DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT

For

PROPOSED VEERIYAPALAYAM MULTI COLOUR GRANITE QUARRY

Extent of 2.30.0 Ha of Patta land

At

S.F. No.: 12/1A, 12/1B, 12/1C, 12/1D, 12/1E, 12/2A, 12/2B, 12/2C, 12/3A, 12/3B, 12/3C, 12/3D, 12/3E, 12/4A, 12/4B and 12/5A,
Veeriyapalayam Village,
Krishnarayapuram Taluk,
Karur District,
Tamil Nadu State

Applicant
Thiru. K.Deivendran,
S/o. Karuthaiah Thevar,
Door No. 4/143, Lake Area,
Uthangudi, Madurai District

(Project termed under Schedule of 1(a) Mining of Minor Minerals 'B2' category as per EIA Notification 2006 and its Amendments thereafter and As per the O.M issued vide F.No. L-11011/175/2018-IA-II (M), dated: 12.12.2018 considering the cluster the project is termed under Schedule 1(a) Mining of Minor Minerals 'B1' Category)

Proposal No: SIA/TN/MIN/430716/2023

ToR File No: SEIAA/TN/F.No.10272/SEAC/ToR-16212023 dated: 28.11.2023

Base Line Monitoring: March 2023 - May 2023

EIA Consultant & Laboratory
HUBERT ENVIRO CARE SYSTEMS (P) LTD, CHENNAI

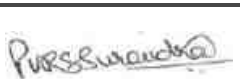
NABET Certificate No & Validity: NABET/EIA/2224/SA0190, valid up to 27.07.2024.

NABL Certificate No: TC-12310 Dated: 25.09.2023 Valid Till 24.09.2025

June 2024

Name of the Client	:	**M/r. K. Deivendran**
Name of the Project	:	PROPOSED VEERIYAPALAYAM MULTI COLOUR GRANITE QUARRY Extent of 2.30.0 Ha of Patta land
Name of the report	:	Draft EIA Report
Project No: H/01/2023/CON/017		**Document No:** RP003

Revision details:

Rev No.	Date	Details	Prepared by: Name	Prepared by: Sign	Checked by: Name	Checked by: Sign	Approved by: Name	Approved by: Sign
R1	11.05.2024	2nd Submission	P.V.R.Surendra		Vamsee		J.R.Moses	
R0	30.04.2024	1st Submission	P.V.R.Surendra		Vamsee		J.R.Moses	

ACKNOWLEDGEMENT

The following personnel are gratefully acknowledged for their fullest support in collection, compilation of needful data regarding the project and kind cooperation in fulfilling the report on Environmental Impact Assessment (EIA) report of Veeriyapalayam Multi Colour Granite quarry, over an extent of 2.30.0 Ha, at survey number 12/1A, 12/1B, 12/1C, 12/1D, 12/1E, 12/2A, 12/2B, 12/2C, 12/3A, 12/3B, 12/3C, 12/3D, 12/3E, 12/4A, 12/4B and 12/5A Veeriyapalayam Village, Krishnarayapuram Taluk, Karur District and Tamil Nadu State.

Proponent

Thiru.K. Deivendran

M/s Hubert Enviro Care Systems Private Limited

1) Dr. J R Moses (CEO)
2) Dr. Raj Kumar Samuel (Director- Technical)
3) Mr. Vamsee Krishna Navooru (Head-Consultancy & EIA Coordinator)

Declaration by the Project Proponent

I, Mr. Deivendran, declaration/ undertaking that owing the contents (information and data) of the EIA report preparation has been undertaken in the compliance with Terms of Reference (ToR) for the "Proposed Veeriyapalayam Multi Colour Granite quarry, over an extent of 2.30.0 Ha, at survey number 12/1A, 12/1B, 12/1C, 12/1D, 12/1E, 12/2A, 12/2B, 12/2C, 12/3A, 12/3B, 12/3C, 12/3D, 12/3E, 12/4A, 12/4B and 12/5A Veeriyapalayam Village, Krishnarayapuram Taluk, Karur District, Tamil Nadu State**"** and the information and content provided in the report are factually correct.

Mr. K. Deivendran.

Proponent

Declaration by the Head of the Accredited Consultant Organization

I, Dr.J.R. Moses, hereby, confirm that the below mentioned experts prepared the EIA/EMP report for " Proposed Veeriyapalayam Multi Colour Granite quarry, over an extent of 2.30.0 Ha, at survey number 12/1A, 12/1B, 12/1C, 12/1D, 12/1E, 12/2A, 12/2B, 12/2C, 12/3A, 12/3B, 12/3C, 12/3D, 12/3E, 12/4A, 12/4B and 12/5A Veeriyapalayam Village, Krishnarayapuram Taluk, Karur District, Tamil Nadu State**"**. I also confirm that I shall be fully accountable for any misleading information mentioned in this statement.

Signature:

Date: 18.05.2024

Name: Dr. J. R. Moses

Designation: Chief Executive Officer

Name of the EIA Consultant Organization: M/s. Hubert Enviro Care Systems (P) Ltd, Chennai

NABET Certificate No & Validity: NABET/EIA/2224/SA 0190 & valid upto27.07.2024

Declaration of Experts contributing to the EIA

I, hereby, certify that I was involved in the EIA report for the project titled Veeriyapalayam Multi Colour Granite quarry, over an extent of 2.30.0 Ha, at survey number 12/1A, 12/1B, 12/1C, 12/1D, 12/1E, 12/2A, 12/2B, 12/2C, 12/3A, 12/3B, 12/3C, 12/3D, 12/3E, 12/4A, 12/4B and 12/5A Veeriyapalayam Village, Krishnarayapuram Taluk, Karur District, Tamil Nadu State. I was a part of the EIA team in the following capacity that developed the above EIA with the support of the following functional area experts.

EIA Coordinator	
Name:	Mr. Vamsee Krishna Navooru
Signature:	
Date:	18.05.2024
Period of Involvement:	February 2023 to Till date

Contact Information:

M/s. Hubert Enviro Care Systems (P) Ltd
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Tamil Nadu, India.
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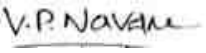
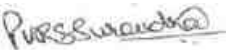
Functional Area Experts (FAEs):

S. No.	Functional Areas	Name of the Expert	Period of Involvement	Signature
1.	WP	Mr. Vamsee Krishna Navooru	**Period : March 2023 to Till date** **Task:** Selection of surface and ground water quality monitoring locations, and interpretation of analysis results. Identification and quantification of impacts and proposed suitable control measures and Environmental Management Plan.	
2.	SE	Mr. V. Dhivakar	**Period : March 2023 to Till date** **Task:** Site visit, Collection of secondary data, discussion with stake holders and	

S. No.	Functional Areas	Name of the Expert	Period of Involvement	Signature
			Preparation of socio -economic status of the study area. Review of demographic characteristics, and supervision of baseline data collection. Collection and analysis of perception study carried out for the proposed project.	
3.	EB	Dr. Rajkumar Samuel	**Period: March 2023 to Till date** **Task:** Primary ecological survey and assessment of flora and fauna with respect to the core and buffer zone in study area and development of EMP. Collection of data from secondary sources and comparing with field data, compilation of Ecology and bio diversity data and their impact assessment on the study area.	
4.	LU	Mr. Venkateswarlu	**Period : March 2023 to May 2023** **Task :** Development of land use maps of study area using GIS / related tools, site visit for ground reality survey, finalization of land use maps and studying the ecologically sensitive details in the study area as per Topo map and Gazette notifications.	
5.	AP	Mr. Tamil Selvan B	**Period: March 2023 to Till date** **Task:** Selection of air quality monitoring location, and interpretation of ambient air quality results. Estimation of fugitive emissions, identification and assessing of impacts due to air pollution and suggested suitable mitigation measures.	
6.	AQ	Dr. J R Moses	**Period: March 2023 to Till date** **Task:** Collection and developing of micro-meteorological data from secondary sources, preparing site specific wind rose pattern, prediction of dispersion of pollutants and incremental pollution levels with air quality modelling. Identification of impacts and proposed the suitable control measures, development of EMP.	

S. No.	Functional Areas	Name of the Expert	Period of Involvement	Signature
7.	NV	Mr. Vivek Navarae	**Period: March 2023 to May 2023** **Task:** Identification of noise monitoring locations and measured the ambient noise levels & vibrations generated due to various activities. Identifying the probable impacts due to noise & vibrations and suggested noise pollution control measures along with environmental management plan.	
8.	GEO	B. Mallikarjuna Rao	**Period: March 2023 to May 2023** **Task:** Studying the site topography, geology, geomorphological analysis, and existing available mineral resources. Studying of ground profile, assessing of environmental impacts due to proposed activity and proposed suitable mitigation measures	
9.	HG	Mr.PVRS Surendra	**Period: March 2023 to Till date** **Task**: Identification of ground water potential in the study area, analysis of surface hydrogeological data, its flow rate and direction. Preparation of report with respect to hydrogeological condition in and around the study area	
10.	SC	Dr. B.C. Nagaraja	**Period: March 2023 to May 2023** **Task:** Identification of soil quality monitoring locations, assessing of soil nutrients/characteristics in the study area, assessing the impacts on soil and proposing the soil management practices during construction and operation phase of project.	
11.	SHW	Mr. Vamsee Krishna Navooru	**Period: March 2023 to Till date** **Task:** Quantification of Municipal solid waste and hazardous waste generation and suggesting management measures, methodologies for handling, treatment, disposal and storage of generated wastes.	

S. No.	Functional Areas	Name of the Expert	Period of Involvement	Signature
12.	RH	Dr. J R Moses	**Period: March 2023 to Till date** **Task:** Identification of hazardous materials, fire accidents within the facility and validation of existing risk assessment & Disaster management plan along with the preparation of risk assessment report for the proposed unit with consequence analysis and mitigation measures.	

EIA Team Members:

S. No	Name	Role
1.	PVRS Surendra	TM for WP
2.	Abraham Abishek Moses	TM for AP & WP
3.	Raj MP	TM for LU & WP
4.	Tamil Selvan B	TM for WP
5.	Dr N Suresh	TM for Geo & HG
6.	Dr Ramrajan S	TM for EB
7.	Praveenkumaar R	FAA for LU
8.	Mahadevi T	FAA for AQ

LU - Land Use
AP - Air Pollution monitoring, prevention and control
AQ - Meteorology, air quality modeling and prediction
WP - Water pollution monitoring, prevention and control
EB - Ecology and biodiversity
NV - Noise& Vibration
SE - Socio-economics
HG - Hydrology, ground water and water conservation
GEO - Geology
RH - Risk assessment and hazards management
SHW - Solid and hazardous waste management
SC -SoilConservation

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LIST OF ANNEXURES

Annexure No	Name of the Annexure
1	ToR Copy
2	Precise Area Communication Letter
3	Mining Approval Letter
4	Approved Mining Plan
5	Sectional Plates
6	Patta Copy
7	Lease Deed
8	500m AD Mines Letter
9	Existing EC
10	CTO
11	VAO Letter
12	Deed of Agreement for Explosives
13	Permit Copy
14	Fencing Photographs
15	Green belt Photographs
16	Self Declaration Affidavit - No mining activity
17	Photograph of First Aid Room
18	300m Radius Affidavit
19	Existing Quarry Photographs
20	Certified Compliance Report

LIST OF ABBREVIATIONS

AAQ	Ambient Air Quality
AAQM	Ambient Air Quality Monitoring
AGL	Above Ground Level
AMSL	Above Mean Sea Level
BGL	Below Ground Level
CPCB	Central Pollution Control Board
CER	Corporate Environmental Responsibility
DMP	Disaster Management Plan
EIA	Environmental Impact Assessment
EMC	Environmental Management Cell
EMP	Environmental Management Plan
GLC	Ground Level Concentration
GO	Government Order
HECS	Hubert Enviro Care Systems
ISO	International Organization for Standardization
IUCN	International Union for Conservation of Nature
O.B	Over Burden
S.B	Side Burden
kVA	kilovolt-ampere
kWh	Kilowatt Hour
MMR	Metalliferous Mines Regulations
MoEF&CC	Ministry of Environment, Forest and Climate Change
NAAQ	National Ambient Air Quality
NABET	National Accreditation Board for Education and Training
QCI	Quality Council of India
R & D	Research & Development
SOM	Scheme of Mining
SEIAA	State Environmental Impact Assessment Authority
SEAC	State Expert Appraisal Committee
TWAD	TamilNadu Water Supply and Drainage Board
TDS	Total Dissolved Solids
TNPCB	Tamil Nadu Pollution Control Board
TNSEAC	Tamil Nadu State Expert Appsaisal Committee
TOR	Terms of Reference
TANGEDCO	Tamil Nadu Generation and Distribution Corporation

EXECUTIVE SUMMARY

1. PROJECT DESCRIPTION

The Veeriyapalayam Multi Colour granite Quarry is over an extent of 2.30.0Ha. The project falls under Schedule 1(a) Mining of Minor Minerals, B2 category as per EIA Notification 2006 and its Amendments thereafter and the proposed project is termed under Schedule 1(a) Mining of Minor Minerals, B1 category, as per the O.M issued vide F.No. L-11011/175/2018-IA-II (M), dated: 12.12.2018 considering the cluster mines area more than 5.00 Ha.

The Additional Chief Secretary, Chennai had issued the precise area communication letter to produce the approved Mining Plan vide **Lr.No.13192/MMB.2/2017-1**, dated 25.01.2018. The Environmental Clearance has obtained from the District Level Environment Impact Assessment Authority, Karur District vide letter **No.DEIAA-DIA/TN/MIN/13050/2018-KRR EC.No.95/2018/Mines,** Dated:06.02.2018.

The quarry lease was granted vide **G.O. (3D) No.7**, Industries (MMB.2) department dated: 21.02.2018 for a period of 20 years. The quarry lease deed was executed on 20.03.2018 and the lease period is valid up to 19.03.2038. The quarry operation was commenced after the execution of lease deed, i.e.17.04.2018. After commencement of quarry operation, there was huge demand for this multi colour granite dimensional stone in the international market and construction industry. Hence, the proponent has proposed to enhance the production and a Modified Mining Plan was prepared on 18.09.2018 and submitted to the Department of Geology and Mining, Guindy, Chennai. The same was approved by the Director, Department of Geology and Mining, Guindy, Chennai vide **Letter No. 373/MM2/2011** dated: 08.10.2018 (Production schedule for the period of five years (2018-19 to 2022-23). Subsequently the proponent has obtained Environmental Clearance from the District Level Environment Impact Assessment Authority, Karur district vide letter No **DEIAA-DIA/TN/MIN/18428/2018-KRR Ec.No.131/2018/Mines,** Dated: 02.11.2018. As per the MoEF & CC Office Memorandum F.No.IA3 - 22/11/2023- IA.III(E-208230), Dated:28.04.2023, the EC obtained from DEIAA is cancelled. ToR application submitted to TN SEIAA vide online proposal No. **SIA/TN/MIN/4 30716/2023**, dated: **25.05.2023**, Hardcopy submitted vide File No.10272/2023, The proposed production capacity of the quarry was **1,24,703 m³** of Colour granite for the period of five years, for the depth of 39.5m (2m top soil+1.5m weathered rock+36m Multi colour granite) from below ground level as per the approved mining plan.

The proposal was appraised during 409th SEAC meeting held on 21.09.2023 and 676th SEIAA meeting held on 128.11.2023 and ToR was issued vide **Letter No. SEIAA-TN/F.No.10272/SEAC/ToR-1621/2023, dated: 28.11.2023**.

Table-1 Salient Features of the Project Site

Survey No.	12/1A, 12/1B, 12/1C, 12/1D, 12/1E, 12/2A, 12/2B, 12/2C, 12/3A, 12/3B, 12/3C, 12/3D, 12/3E, 12/4A, 12/4B and 12/5A
Village	Veeriyapalayam
Taluk and District	Krishnarayapuram Taluk , Karur District
State	Tamil Nadu
Toposheet No.	C44G1&5
Latitude	10°52'40.64"N to 10°52'47.86"N
Longitude	78°16'58.79"E to 78°17'04.43"E
Extent Area	2.30.0 Ha
Lease Period	20 years
Estimated Geological Reserves (ROM) m^3	Colour Granite-7,38,502m^3
Estimated Mineable Reserves (ROM)	Colour Granite-1,87,835m^3
Colour Granite production	Colour Granite-1,24,703m^3
Depth of Mining	39.5m below ground level
Method of Mining	Open cast semi mechanized method
Nearest Roads	➢ MDR-625 (Mahadhanapuram-Mylampatti) ~0.17km, W ➢ SH-199 (Vaiyampatti-Karur road) ~ 10.41km, WSW ➢ NH-81 (Coimbatore-Karur-Chidambaram)~ 8.27km, N
Nearest Railway station	➢ Railway Station - Mahadhanapuram Railway Station ~ 8.31km, N ➢ Railway Track - (Sithalavai RS- Mahadhanapuram RS) ~ 8.31km, N
Nearest Airport	➢ Tiruchirappalli International Airport ~47.40km, ESE
Nearest Town / City	Tiruchirappalli ~ 38km, ESE Thottiyam~13km, NNE
Water Requirement	1.8 KLD
Source of Water	Approved water vendors
Power Requirement	125kVA
Fuel Requirements	1,99,520 liters
Approved Quantity as per EC	51,712 Cbm
Permit Issued Quantity	5,360.757 Cbm
Balance Quantity	46,351.243 Cbm

Table-2 Cluster Details within 500m Radius

S.No	Name of the lessee	Area (Ha)	S.F.No	Lease Peeriod
1.	Mr. Deivendran (Current Proposal)	2.30.0	12/1A, 12/1B, 12/1C, 12/1D, 12/1E,12/2A, 12/3A, 12/3B, 12/3C,12/3D, 12/3E, 12/4A, 12/4/B, 12/5A	20.03.2023 to 19.03.2028
2.	Mr. Deivendran	2.86.5	11/3F, 12/4C, 12/5B, 12/5C, 12/5D and 12/5E	06.03.2023 to 05.04.2043

2. PROJECT PROCESS DESCRIPTION

2.1. Method of Quarrying

An open cast quarrying by semi-mechanized method will be adopted to operate the quarry. Annual Peak production will be Colour Granite-25,596m^3. 2 No. of Excavator having 300LC capacity Tata Hitachi will be used for excavation and 1 nos of 20 tones capacity Tata Tippers will be used during loading.

Conceptual Quarry Plan

Colour Granite

The Geological reserves of Colour granite have been computed based on the Geological Plan & Sections up to the economically workable average depth of 39.5m from the surface level and the top surface of the granite body works out to 7,38,502 m^3. By applying 40% recovery the effective Geological reserves works out 2,95,402m^3.

Mineable Reserves have been computed as 1,87,835 m^3 after leaving the reserves locked up in safety barrier and benches based on the Conceptual Plan and sections, the effective(Saleable) Mineable Reserves have been worked out as 75,134 m^3 by applying the recovery factor 40%. The annual peak production per year would be

25,596 m^3 of ROM of saleable and 10,238m^3 of ROM during the first five year of Mining plan period at the rate of 40% recovery.

