,
வேலூர் யாவட்டம், வேலூர் - 9



Annexure III- Precise Area Communication Letter

நாள் 12.01.2022

நோட்டீஸ்

(Precise Area Communication Letter)

பொருள்: கனிமவளங்கள் - மணல் - வேலூர் யாவட்டம் - குடியாத்தம் வட்டம், சுத்தம்பாக்கம் கிராம ச.எண்.1 (2.70.0 ஹெக்டேர்) மற்றும் அனங்காநல்லூர் கிராம ச.எண்.213 (9.00.0 ஹெக்டேர்) ஆக மொத்த பரப்பு 11.70.0 ஹெக்டேர் பரப்பில் மணல் குவாரி செயல்படுத்துபவ்னித் துறையினக்குக் குத்தகை அனுமதி வழங்க உத்தேசிக்கப்பட்டுள்ளது ஒப்புதல் பெறப்பட்ட காங்கத்திட்ட அறிக்கை (Approved Mining Plan) மற்றும் யாவட்ட அளவிலான சுற்றுச்சூழல் தாக்க மதிப்பீட்டு (SEIAA) - அணைத்துள்ள தடைவிடும் சான்றிணை பெற்று சமர்ப்பிக்க தெரிவிப்பது - தொடர்பாக.

- பார்வை: 1. அரசாணை எண்.95/தொழில்/(MMC) துறை நாள் 01.10.2003,
2. அரசாணை (நிலை)எண்.110-பொதுப்பணித்துறை(சி.பி.2) துறை நாள் 06.07.2006,
3. அரசாணை(நிலை)எண்.39/தொழில்/(MMC-1)துறை நாள் 01.02.2011
4. செயற்பொறியாளர், நீ.ஆது, சுரங்கவியல் (ம) கண்காணிப்பு கோட்டம், சேப்பாக்கம் சென்னை கடித எண்.465/கோ/2021 நாள் 11.08.2021,
5. யாவட்ட ஆட்சித்தலைவர் அவர்களின் கடிதம் நக.எண்.37/2021(கனிமம்) நாள்:23.08.2021,
6. நிர்வாக பொறியாளர், தமிழ்நாடு குடிநீர் வடிகால் வாரியம், கிராமக்குடிநீர் திட்ட கோட்டம், வேலூர் அவர்களின் கடிதஎண் கோ.மணல் குவாரி/திவ.அ /கி.கு.தி/2021 நாள் 06.09.2021,
7. வகுமாய் கோட்டாட்சியர், குடியாத்தம் அவர்களின் கடித எண் நக.ஆ1/914/2021, நாள்: 27.10.2021.
8. உதவி இயக்குநர், புவிவியல் மற்றும் சுரங்கத்துறை, வேலூர் அவர்களின் அறிக்கை நாள் 05.10.2021.

பார்வை-1ல் காணும் அரசாணைவின்படி செயற்பொறியாளர், நீ.ஆது, சுரங்கவியல் (ம) கண்காணிப்பு கோட்டம், சேப்பாக்கம் சென்னை அவர்கள் வேலூர் யாவட்டம், குடியாத்தம் வட்டம், சுத்தம்பாக்கம் கிராம ச.எண்.1 (2.70.0 ஹெக்டேர்) மற்றும் அனங்காநல்லூர் கிராம ச.எண்.213(9.00.0 ஹெக்டேர்) ஆக மொத்த பரப்பு 11.70.0 ஹெக்டேர் பரப்பு பாலாற்றுப் படுகையில் 900 x 130 x 1.00 மீ சுமார் 1,17,000 க.மீ என்ற மணல் குவாரி அமைத்து கிற்பவனை செயல் அனுமதி வழங்குமாறு பார்வை-4ல் காணும் கடிதத்தில் கோரியுள்ளார்.

கூடுபொருள் தொடர்பாக, நிர்வாக பொறியாளர், தமிழ்நாடு குடிநீர் வடிகால் வாரியம், கிராமக்குடிநீர் திட்ட கோட்டம், வேலூர், சார் ஆட்சியர், வேலூர் மற்றும் உதவி புவிவியலாளர், புவிவியல் சுரங்கத்துறை, வேலூர் ஆகியோர் மேற்படி பகுதியில் மணல் குவாரி அனுமதி வழங்க பரிந்துரை செய்து அறிக்கை அளித்துள்ளனர்.