Table-3 Proposed and Achieved Production Details (2018 – 2023)

Proposed						
Year	**ROM**	**Production 40% (m^3)**	**Granite waste**	**Top soil (m^3)**	**Weathered rock (m^3)**	**Period**
20.03.2018-17.09.2018	11,655	4,662	6,993	Nil	Nil	**Approved Mining plan**
Total	**11,655**	**4,662**	**6,993**	**Nil**	**Nil**	
20.09.2018 - 19.03.2019	16,417	6,567	9,850	2,838	1,800	**Approved Modified Mining Plan**
2019-20	26,772	10,138	16,634	Nil	Nil	
2020-21	27,450	10,980	16,470	5,978	3,935	
2021-22	32,094	12,838	19,256	5,246	3,935	
2022-23	27,972	11,189	16,783	5,124	3,843	
Total	**1,30,705**	**51,711**	**78,994**	**19,186**	**13,513**	
Grand Total	**1,42,360**	**56,373**	**85,987**	**19,186**	**13,513**	-

Achieved							
Previous lease period (Tmt.S. Shanthi excavation (Overburden+Mineral	**ROM (m^3) (a)**	**Production and dispatch (m^3)**	**Recovery (%)**	**Granite waste (m^3)**	**Gravel (m^3) (b)**		**Total excavated Volume (m^3) (a+b)**
	13,385	13,385	100	nil	10,140		23,525
Year (Present lease)	**Granite**				**Over Burden**		**Total excavate d volume (a+b+c) (m^3)**
	ROM in m^3 (a)	**Production and dispatch (m^3)**	**Recovery (%)**	**Granite waste (m^3)**	**Top soil (m^3)**	**W.Rock**	
2018-19	25,563	4225.223	16.5	21,337.77	1,480	1,840	28,883
2019-20	4,261	945.784	22.2	3,315.216	934	519	5,714
2020-21	687	153.797	22.4	533.203	1,190	753	2,630
2021-22	86	20.451	23.8	65.549	1,650	688	2,424
2022-23	-	-	-	-	1,136	978	2,114
Total	**30,597**	**5,345.255**	-	**25,251.745**	**6,390**	**4,778**	**41,765**
Grand Total							**65,290**

Table-4 Year wise production and development details (2023-2028)

Year	Section	Bench	Length (m)	width (m)	Depth (m)	ROM in m^3	Recovery 40% (m^3)	Granite waste 60% (m^3)	Weathered rock (m^3)	Top soil (m^3)
I	XIYI–CD		40	14	3	1,680	672	1,008	-	-
		iii	40	57	1.5	3,420	1,368	2,052	-	-
		iv	37	53	6	11,766	4,706	7,060	-	-
		v	25	41	6	6,150	2,460	3,690	-	-
		vi	13	28	6	2,184	874	1,310	-	-
		Total				**25,200**	**10,080**	**15,120**	**-**	**-**
II	XIYI–CD	ii	44	14	0.5	308	123	185	**-**	**-**
		iii	27	14	1.5	567	227	340	**-**	**-**
			40	14	4.5	2,520	1,008	1,512	**-**	**-**
		iv	37	16	6	3,552	1,421	2,131	**-**	**-**
		V	25	22	6	3,300	1,320	1,980	**-**	**-**
		vi	13	29	6	2,262	905	1,357	**-**	**-**
	XY–CD	i	14	20	3.5	-	-	-	**-**	**-**
		ii	17	26	4	-	-	-	**1,768**	**980**
		iii	42	22	6	5,544	2,218	3,326	**-**	**-**
		iv	42	12	6	3,024	1,210	1,814	**-**	**-**
		v	42	7	6	1,764	706	1,058	**-**	**-**
		Total				**22,841**	**9,136**	**13,705**	**1,768**	**980**
III	XY–CD	i	73	40	3.5	-	-	-	-	10,220
		ii	63	29	4	-	-	-	7,308	-
		iii	59	26	6	9,204	3,682	5,522	-	-
		iv	45	30	6	8,100	3,240	4,860	-	-
		v	33	25	6	4,950	1,980	2,970	-	-
		vi	21	26	6	3,276	1,310	1,966	-	-
		Total				**25,530**	**10,212**	**15,318**	**7,308**	**10,220**
IV	XY–CD	i	73	46	3.5	-	-	-	-	11,753
		iii	63	52	4	-	-	-	13,104	-
		iv	59	27	6	9,558	3,823	5,735	-	-
		v	45	27	6	7,290	2,916	4,374	-	-
		vi	33	27	6	5,346	2,138	3,208	-	-
		vii	21	27	6	3,402	1,361	2,041	-	-
		Total				**25,596**	**10,238**	**15,358**	**13,104**	**11,753**
V	XY–AB	i	15	31	3.5	-	-	-	-	1,628
		ii	5	10	4	-	-	-	200	-
	XY–CD	iii	59	28	6	9,912	3,965	5,947	-	-
		iv	45	28	6	7,560	3,024	4,536	-	-

		v	33	28	6	5,544	2,218	3,326	-	-
		vi	21	20	6	2,520	1,008	1,512	-	-
		Total				**25,536**	**10,215**	**15,321**	**200**	**1,628**
Grand Total						**1,24,703**	**49,882**	**74,821**	**22,380**	**24,581**

Total Proposed ROM : 1,24,703 m^3

Total Recoverable Reserves @ 40% : 49,882 m^3

Granite waste @60% : 74,821 m^3

Weathered rock (WR) : 22,380 m^3

Total waste (Granite waste+WR) : 97,201 m^3

Top soil : 24,581 m^3

Granite waste ratio : 1:1.95

Land Use Pattern

Land Use Pattern of the Mining lease area is given in below table

Table-5 Land Use Pattern

S. No	Description	Present Area (Ha.)	Area in use during the quarrying period (Ha.)	Area at end of the life of Quarry(ha)
1.	Area under quarry	0.71.32	0.74.11	1.86.70
2.	Waste dump	0.34.00	0.20.80	Nil
3.	Roads	0.02.00	0.01.00	0.03.00
4.	Green Belt	0.03.00	0.14.26	0.38.50
5.	Stocking blocks	1.19.68	0.09.51	0.01.80
	Total	**2.30.00**	**1.19.68**	**2.30.00**

3. IMPACTS AND MITIGATION MEASURES

Impacts due to Mining Activity:

Various environmental impacts, which have been identified due to the mining operations proposed project, are discussed in the following sections. The environmental parameters most commonly affected by mining activities are:

3.1. Soil Environment

3.1.1. Impacts

Potential impacts on land environment are envisaged due to hazardous and non-hazardous wastes generated due to various operations in the project site like municipal waste from domestic use and waste diesel oil from quarry machineries.

3.1.2. Mitigation Measures

Good housekeeping and best practices of waste handling shall be adopted to eliminate/minimize the risks of soil contamination. The wastes generated will be stored in temporary storage facility and transferred to nearby municipal disposal bins. Waste oil generated from quarry machineries and the same is disposed through TNPCB Authorized dealers.

3.2. Land Environment:

3.2.1. Land Degradation

The impact on land will be due to the following aspects:

- Land degradation due to disposal of large volume of waste materials.
- Creation of infrastructural facilities like office, rest shelter, first-aid centre and other service facilities.

3.2.2. Mitigation Measures

- Dust suppression using water sprinklers.
- Contour overburden dump to minimize erosion.
- Greenbelt around infrastructures within the mine lease area and along the road by using native plants.

3.3. Air Environment:

3.3.1. Impacts on Air Environment

The major air pollution sources from the mining operations are DG sets, mining activities like drilling, blasting and transportation. The DG sets are provided with stacks of adequate height to disperse the emanating flue gases containing suspended particulate matter, oxides of Sulphur and nitrogen without affecting the ground level concentrations. The emissions mainly generated from the mining activities are Blasting, Drilling, Excavation, Loading, Unloading, and transportation etc. Machinery like compressors and jack ham mers are used for Drilling. The sources of air emission are detailed below in **Table 6**.

Table-6 Sources of air pollution at quarry

S. No	Source of emission	Pollutant
1.	Excavation of Granite	PM
2.	Operation of diesel driven equipment	Gaseous emission
3.	Transportation of product	PM

3.3.2. Mitigation measures

- Use of dust aprons on drilling equipment and adopting wet drilling methods.
- Delay blasting under unfavourable wind and atmospheric conditions
- The production of blast fumes containing noxious gases will be redused by the following methods:
- Use of adequate booster/primer.
- Proper stemming of the blast hole.
- Development of greenbelt.

Table-7 Dust control measures in quarry

S. No	Operation or source	Control options
1	Drilling	➢ Liquid injection (water or water plus a wetting agent) ➢ Capturing and venting emissions to a control device. ➢ Drills should be provided with dust extractors (dry or wet system).
2	Blasting	➢ Water spray before blasting ➢ Water spray on blasted material prior to transportation ➢ Use of control blasting technique
3	Loading	Water spray
4	Hauling (emissions from roads)	Water spray, treatment with surface agents, soil stabilization, paving, traffic control.
5	Transportation of mined material	➢ Covering of the trucks/dumpers to avoid spillage ➢ Compacted haul road ➢ Speed control on vehicles ➢ Development of a green belt of suitable width on both sides of road, which acts as wind break and traps fugitive dust

3.3.3. Air Quality Modelling:

Total maximum GLCs from emissions as given below:

Table -8 Total maximum GLCs from emissions

S.No	Pollutant	Max. Base Line Conc. (µg/m^3)	Estimated Incremental Conc. (µg/m^3)	Total Conc. (µg/m^3)	NAAQ standard
1.	PM_{10}	63.76	4.71	68.47	100
2.	$PM_{2.5}$	39.53	2.82	42.35	60
3.	SO_2	12.9	0.85	13.75	80
4.	NO_X	25.8	1.46	27.26	80

The maximum ground level concentration observed due to mining activities and traffic movement through Air Modelling for PM_{10}, $PM_{2.5}$, SO_2 and NO_x are 68.47µg/m³, 42.35µg/m³, 13.75µg/m³ and 27.26µg/m³ respectively.

3.4. Impacts due to Transportation

The Granite is transported to consumer directly as per buyer's requirement t. The granite will be transported through existing road by tippers and approx. no. of trips required is 2 times per week. This minimum trip does not create impact on existing transportation. The vehicular movement for the proposed project is given in **Table-9**

Table-9 Traffic Volume after Implementation of the Project

For the Road	Volume of Traffic	Volume (V)	Road Capacity (C)	V/C Ratio	LOS Category*	Traffic Classification
Existing	538	1022	6000	0.17	"A"	Free Flow
After implementation	540	1027	6000	0.17	"A"	Free Flow

*LOS (Level of Service) categories are A-Free Flow, B- Reasonably Free Flow, C-Stable Flow, D-Approaching unstable flow, E- Unstable flow, F- Forced or breakdown flow Due to propose project there will be slight increment in the vehicle movement but the level of service (LOS) anticipated will be Free Flow.

3.4.1. Mitigation Measures

- Regular water sprinkling on haul and access roads.
- Greenbelt development along the haul roads, dumps and along the boundaries of the lease area.
- Utmost care will be taken to prevent spillage of sand and stone from the trucks.

3.5. Wastewater Generation

There is no effluent generation. The domestic sewage of 0.4 KLD will be disposed through septic tank followed by soak pit.

3.5.1. Mitigation Measures

3.5.1.1. Surface Water Pollution Control Measures

- Construction of garland drains of suitable size around mine area and dumps to prevent rain water descent into active mine areas.

- During monsoon season, the rain water will be collected by natural slope of area to water fed tank of the mine and it will be utilized for dust suppression and greenbelt development.
- The dump tops will be provided with inner slopes to control water flow to prevent erosion washouts. The dumps tops and slopes of in active areas will be covered with grasses, shrubs, mulching, etc, to prevent erosion, till final backfilling of dumps into mined out areas.

3.5.1.2. Ground Water Pollution Control Measures

- The domestic sewage from the toilets will be routed to septic tanks.
- Regular monitoring of water levels and quality in the existing open wells and bore well in the vicinity will be carried out.

3.5.1.3. Rain Water Harvesting

The rainwater will be diverted by garland drains to the sump area within the mine lease. The stored water will be used for agriculture activities.

3.5.1.4. Mitigation Measures

- Construct barriers at suitable intervals along the path of the drains.
- Provide necessary overflow arrangement to maintain the natural drainage system.

3.6. Impact of Noise / Vibrations & Mitigation Measures

3.6.1. Impact of Noise

The main sources of noise in the mine are as follows:

- Transportation vehicles
- Loading & unloading of minerals
- Drilling
- Blasting

3.6.1.1. Noise due to Drilling, Excavation and Transportation

The noise levels in the working environment will be maintained within the standards prescribed by Occupational Safety and Health Administration (OSHA). These standards were established with the emphasis on reducing the hearing loss. The permissible limits, as laid down by OSHA, are presented in **Table 10**

Table -10 Permissible Exposure in Cases of Continuous Noise (OSHA, Govt. of India)

S. No	Sound Level (dB A)	Continuous Duration (Hours)
1	85	8
2	88	4
3	91	2
4	94	1
5	97	0.5
6	100	0.25

3.6.1.2. Noise Due to Blasting

Blasting activities are involved in this Quarry as green belt will be developed around the mine which restricts the propagation of noise. The main source of noise in quarrying is due to usage of machinery like excavators, mining tippers and compressors and diesel generators.

3.6.2. Mitigate Measures

Following mitigation measures should be taken to control noise pollution:

- Wherever the noise levels exceed 85 dB (A), workers should be provided with earmuffs, ear plugs etc.
- All vehicles and machinery will be properly lubricated and maintained regularly.
- Speed of the Vehicles entering and leaving the quarrying lease will be limited to 25 kmph.
- Unnecessary use of horns by the drivers of the vehicles shall be avoided.
- Controlled blasting with proper spacing, burden and stemming will be maintained
- No secondary blasting.
- Minimum quantity of detonating fuse will be consumed by using alternatively Excel non-electrical initiation system.
- The blasting will be carried out during favourable atmospheric condition and less human activity timings.

3.7. Impact of Vibration

Blasting activities are involved in Granite Quarry operations. The vibration during the moment of machinery will be minimal for a short span that will be well within the prescribed limits. Proposed Peripheral green belt will be developed in 7.5m safety zone around the quarry. This will mitigate the Vibration.

3.7.1. Mitigation Measures

- Proper quantity of explosive, suitable stemming materials and appropriate delay system are to be adopted for safe blasting.
- Safe blasting zones are kept around the periphery of the quarry.

- Overcharging will be avoided. The charge per delay will be minimized and pref erably more number of delays will be used per blasts.

3.8. Impact on Human Settlement

There are no monuments or places of worships in mine area. Ground vibration and noise pollution is maintained minimal and confined to the mine area. The quality of water both surface and ground water is good and all parameters of drinking water are as per IS standards. Water quality analysis will be carried out at periodical intervals during post project monitoring.

The PM, NOx and SO2 have been observed to be below the prescribed limit. Noise levels have also been found to be below the permissible limits at all the locations.

3.8.1. Mitigation Measures

- The noise generated in the lease area will get attenuated due to plantation all around the lease area.
- As preventive measures, greenbelt development around the mine lease area will be further strengthening for control of air emission to environment.
- All the employees will be periodically medically examined.

3.9. Biological Environment

3.9.1. Mining activities and their impact on biodiversity

Table -11 Impacts on Biodiversity

S. No	Activity	Examples of aspects	Examples of biodiversity impact
1	Extraction	Land clearing	Loss of habitat, introduction of plant diseases, Siltation of water courses
2	Blasting, Digging and hauling	Dust, noise ,vibration, water pollution	Disruption of water courses ,impacts on aquatic ecosystems due to changes in hydrology and water quality
3	Waste dumping	Clearing, water and soil pollution	Loss of habitat, soil and water contamination, sedimentation.
4	Air emissions	Air pollution	Loss of habitat or species
5	Waste disposal	Oil and water pollution	Encouragement of pests, disease transfer, contamination of groundwater and soil
6	Access roads	Land clearing	Habitat loss or fragmentation, water logging upslope and drainage shadows down slope
7	Water supply (potable or industrial)	Water abstraction or mine dewatering	Loss or changes in habitat or species composition

3.9.2. Mitigate Measures

To reduce the adverse effects on flora/fauna status that are found in project area due to deposition of dust generating from mining operations, water sprinkling and water spraying systems will be ensured in all dust prone areas to arrest dust generation.

3.10. Impacts on Occupational Health due to project operations

Anticipated occupational illness sequel to mining activities involved in the project. Occupational health problems due to dust & noise and Occupational illness by quarry activities are as follows;

- Dust related pneumonia
- Tuberculosis
- Rheumatic arthritis
- Segmental vibration

3.10.1. Mitigate Measures for Occupational Health

- Adoption of dust suppression measures like spraying water, use of drill with dust collection system or wet drills etc.
- Plantation
- Avoid blasting during unfavorable wind & atmospheric conditions.
- Use of personal protective equipment. Compliance with DGMS circulars.
- Emergency response plan that includes installation of emergency response equipment to combat events such as fire.

Table-12 Mitigation for occupational health and safety

S.No	Activity	Mitigation measures
1	Excavation	➢ Planned excavation, avoid haphazard mining
2	Drilling and blasting	➢ In addition, the operators and other workers should be provided with masks, helmets, gloves and earplugs.
3	Safety zone	➢ Provisions for a buffer zone between the local habitation and the mine lease in the form of a green belt of suitable width. ➢ Restricted entry, use of sirens and cordoning of the lasting area are some of the good practices to avoid accidents.
4	Overburden stabilization	➢ Accidents are known to happen due to overburden collapse. ➢ Therefore, slope stabilization and dump stability are critical issues for safety and environment. Proper measures will be taken care.

5	Worker"s health surveillance	➢ Health survey programmers for workers and local community. ➢ Regular training and awareness of employees to be conducted to meet health and safety objectives.

3.11. Mitigate Measures for Safety Aspects

- To reduce pollution emanation from quarry operations, carry out splitting of sheet rock by diamond wire saw which largely reduces the dust and noise generation.
- Water sprinkling on haul roads and dumping yards, etc.
- Green belt creation wherever possible to arrest dust and reduce noise propagation.
- All staff and workers will be provided with PPE to guard against excess noise levels
- Provision of safety Helmets, goggles, safety boots, ear muffs, gas masks, etc.
- To provide appropriate instruction, training, retraining, vocational training, etc.
- Organization of safety contests and safety campaigns regularly to update knowledge of safe operational procedures, etc.
- Observation and compliance of all precautions, control measures and stipulations on above lines will ensure that in this project, health and safety problems will be minimal.