செயற்பொறியாளர், நீ-ஆறு, கரங்கலியல் (ம) கண்காணிப்பு கோட்டம், சேப்பாக்கம் சென்னை அவர்களின் கருத்துருவை ஏற்றும், வகுனம் கோட்டாட்சியர், குடியாத்தம், நீர்வள பொறியாளர், தமிழ்நாடு குடிநீர் வடிவாக வாரியம், கிராமக் குடிநீர் திட்ட கோட்டம், வேலூர், மற்றும் உதவி தியக்குநர், புலியியல் கரங்கல்துறை, வேலூர் ஆதிகளோர்களின் பரிந்துரைகளின் அடிப்படையிலும் வேலூர் மாவட்டம், குடியாத்தம் வட்டம், கூத்தம்பாக்கம் கிராம ச.எண்.1 (2.70.0 ஹெக்டேர்) மற்றும் அனங்காநல்லூர் கிராம ச.எண்.213 (9.00.0 ஹெக்டேர்) ஆகிய சொந்த பரப்பு 11.70.0 ஹெக்டேர் பரப்பு பாலாற்றுப் படுகையில் 900 x 130 x 1.00 மீ சுமார் 1,17,000 க.மீ மணல் எழுத்து சிற்பனை செய்வது தொடர்பாக ஒப்புதல் பெறப்பட்ட கரங்கல்திட்ட அறிக்கை (Approved Mining Plan) மற்றும் மாவட்ட அளவிலான சுற்றுச்சூழல் தாக்க மதிப்பீட்டு (SEIAA) - ஆணையத்தின் தடையின்மை சான்றினை செயற்பொறியாளர், நீ-ஆறு, கரங்கலியல் (ம) கண்காணிப்பு கோட்டம், சேப்பாக்கம் சென்னை அவர்கள் பெற்று சமர்ப்பிக்கும் பட்சத்தில் தமிழ்நாடு சிறுகனிம சலுகை விதி 1959-ன்படி ஓராண்டிற்கு அனுமதி வழக்க உத்தேசிக்கப்பட்டுள்ளது.

எனவே, செயற்பொறியாளர், நீ-ஆறு, கரங்கலியல் (ம) கண்காணிப்பு கோட்டம், சேப்பாக்கம் சென்னை அவர்கள் ஒப்புதல் பெறப்பட்ட கரங்கல்திட்ட அறிக்கையை (Approved Mining Plan) மூன்று மாத காலத்திற்குள் உதவி தியக்குநர், புலியியல் கரங்கல்துறை வேலூர் அவர்களின் ஒப்புதல் பெற்று மாவட்ட அளவிலான சுற்றுச்சூழல் தாக்க மதிப்பீட்டுக் குழுவின் தடையின்மை சான்றினை பெற்று சமர்ப்பிக்குமாறு அறிவுறுத்தப்படுகிறார்.

(ஓம்)xxxxxxxx(12.01.2022)

மாவட்ட ஆட்சித்தலைவர்,
வேலூர்.

// உத்தரவு படி //

மாவட்ட ஆட்சித்தலைவருக்காக

பெறுநர்

செயற்பொறியாளர்,

நீர்வள ஆதாரத் துறை,

கரங்கலியல் (ம) கண்காணிப்பு கோட்டம்,

சேப்பாக்கம்.