4. PROJECT COST & ESTIMATED TIME OF COMPLETION

4.1. Project Cost

The estimated project cost is given below

Table-13 Project Cost

S.No	Description of the Cost	Amount in Rs.
A. Operational Cost		
1.	Land Cost S.F.Nos.12/1A to 12/3E and 12/5A=2.13.0HaxRs.1,91,000/Ha=4,06,830/- S.F.Nos.12/4A to 12/4B=0.17.0HaxRs.2,12,500/Ha=36,125/-	4,43,000
2.	Labourers shed (already constructed)	2,00,000
3.	Sanitary facilities	75,000
4.	First aid room and Accessories & safety kits	50,000
5.	Excavator (2nos)	35,00,000
6.	Crawler crane (1 no)	15,00,000
7.	Diesel generator (1 no)	7,50,000
8.	Tipper (1 no)	12,00,000
9.	Diamond wire saw (2 nos)	6,00,000
10.	Compressor with loose tools (2 nos) & jack hammer (4 nos)	12,00,000
11.	Wagon drill (2 nos)	8,00,000
12.	Drinking water facility & water sprinkling	1,00,000
13.	Fencing cost (700m lengthxRs.300/- per meter)	2,10,000
14.	Garland Maintenance	1,00,000
15.	Greenbelt development under safety zone during this scheme period (200m saplimgxRs.200/-per saplimg)	40,000
	Total	**1,07,68,000**
B. EMP Cost		
1.	Air Environment	9,03,000
2.	Noise	50,000
3.	Water Environement	23,000
4.	Waste Management	1,10,000
5.	Implementation of EC, Mining Plan & DGMS Condition	16,44,000
6.	Greenbelt	2,50,000
	Total	**29,80,000**
	Total Project Cost	**1,37,48,000**

4.2. Proposed schedule for approval and implementation

The time schedule for the completion of the proposed mining project is given in the below as,

Table-14 Project schedule

Particulars	Time Schedule
Submission of Draft EIA/EMP for PH	May 2024
Conduction of Public Hearing and submitting final EIA/EMP	July 2024
Presentation before SEAC and Obtaining EC	August 2024

The project will be implemented after Obtaining EC from SEIAA and CTO from PCB.

5. MINING CLOSURE PLAN

5.1. Progressive Mine Closure Plan

The various schedules for mining activities regarding mining of granite block, waste disposal, proposed land use pattern, environmental preservation measures, disaster management plan, etc. have been fully covered in the EIA/EMP report. Pit boundaries shall be safely fenced and used for agriculture purpose then the pit is filled with underground seepage or rain water. Afforestation and green belt development will be maintained in all the boundaries, till the trees attained the stabilized level.

6. REHABILITATION AND RESETTLEMENT

There will be no Rehabilitation and Resettlement in this proposed project.

7. SITE ANALYSIS

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 are given below.

7.1 Environmental Sensitive areas

The environmental sensitive areas covering an aerial distance of 15 km from the project boundary is given in below table.

Table-15 List of Water Bodies

S.No	Water bodies	Distance (~km)	Direction
1	Pond near Project Site	0.19	W
2	Pungar R	3.28	SE
3	Kovakkulam Lake	4.35	NNW
4	Stream near Vadavambadi	5.37	SSW
5	Panjappatti Lake	5.43	S
6	Kattalai High Level Canal	5.87	NNE
7	Vayalur Lake	6.50	ESE

8	Mayanur Barrage Right Canal	8.33	N
9	Kaveri/Cauvery R	8.87	NNE
10	North Bank Canal	10.03	N
11	Mullippadi Canal	10.44	N
12	Odaiyappatti Lake	10.54	SSW
13	Kattuvari Canal	10.81	NE
14	Karaipottanur R	10.94	NNW
15	Irumbudippatti Lake	11.81	ESE
16	Virarakkiyam Lake	12.72	WNW
17	Kattaputtur Channel	13.46	NW
18	Amaravati R	14.08	NW
19	Karunamkulam	14.13	SW
20	Nerur Channel	14.61	NW

Table-16 List of Monuments

S.No	Monuments	Distance (~km)	Direction
1	Kundankal Jain Monument	11.57	E
2	Sirnivasanallur Koranganatha Temple	13.38	NE

Table-17 List of Reserved Forest

S.No	Reserved Forest	Distance (~km)	Direction
1	Mahadanapuram RF	8.46	NNE
2	Sittalavay RF	8.55	N
3	Lalappettai RF	8.58	NNE
4	Mayanur RF	9.87	NW
5	Nattam RF	10.42	N
6	RF near Sippalaputtur	11.06	NNW
7	RF near Mel Vadiyam	14.03	NE
8	RF near Kattalai	14.18	NW
9	Manattattai RF	14.75	NE

Table-18 List of Villages/Settlements

S.No	Villages	Distance (km)	Direction	Population
1	Kaikaluviyur	0.14	NNW	120
2	Uthuppatti	0.41	ENE	100
3	Ellammankovilpatti	0.80	WNW	250
4	Lakshmanapatti	0.89	N	1,000
5	Bommakkavundanur	1.23	WSW	100

8. BASELINE STUDY

8.1. Study Period

The baseline environmental surveys were carried out during March 2023-May 2023 with in the study area

8.2. Ambient Air Quality

Table-19 Summary of Ambient Air Quality Monitoring

S.No	Parameters	Minimum of Average	Maximum of Average	NAAQ Standards
1	PM10 (µg/m³)	44.93	53.65	100
2	PM2.5 (µg/m³)	24.27	33.27	60
3	SO2 (µg/m³)	8.43	10.86	80
4	NO2 (µg/m³)	16.86	21.71	80

The ambient air quality has been monitored at 8 locations for 13 parameters as per NAAQS, 2009 within the study area.

8.3. Noise Environment

Ambient noise levels were monitored using precision noise level meter in and around the project site at 10 km radius at 8 locations during study period.

- In Industrial areas day time noise levels was about 63.8 dB (A) and 42.6 dB (A) during night time, which is within prescribed limit by CPCB (75 dB(A) Day time & 70 dB(A) Night time).
- In residential areas day time noise levels varied from 50.6 dB (A) to 54.1 dB (A) and night time noise levels varied from 40.2 dB (A) to 43.7 dB(A) across the sampling stations. The field observations during the study period indicate that the ambient noise level is within the prescribed limit by CPCB (55 dB (A) Day time & 45 dB (A) Night time).

8.4. Water Quality

The prevailing status of water quality at 8 locations for surface water and 8 locations for ground water have been assessed during the study period. The standard methods prescribed in IS were followed for sample collection, preservation and analysis in the laboratory for various physiochemical parameters.

8.4.1 Surface water quality

Table -20 Summary of Surface Water Quality Monitoring

S.No	Parameters	Minimum	Maximum	IS 2296:1992 Standards
1	pH	7.21	7.81	6.5 – 8.5
2	TDS (mg/l)	388	418	500
3	COD (mg/l)	14.8	33	-
4	BOD (mg/l)	6.3	7.3	2
5	Total Hardness	175	211	-

8.4.2 Ground Water Quality

Table-21 Summary of Ground Water Quality Monitoring

S.No	Parameters	Minimum	Maximum	IS 10500: 2012 Standards	
				Acceptable Limit	Permissible Limit
1	pH	7.31	7.66	6.5 – 8.5	NR
2	Total Hardness (mg/l)	151	257	200	600

It is observed that all the collected ground water samples meets the drinking water standards (IS 10500:2012) and can be used for drinking.

8.5. Soil Quality

Assessment of soil characteristics is of paramount importance since the vegetation growth, agricultural practices and production is directly related to the soil fertility and quality. Soil sampling was carried out at 8 locations in the study area. The summary of the Soil quality is given below.

Table-22 Summary of Soil Quality Monitoring

S.No	Parameters	Minimum	Maximum
1	pH	4.51	5.54
2	Electrical conductivity (µmhos/cm)	101	197
3	Nitrogen (mg/kg)	103.58	134.57
4	Phosphorus (mg/kg)	6.94	9.01
5	Potassium (mg/kg)	107.28	139.38

9. WASTE HANDLING

9.1. Solid Waste Management

The municipal solid waste generation and management details are given in **Table-23**.

Table-23 Municipal Solid Waste generation & Management

S.No	Type	Quantity Kg/Day	Disposal Method
1	Organic	9.45	Municipal Bin
2	Inorganic	6.30	TNPCB authorized recyclers
	Total	**15.75**	

As per CPHEEO guidelines: MSW per capita/day =0.45

9.2. Hazardous waste Management

The type of hazardous waste and the quantity generated are given in **Table-24**

Table-24 Hazardous Waste Management

Waste Category No	Description	Quantity (L/Year)	Mode of Disposal
5.1	Waste Oil	3.0	Will be Collected in leak proof containers and disposed to TNPCB Authorized Agencies for reprocessing/Recycling

10. POST PROJECT MONITORING

10.1. Post Project Environmental Monitoring

The Project proponent set up regular monitoring stations to assess the quality of the environment.

Table-25 Post Project Environmental Monitoring Program

S. No	Area of Monitoring	Number of Sampling Stations	Frequency of Sampling	Parameters to be Analyzed
1	Meteorology	One	Hourly and Daily basis	Wind speed and direction, Temperature, Relative Humidity, Atmospheric pressure, Rainfall.
2	Ambient Air Quality	2 Stations (One in upwind and one in downwind)	Twice a week:24 hourly period	PM10, PM2.5, SO2, and NO2

3	Noise	2 (two within core area and two in buffer area)	Once every season	Ambient Equivalent continuous Sound Pressure Levels (Leq) at day and Night time.
4	Exhaust from DG set	Stack of DG set	Quarterly	PM10, PM2.5, SO2 & CO
5	Vehicular Emissions	Parking area	Periodic monitoring of vehicles	Air emission and noise, PCU
6	Soil	Two Locations within the Project Site	Yearly Once	Physico chemical properties,Nutrients, Heavy metals
7	Terrestrial Ecology	Within 10km, around the project	Once in three years	Symptoms of injuries on plants
8	Surface/ Ground water quality	Two Locations Within Project Site	Yearly Once	As per ISO 10500 2012 & IS 2296 - 1992 Standard parameters

11. CONCLUSION

The proposed **"Veeriyapalayam Multi Colour Granite Quarry"** will be beneficial for the development of the nearby villages. Some environmental aspects like dust emission, noise, siltation due to surface run-off, etc. will have to be controlled within the permissible limit to avoid impacts on the surrounding environment. Necessary pollution control equipment like water sprinkling, plantation, personal protective equipments, etc., will form regular practice in the project. Additional pollution control measures and environmental conservation measures will be adopted to control/minimize impacts on the environment and socio-economic environment of the area. Measures like development of green belt and plantation along with transport road will be implemented. The CER measures proposed to be adopted by the quarry management will improve the social, economic status of the nearby village.

1 INTRODUCTION

1.1 Purpose of the report

The Veeriyapalayam Multi Colour granite Quarry is over an extent of 2.30.0Ha. The project falls under Schedule 1(a) Mining of Minor Minerals, B2 category as per EIA Notification 2006 and its Amendments thereafter and the proposed project is termed under Schedule 1(a) Mining of Minor Minerals, B1 category, as per the O.M issued vide F.No. L-11011/175/2018-IA-II (M), dated: 12.12.2018 considering the cluster mines area more than 5.00 Ha

ToR application submitted to TN SEIAA vide online proposal No. SIA/TN/MIN/430716/2023, dated: 25.05.2023 , Hardcopy submitted vide File No.10272/2023, The proposed Production Capacity of the quarry was 1,24,703 m^3 of multi colour granite for the period of five years, for the depth of 39.5m (2m top soil+1.5m weathered rock+36m Multi colour granite) from below ground level as per the approved mining plan.

The proposal was appraised during 409th SEAC meeting held on 21.09.2023 and 676th SEIAA meeting held on 28.11.2023 and ToR was issued vide **Letter No. SEIAA-TN/F.No.10272/SEAC/ToR-1621/2023, dated: 28.11.2023**.

The Draft EIA/EMP report will be submitted for Public Hearing (PH). After completion of Public Hearing, the minutes raised was incorporated in the EIA report along with proponent action plan. Final EIA report has been submitted to TNSEAC for further appraisal of the project and obtaining Environmental Clearance.

1.2 Project back ground

The Additional Chief Secretary, Chennai had issued the precise area communication letter to produce the approved Mining Plan vide **Lr.No.13192/MMB.2/2017-1, dated 25.01.2018.** The precise area communication letter is enclosed as **Annexure-2**. The mining plan was approved by the Commissioner, Department of Geology and Mining, Guindy, Chennai vide letter No. 373/MM2/2011, dated 12.02.2018. As per direction issued in the precise area communication letter the proponent has obtained Environmental Clearence from the District Level Environment Impact Assessment Authority, Karur District for mining plan period vide letter No.DEIAA-DIA/TN/MIN/13050/2018-KRR EC.No.95/2018/Mines, Dated:06.02.2018.

The quarry lease was granted vide G.O. (3D) No.7, Industries (MMB.2) department dated: 21.02.2018 for a period of 20 years. The quarry lease deed was executed on 20.03.2018 and the lease period is

valid up to 19.03.2038. The quarry operation was commenced after the execution of lease deed, i.e.17.04.2018. After commencement of quarry operarion, there was huge demand for this multi colour granite dimensional stone in the international market and construction industry. Hence, the lessee has proposed to enhance the production and a Modified Mining Plan was prepared on 18.09.2018 and submitted to the Department of Geology and Mining, Guindy, Chennai. The same was approved by the Director, Department of Geology and Mining, Guindy, Chennai vide Letter No. 373/MM2/2011 dated: 08.10.2018 (Production schedule for the period of five years (2018-19 to 2022-23). Also the proponent has obtained Environmental Clearance from the Distrcit Level Environment Impact Assessment Authority, Karur district for modified mining plan period vide letter No DEIAA-DIA/TN/MIN/18428/2018-KRR Ec.No.131/2018/Mines, Dated: 02.11.2018. As per the MoEF & CC Office Memorandum F.No.IA3 -22/11/2023- IA.III(E-208230), Dated:28.04.2023, the EC obtained from DEIAA is cancelled.

The Modified mining plan period is valid up to 19.03.2023. Now, the first scheme of quarrying is prepared and submitted to obtain approval for the period of 20.03.2023 to 19.03.2028. The quarry is operated from 2018 to 2023 with proposed total RoM of 1,42,360m^3.

Subsequently, submitted the first scheme of Mining Plan for the subject area and the same was approved by Commissioner, Commissionerate of Geology and Mining, Guindy vide **Rc.No.521/MM2/2023, dated: 22.02.2023**. Mining plan approval letter is enclosed as **Annexure-3** and the approved Mining plan is enclosed as **Annexure-4.**

ToR application submitted to TN SEIAA vide online proposal No. SIA/TN/MIN/430716/2023, dated: 25.05.2023, Hardcopy submitted vide File No.10272/2023, The proposed Production Capacity of the quarry was 1,24,703 m^3 of Colour granite for the period of five years, for the depth of 39.5m (2m top soil+1.5m weathered rock+36m Multi colour granite) from below ground level as per the approved mining plan.

The proposal was appraised during 409th SEAC meeting held on 21.09.2023 and 676th SEIAA meeting held on 28.11.2023 and ToR was issued vide **Letter No. SEIAA-TN /F.No .10272 /SEAC /ToR-1621/2023, dated: 28.11.2023**. The issued ToR is attached as **Annexure-1.**

1.3 Identification of Project & Project Proponent

1.3.1 Project

The proposed Veeriyapalayam Multi Colour Granite Quarry over an extent of 2.30.0Ha, located in survey number 12/1A, 12/1B, 12/1C, 12/1D, 12/1E, 12/2A, 12/2B, 12/2C, 12/3A, 12/3B, 12/3C, 12/3D, 12/3E, 12/4A, 12/4B and 12/5A, Veeriyapalayam Village, Krishnarayapuram Taluk, Karur District, Tamil Nadu State, lies in the latitude of 10°52'40.64"N to 10°52'47.86"N and longitude of

78°16'58.79"E to 78°17'04.43"E. The area is marked in the survey of India Topo Sheet No. C44G1&5.

The Veeriyapalayam Multi Colour Granite quarry operation is proposed to be carried out by opencast semi mechanized method by formation of benches. Benches height and width of 6m with vertical slope will be followed. The area applied for quarry lease exhibits almost plain topography with an altitude of ~128m to 129m (max) MSL.

1.3.2 Project Proponent

Name of the applicant : Thiru.K.Deivendran,
Address : S/o. Karuthaiah Thevar,
Door No.4/143, Lake Area,
Uthangudi,
Madurai District
Pin code – 625 107
Phone No : 9952355554
Email ID : dvnmines@gmail.com

1.4 Land Acquisition Status

The entire mine area of 2.30.0 Ha is a patta land which is registered in the name of Thiru.M.Gandhi, S/o. Masana Thevar vides patta No.2044. Mr. Deivendran has obtained lease from the pattadar for grant of quarry lease for a period of 49 years from 09.12.2010 to 08.12.2059. The Patta document is enclosed as **Annexure–6** and Lease Deed enclosed as **Annexure-7**.

Table 1-1 Land Use Description

District and State	Taluk	Village	S.F. No	Area in (Ha)	Land Classification
Karur district, Tamil Nadu	Krishnarayapuram	Veeriyapalayam	S.F.No. 12/1A, 12/1B, 12/1C, 12/1D, 12/1E, 12/2A, 12/2B, 12/2C, 12/3A, 12/3B, 12/3C, 12/3D, 12/3E, 12/4A, 12/4B and 12/5A	2.30.0	Patta Land (Vide No:2044)

1.5 Brief Description of the Project

1.5.1 Nature of the Project

I. Thiru. Deivendran has obtained a lease in the Veeriyapalayam Multi Colour Granite Quarry over an extent of 2.30.0 Ha, and intends to quarry 1,24,703m^3 of Colour granite, 24,581 m^3 of Top soil for a depth of mining is 39.5m from BGL (2m top soil+1.5m weathered rock+36m Multi colour granite) for five years as per the ToR vide Letter No. SEIAA-

TN/F.No.10272/SEAC/ToR-1621/2023, dated: 28.11.2023, for survey numbers 12/1A, 12/1B, 12/1C, 12/1D, 12/1E, 12/2A, 12/2B, 12/2C, 12/3A, 12/3B, 12/3C, 12/3D, 12/3E, 12/4A, 12/4B and 12/5A, Veeriyapalayam Village, Krishnarayapuram Taluk, Karur District, Tamil Nadu State for 5 years. Accordingly, The Additional Chief Secretary of Chennai had issued the precise area communication letter to produce the approved Mining Plan within a period of 90 days as per Rule 8-C (3b) of Tamil Nadu Minor Mineral Concession Rules, 1959 vide Rc. No.33/2021(Mines) dated 22.10.2021.

II. The patta document is enclosed as **Annexure-6.**

III. The project falls under Schedule 1(a) mining of Minor Minerals 'B2' categories as per EIA Notification 2006 and its Amendments thereafter and as per the O.M issued vide F.No. L-11011/175/2018-IA-II (M), dated: 12.12.2018 considering the cluster the project is termed under Schedule 1(a) Mining of Minor Minerals 'B1' category.

1.5.2 Size of the Project

Veeriyapalayam Multi Colour Granite Quarry, over an extent of 2.30.0 Ha in survey number 12/1A, 12/1B, 12/1C, 12/1D, 12/1E, 12/2A, 12/2B, 12/2C, 12/3A, 12/3B, 12/3C, 12/3D, 12/3E, 12/4A, 12/4B and 12/5A, Veeriyapalayam Village, Krishnarayapuram Taluk, Karur District, Tamil Nadu State. The proposed production capacity is 1,24,703 m^3 of Colour granite for a period of 5 years as per the ToR issued.

Table 1-2 Colour Granite Reserves

S. No	Description	Colour Granite (m^3)
1.	Geological Resource	7,38,502
2.	Mineable Reserves	1,87,835
3.	Production Capacity	1,24,703

1.5.3 Location of the project

Veeriyapalayam Multi Colour Granite Quarry over an extent of 2.30.0Ha, located in survey number 12/1A, 12/1B, 12/1C, 12/1D, 12/1E, 12/2A, 12/2B, 12/2C, 12/3A, 12/3B, 12/3C, 12/3D, 12/3E, 12/4A, 12/4B and 12/5A, Veeriyapalayam Village, Krishnarayapuram Taluk, Karur District, Tamil Nadu State. The boundary co-ordinates of the mine lease area are tabulated in **Table 1.3.**

Table 1-3 Boundary Coordinates of the project

S. No	Latitude (N)	Longitude(E)
1	10°52'40.80"N	78°16'58.82"E
2	10°52'43.81"N	78°16'58.79"E
3	10°52'44.53"N	78°17'1.82"E
4	10°52'47.86"N	78°17'2.11"E
5	10°52'47.70"N	78°17'4.43"E
6	10°52'44.74"N	78°17'4.23"E

7	10°52'44.66"N	78°17'3.94"E
8	10°52'40.64"N	78°17'3.69"E
9	10°52'40.79"N	78°17'0.97"E

1.5.4 Need for the project and its importance to the country and or region

The Multi Colour Granite quarrying project falls in the area of Karur District, Tamil Nadu where scanty agricultural activities are been carried out and the new industries are springing up in the district and more specifically the area applied for quarry lease is devoid of any major industries and agricultural activities. The earning source in the targeted area is limited, most ofthe people in and around the area depend upon the seasonal agriculture and much of the people migrate to nearby towns where good and industries and factories are growing up.

This project will give employment opportunities to 35 members directly and 10 members will be get benefited indirectly, besides this Multi Colour Granite is well known in the international supermarket of Granite which will fetch a good foreign exchange to the nation.

Mineral Industries of the state of Tamil Nadu provides employment opportunities for the people of the state as well as in the specific project area.

1.5.4.1 Demand –Supply Gap

Multi Colour Granite is one among the most used Granite Dimensional Blocks for building and construction in the form of Rough block, Slabs, Tiles, fancy items and precession plates besides catering monument industries. The requirement of Multi Colour Granite due to its stability and color which always requires a huge demand of every house, Industries, Factories, Colleges, Hospitals and all major infrastructure industries. This specific Multi Colour Granite area has already achieved a considerable place in the domestic and international markets of Granites for the past three decades.

1.5.4.2 Imports Vs Indigenous

There is no import of Multi Colour Granite at present in India. India has good resource of Multi Colour Granite and has a great demand in the international super market of Granites. Indigenous Multi Colour Granite almost shares more than 30% requirement in the world.

1.5.4.3 Export possibility

The Multi Colour Granite approved for export market are shipped from Chennai Harbour to various countries and if required blocks may be shifted to Tuticorin Harbour which depend upon the exporter’s destination.

1.5.4.4 Domestic/export markets

There are many Granite processing industries inside the district and all-over Tamil Nadu. There is a huge demand of Multi Colour Granite for construction, Infrastructure and Housing Industries as these

Granite slabs are Eco friendly and has less maintenance besides giving an aesthetic appearance in the floor and walls.

India is a Global player in the supply of Multi Colour Granite to the international supermarket of Granite for the past three decades. At present there is a huge requirement of this Multi Colour Granite Blocks for the domestic construction industries depends upon the size. Clarity, Purity, Rarity the commercial aspects are decided, the applicant proposed to ensure that the Granite is quarried in a scientific and systematic way to attain the maximum recovery of Granite blocks from the area applied for lease. There is a considerable demand of Multi Colour Granite in domestic as well as for export.

1.6 EIA Study

As a part of compliance to the regulatory requirement i.e., to obtain Environmental Clearance from SEIAA, TN, has appointed Environmental Consultants accredited by National Accreditation Board for Education and Training (NABET)-Quality Council of India (QCI), New Delhi.

The work of undertaking field studies and preparation of EIA/EMP report under B1 category after obtained Terms of Reference from SEIAA-TN was assigned to M/s Hubert Enviro Care Systems (P) Ltd. (HECS) Chennai by the project proponent. HECS is accredited by NABET, vide possession of Certificate No. NABET/EIA/2224/SA 0190, valid up to 27.07.2024.

1.7 EIA Cost

EIA study was undertaken by HECS for an amount of Rs.2,00,000. The base line monitoring was done by M/s. HECS lab, Chennai, an NABL and MoEF & CC Accredited Laboratory.

1.8 Scope of the Study

The scope of the work mentioned includes an assessment study of Veeriyapalayam Multi Colour Granite quarry project and their impact on the region. This study puts forward the most effective ways to protect the environment from increasing pollution caused by the mining activities and recommendations for environmental-friendly development initiatives in the region.

An Environmental Impact Assessment (EIA) is an assessment of the possible impact, whether positive or negative that, the mining activities may have on the environment, together consisting of the natural, social and economic aspects, i.e., aiming at “Sustainable Development” due to the project activities.

This EIA report presents the existing baseline scenario and the assessment and evaluation of the environmental impacts that may arise during mining. This report also highlights the Environmental Monitoring Program during the operation phase of the project and the post mined management program. The generic structure of the EIA document will be as per the EIA Notification of the

MoEF&CC dated 14th September 2006 and subsequent amendments. The basic structure of the report will be as under:

Chapter 1: Introduction

Introductory information is presented in this Chapter. The introduction chapter provides background to the project, project proponent and describes the objective of this document. The purpose and organization of the report is also presented in this chapter.

Chapter 2: Project Description

This chapter includes project description and infrastructure facilities delineating all the quarry operations and environmental aspect of the quarry activities.

Chapter 3: Description of the Environment

This chapter provides baseline environmental status of Environmental Components (Primary data) delineating meteorological details of the project site and surrounding area.

Chapter 4: Anticipated Environmental Impacts & Mitigation Measures

This chapter presents the analysis of impacts on the environmental and social aspects of the project as a result of establishment of plan and thereby suggesting the mitigation measures.

Chapter 5: Analysis of Alternatives (Technology and Sites)

This chapter includes the justification for the selection of the project site from Environmental point of view as well as from economic point of view.

Chapter 6: Environmental Monitoring Programme

This chapter will include the technical aspects of monitoring, the effectiveness of mitigation measures which will include the measurement methodologies, frequency, location, data analysis, reporting schedules etc.

Chapter 7: Additional Studies

This chapter will detail about the public consultation sought regarding the project. It will also identify the risks of the project in relation to the general public and the surrounding environment during quarry operation phase and thereby presents Disaster Management Plan, Social impact assessment and R&R action plans.

Chapter 8: Project Benefits

This chapter deals with improvement in physical and social infrastructures, employment potential and other tangible benefits.

Chapter 9: Environmental Cost Benefit analysis

Not recommended during scoping

Chapter 10: Environmental Management Plan

This is the key chapter of the report and presents the mitigation plan, covers the institutional and monitoring requirements to implement environmental mitigation measures and to assess their adequacy during project implementation.

Chapter 11: Summary and Conclusion

This chapter summarizes the information given in Chapters in this EIA/EMP report and the conclusion based on the environmental study, impact identification, mitigation measures and the environmental management plan.

Chapter 12: Disclosure of the Consultant

Names of consultants engaged in the preparation of the EIA/EMP report along with their brief resume and nature of consultancy rendered are included in this chapter.

1.8.1 Objectives of the Study

- To ensure environmental considerations are explicitly addressed and incorporated into the development & decision-making process.
- To anticipate and avoid, minimize or offset the adverse significant biophysical, social and other relevant effects of the above project proposal.
- To protect the productivity and capacity of natural systems and the ecological processes to maintain their respective functions.
- To promote development that is sustainable and optimized resource use as well as management opportunities.
- To fully recognize the scope and requirements of the TOR and comply with the same.
- The major objective of this study is to prepare a detailed Environmental Impact Assessment study within the study area i.e 10 km radius from the project.

1.8.2 Methodology adopted for the Study

An Environmental Impact Assessment (EIA) is an assessment of the possible impact, whether positive or negative, that a proposed project may have on the environment, together consisting of the natural, social and economic aspects, i.e., aiming at “Sustainable Development” due to the project activities.

1.8.3 Detailed Methodology adopted for the EIA Study

The EIA process followed for this EIA report is composed of the following stages:

1. Study of project information.

2. Screening & Scoping.
3. Environmental pre-feasibility study & application for approval of ToR.
4. Collection of detailed project management plan/report.
5. Baseline data collection.
6. Impact identification, Prediction & Evaluation.
7. Mitigation measures & delineation of EMP.
8. Risk assessment and safety & disaster management plan.
9. Review & finalization of EIA Report based on the ToR requirements.
10. Submission of EIA report for implementation of mitigation measures & EMP as well as necessary clearances from relevant Authority.

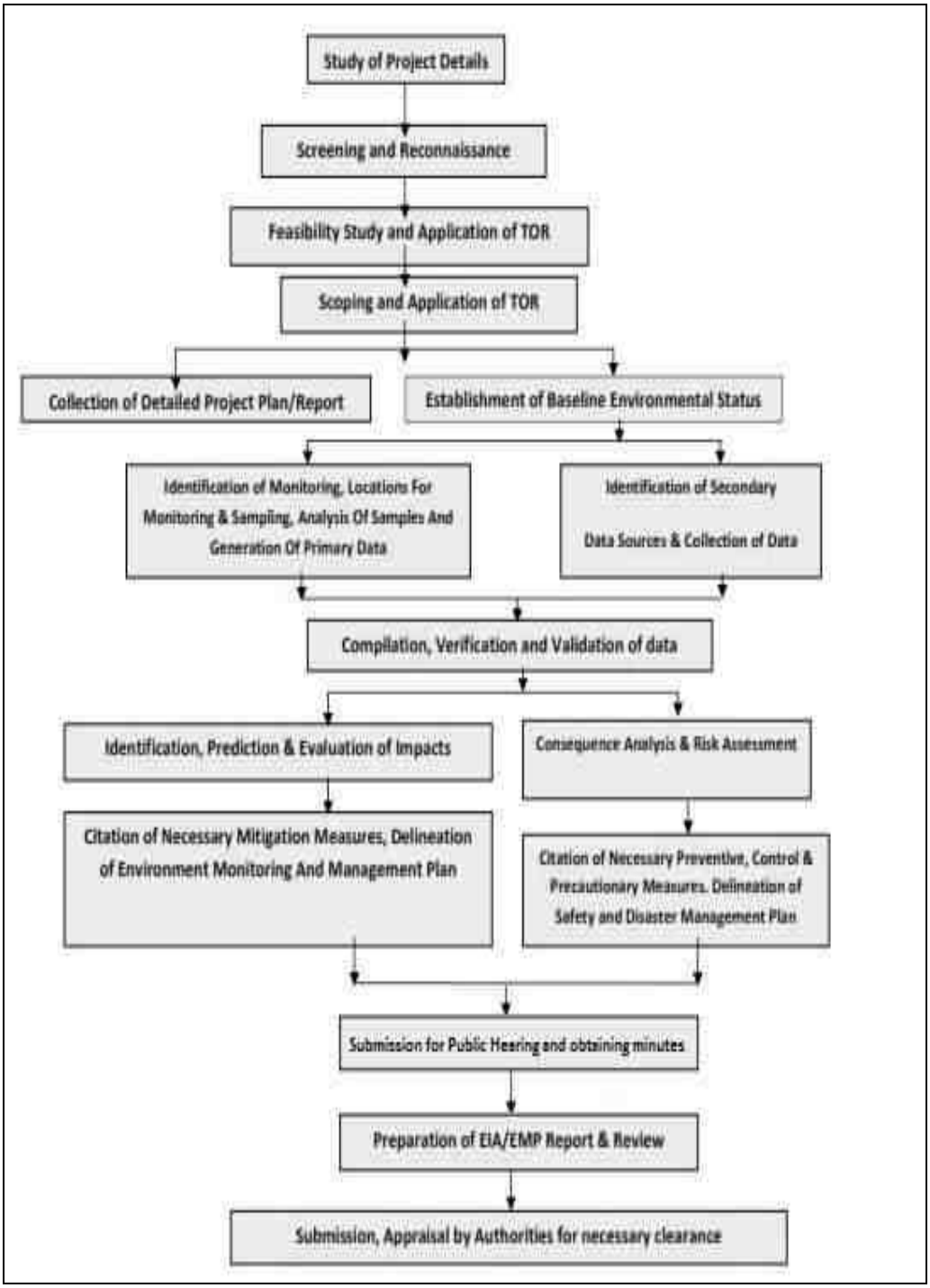


Figure 1-1 Feasibility & Environmental Assessment Process

1.8.4 Legal Complicability

The establishment and functioning of mining industry will be governed by the following environmental acts/regulations besides the local zoning and land use laws of the States.

- The Water (Prevention and Control of Pollution) Act, 1974 as amended
- The Water (Prevention and Control of Pollution) Cess Act, 1977, as amended
- The Air (Prevention and Control of Pollution) Act, 1981 as amended (AirAct).
- The Noise Pollution and Regulation Act: 2000
- The Environment (Protection) Act, 1986 (EPA)
- The Wildlife (Protection) Act, 1972 as amended
- The Forest (Conservation) Act, 1980 as amended
- The Public Liability Insurance Act, 1991
- The Mines and Minerals (Regulation and Development) Act, 1957 as amended
- Circulars issued by the Director-General Mines Safety (DGMS).
- Contract Labor Regulation and Abolition Act 1970
- The Motor Vehicles Act – 1989
- PESO – Explosives and handling of Hazardous Material: 1934 amended in 2021.

1.8.5 Terms of Reference Compliance

The Terms of Reference (ToR) issued by SEIAA-Tamil Nadu compliance is given as follows:

1.8.5.1 Discussion by SEAC and the Remarks

Table 1-4 Specific conditions in addition to the normal conditions as part of ToR

S.No	ToR Point	Compliance
1.	The proponent shall give an affidavit before the issuance of ToR from SEIAA-TN stating that the mining operations will remain suspended till they obtain the EC granted by the SEIAA after the reappraisal process es per MoEF &CC OM F.No. IA3-22/11/2023-IA.III (E-208230), dated. 28.04.2023.	The affidavit on the stoppage of mining opertaions is enclosed as **Annexure-16**
2.	For the existing quarry, the PP shall obtain a letter from the concerned AD (Mines) which shall stipulate the following information: i. Original pit dimension of the existing quarry ii. Quantity achieved Vs EC Approved Quantity iii. Balance Quantity as per Mineable Reserve calculated. iv. Mined out Depth as on date Vs EC Permitted depth v. Details of illegal/illicit mining carried out, if any vi. Non-compliance/Violation in the quarry during the pastworking. vii. Quantity of material mined out outside the mine lease area (or) in the adjacent quarry/land. viii. Existing condition of Safety zone benches ix. Details of any penalties levied on the PP for any violation in the quarry operation	The work permit letter has been obtained from Deputy Director, Department of Geology and Mines Vide Rc.No.633/Mines/2022 Dated. 19.09.2023. The same has been attached as **Annexure 13**. As per the Permit Letter the permit quantity issued 46,351.243m^3. Date of Last permit issued 19.01.2023
3.	The PP shall furnish mitigation measures/action plan for the non-compliance stated in the Certified Compliance Report (CCR) obtained from IRO(SZ),	CCR is enclosed as **Annexure-20**

<table>
<tr><th>S.No</th><th>ToR Point</th><th>Compliance</th></tr>
<tr><td></td><td>MoEF&CC.</td><td></td></tr>
<tr><td>4.</td><td>The PP/EIA Coordinator shall explain the mining technique and methodology with strategies to be adopted comprehensively to achieve the unquarried quantity of granite in duration of just 18 months from a hard rock terrain.</td><td>The mining technique and methodology with strategies adopted were discussed in the EIA report in Chapter 2 Section 2.9</td></tr>
<tr><td>5.</td><td>The Project Proponent shall furnish the revised EMP based on the study carried out on impact of the dust & other environmental impacts due to proposed quarrying operations of aforesaid excavation volume of unquarried quantity of granite on the nearby agricultural lands/ surrounding environment for remaining life of the mine in the format prescribed by the SEAC considering the cluster situation.</td><td>The EMP based on the environmental impcts of the proposed quarrying activity with budget allocation has been discussed in Chapter 10, Section 10.3.
<table>
<tr><th>S.No</th><th>Environment Aspects for Budget Allocation</th><th>Capital Cost</th><th>Recurring Cost</th></tr>
<tr><td>1.</td><td>Air Environment</td><td>9,03,000</td><td>6,46,500</td></tr>
<tr><td>2.</td><td>Noise</td><td>50,000</td><td>6,15,000</td></tr>
<tr><td>3.</td><td>Water Environement</td><td>23,000</td><td>11,500</td></tr>
<tr><td>4.</td><td>Waste Management</td><td>1,10,000</td><td>5,000</td></tr>
<tr><td>5.</td><td>Implementation of EC, Mining Plan & DGMS Condition</td><td>16,44,000</td><td>9,76,000</td></tr>
<tr><td>6.</td><td>Greenbelt</td><td>2,50,000</td><td>12,000</td></tr>
<tr><td></td><td>Total</td><td>29,80,000</td><td>22,66,000</td></tr>
</table></td></tr>
<tr><td>6.</td><td>The PP shall carry out the scientific studies to assess the slope stability of the existing quarry wall and working benches to be constructed along with slope stability remedial action plan, by involving any one of the reputed Research and Academic Institutions - CSIR-Central Institute of Mining & Fuel Research / Dhanbad, NIRM/Bangalore. Division of Geotechnical Engineering-11T-Madras, IIT(ISM)/Dhanbad, and Anna University Chennai-CEG Campus.</td><td>Benches have been formed as per mining plan in accordance with Reg. 106 of MMR, 1961 in this old quarry. Further this Granitic Gneiss rock is very hard rock formation. Hence, as of now there is no need to coduct the slope stability study.</td></tr>
<tr><td colspan="3">Annexure I</td></tr>
<tr><td>1.</td><td>In the case of existing/operating mines, a letter obtained from the concerned AD (Mines) shall be submitted and it shall include the following:

(1) Original pit dimension</td><td>The work permit letter has been obtained from Deputy Director, Department of Geology and Mines Vide Rc.No.633/Mines/2022 Dated. 19.09.2023. The same has been attached as Annexure 13. As per the Permit Letter the permit quantity issued 5360.757Cbm. The Balance Quantity 46351.243Cbm Date of Last permit issued 19.01.2023
Earliest EC copy is enclosed as Annexure-9.</td></tr>
</table>

<table>
<tr><th>S.No</th><th>ToR Point</th><th>Compliance</th></tr>
<tr><td></td><td>(ii) Quantity achieved Vs EC Approved Quantity

(iii) Balance Quantity as per Mineable Reserve calculated.