8
12/1/22

S. Suriyakumar

S. SURIYAKUMAR

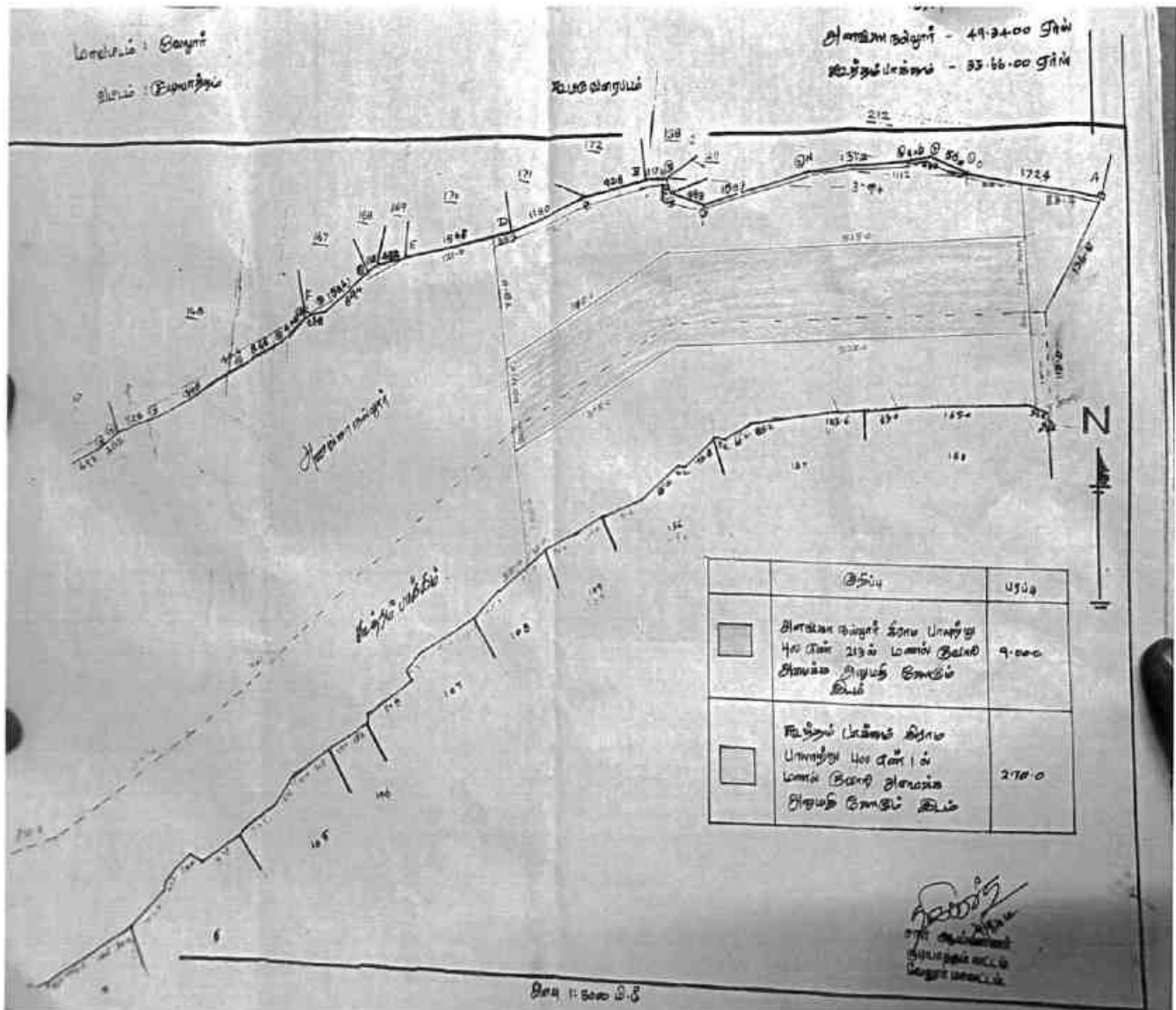
EIA coordinator (mining)