(iv) Mined out Depth as on date Vs EC Permitted depth

(v) Details of illegal/illicit mining

(vi) Violation in the quarry during the past working.

(vii) Quantity of material mined out outside the mine lease area

(viii) Condition of Safety zone/benches

(ix) Revised/Modified Mining Plan showing the benches of not exceeding 6 m height and ultimate depth of not exceeding 50m</td><td></td></tr>
<tr><td>2.</td><td>Details of habitations around the proposed mining area and latest VAO certificate regarding the location of habitations within 300m radius from the periphery of the site.</td><td>VAO certificate is enclosed as Annexure-11.
There is a small habitation named Kaikluviyur at 0.14km in NW direction of the project site.</td></tr>
<tr><td>3.</td><td>The proponent is requested to carry out a survey and enumerate on the structures located within the radius of (i) 50 m, (ii) 100 m, (iii) 200 m and (iv) 300 m (v) 500m shall be enumerated with details such as dwelling houses with number of occupants, whether it belongs to the owner (or) not, places of worship, industries, factories, sheds, etc with indicating the owner of the building, nature of construction, age of the building, number of residents, their profession and income, etc.</td><td>The manmade features with in 50m, 100m, 200m 300m and 500m radius were discussed in Chapter 3, Section 3.3, Table 3-1

School
<table>
<tr><th>S.No</th><th>Places</th><th>Distance (~km)</th><th>Direction</th></tr>
<tr><td>1.</td><td>Pappayambadi Panchayat Union Middle School</td><td>2.02</td><td>SW</td></tr>
<tr><td>2.</td><td>Palayajayankondam Government High School</td><td>2.61</td><td>N</td></tr>
<tr><td>3.</td><td>Chinna Sengal Goverment Higher Secondary School</td><td>3.74</td><td>W</td></tr>
<tr><td>4.</td><td>Kuppureddipatti Panchayat Union Middle School</td><td>4.23</td><td>NNE</td></tr>
<tr><td>5.</td><td>Panjapatti Goverment Higher Secondary School</td><td>5.16</td><td>SSE</td></tr>
<tr><td>6.</td><td>Punavasippatti Government Higher Secondary School</td><td>6.05</td><td>NE</td></tr>
<tr><td>7.</td><td>Krishnarayapuram Goverment</td><td>8.54</td><td>N</td></tr>
</table></td></tr>
</table>

S.No	ToR Point	Compliance

	High School		
8.	Lalapettai Goverment High School	9.61	NE
9.	Marist Higher Secondary School	10.2	SSW
10.	Virarakkiyam Goverment Higher Secondary School	12.55	WNW

Colleges

S.No	Places	Distance (~km)	Direction
1.	Kulithalai Government Arts College	10.81	E
2.	Suba Sakthi Women's Arts and Science College	11.53	E
3.	Kaniyalampatti Government Polytechnic College	12.55	SW
4.	VKS College of Engineering and Technology	12.85	ESE
5.	Kongunadu Institution	14.36	N
6.	Vetri Vinayaha Institution	14.75	N

Hospitals

S.No	Places	Distance (~km)	Direction
1.	Palayajayankondam Government Veterinary Hospital	2.58	N
2.	Sengal Government Veterinary Hospital	4.16	WSW
3.	Sengal Goverment PHC	4.8	WSW
4.	Kovakkulam Goverment Hospital	5.81	N
5.	Panjapatti Goverment UPHC	5.85	SSE
6.	Chinthalavadi Government Hospital	8.65	NE
7.	Ayyarmalai Goverment PHC	11.59	E
8.	Kaniyalampatti Goverment PHC	12.4	SW
9.	Thoittyam Government Hospital	12.89	NNE
10.	Kaduvetti Goverment PHC	13.15	NNW
11.	Kattuputhur Goverment UPHC	14.59	NNW

Government Buildings

S.No	Places	Distance (~km)	Direction
1.	Pappayambadi Gram Panchayat Office	1.99	SW

S.No	ToR Point	Compliance

2.	Palayajayankondam VAO Office	2.80	N
3.	Krishnarayapuram Registration Office	8.73	NNw
4.	Krishnarayapuram Taluk Office	8.85	NNW
5.	Mayanur Police Station	9.36	NW
6.	Kulithalai RTO Office	11.21	E
7.	Thottiyam Taluk Office	13.48	NNE

Religious Place

S.No	Places	Distance (~km)	Direction
1.	Kilikoottu Mariyamman Temple	0.49	NW
2.	Vinayagar Temple	0.60	S
3.	Ellai Amman Kovil	0.88	NW
4.	Arulmigu Aalavanthiswar Aalayam	3.15	N
5.	Arulmigu Meenaktchi Sundreswarar Temple	4.09	W
6.	Karuppasamy Temple	5.88	SSE
7.	Shri Yoga Narasimhar Temple	8.46	NNE
8.	Sree Thirukkanmaleeswarar Temple	8.63	N
9.	E.C.I Church	9.26	NW
10.	Lalapettai Masjid	9.70	NE
11.	Madukkarai Sri Sellandiamman Temple	9.89	NW
12.	Arulmigu Mariamman Kovil	10.20	S
13.	Arulmigu Rathnagireeswarar Temple	10.75	E
14.	Analadeeshwarar Temple	13.42	NNE
15.	E.C.I Immanuel Church	13.52	W
16.	Arulmigu Ellaiamman Thirukovil	13.55	WNW
17.	Shri Ayyappan Temple	13.59	NNE
18.	Madura Kaliamman Temple	13.69	NNE
19.	Kattalai Malayala Swamy Kovil	14.11	NW

Industries

S.No	Places	Distance (~km)	Direction
1.	Walwhan Renewable Energy Limited	0.72	SSE
2.	HILD Energy Solar Power Plant	3.63	SE

<table>
<tr><th>S.No</th><th>ToR Point</th><th>Compliance</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><td>3.</td><td>Solar Power Plant near Panjapatti</td><td>5.46</td><td>SE</td></tr>
<tr><td>4.</td><td>Ayyarmalai Solar Power Plant</td><td>6.09</td><td>E</td></tr>
<tr><td>5.</td><td>Quick Solar Pvt Ltd</td><td>6.51</td><td>SSE</td></tr>
<tr><td>6.</td><td>SKT Power Plant</td><td>7.20</td><td>E</td></tr>
<tr><td>7.</td><td>Sarjan Realities Solar Power Plant</td><td>7.36</td><td>ESE</td></tr>
<tr><td>8.</td><td>Ambal Bricks Pvt Ltd</td><td>7.46</td><td>ENE</td></tr>
<tr><td>9.</td><td>KCP Packaging Ltd</td><td>8.64</td><td>NW</td></tr>
<tr><td>10.</td><td>TNPL Mayanur</td><td>9.27</td><td>NW</td></tr>
<tr><td>11.</td><td>Solar Power Plant near Pothuravuthanpatti</td><td>9.33</td><td>SSE</td></tr>
<tr><td>12.</td><td>Magna Green Building Products</td><td>9.63</td><td>WNW</td></tr>
<tr><td>13.</td><td>Tamilnadu Bricks Works</td><td>10.06</td><td>W</td></tr>
<tr><td>14.</td><td>PVG Chambers</td><td>10.37</td><td>W</td></tr>
<tr><td>15.</td><td>Manjanaickenpatti Solar Park</td><td>12.30</td><td>SW</td></tr>
<tr><td>16.</td><td>Solar power plant near Desiyamangalam</td><td>13.90</td><td>SE</td></tr>
<tr><td>17.</td><td>Arthanari Loom Centre Pvt Ltd</td><td>14.40</td><td>SE</td></tr>
</table>
</td></tr>
<tr><td>4.</td><td>The PP shall submit a detailed hydrological report indicating the impact of proposed quarrying operations on the waterbodies like lake, water tanks, etc are located within 1 km of the proposed quarry.</td><td>The hydrogeological report will be submitted along with final EIA. Details of Water bodies are provided in Chapter 3, Section 3.3, and Table 3-1.</td></tr>
<tr><td>5.</td><td>The Proponent shall carry out Bio diversity study through reputed Institution and the same shall be included in EIA Report.</td><td>Bio diversity study was conducted and details of Bio diversity is dicussed in Chapter 3, Section 3-11.</td></tr>
<tr><td>6.</td><td>The DFO letter stating that the proximity distance of Reserve Forests, Protected Areas, Sanctuaries, Tiger reserve etc., up to a radius of 25 km from the proposed site.</td><td>DFO letter will be submitted during final EIA. Reserve Forests, Protected Areas, Sanctuaries, and Tiger reserve etc., up to a radius of 15 km from the proposed site are provided in Chapter 3, Section 3.3, and Table 3-1.</td></tr>
<tr><td>7.</td><td>In the case of proposed lease in an existing (or old) quarry where the benches are not formed (or) partially formed as per the approved Mining Plan, the Project Proponent (PP) shall the PP shall carry out the scientific</td><td>Benches have been formed as per mining plan in accordance with Reg. 106 of MMR, 1961 in this old quarry. Further this Granitic Gneiss rock is very hard rock formation. Hence, as of now there is no need to coduct the slope stability study.</td></tr>
</table>

S.No	ToR Point	Compliance
	studies to assess the slope stability of the working benches to be constructed and existing quarry wall, by involving any one of the reputed Research and Academic Institutions - CSIR-Central Institute of Mining & Fuel Research / Dhanbad, NIRM/Bangalore, Division of Geotechnical Engineering-IIT-Madras, NIT-Dept of Mining Engg, Surathkal, and Anna University Chennai-CEG Campus. The PP shall submit a copy of the aforesaid report indicating the stability status of the quarry wall and possible mitigation measures during the time of appraisal for obtaining the EC.	
8.	However, in case of the fresh/virgin quarries, the Proponent shall submit a conceptual 'Slope Stability Plan' for the proposed quarry during the appraisal while obtaining the EC, when the depth of the working is extended beyond 30 m below ground level.	Benches have been formed as per mining plan in accordance with Reg. 106 of MMR, 1961 in this old quarry. Further this Granitic Gneiss rock is very hard rock formation. Hence, as of now there is no need to coduct the slope stability study.
9.	The PP shall furnish the affidavit stating that the blasting operation in the proposed quarry is carried out by the statutory competent person as per the MMR 1961 such as blaster. mining mate, mine foreman, II/1 Class mines manager appointed by the proponent.	The blasting operations along with mititgation measures are given in **Chapter 7, Section 7.2.2.2.** The Blasting affidavit is enclosed as **Annexure-12.**The proponent appointed mining mate, mine foreman, II/I Class mines manager for the quarry activity.
10.	The PP shall present a conceptual design for carrying out only controlled blasting operation involving line drilling and muffle blasting in the proposed quarry such that the blast-induced ground vibrations are controlled as well as no fly	The conceptual design of blasting operation is discussed in detail in Section 6 of approved mining plan and the same has been attached as **Annexure 4**

<table>
<tr><th>S.No</th><th>ToR Point</th><th>Compliance</th></tr>
<tr><td></td><td>rock travel beyond 30 m from the blast site.</td><td></td></tr>
<tr><td>11.</td><td>The EIA Coordinators shall obtain and furnish the details of quarry/quarries operated by the proponent in the past, either in the same location or elsewhere in the State with video and photographic evidences.</td><td>The Proponenet has operated the Quarry in the same location and quarry is operated from 2018 to 2023. The Photographs of the exixiting quarry is attached as Annexure 19.</td></tr>
<tr><td>12.</td><td>If the proponent has already carried out the mining activity in the proposed mining lease area after 15.01.2016, then the proponent shall furnish the following details from AD/DD, mines,</td><td>The quarry was operated from 2018 to 2023 and the Proposed and achieved production details were given in Section 1 of mining Plan. The Bulk Permit was obtained from Deputy Director of Department of Geology and Mining vide Rc.No.633/Mines/2022. Dated. 19.09.2023 and the same has been attached as Annexure-13</td></tr>
<tr><td>13.</td><td>What was the period of the operation and stoppage of the earlier mines with last work permit issued by the AD/DD mines?</td><td>The quarry was operated from 2018 to 2023 The last work Permit was obtained form AD Mines and Attached as Annexure -13.</td></tr>
<tr><td>14.</td><td>Quantity of minerals mined out.

Highest production achieved in any one year

• Detail of approved depth of mining.

• Actual depth of the mining achieved earlier.

• Name of the person already mined in that leases area.

•If EC and CTO already obtained, the copy of the same shall be submitted.

• Whether the mining was carried out as per the approved mine plan (or EC if issued) with stipulated benches.</td><td>
<table>
<tr><th>S.No</th><th>Description</th><th>Details</th></tr>
<tr><td>1.</td><td>Quantity of Minerals Mined Out</td><td>41,765m3</td></tr>
<tr><td>2.</td><td>Highest Production achieved</td><td>2018-2019
25,563m ROM</td></tr>
<tr><td>3.</td><td>Approved Depth of mining</td><td>27.5m</td></tr>
<tr><td>4.</td><td>Actual depth of Mining</td><td>17.0m</td></tr>
<tr><td>5.</td><td>Name of the Person Already mined</td><td>Tmt.S.Shanthi
RoM:23525m^3</td></tr>
</table>
The Bulk Permit was obtained from Deputy Director of Department of Geology and Mining vide Rc.No.633/Mines/2022. Dated. 19.09.2023 and the same has been attached as Annexure-13. Excavated Quantity 41,765m^3. The production details are given in Chapter 2, Section 2.7 and Table 2.5 to Table 2.9. EC is enclosed as Annexure-9 and CTO is enclosed as Annexure-10</td></tr>
<tr><td>15.</td><td>All corner coordinates of the mine lease area, superimposed on a High-Resolution Imagery/Topo sheet, topographic sheet, geomorphology, lithology</td><td>All corner coordinates and Google image of the project site is given below.
<table>
<tr><th>S. No</th><th>Latitude (N)</th><th>Longitude(E)</th></tr>
<tr><td>1</td><td>10°52'40.80"N</td><td>78°16'58.82"E</td></tr>
<tr><td>2</td><td>10°52'43.81"N</td><td>78°16'58.79"E</td></tr>
</table></td></tr>
</table>

<table>
<tr><th>S.No</th><th>ToR Point</th><th>Compliance</th></tr>
<tr><td></td><td>and geology of the mining lease area should be provided. Such an Imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).</td><td>
<table>
<tr><td>3</td><td>10°52'44.53"N</td><td>78°17'1.82"E</td></tr>
<tr><td>4</td><td>10°52'47.86"N</td><td>78°17'2.11"E</td></tr>
<tr><td>5</td><td>10°52'47.70"N</td><td>78°17'4.43"E</td></tr>
<tr><td>6</td><td>10°52'44.74"N</td><td>78°17'4.23"E</td></tr>
<tr><td>7</td><td>10°52'44.66"N</td><td>78°17'3.94"E</td></tr>
<tr><td>8</td><td>10°52'40.64"N</td><td>78°17'3.69"E</td></tr>
<tr><td>9</td><td>10°52'40.79"N</td><td>78°17'0.97"E</td></tr>
</table>

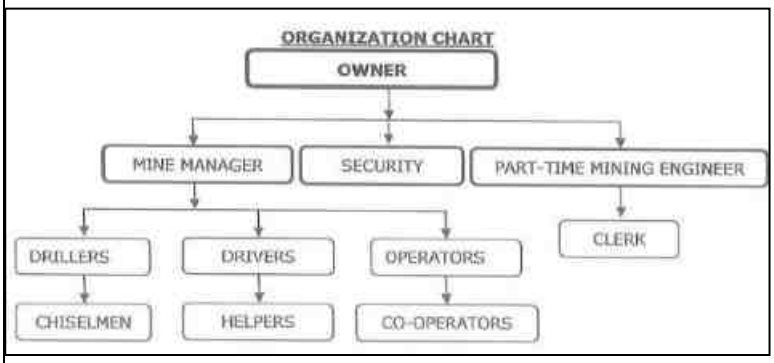

All corner coordinates are given in Chapter 1, Section 1.5.3, and Table 1-3.Topo Map given in Figure 2-9.

Land use & Land cover given in Chapter 3, Section 3.4.4, Table 3-2 & 3-3, Figure 3-6, Figure 3-7.
</td></tr>
<tr><td>16.</td><td>The PP shall carry out Drone video survey covering the cluster, green belt, fencing, etc.,</td><td>The entire Cluster of mine lease area along with green belt shall be video graphed through Drone will be submitted in the Final EIA.</td></tr>
<tr><td>17.</td><td>The proponent shall furnish photographs of adequate fencing, green belt along the periphery including replantation of existing trees & safety distance between the adjacent quarries & water bodies nearby provided as per the approved mining plan.</td><td>Photographs of adequate fencing, green belt along the periphery including replantation of existing trees are attached as Annexure 14 and Annexure 15.</td></tr>
</table>

<table>
<tr><th>S.No</th><th>ToR Point</th><th>Compliance</th></tr>
<tr><td>18.</td><td>The Project Proponent shall provide the details of mineral reserves and mineable reserves, planned production capacity, proposed working methodology with justifications, the anticipated impacts of the mining operations on the surrounding environment, and the remedial measures for the same.</td><td>
<table>
<tr><th>S. No</th><th>Description</th><th>Colour granite (m^3)</th></tr>
<tr><td>1</td><td>Geological Resource</td><td>7,38,502</td></tr>
<tr><td>2</td><td>Mineable Reserves</td><td>1,87,835</td></tr>
<tr><td>3</td><td>Production capacity</td><td>1,24,703</td></tr>
</table>
Yearwise production details are given in Chapter 2, Table 2-9.

Method of mining is given in Chapter 2, Section 2.9.2. and 2.10.

Mitigation of measures is given in Chapter 2, Section 2.13.

The anticipated impacts of the mining operations on the surrounding environment, and the remedial measures are given in Chapter 4, Section 4.4-4.7.
</td></tr>
<tr><td>19.</td><td>The Project Proponent shall provide the Organization chart indicating the appointment of various statutory officials and other competent persons to be appointed as per the provisions of the Mines Act 1952 and the MMR, 1961 for carrying out the quarrying operations scientifically and systematically in order to ensure safety and to protect the environment.</td><td>The Organization Chart based on the proposed manpower requirement is gven below.
 

.</td></tr>
<tr><td>20.</td><td>The Project Proponent shall conduct the hydro-geological study considering the contour map of the water table detailing the number of groundwater pumping & open wells, and surface water bodies such as rivers, tanks, canals, ponds, etc. within 1 km (radius) along with the collected water level data for both monsoon and non-monsoon seasons from the PWD/TWAD so as to assess the impacts on the wells due to mining activity. Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and</td><td>Ground water occurrence in this area is 63m depth below from the ground level. The quarry operation restricted well above the water table, hence the quarry operation will not be affected by the ground water in any manner.</td></tr>
</table>

<table>
<tr><th>S.No</th><th>ToR Point</th><th>Compliance</th></tr>
<tr><td></td><td>documentation in this regard may be provided.</td><td></td></tr>
<tr><td>21.</td><td>The proponent shall furnish the baseline data for the environmental and ecological parameters with regard to surface water/ground water quality, air quality, soil quality & flora/fauna including traffic/vehicular movement study.</td><td>The baseline data for the environmental and ecological parameters with regard to surface water / groundwater quality, air quality, soil quality & flora / fauna are discussed in Chapter 3, Section 3.6, Section 3.7, Section 3.8, Section 3.9, Section 3.10, and Section 3.11.