NABET accredited consultant

Reg. No. NABET/EIA/2124/RA 0228

S. Suriyakumar
12/1/22
Executive Engineer, WRD.,
Mining and Monitoring Division,
Chepauk, Chennai

Annexure IV - Copy of FMB



பக்க 11 சைட் 2.3

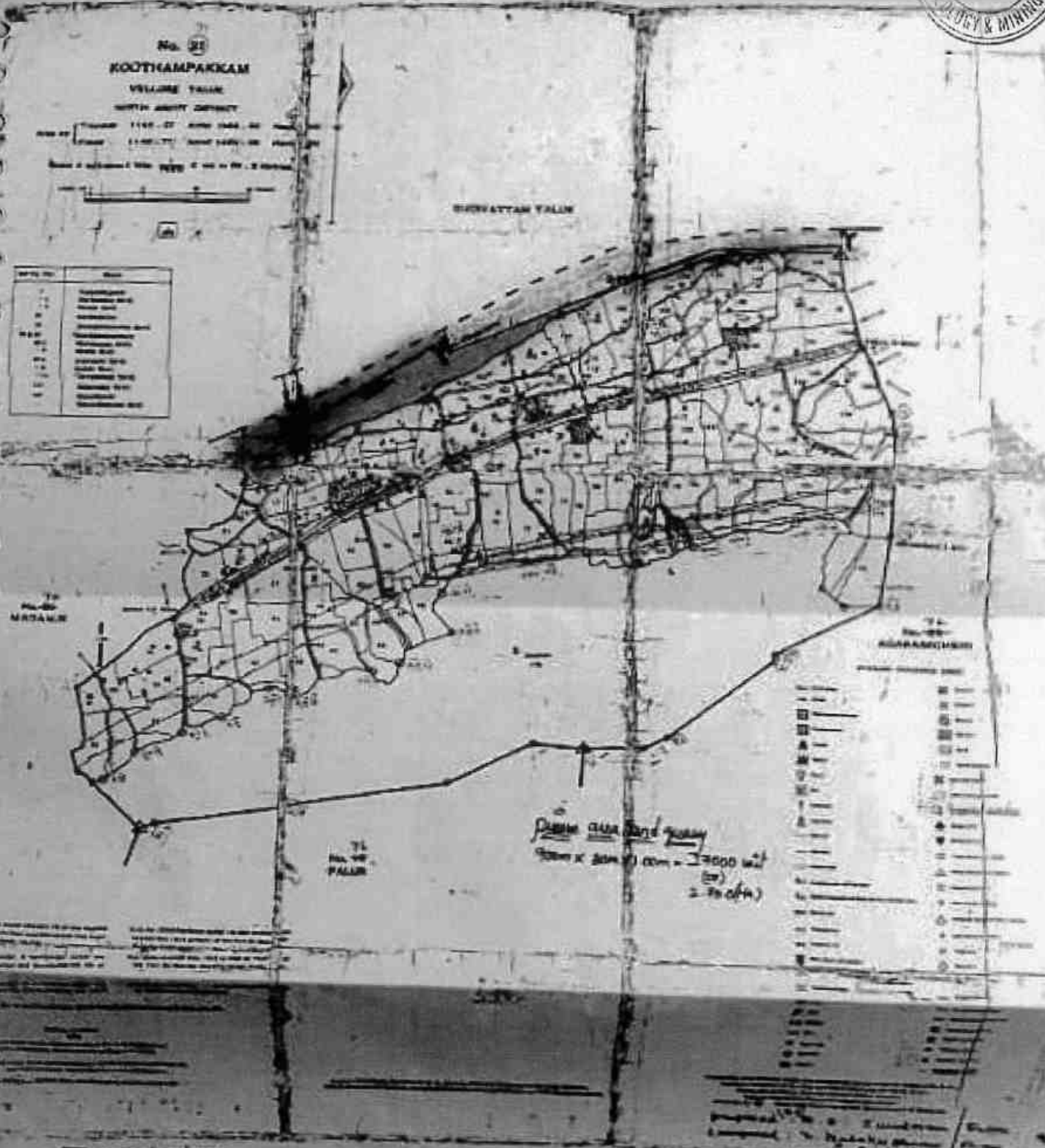
S. Suriyakumar

S. SURIYAKUMAR
EIA coordinator (mining)
NABET accredited consultant
Reg. No. NABET/EIA/2124/RA 0228

S. Suriyakumar
12/5/22

Executive Engineer, P.W.D., W.R.D.,
Mining and Monitoring Division,
Chepauk, Chennai-600 005.