Traffic / vehicular movement study details are provided in Chapter 4, Table 4-13

As a part of Green Belt development program project proponent has already completed planting of around 150 trees of Neem, Pungam, Vengai and maintaining their growth around the periphery of the proposed project site and the photographs of the same is attached as Annexure 15. Also as this an expansion project the exisiting green belt details are given below
<table>
<tr><th>Year</th><th>No of trees proposed to be planted</th><th>Area to be covered in m^2</th><th>Name of the species to be plant</th><th>Survival rate expected in %</th><th>No of trees expected to be grown</th></tr>
<tr><td>2018-23</td><td>300</td><td>1320</td><td>Neem, Casuarinas, pongamia, pinnata,Tamarind</td><td>50</td><td>150</td></tr>
</table>
</td></tr>
<tr><td>22.</td><td>The Proponent shall carry out the Cumulative impact study due to mining operations carried out in the quarry specifically with reference to the specific environment in terms of soil health, biodiversity, air pollution, water pollution, climate change and flood control & health impacts. Accordingly, the Environment Management plan should be prepared keeping the concerned quanty and the surrounding habitations in the mind.</td><td>Noted. Impacts and mitigation measures are given in Chapter 4, Section 4.6-4.8.
<table>
<tr><th>S. No</th><th>Description</th><th>Capital Cost (Rs.)</th><th>Reccuring Cost (Rs)</th></tr>
<tr><td>1.</td><td>Ambient Air Quality Monitoring</td><td>9,03,000</td><td>6,46,500</td></tr>
<tr><td>2.</td><td>Noise Environment</td><td>50000</td><td>6,15,030</td></tr>
<tr><td>3.</td><td>Water Environment</td><td>23,000</td><td>11,500</td></tr>
<tr><td>4.</td><td>Waste Management</td><td>1,10,000</td><td>5000</td></tr>
<tr><td>5.</td><td>Implementation of EC, Mining Plan and DGMS Condition</td><td>16,44,000</td><td>9,76,000</td></tr>
<tr><td>6.</td><td>Green Belt Development</td><td>2,50,000</td><td>12,000</td></tr>
<tr><td colspan="2">Total EMP Cost</td><td>29,80,000</td><td>22,66,000</td></tr>
</table>
The EMP details are given in Chapter 10, Section 10.3.</td></tr>
<tr><td>23.</td><td>Rain water harvesting management with recharging details along with water balance (both monsoon & non-monsoon) is submitted.</td><td>Rain water Harvesting provided in Chapter 4, Section 4.7.4.2. Water requirement is given in Chapter 2, Table 2.14.

➢ The rainwater will be diverted by garland drains to the sump area within the mine lease. The stored water will be used for agriculture activities.
➢ Construct barriers at suitable intervals along the path of the</td></tr>
</table>

<table>
<tr><th>S.No</th><th>ToR Point</th><th>Compliance</th></tr>
<tr><td></td><td></td><td>drains.
➢ Provide necessary overflow arrangement to maintain the natural drainage system.</td></tr>
<tr><td>24.</td><td>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.</td><td>The Land Use plan of the Mining Lease Area is given below.
<table><tr><th>S. No</th><th>Description</th><th>Present Area (Ha.)</th><th>Area in use during the quarrying period (Ha.)</th><th>Area at end of the life of Quarry(ha)</th></tr><tr><td>1.</td><td>Area under quarry</td><td>0.71.32</td><td>0.74.11</td><td>1.86.70</td></tr><tr><td>2.</td><td>Waste dump</td><td>0.34.00</td><td>0.20.80</td><td>Nil</td></tr><tr><td>3.</td><td>Roads</td><td>0.02.00</td><td>0.01.00</td><td>0.03.00</td></tr><tr><td>4.</td><td>Green Belt</td><td>0.03.00</td><td>0.14.26</td><td>0.38.50</td></tr><tr><td>5.</td><td>Stocking blocks</td><td>1.19.68</td><td>0.09.51</td><td>0.01.80</td></tr><tr><td colspan="2">Total</td><td>2.30.00</td><td>1.19.68</td><td>2.30.00</td></tr></table></td></tr>
<tr><td>25.</td><td>Details of the land for storage of Overburden/Waste Dumps (or) Rejects outside the mine lease, such as extent of land area, distance from mine lease, its land use, R&R issues, if any, should be provided.</td><td>The quarried out waste will be proposed to dump on the Southwest side also height increased in the existing waste dump with maximum dimension of 4,100m^2 area X 27.26m (H).

During the modified mining plan period 39.5m depth has been envisaged as workable depth for safe and syatematic quarrying operations. Now the quarry attained a maximum depth of 17m only in a small portion of the area and the entire quarry area is an active hence, no reclamation has carried out and immediate backfilling does not arise.</td></tr>
<tr><td>26.</td><td>Proximity to Areas declared as 'Critically Polluted (or) the Project areas which attracts the court restrictions for mining operations, should also be indicated and where so required. Clearance certifications from the prescribed Authorities, such as the TNPCB (or) Dept. of Geology and Mining should be secured and furnished to the effect that the proposed mining activities could be considered.</td><td>There is no critical polluted area within 15km radius of the project site.</td></tr>
<tr><td>27.</td><td>Description of water conservation measures proposed to be adopted in the Project should be given. Details of</td><td>Water conservation measures:
• No wastewater will be generated by quarry operation except domestic sewage. Domestic sewage will be disposed to septic tank followed by soak pit.</td></tr>
</table>

S.No	ToR Point	Compliance
	rainwater harvesting proposed in the Project, if any, should be provided.	• After the excavation of granite will be directly loaded into tipper to the needy buyers for road project and construction works for filling and leveling of low lying areas.so there is no disposal of waste in the water bodies. • The total water requirement is sourced from Private tank suppliers so the proposed quarry does not damage the water quality. • One of the strategies in water conservation is rain water harvesting. **Rainwater Harvesting:** • The rainwater will be diverted by garland drains to the sump area within the mine lease. The stored water will be used for agriculture activities. • Construct barriers at suitable intervals along the path of the drains. • Provide necessary overflow arrangement to maintain the natural drainage system.
28.	Impact on local transport infrastructure due to the Project should be indicated.	Impact on local transport infrastructure due to the Project dicussed in **Chapter 4 in Section 4.2.3.**
29.	A tree survey study shall be carried out (nos., name of the species, age, diameter etc.,) both within the mining lease applied area & 300m buffer zone and its management during mining activity.	A tree survey study was carried out (nos., name of the species with in 300m buffer zone and its management during mining activity and the list of species were listed in **Chapter 3, Section 3.11.**
30.	A detailed mine closure plan for the proposed project shall be included in EIA/EMP report which should be site-specific.	**Mine Closure Plan:** ➢ There is no proposal for back filling reclamation and rehabilitation. The Quarried pits after the end of the life of lease will be fenced using Barbed wire fencing to prevent inherent entry of public and cattles. ➢ Measures will be taken as per the Acts and Rules. ➢ Drilling will be carried out by wet drilling mode to control the dust propogation into the air. ➢ Blasting will be carried out on limited scale. Mist water spraying on haul road is proposed to prevent the dust propogation into the air. The detailed Mine closure plan is attached along with Mining Plan as **Annexure 3.** Mine closure plan is given in **Chapter 7, Section 7.2.4.**
31.	As a part of the study of flora and fauna around the vicinity of the proposed site, the EIA coordinator shall strive to educate the local students on the importance of preserving local flora and fauna by involving them in the study, wherever possible.	The EIA coordinator educated the local students on the importance of preserving local flora and fauna and involving them in the study, wherever possible.

<table>
<tr><th>S.No</th><th>ToR Point</th><th>Compliance</th></tr>
<tr><td>32.</td><td>The purpose of Green belt around the project is to capture the fugitive emissions, carbon sequestration and to attenuate the noise generated, in addition to improving the aesthetics. A wide range of indigenous plant species should be planted as given in the appendix-I in consultation with the DFO, State Agriculture University. The plant species with dense/moderate canopy of native origin should be chosen. Species of small/medium/tall trees alternating with shrubs should be planted in a mixed manner.</td><td>The total area for proposed green belt is 0.14.26 Ha out of 2.30.0 Ha during 5 years of the proposed quarrying activity and it is proposed to plant 400 nos of trees per year and Rs.2,50,000/- will spend for proposed greenbelt development and maintenance. The details are given in Chapter 4 Section 4.7. Tha project proponent has already completed planting of around 150 trees of Neem, Pungam, Vengai and maintaining their growth around the periphery of the proposed project site and the photographs of the same is attached as Annexure 15.
<table>
<tr><th>Year</th><th>No of trees proposed to be planted</th><th>Area to be covered in m^2</th><th>Name of the species to be plant</th><th>Survival rate expected in %</th><th>No of trees expected to be grown</th></tr>
<tr><td>2023-28</td><td>400</td><td>1426</td><td>Neem, Vilvam, Aathi, Panai</td><td>80</td><td>320</td></tr>
</table></td></tr>
<tr><td>33.</td><td>Taller/one year old Saplings raised in appropriate size of bags, preferably ecofriendly bags should be planted as per the advice of local forest authorities/botanist/Horticulturist with regard to site specific choices. The proponent shall earmark the greenbelt area with GPS coordinates all along the boundary of the project site with at least 3 meters wide and in between blocks in an organized manner</td><td>As per committee recommendations, taller / one year old saplings raised in eco-friendly bags, will be planted in proper espacement as per the advice of local forest authorities / botanist / horticulturist with regard to sites specific choices

The proposed quarry an existing quarry. The total area for proposed green belt is 0.14.26 Ha out of 2.30.00 Ha during 5 years of the proposed quarrying activity and it is proposed to plant 400 nos of trees per year and Rs.2,40,000/- will spend for proposed greenbelt development and maintenance. The details are given in Chapter 4, Section 4.8.

Also the Proponent has completetd planting of around 150 of trees species including Neem, Vengai, Pungam around the periphery of proposed project site. The photograph of the same has been attached as Annexure 15.</td></tr>
<tr><td>34.</td><td>A Disaster management Plan shall be prepared and included in the EIA/EMP Report for the complete life of the proposed quarry (or) till the end of the lease period.</td><td>A detailed Disaster management plan is discussed in Chapter 7, Sectio.n 7.2.3.</td></tr>
<tr><td>35.</td><td>A Risk Assessment and management Plan shall be prepared and included in the EIA/EMP Report for the complete life of the proposed quarry (or) till the end of the lease period.</td><td>A detailed Risk assessment and management plan is discussed in Chapter 7, Section 7.2.</td></tr>
</table>

S.No	ToR Point	Compliance
36.	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.	Public Health implication & mitigation measures are provided in **Chapter 10, Section 10.2.7.**
37.	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.	Public health implications of the Project and related activities are provided in **Chapter 10, Section 10.2.7.** A detailed budgetary allocations on Environment Managaement Plan **is** discussed in **Chapter 10, Table 10-1**
38.	The Socio-economic studies should be carried out within a 5km buffer zone from the mining activity. Measures of socio-economic significance and influence to the local community proposed to be provided by the Project Proponent should be indicated. As far as possible, quantitative dimensions may be given with time frames for implementation.	The socio-economic study was carried out within a 10 km buffer zone from the mining activity. The detailed measure of socio-economic significance is discussed in **Chapter 3, Section 3.12.**
39.	Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.	Nil
	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.	Benefits of the Proposed Project • The quarrying activities in this belt will benefit to the local people directly 35 persons. • The direct beneficiaries will be those who get employed in the mines as skilled and unskilled workers. • Improvement in Per Capita Income.

S.No	ToR Point	Compliance
		• The socio - Economic conditions of the village will enhance due to the project, hence the project should be allowed after considering all the parameters. • It can be concluded that the project is environmentally compatible, financially viable and would be in the interest of construction industry thereby indirectly benefiting the masses. Benefits of the project are discussed in **Chpater 8.**
40.	If any quarrying operations were carried out in the proposed quarrying site for which now the EC is sought, the Project Proponent shall furnish the detailed compliance to EC with the site photographs which shall duly be certified by MoEF&CC, Regional Office, Chennai (or) the concerned DEE/TNPCB.	The detiled EC compliance report is attached as **Annexure -19**
41.	The PP shall prepare the EMP for the entire life of mine and also furnish the sworn affidavit stating to abide the EMP for the entire life of mine.	EMP is provided in **Chapter 10**. Since the budgetary allocation of EMP is under negotiataion with SEAC Committee members, after finalizing the EMP in final EC Presentation meeting the Sworn Affidavit will be submitted in SEIAA by the proponent.
42.	Concealing any factual information or submission of false/fabricated data and failure to comply with any of the conditions mentioned above may result in withdrawal of this Terms of Conditions besides attracting penal provisions in the Environment (Protection) Act, 1986.	All the information provided by the project proponenet are factual and no false information has been submitted.

1.8.5.2 Discussion by SEIAA and the Remarks

<table>
<tr><th>S. No</th><th>ToR Point</th><th>Compliance</th></tr>
<tr><td colspan="3">Annexure B</td></tr>
<tr><td colspan="3">Cluster Management and Committee</td></tr>
<tr><td>1.</td><td>Cluster Management Committee shall be framed which must include all the proponents in the cluster as members including the existing as well as proposed quarry.</td><td>The cluster management Committee will be formed with inclusive of all proponent in the cluster.

The cluster committee certificate will be submitted with the Final EIA

The Cluster Details are given below

Details of Existing Quarry:
<table>
<tr><th>S.No</th><th>Name of the lessee</th><th>Area (Ha)</th><th>S.F.No</th><th>Lease Peeriod</th></tr>
<tr><td>1.</td><td>Mr. Deivendran</td><td>2.30.0</td><td>12/1A, 12/1B, 12/1C, 12/1D, 12/1E,12/2A, 12/3A, 12/3B, 12/3C,12/3D, 12/3E, 12/4A, 12/4/B, 12/5A</td><td>20.03.2023 to 19.03.2028</td></tr>
<tr><td>2.</td><td>Mr. Deivendran</td><td>2.86.5</td><td>11/3F, 12/4C, 12/5B, 12/5C, 12/5D and 12/5E</td><td>06.03.2023 to 05.04.2043</td></tr>
</table></td></tr>
<tr><td>2.</td><td>The members must coordinate among themselves for the effective implementation of EMP as committed including Green Belt Development, Water sprinkling,</td><td>For the effective implementation of EMP the members of the Cluster Management Committee will coordinate among themselves a committed.</td></tr>
</table>

<table>
<tr><td></td><td>tree plantation, blasting etc.,</td><td></td></tr>
<tr><td>3.</td><td>The List of members of the committee formed shall be submitted to AD/Mines before the execution of mining lease and the same shall be updated every year to the AD/Mines.</td><td>The list of Members involving in the Cluster Management Committee will be intimated to the AD Mines before execution of Mining Lease and the same will updated every year to the AD mines.
The cluster committee certificate will be submitted with the Final EIA

Details of Existing Quarry:
<table>
<tr><th>S.No</th><th>Name of the lessee</th><th>Area (Ha)</th><th>S.F.No</th><th>Lease Peeriod</th></tr>
<tr><td>1.</td><td>Mr. Deivendran</td><td>2.30.0</td><td>12/1A, 12/1B, 12/1C, 12/1D, 12/1E,12/2A, 12/3A, 12/3B, 12/3C,12/3D, 12/3E, 12/4A, 12/4/B, 12/5A</td><td>20.03.2023 to 19.03.2028</td></tr>
<tr><td>2.</td><td>Mr. Deivendran</td><td>2.86.5</td><td>11/3F, 12/4C, 12/5B, 12/5C, 12/5D and 12/5E</td><td>06.03.2023 to 05.04.2043</td></tr>
</table></td></tr>
<tr><td>4.</td><td>Detailed Operational Plan must be submitted which must include the blasting frequency with respect to the nearby quarry situated in the cluster, the usage of haul roads by the individual quarry in the form of route map and network.</td><td>The Detailed Operational Plan will be submitted including the blasting frequency with respect to the nearby quarry after the Cluster Managemenet Committee formation.</td></tr>
<tr><td>5.</td><td>The committee shall deliberate on risk management plan pertaining to the cluster in a holistic manner especially during natural calamities like intense rain and the mitigation measures considering the</td><td>The committee will deliberate the Risk Management Plan during natural calamities by considering the cluster evacuation Plan.</td></tr>
</table>

	inundation of the cluster and evacuation plan.	
6.	The Cluster Management Committee shall form Environmental Policy to practice sustainable mining in a scientific and systematic manner in accordance with the law. The role played by the committee in implementing the environmental policy devised shall be given in detail.	The Environmental Policy to practice sustainable mining will be drafted after the Cluster Management Committee formation.
7.	The committee shall furnish action plan regarding the restoration strategy with respect to the individual quarry falling under the cluster in a holistic manner.	The action plan on restoration strategy will be provided after the Cluster Management Committee formation.
8.	The committee shall furnish the Emergency Management plan within the cluster.	The Emergency Management Plan within the cluster will be furnished after the formation of Cluster Maganement Committee.
9.	The committee shall deliberate on the health of the workers/staff involved in the mining as well as the health of the public.	The detailed health deliberation of the workers will be provided after the Cluster Management Committee formation.
10.	The committee shall furnish an action plan to achieve sustainable development goals with reference to water, sanitation & safety,	The action plan to achieve sustainable development goals with reference to water, sanitation and safety will be submitted after committee formation
11.	The committee shall furnish the fire safety and evacuation plan in the case of fire accidents.	The fire safety evacuation plan will be provided after committee formation
Impact Study of Mining		
12.	Detailed study shall be carried out in regard to impact of mining around the proposed mine lease area covering the entire mine lease period as per precise area communication order issued from reputed research institutions on the following a) Soil health & soil biological, physical land chemical features.	The detailed impact study has been carried out and the detailed impacts and mitigation measures were discussed in **Chapter 4.**

<table>
<tr><td></td><td>b) Climate change leading to Droughts, Floods etc.

c) Pollution leading to release of Greenhouse gases (GHG), rise in Temperature, & Livelihood of the local people.

d) Possibilities of water contamination and impact on aquatic ecosystem health.

e) Agriculture, Forestry & Traditional practices.

f) Hydrothermal/Geothermal effect due to destruction in the Environment.

g) Bio-geochemical processes and its foot prints including environmental stress.

h) Sediment geochemistry in the surface streams.</td><td></td></tr>
<tr><td colspan="3">Agriculture & Agro-Biodiversity</td></tr>
<tr><td>13.</td><td>Impact on surrounding agricultural fields around the proposed mining Area.</td><td>No impact is envisaged on the nearby agicultural land.</td></tr>
<tr><td>14.</td><td>Impact on soil flora & vegetation around the project site.</td><td>Impact and mitigation measures of soil given in Section 4.1, 4.1.1&4.1.2. Impact of flora is given in Chapter 4, Section 4.5.1.</td></tr>
<tr><td>15.</td><td>Details of type of vegetations including no. of trees & shrubs within the proposed mining area and. If so, transplantation of such vegetations all along the boundary of the proposed mining area shall committed mentioned in EMP.</td><td>Existing GreenBelt details

<table>
<tr><th>Year</th><th>No of trees proposed to be planted</th><th>Area to be covered in m^2</th><th>Name of the species to be plant</th><th>Survival rate expected in %</th><th>No of trees expected to be grown</th></tr>
<tr><td>2018-23</td><td>300</td><td>1320</td><td>Neem, Casuarinas, pongamia,</td><td>50</td><td>150</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><td></td><td></td><td>
<table>
<tr><td></td><td></td><td></td><td>pinnata,Tamarind</td><td></td><td></td></tr>
</table>
Noted. An area of 0.14.26 Ha land was alloted for greenbelt development during 5 years of mining plan, Veeriyapalayam Multi Colour Granite quarry proposed to plant 400 No's of trees per year and Rs.2,50,000/- will spend for proposed greenbelt development and for maintenance Rs. 12,000 will be spent as recurring cost..
<table>
<tr><th>Year</th><th>No of trees proposed to be planted</th><th>Area to be covered in m^2</th><th>Name of the species to be plant</th><th>Survival rate expected in %</th><th>No of trees expected to be grown</th></tr>
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</table>
Also the Propoenent has completetd planting of around 150 of trees species including Neem, Vagai, Pungam around the periphery of proposed project site. The photographs of the same has been attached as Annexure 15.
</td></tr>
<tr><td>16.</td><td>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.</td><td>The details of Flora and fauna are discussed in Chapter 3, Section 3.11. The mitigation measures on biological environment is discussed in Chapter 4, Section-4.7.6</td></tr>
<tr><td>17.</td><td>Action should specifically suggest for sustainable management of the area and restoration of ecosystem for flow of goods and services.</td><td>A detailed action plan on sustainable management of the area and restoration of ecosystem for flow of goods and services are discussed in Chapter 4.</td></tr>
<tr><td>18.</td><td>The project proponent shall study and furnish the impact of project on plantations in adjoining patta lands, Horticulture, Agriculture and livestock.</td><td>The area contain mainly neem, palm, cocos nuciferra, Calotropis,Cactus, Prosopis juliflora and thorny bushes are observed around the area and Cow, Goat, Rabbit, Squirrel, Crow, Snake, Dog faunas are found in around the area. No plants of botanical</td></tr>
</table>

<table>
<tr><td></td><td></td><td>interest or animals of zoological interest are recorded within 500m radius. So there is no impact around the agriculture, Horticulture and livestock.</td></tr>
<tr><td>19.</td><td>The project proponent shall detailed study on impact of mining on Reserve forests free ranging wildlife.</td><td>Mining activity affects the air, water, noise and biological environment, which is major source of living for faunal species. Implementation fo mitigation measures like dust suppression, garland drains, fencing and development of greenbelt prevents major threat to the wildlife species.</td></tr>
<tr><td>20.</td><td>The Environmental Impact Assessment should study impact on forest, vegetation, endemic, vulnerable and endangered indigenous flora and fauna.</td><td>An impact on Flora and Fauna is discussed in Chapter 4, Section 4.5.1.</td></tr>
<tr><td>21.</td><td>The Environmental Impact Assessment should study impact on standing trees and the existing trees should be numbered and action suggested for protection.</td><td>Action suggested for protection:

An area of 0.14.26 Ha land was alloted for greenbelt development, Veeriympalayam Multi colour Granite quarry proposed to plant 400 No’s of trees per year and Rs.2,50,000/- will spend for proposed greenbelt development and maintenance.

Plants are chosen to provide aesthetic, ecological and economical value. Trees will help to arrest propagation of noise and help to lessen dust pollution due to dust arresting action. The plantation will be developed around 7.5m safety zone of the quarry.

Existing plantation details
<table>
<tr><th>Year</th><th>No of trees proposed to be planted</th><th>Area to be covered in m^2</th><th>Name of the species to be plant</th><th>Survival rate expected in %</th><th>No of trees expected to be grown</th></tr>
<tr><td>2018-22</td><td>300</td><td>200</td><td>Neem, Vilvam, Aathi, Panai</td><td>50</td><td>150</td></tr>
</table>
</td></tr>
<tr><td>22.</td><td>The Environmental Impact Assessment should study impact on protected areas, Reserve Forests, National Parks, Corridors and Wildlife pathways, near project site.</td><td>There are no National parks, Biosphere Reserves, Wildlife Corridors; Tiger/ Elephant Reserves is located within 10km of the mine lease area.</td></tr>
<tr><td colspan="3">Water Environment</td></tr>
</table>

23.	Hydro-geological study considering the contour map of the water table detailing the number of ground water pumping & open wells, and surface water bodies such as rivers, tanks, canals, ponds etc. within 1 km (radius) so as to assess the impacts on the nearby waterbodies due to mining activity. Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided, covering the entire mine lease period.	Hydrogeological Study will be conducted and the report will be submitted along with final EIA report.
24.	Erosion Control measures.	Green belt development is one the important control measure of erosion which is discussed in **Chapter 4 in Section 4.8.**
25.	Detailed study shall be carried out in regard to impact of mining around the proposed mine lease area on the nearby Villages, Water-bodies/ Rivers, & any ecological fragile areas.	Impact of mining activities is discussed in **Chapter 4**.
26.	The project proponent shall study impact on fish habitats and the food WEB/ food chain in the water body and reservoir.	A detailed study on impacts and its mitigation measures of biological environment is discussed in **Chapter 4, Section 4.5.**
27.	The project proponent shall study and furnish the details on potential fragmentation impact on natural environment, by the activities.	The potential fragmentation impact of natural environment, by the activities is discussed in **Chapter 4.**
28.	The project proponent shall study and furnish the impact on aquatic plants and animals in water bodies and possible scars on the landscape, damages to nearby caves, heritage site, and archaeological sites possible land form changes visual and aesthetic impacts.	The detailed impact on aquatic plants and animals in water bodies and possible scars on the landscape, damages to nearby caves, heritage site, and archaeological sites are discussed in **Chapter 4.**
29.	The Terms of Reference should specifically study impact on soil health, soil erosion, the soil physical,	**Impacts of soil erosion:** The effects of soil erosion go beyond the loss of fertile land. It has led to increased

	chemical components and microbial components.	pollution and sedimentation in streams and rivers, clogging these waterways and causing declines in fish and other species. And degraded lands are also often less able to hold onto water, which can worsen flooding. Physical properties of soil include color, texture, structure, porosity, density, consistence, aggregate stability, and temperature. These properties affect processes such as infiltration, erosion, nutrient cycling, and biologic activity.
30.	The Environmental Impact Assessment should study on wetlands, water bodies, rivers streams, lakes and farmer sites.	A detailed impact and mitigation measure on water environment is discussed in **Chapter 4, Section 4.3.**
Energy		
31.	The measures taken to control Noise, Air, Water, Dust Control and steps adopted to efficiently utilize the energy shall be furnished.	Control Measures of Noise, Air, Water, Dust are provided in **Chapter 4, Section 4.7.**
Climate Change		
32.	The Environmental Impact Assessment shall study in detail the carbon emission and also suggest the measures to mitigate carbon emission including development of carbon sinks and temperature reduction including control of other emission and climate mitigation activities.	The mitigation measures of Air Environment are discussed in **Chapter 4, Section 4.7.2.**
33.	The Environmental Impact Assessment should study impact on climate change, temperature rise, pollution and above soil & below soil carbon stock.	The Cumulative Impact study due to mining operations carried out in terms of soil health, biodiversity, airpollution, water pollution, climate change and food control & health impacts are discussed in **Section 4.**
Mine Closure Plan		
34.	Detailed Mine Closure Plan covering the entire mine lease period as per precise area communication order issued.	The detailed mine closure plan is discussed in **Chapter 7 in Section 7.2.4.**
EMP		

<table>
<tr>
<td>35.</td>
<td>Detailed Environment Management Plan along with adaptation, mitigation & remedial strategies covering the entire mine lease period as per precise area communication order issued.</td>
<td>Environment Management Plan is Provided as per SEAC recommendation
<table>
<tr><th>S. No</th><th>Description</th><th>Capital Cost (Rs.)</th><th>Reccuring Cost (Rs)</th></tr>
<tr><td>1.</td><td>Ambient Air Quality Monitoring</td><td>9,03,000</td><td>6,46,500</td></tr>
<tr><td>2.</td><td>Noise Environment</td><td>50000</td><td>6,15,030</td></tr>
<tr><td>3.</td><td>Water Environment</td><td>23,000</td><td>11,500</td></tr>
<tr><td>4.</td><td>Waste Management</td><td>1,10,000</td><td>5000</td></tr>
<tr><td>5.</td><td>Implementation of EC, Mining Plan and DGMS Condition</td><td>16,44,000</td><td>9,76,000</td></tr>
<tr><td>6.</td><td>Green Belt Development</td><td>2,50,000</td><td>12,000</td></tr>
<tr><td colspan="2">Total EMP Cost</td><td>29,80,000</td><td>22,66,000</td></tr>
</table>
</td>
</tr>
<tr>
<td>36.</td>
<td>The Environmental Impact Assessment should hold detailed study on EMP with budget for Green belt development and mine closure plan including disaster management plan.</td>
<td>The budgetary allocation for Green belt development and maintainance and other aspects of environment is given below. However there is no EMP for Mine Closure Plan as the quarried pit will be left open and the Rainwater will be diverted to the Center of the pit. The water saved in the pit will be used for agricultural purposes and for ground water recharge.

Budget for Environmental Protection
<table>
<tr><th>S. No</th><th>Description</th><th>Capital Cost (Rs.)</th><th>Reccuring Cost (Rs)</th></tr>
<tr><td>1.</td><td>Ambient Air Quality Monitoring</td><td>9,03,000</td><td>6,46,500</td></tr>
<tr><td>2.</td><td>Noise Environment</td><td>50000</td><td>6,15,030</td></tr>
<tr><td>3.</td><td>Water Environment</td><td>23,000</td><td>11,500</td></tr>
<tr><td>4.</td><td>Waste Management</td><td>1,10,000</td><td>5000</td></tr>
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<tr><td colspan="2">Total EMP Cost</td><td>29,80,000</td><td>22,66,000</td></tr>
</table>
</td>
</tr>
<tr><td colspan="3">Risk Assessment</td></tr>
</table>

37.	To furnish risk assessment and management plan including anticipated vulnerabilities during operational and post operational phases of Mining.	Risk Identification & Management are provided in **Chapter 7, Section 7.2.**
Disaster Management Plan		
38.	To furnish disaster management plan and disaster mitigation measures in regard to all aspects to avoid/reduce vulnerability to hazards & to cope with disaster/untoward accidents in & around the proposed mine lease area due to the proposed method of mining activity & its related activities covering the entire mine lease period as per precise area communication order issued.	Disaster Management Plan is provided in **Chapter 7, Section 7.2.3.**
Others		
39.	The project proponent shall furnish VAO certificate with reference to 300m radius regard to approved habitations, schools, Archaeological sites, Structures, railway lines, roads, water bodies such as streams, odai, vaari, canal, channel, river, lake pond, tank etc.	Environmental Sensitive Areas within 15km from Project Boundary is given in **Chapter 3, Section 3.3 and Table 3-1.** VAO certificate with reference to 300m radius regard to approved habitations, schools, Archaeological sites, Structures, railway lines, roads, water bodies such as streams, odai, vaari, canal, channel, river, lake pond, tank is enclosed as **Annexure-11.** There is no permanent structures, temples etc., are located within 300m radius from the periphery of my quarry**.** The affidavit is enclosed as **Annexure -18.**
40.	As per the MoEF& CC office memorandum F.No.22-65/2017-IA.III dated: 30.09.2020 and 20.10.2020 the proponent shall address the concerns raised during the public consultation and all the activities proposed shall be part of the Environment Management Plan.	The draft EIA will be submitted for Public After obtaining minutes of Public Hearing from the TNPCB Portal the minutes will be incorporated in the EIA in **Chapter 7.**
41.	The project proponent shall study and furnish the possible pollution due to plastic and microplastic on the environment. The ecological risks and impacts of	Not applicable as the usage of plastics is not encouraged with in the proposed project premises by the project proponent.

	plastic & microplastics on aquatic environment and fresh water systems due to activities, contemplated during mining may be investigated and reported.	

1.8.5.3 Standard Terms of Reference

S. No	Terms of Reference	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.	The proposed project is an existing quarry. The yearwise production details are provided in **Chapter 2, Section 2.8 and Table 2.9.** The quarrying agreement has been made between M.Ghandhi and Mr. Devendran on 20.03.2018 and the sanctioned G.O has been attached as **Annexure 6 page No. 23**
2	A copy of the document in support of the fact that the Proponent is the rightful lessee of the mine should be given.	It is patta land which is registered in the name of the applicant Thiru.M. Gandhi vides patta no.2044. The Patta and the Lease document is enclosed as **Annexure–6**.
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.	All documents including approved mine plan, EIA are compatible with one another in terms of the mine lease area, production levels, waste generation and its management, mining technology etc. and are in the name of the lessee Thiru.K Devendran. After the Public hearing, the PH regarding document will be incorporated in the Final EIA report in the name of the lessee Thiru.K Deivendran. Mining Approval letter is enclosed as **Annexure 2** and the Mining plan is enclosed as **Annexure 3.**
4	All corner co-ordinates of the mine lease area, superimposed in a High-Resolution Imagery/ topo sheet, topographic sheet, geomorphology and geology of the area should be provided. Such a Imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).	All corners co-ordinates of the mine lease area are given in **Chapter 1 and Section 1.5.3, Table 1-3**, Topo map is given in **Figure 2-9.** Geology and Geomorphology of the area is provided in **Chapter 3, Section 3.4.9 & 3.4.6.** The land use pattern and land use map of the study area are given in **Figure 3.6 & Figure 3.8.**

<table>
<tr><td></td><td></td><td>

Land use and other ecological features of the study area:

S.No.	Description	Area (Sq.km)	Area (Acres)	Area (Hectares)	Area (%)
1.	Crop Land	159.05	39302.05	15905	49.21
2.	Fallow	102.43	25310.97	10243	31.69
3.	Rural	24.35	6017.01	2435	7.53
4.	River / Stream / Canals	13.64	3370.51	1364	4.22
5.	Scrub Land	8.41	2078.15	841	2.60
6.	Plantation	6.40	1581.47	640	1.98
7.	Tanks / Lakes / Canals	5.07	1252.82	507	1.57
8.	Grass / Grazing Land	2.40	593.05	240	0.74
9.	Mining	1.35	333.59	135	0.42
10.	Urban	0.13	32.12	13	0.04
Total		**323.23**	**79871.75**	**32323**	**100.00**

Land use & land cover is given in **Chapter 3, Section 3.4.4.1, and Table 3.3.**
</td></tr>
<tr><td>5</td><td>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.</td><td>All the Information is 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.

Topo map prepared in 1:50,000 scale and given as Chapter 3, Figure 3.2.

Hydrogeology of district is given in Chapter 3, Section 3.4.7 and Figure 3.15.

Geomorphology map of the study area is given in Chapter 3, Figure 3.13.</td></tr>
<tr><td>6</td><td>Details about the land proposed for mining activities should be given with information as to whether mining confirms to the land use policy of the State; land diversion for mining should have approval from State land use board or the concerned authority.</td><td>It is an existing quarry. Patta document is enclosed as Annexure-6.

Director of Geology and Mining has approved the Mining Plan to carryout the mining activities. Mining Plan is enclosed as Annexure-3.

The proposed Production Capacity of the quarry was 1,24,703m^3 of Colour granite, for the depth of 39.5m from below ground level (existing depth-27.5m; proposed depth- 31.5m) for 5 years as per the approved mining plan.</td></tr>
</table>

<table>
<tr><td></td><td></td><td>The production details are provided in Chapter 2, Section 2.8. to Table 2.9</td></tr>
<tr><td>7</td><td>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 envrionmental issues and for ensuring compliances 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 stakeholders at large, may also be detailed in the EIA Report.</td><td>Since, this quarry belongs to individual proponent, there is no Environmental Policy, but proponent will be following all environmental legal compliance as recommended by authorities.</td></tr>
<tr><td>8</td><td>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 be provided.</td><td>Mine Safety and Mitigation Measures:
<table>
<tr><th>S. No</th><th>Activity</th><th>Mitigation measures</th></tr>
<tr><td>1.</td><td>Excavation</td><td>Planned excavation, avoid haphazard mining</td></tr>
<tr><td>2.</td><td>Drilling and blasting</td><td>➢ In addition, the operators and other workers should be provided with masks, helmets, gloves and earplugs.</td></tr>
<tr><td>3.</td><td>Safety zone</td><td>➢ Provisions for a buffer zone between the local habitation and the mine lease in the form of a green belt of suitable width.
➢ Restricted entry, use of sirens and cordoning of the lasting area are some of the good practices to avoid accidents.</td></tr>
<tr><td>4.</td><td>Overburden stabilization</td><td>➢ Accidents are known to happen due to overburden collapse.
➢ Therefore, slope stabilization and dump stability are critical issues for safety and environment.</td></tr>
</table></td></tr>
</table>

<table>
<tr><td></td><td></td><td>
<table>
<tr><td>5.</td><td>Worker's health surveillance</td><td>➢ Health survey programmes for workers and local community.
➢ Regular training and awareness of employees to be conducted to meet health and safety objectives.</td></tr>
</table>
It is a Colour granite quarry; an open cast Mining methodology will be followed. The proposed depth of mining will be 39.5m (existing depth-27.5m; proposed depth- 31.5m) as per the ToR issued.
Safeguard measures are provided in Chapter 7, Section 7.2.2.8.
The production of granite in this mine involves the following methods.
1. Splitting of rock mass of considerable volume from the parent sheet rock carefully avoiding any kind of damage in the form of cracks in the deposit by adopting the following methods.
2. The secondary splitting in to required size involves long hole drilling up to the bottom of the separated block and mild blasting along the required plans. The blocks split as above are separated and removed from the pit using hydraulic excavators.
3. The primary boulders thus spitted are removed from the pits by excavators and further made to smaller sizes by rock breakers attached in excavators.
Mining methodology is provided in Chapter 2 and Section 2.9 and 2.10.</td></tr>
<tr><td>9</td><td>The study area will comprise of 10km 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.</td><td>The study area of 10km zone around the mines lease from lease periphery and furnished in Chapter 3. The production and waste generation details are provided in Chapter 2 Section 2.6, Table 2.9.</td></tr>
<tr><td>10</td><td>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.</td><td>Land use of the study area delineating agricultural land, grazing land, migratory routes of fauna, water bodies, human settlements and other ecological features are given below.
<table>
<tr><th>S.No</th><th>Description</th><th>Area (Sq.km)</th><th>Area (Acres)</th><th>Area (Hectares)</th><th>Area (%)</th></tr>
<tr><td>1</td><td>Crop Land</td><td>159.05</td><td>39302.05</td><td>15905</td><td>49.21</td></tr>
<tr><td>2</td><td>Fallow</td><td>102.43</td><td>25310.97</td><td>10243</td><td>31.69</td></tr>
<tr><td>3</td><td>Rural</td><td>24.35</td><td>6017.01</td><td>2435</td><td>7.53</td></tr>
<tr><td>4</td><td>River / Stream / Canals</td><td>13.64</td><td>3370.51</td><td>1364</td><td>4.22</td></tr>
<tr><td>5</td><td>Scrub Land</td><td>8.41</td><td>2078.15</td><td>841</td><td>2.60</td></tr>
<tr><td>6</td><td>Plantation</td><td>6.40</td><td>1581.47</td><td>640</td><td>1.98</td></tr>
<tr><td>7</td><td>Tanks / Lakes / Canals</td><td>5.07</td><td>1252.82</td><td>507</td><td>1.57</td></tr>
</table></td></tr>
</table>

		8 | Grass / Grazing Land | 2.40 | 593.05 | 240 | 0.74 9 | Mining | 1.35 | 333.59 | 135 | 0.42 10 | Urban | 0.13 | 32.12 | 13 | 0.04 **Total** | **323.23** | **79871.75** | **32323** | **100** Land use & land cover is given in **Chapter 3, Section 3.4.4.1, Table 3.4, Figure 3.7 and Figure 3.8.** **Land Use Pattern of the lease area:** **S. No** | **Description** | **Present Area (Ha.)** | **Area in use during the quarrying period (Ha.)** | **Area at end of the life of Quarry(ha)** 1. | Area under quarry | 0.71.32 | 0.74.11 | 1.86.70 2. | Waste dump | 0.34.00 | 0.20.80 | Nil 3. | Roads | 0.02.00 | 0.01.00 | 0.03.00 4. | Green Belt | 0.03.00 | 0.14.26 | 0.38.50 5. | Stocking blocks | 1.19.68 | 0.09.51 | 0.01.80 **Total** | **2.30.00** | **1.19.68** | **2.30.00** The land use patten of the lease area is given in **Chapter 4, Section 4.1.2, and Table 4.1.**
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 are no external dumps for over burden, side burdens. Over burden, Side burden if any will be dumped within the lease area/boundary only. **Disposal of Overburden:** The overburden in the form of top soil and weathered rock. The excavated top soil and weathered rock after will be directly loaded into tipper to the needy buyers for road project and construction works for filling and leveling of lowlying areas. The waste will be dump on southwest side of the quarry. The production and waste generation details are provided in **Chapter 2, Section 2.6 & Table 2.9.**
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	Not applicable. Since no Forest land involved in this project area.