Annexure V- Copy of Combined Sketch



Assistant Engineer, W.R.D.,
Mining and Monitoring Section, 4
Vellore - 6

19/5/22

Executive Engineer, P.W.D., W.R.D.,
Mining and Monitoring Division,
Chepauk, Chennai-600 005.

No. 72
ANANGANELLORE
 GUDIPATTI TALUK
 NORTH AREBET DISTRICT

Scale 1:1000
 1 cm = 10 m
 1 inch = 25.4 m



Planning done based on survey
 (Area of 10000 sq. m. approx.)
 7.20 (approx.)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
...



Signature 12/12/22
 Executive Engineer, P.W.D., W.R.D.
 Mining and Monitoring Division,
 Chepauk, Chennai-600 005.

Signature
S. SURIYAKUMAR
 EIA coordinator (mining)
 NABET accredited consultant
 Reg. No. NABET/EIA/2124/RA 0228

Proposed sand quarry
 2000 sq. m.

Signature
 Assistant Engineer, W.R.D.
 Mining and Monitoring Section,
 Vellore - 6.



சட்டம் எண் 1957-58

சட்டம் எண்

சட்டம் எண் 1957-58

சட்டம் எண் 1957-58

சட்டம் எண்

சட்டம் எண்

சட்டம் எண் 1957-58

சட்டம் எண் 1957-58

சட்டம் எண்

சட்டம் எண் 1957-58

சட்டம் எண்

சட்டம் எண் 1957-58

சட்டம் எண் 1957-58

சட்டம் எண் 1957-58

சட்டம் எண் 1957-58

சட்டம் எண்

சட்டம் எண்

சட்டம் எண் 1957-58

சட்டம் எண்

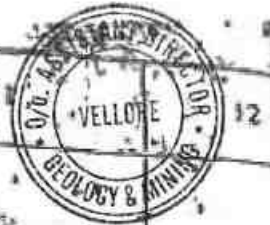
சட்டம் எண் 1957-58

	2	3	4	5	6	7	8	9	10	11	12
1A	2-100	1	11	...	7-1	2	6 32	0 20 0	1 25	5 1/2 சதமீட்டர்	
1B	1-100	1	11	...	7-1	2	6 32	0 41 0	2 59	41 1/2 சதமீட்டர்	
2	2	2	11	...	7-1	2	6 32	0 09 5	0 61	37 A சதமீட்டர்	
3	3	1	11	...	7-1	2	6 32	0 17 0	1 08	204 சதமீட்டர்	
4	4	1	11	...	7-1	2	6 32	0 01 0	0 08	457 சதமீட்டர்	சட்டம்
5	5	1	11	...	7-1	2	6 32	0 01 5	0 15	357 சதமீட்டர்	சட்டம்
6	6	1	11	...	7-1	2	6 32	0 24 0	1 51	7 1/2 சதமீட்டர்	
7	7	1	11	...	7-1	2	6 32	0 25 0	1 40	204 சதமீட்டர்	
8	8	1	11	...	7-1	2	6 32	0 21 0	1 33	152 சதமீட்டர்	

District:Vellore Taluk:Pernambut Village:Ananganallur



புல எண்	உட்பிரிவு எண்	பகுதி	அரசு - ரயத்துவாரி	நிலத்தின் வகை	பாசன ஆதாரம்	இரு போகமா	மண் வயனமும் ரகமும்	மண் தீர்வு	தீர்வை - ஹெக்டேர்	பரப்பு	மொத்த தீர்வை	குறிப்பு		
									ரூபை	ஹெக்டேர்	ரூபை			
209	-		அரக	புறம்போக்கு			0-0	0	0	0	0	காலவாய்		
210	-		கலக	புறம்போக்கு			0-0	0	0	0	0	காலவாய்		
211	-		அரக	புறம்போக்கு			0-0	0	0	0	0	காலவாய்		
212	1A1	P	ரயத்துவாரி	புஞ்சை			4-3	3	4	94	7	361-அபரிவு மறுமு 3 நபர்(கை)		
212	1A2	P	ரயத்துவாரி	புஞ்சை			4-3	3	4	94	0	278-நட.ரயதுள்		
212	1A3	P	ரயத்துவாரி	புஞ்சை			4-3	3	4	94	0	279-முருகேசன் மறுமு 1 நபர்(கை)		
212	1A4	P	ரயத்துவாரி	புஞ்சை			4-3	3	4	94	0	392-சாதிநாதன்		
212	1A5	P	ரயத்துவாரி	புஞ்சை			4-3	3	4	94	0	393-குடியாடல்		
212	1B	P	ரயத்துவாரி	புஞ்சை			4-3	3	4	94	6	388-கேசால் மறுமு 6 நபர்(கை)		
212	2A	P	ரயத்துவாரி	புஞ்சை			4-3	3	4	94	0	391-சு.ரீபராஜ		
212	2B	P	ரயத்துவாரி	புஞ்சை			4-3	3	4	94	5	163-நட.ரயதுள் மறுமு 7 நபர்(கை)		
212	3A1	P	ரயத்துவாரி	புஞ்சை			4-3	3	4	94	0	217-சுத்தநாயகன்		
212	3A2	P	ரயத்துவாரி	புஞ்சை			4-3	3	4	94	0	395-முனிமயமன்		
212	3A3	P	ரயத்துவாரி	புஞ்சை			4-3	3	4	94	0	425-ராமு (ள) குடியாடல்		
212	3A4	P	ரயத்துவாரி	புஞ்சை			4-3	3	4	94	0	426-சுத்தநாயகன்		
212	3A5	P	ரயத்துவாரி	புஞ்சை			4-3	3	4	94	0	427-சுத்தநாயகன் மறுமு 11 நபர்(கை)		
212	3B	P	ரயத்துவாரி	புஞ்சை			4-3	3	4	94	2	374-காவலித்தரணி மறுமு 5 நபர்(கை)		
212	4	P	ரயத்துவாரி	புஞ்சை			4-3	3	4	94	1	316-சுத்தநாயகன்		
212	5	P	ரயத்துவாரி	புஞ்சை			4-3	3	4	94	2	139-முனிமயமன் மறுமு 3 நபர்(கை)		
212	6	P	ரயத்துவாரி	புஞ்சை			4-3	3	4	94	0	398-சுத்தநாயகன்		
TOTAL FOR SURVEY NUMBER-208											1	99.50	9	87
TOTAL FOR SURVEY NUMBER-212											3	50.50	17	82
213	-		அரக	புறம்போக்கு			0-0	0	0	0	0	மீளாத காலம்		
212	4	P	அரக	புறம்போக்கு			0-0	0	0	0	0	மீளாத காலம்		



சு. எ.ப.	பெயர்	பகுதி	பகுதி	பகுதி	பகுதி	பகுதி	பகுதி	பகுதி	பகுதி	பகுதி	பகுதி	பகுதி	பகுதி
211	0 41.5
212-1	A-3	3	4	94	0 71.5	3 43	381	பு. கோபால்	மற்றும் ஆறு	பெரிசனும்.
-1பு	4-3	3	4	94	0 04.0	0 32	388	பு. கோபால்	மற்றும் ஆறு	பெரிசனும்.
-2பு	4-3	3	4	94	0 03.0	0 40	391	கு. நடராஜன்	மற்றும் மூன்று	பெரிசனும்.
-2பு	4-3	3	4	94	1 07.0	5 26	363	கு. நடராஜன்	மற்றும் மூன்று	பெரிசனும்.
-3	4-3	3	4	94	0 87.0	4 31	374	பெ. கோவிந்த்	மற்றும் நான்கு	பெரிசனும்.
	4-3	3	4	94	0 26					
	4-3	3	4	94	0 46.5	2 31	139	...		
					3 50.5	17 34				
					49 34.0					
				இராமமொத்தம்				234 69.0	1852 38				

381 பு. கோபால்
மற்றும் ஆறு
பெரிசனும்.

388 பு. கோபால்
மற்றும் ஆறு
பெரிசனும்.

391 கு. நடராஜன்
மற்றும் மூன்று
பெரிசனும்.

363 கு. நடராஜன்
மற்றும் மூன்று
பெரிசனும்.

374 பெ. கோவிந்த்
மற்றும் நான்கு
பெரிசனும்.

விவரப்பட்டியலைப் பார்க்கவும்.

Responsible Engineer, P.W.B., W.R.D.,
Mining and Monitoring Division,
Chepauk, Chennai-600 005.

S. SURIYAKUMAR
EIA coordinator (mining)
NABET accredited consultant
Reg. No. NABET/EIA/2124/RA 0228

ச. எஸ். இராமமூர்த்தி,
குறிப்பாளர்,
உடைமையப்பட்டு

(இ-ம்) நா. கன்னியப்பன்,
தலைவரின் உதவி,
நிலை உடைமையப்பட்டு
மேம்பாட்டுத்துறை,
குடியாத்தம் அலகு-1

(இ-ம்) கோ. ப.
தலைவரின் உதவி,
நிலை உடைமையப்பட்டு
மேம்பாட்டுத்துறை,
குடியாத்தம் அலகு-1

Annexure VII - Copy of Cluster letter

From

Thiru. D.Bernaude, M.Sc.,
Assistant Director,
Geology and Mining,
Vellore District

To

The Executive Engineer,
Water Resource Department,
Mining and Monitoring Division,
Chepauk, Chennai.

Rc. No. 37/2021 (Mines) Dated: 27.05.2022 .

Sir,

Sub : Mines and Minerals - Minor - Sand Quarry Permission Applied by the
Executive Engineer - Water Resource Department- SF. No. 1(P) & 213(P)
(OAE of 11.70.0 Ha) - Kuthambakkam & Ananganallur Village -
Gudiyatham Taluk- Vellore District - Certificate Requested Sent - Reg.

Ref : The Executive Engineer, WRD, Mining and Monitoring Division,
Chepauk, Chennai Letter No. / F.26/2022/Dated : 27.05.2022

It is Informed that no other quarries located within a radius of 1km from the
boundary of the proposed sand quarry in SF. No. 1(P) & 213(P) (OAE of 11.70.0 Ha)
Kuthambakkam & Ananganallur Village in Gudiyatham Taluk of Vellore District.

27/05/22
Assistant Director,
Geology and Mining,
Vellore District.


27/5/22

Annexure VIII - Copy of VAO letter

சான்று

வேலூர் மாவட்டம் - குடியாத்தம் வட்டம் -
கூத்தம்பாக்கம் கிராம நிர்வாக அலுவலர் அளிக்கும் சான்று

வேலூர் மாவட்டம் - குடியாத்தம் வட்டம் -
கூத்தம்பாக்கம் கிராமம் பாலாறு சர்வே எண்.1ல் (பகுதி)
ஆகிய கிராமங்களின் மொத்த பரப்பளவு 2.70.0 ஹெக்டோ
நீர்வளததுறை மூலம் துவங்க இருக்கும் மணல் குவாரி
பகுதியில் இருந்து 300 மீட்டர்க்குள் அங்கீகரிக்கப்பட்ட வீட்டு
மனைகள் மற்றும் புராதனச்சின்னங்கள் ஏதும் இல்லை
எனவும், தெரிவித்துக் கொள்கிறேன்.



கிராம நிர்வாக அலுவலர்
பிறப்பு இறப்பு பதிவாளர்
சிங்களப்பாடி அனங்காநல்லூர்
குடியாத்தம் வட்டம், (வே.மா.)

Annexure IX - Copy of Photograph attested by VAO

THE EXECUTIVE ENGINEER, MMD, WRD/PWD, Chennai, Sand quarry, over extent of 11.70.0Ha in S.F.No.1 (P) & 213 (P), palar River in Kuthambakkam and Ananganallore Village, Gudiyatham Taluk, Vellore District District, Tamil Nadu.

General view of the Sand Quarry




கிராம நிர்வாக அலுவலர்
பிறப்பு இறப்பு பதிவாளர்
சிங்களப்பாடி அனங்காநல்லூர்
குடியாத்தம் வட்டம், (வே.மா.)