	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 forest land 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.	No Forest Clearance is required since there is no forest land involved in project area.
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. No scheduled tribes and other traditional forest dwellers are observed.
15	The vegetation in the RF/ PF areas in the study area, with necessary details, should be given.	The details of environmental sensitive areas & Reserve forests covering within 15 km from project boundary are given in **Chapter 3** and **Section 3.4 & Table 3-1.**
16	A study shall be got done to ascertain the impact of the Mining Project on wildlife of the study area and details furnished. Impact of the project on the wildlife in the surrounding and any other protected area and accordingly, detailed mitigative measures required, should be worked out with cost implications and submitted.	The proposed project will not have any impact on terrestrial ecology of the area as there are no protected wildlife areas within the 15km radius of the project.Detailed mitigate measures for biological environment is furnished in **Chapter 4, Section 4.7.**
17	Locations of National parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar site Tiger/ Elephant Reserves/(existing as well proposed), if any, within 10km 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 are no National parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors; Ramsar site Tiger/ Elephant Reserves is located within 10km of the mine lease area.

18	A detailed biological study of the study area [core zone and buffer zone (10km 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 filed survey, clearly indicating the schedule of the fauna present. In case of any Schedule-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 implementing the same should be made as part of the project cost.	Details of the flora and fauna, endangered, endemic and RET species for core and buffer zone is given in **Chapter 3 and Section 3.11.** • During secondary information, following aspects were considered for ecological studies: • Assessment of present status of flora and fauna; • Identification of rare and endangered species of plants and animals (if any); • Identification of ecologically sensitive areas within the study area; • Assessment of migratory route of wildlife (if any); and • Assessment of Aquatic Ecology with specific reference to aquatic birds and plankton resources.
19	Proximity to Areas declared as "Critically Polluted" or the Project areas likely to come under the 'Aravali Range', (attracting court restriction 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.	No Critically polluted area within 15km radius from the project boundary.
20	Similarly, for coastal Projects, A CRZ map duly authenticated by one of the authorized agencies demarcating LTL. HTL, CRZ area, location of the mine lease w.r.t CRZ, coastal features such as mangroves, if any, should be furnished. (Note: The Mining Projects falling under CRZ would also need to obtain approval of the concerned Coastal Zone Management Authority).	There is no Coastal Zone within 15km radius of the project site.
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,	There is no Rehabilitation and Resettlement involved. As it is a patta land. Mining lease documents are enclosed as **Annexure-7.**

<table>
<tr><td></td><td>should be undertaken to access their requirements and action programmes prepared 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.</td><td></td></tr>
<tr><td>22</td><td>One season (non-monsoon) [i.e March–May (Summer Season); October-December (Post Monsoon Season); December-February (Winter Seasons)] primary baseline data on ambient air quality as per CPCB Notification of 2009, water quality, noise level, soil nd flora and fauna shall be collected and the AAQ and other data so compiled presented data-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 500m of the mine lease in the pre-dominant downwind direction. The mineralogical composition of PM10, particularly for free silica, should be given.</td><td>The primary baseline data monitoring covered one season (three (3) months) i.e., from March 2023 to May 2023 and secondary data was collected from government and semi-government organization’s published data.
Ambient Air Quality details are provided in Chapter 3, Section 3.6,
The day and night equivalent noise levels Section 3.7,
Surface Water Quality Assessment Section 3.8,
Ground Water Quality Assessment Section 3.9,
Soil Monitoring Locations are given in Section 3.10</td></tr>
<tr><td>23</td><td>Air quality modelling 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 modelling 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.</td><td>Total maximum GLCs from emissions
<table>
<tr><th>Pollutant</th><th>Max. Base Line Conc. (µg/m^3)</th><th>Estimated Incremental Conc. (µg/m^3)</th><th>Total Conc. (µg/m^3)</th><th>NAAQ standard</th></tr>
<tr><td>PM_{10}</td><td>63.76</td><td>4.71</td><td>68.47</td><td>100</td></tr>
<tr><td>$PM_{2.5}$</td><td>39.53</td><td>2.82</td><td>42.35</td><td>60</td></tr>
<tr><td>SO_2</td><td>12.9</td><td>0.85</td><td>13.75</td><td>80</td></tr>
<tr><td>NO_X</td><td>25.8</td><td>1.46</td><td>27.26</td><td>80</td></tr>
</table>
Note: It is observed that maximum estimated incremental concentration is within the mining area (Project premises).</td></tr>
</table>

<table>
<tr><td></td><td></td><td>
Air quality modeling carried out for prediction of impacts of the project on the air quality of the area. The details are given in Chapter 4 and Section 4.2.2, 4.2.3 & 4.2.4.

Wind rose diagram considered for dispersion modeling is shown in Chapter 4, Section 4.2.1 Figure 4.1.

Traffic Volume after Implementation of the Project
<table>
<tr><th>For the Road</th><th>Volume of Traffic</th><th>Volume (V)</th><th>Road Capacity (C)</th><th>V/C Ratio</th><th>LOS Category*</th><th>Traffic Classification</th></tr>
<tr><td>Existing</td><td>309</td><td>449.25</td><td>3600</td><td>0.125</td><td>“A”</td><td>Free Flow Traffic</td></tr>
<tr><td>After implementation</td><td>314</td><td>461.85</td><td>3600</td><td>0.128</td><td>“A”</td><td>Free Flow Traffic</td></tr>
</table>
*LOS (Level of Service) categories are A-Free Flow, B- Reasonably Free Flow, C-Stable Flow, D-Approaching unstable flow, E- Unstable flow, F- Forced or breakdown flow.

Due to proposed project, there will be slight increment in the vehicle movement but the level of service (LOS) anticipated will be Free Flow.

The details are provided in Chapter 4, Section 4.2.3, and Table 4.13 & Table 4.14.
</td></tr>
<tr><td>24</td><td>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.</td><td>
The water requirement is 1.8 KLD and the breakup is provided in Chapter 2, Section 2.12.2.

<table>
<tr><th>S. No</th><th>Description</th><th>Water Requirement (KLD)</th></tr>
<tr><td>1.</td><td>Drinking & Domestic purpose</td><td>0.5</td></tr>
<tr><td>2.</td><td>Dust suppression</td><td>0.7</td></tr>
<tr><td>3.</td><td>Green Belt</td><td>0.6</td></tr>
<tr><td colspan="2">Total</td><td>1.8</td></tr>
</table>
Source: Private Tankers
</td></tr>
<tr><td>25</td><td>Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided.</td><td>No ground water withdrawn to meet the water requirement.The total water requirement is sourced from Private tank suppliers.</td></tr>
</table>

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.	**Surface Water Pollution Control Measures:** • Construction of garland drains of suitable size around mine area and dumps to prevent rain water descent into active mine areas. • During monsoon season, the rain water will be collected by natural slope of area to water fed tank of the mine and it will be utilized for dust suppression and greenbelt development. • Retaining walls of adequate dimensions will be provided at the top of dumps and the unstable OB benches within the mine to prevent wash off from dumps and sliding of material from benches. This will help in preventing silting of water drains/channels. • The water channels/drains carrying the rain water from the mine will be provided with baffles and settling pits to arrest the suspended solids, if any, present in this water. • The worked out slopes will be stabilized by planting appropriate shrub/grass species on the slopes. • The mine water will be regularly tested for presence of any undesirable elements and appropriate measures will be taken in case any element is found exceeding the limits prescribed by CPCB. **Ground Water Pollution Control Measures:** • The domestic sewage from the toilets will be routed to septic tanks. • Regular monitoring of water levels and quality in the existing open wells and bore well in the vicinity will be carried out. **Water conservation measures:** • No wastewater will be generated by quarry operation except domestic sewage. Domestic sewage will be disposed to septic tank followed by soak pit. • After the excavation of granite will be directly loaded into tipper to the needy buyers for road project and construction works for filling and leveling of low lying areas.so there is no disposal of waste in the water bodies. • The total water requirement is sourced from Private tank suppliers so the proposed quarry does not damage the water quality. • One of the strategies in water conservation is rain water harvesting. **Rainwater Harvesting:** ➢ The rainwater will be diverted by garland drains to the sump area within the mine lease. The stored water will be used for agriculture activities.

		➢ Construct barriers at suitable intervals along the path of the drains. ➢ Provide necessary overflow arrangement to maintain the natural drainage system.
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.	Impacts on water environment and control measures are given in **Chapter 4, Section 4.3.**
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 be obtained and copy furnished.	The proposed depth of mining is restricted to 39.5m below ground level (Existing depth of mining – 27.5m; Proposed depth of mining – 31.5m). Ground water table is available at 63m as per mining plan. Mining activities will not intersect with ground water table since; proposed depth of mining will be above the ground water table.
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.	Not Applicable.There is no stream, or seasonal streams are passing through project area.
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.	Site Elevation: ~128m to 129m AMSL The proposed depth of mining will be 39.5m below ground level (Exisiting depth of mining 27.5m; Propose depth of mining – 31.5m). Ground water table is available at 63m as per mining plan. Site Salient features are given in **Chapter 2, Section 2.3, and Table 2-2.**
31	A time bound Progressive Greenbelt Development Plan shall be prepared in a tabular form (indicating the linear	It is an exiting quarry. The total area for proposed green belt is 0.14.26 Ha out of 2.30.0Ha during 5 years of the proposed quarrying activity and it is proposed to plant 400 nos of trees per year and

<table>
<tr>
<td></td>
<td>and quantitative coverage, plant species and time frame) and submitted, keeping in mind, the same will have to be executed up front on commencement of the Project. Phase-wise plan of plantation and compensatory afforestation should be charted clearly indicating the area to be covered under plantation and the species to be planted. The details of plantation already done should be given. The plant species selected for greenbelt 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.</td>
<td>Rs.2,50,000/- will spend for proposed greenbelt development and maintenance. The details are given in Chapter 4 Section 4.7.
<table>
<tr><th>Year</th><th>No of trees proposed to be planted</th><th>Area to be covered in m^2</th><th>Name of the species to be plant</th><th>Survival rate expected in %</th><th>No of trees expected to be grown</th></tr>
<tr><td>2018-22</td><td>300</td><td>1426</td><td>Neem, Vilvam, Aathi, Panai</td><td>50</td><td>150</td></tr>
</table>
</td>
</tr>
<tr>
<td>32</td>
<td>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.</td>
<td>Traffic Volume after Implementation of the Project:
<table>
<tr><th>For the Road</th><th>Volume of Traffic</th><th>Volume (V)</th><th>Road Capacity (C)</th><th>V/C Ratio</th><th>LOS Category*</th><th>Traffic Classification</th></tr>
<tr><td>Existing</td><td>309</td><td>449.25</td><td>3600</td><td>0.125</td><td>“A”</td><td>Free Flow Traffic</td></tr>
<tr><td>After implementation</td><td>314</td><td>461.85</td><td>3600</td><td>0.128</td><td>“A”</td><td>Free Flow Traffic</td></tr>
</table>
*LOS (Level of Service) categories are A-Free Flow, B- Reasonably Free Flow, C-Stable Flow, D-Approaching unstable flow, E- Unstable flow, F- Forced or breakdown flow.
Due to propose project there will be slight increment in the vehicle movement but the level of service (LOS) anticipated will be Free Flow.</td>
</tr>
</table>

<table>
<tr>
<td>33</td>
<td>Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA Report.</td>
<td>Sanitation facilities are provided to mines workers.

Land use details of the quarry area:

<table>
<tr><th>S. No</th><th>Description</th><th>Present Area (Ha.)</th><th>Area in use during the quarrying period (Ha.)</th><th>Area at end of the life of Quarry(ha)</th></tr>
<tr><td>1.</td><td>Area under quarry</td><td>0.71.32</td><td>0.74.11</td><td>1.86.70</td></tr>
<tr><td>2.</td><td>Waste dump</td><td>0.34.00</td><td>0.20.80</td><td>Nil</td></tr>
<tr><td>3.</td><td>Roads</td><td>0.02.00</td><td>0.01.00</td><td>0.03.00</td></tr>
<tr><td>4.</td><td>Green Belt</td><td>0.03.00</td><td>0.14.26</td><td>0.38.50</td></tr>
<tr><td>5.</td><td>Stocking blocks</td><td>1.19.68</td><td>0.09.51</td><td>0.01.80</td></tr>
<tr><td colspan="2">Total</td><td>2.30.00</td><td>1.19.68</td><td>2.30.00</td></tr>
</table>

The details are provided in Mining plan is enclosed as Annexure-4.

The area breakup details are given in Chapter-2, Section 2.11 Table 2-14.</td>
</tr>
<tr>
<td>34</td>
<td>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.</td>
<td>There is no proposal for back filling reclamation and rehabilitation in the proposed project as per the mining plan.</td>
</tr>
<tr>
<td>35</td>
<td>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.</td>
<td>Anticipated occupational illness sequel to mining activities involved in the project. Occupational health problems due to dust &noise and Occupational illness by quarry activities as follows;
• Dust related pneumonia
• Tuberculosis
• Rheumatic arthritis
• Segmental vibration
Mitigation Measures for occupational Health:

• Adoption of dust suppression measures like spraying water, use of drill with dust collection system or wet drills etc.
• Plantation.</td>
</tr>
</table>

<table>
<tr>
<td></td>
<td></td>
<td>

Avoid blasting during unfavorable wind & atmospheric conditions.
Use of personal protective equipment. Compliance with DGMS circulars.
Emergency response plan that includes installation of emergency response equipment to combat events such as fire.
All personnel required to handle hazardous materials will be provided with personal protective equipment suitable for the hazardous material being handled.
On-site first aid facilities will be provided and employees will be extended to the local community in emergencies.

Occupational Health impacts & preventive measures detail given in Chapter 4 and Section 4.5.2. and 4.9.

Environmental Management Plan Cost: (As per SEAC recommended Template)
<table>
<tr><th>S. No</th><th>Description</th><th>Capital Cost (Rs.)</th><th>Reccuring Cost (Rs)</th></tr>
<tr><td>1.</td><td>Ambient Air Quality Monitoring</td><td>9,03,000</td><td>6,46,500</td></tr>
<tr><td>2.</td><td>Noise Environment</td><td>50000</td><td>6,15,030</td></tr>
<tr><td>3.</td><td>Water Environment</td><td>23,000</td><td>11,500</td></tr>
<tr><td>4.</td><td>Waste Management</td><td>1,10,000</td><td>5000</td></tr>
<tr><td>5.</td><td>Implementation of EC, Mining Plan and DGMS Condition</td><td>16,44,000</td><td>9,76,000</td></tr>
<tr><td>6.</td><td>Green Belt Development</td><td>2,50,000</td><td>12,000</td></tr>
<tr><td colspan="2">Total EMP Cost</td><td>29,80,000</td><td>22.66.000</td></tr>
</table>
The EMP details are given as a separately as Chapter 10 along with EMP Cost details are provided in Section 10.3.
</td>
</tr>
<tr>
<td>36</td>
<td>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.</td>
<td>
Anticipated health implications sequel to mining activities involved in the project. Occupational health problems due to dust &noise and Occupational illness by quarry activities as follows;

Dust related pneumonia
Tuberculosis
Rheumatic arthritis
Segmental vibration

</td>
</tr>
</table>

Mitigation Mesures for occupational Health:

- Adoption of dust suppression measures like spraying water, use of drill with dust collection system or wet drills etc.
- Plantation.
- Avoid blasting during unfavorable wind & atmospheric conditions.
- Use of personal protective equipment. Compliance with DGMS circulars.
- Emergency response plan that includes installation of emergency response equipment to combat events such as fire.
- All personnel required to handle hazardous materials will be provided with personal protective equipment suitable for the hazardous material being handled.
- On-site first aid facilities will be provided and employees will be extended to the local community in emergencies.

Occupational Health impacts & preventive measures details are given in **Chapter 4 and Section 4.5.2. and Section 4.9.**

The EMP details are given as a separately as **Chapter 10** along with EMP Cost details are provided in **Section 10.3.**

S. No	Description	Capital Cost (Rs.)	Reccuring Cost (Rs)
1.	Ambient Air Quality Monitoring	9,03,000	6,46,500
2.	Noise Environment	50000	6,15,030
3.	Water Environment	23,000	11,500
4.	Waste Management	1,10,000	5000
5.	Implementation of EC, Mining Plan and DGMS Condition	16,44,000	9,76,000
6.	Green Belt Development	2,50,000	12,000
	Total EMP Cost	**29,80,000**	**22.66.000**

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	**Impacts & Measures of Socio Economic:** • The entire lease area of the project has no habitations or hutments in the core zone area, no rehabilitation or resettlement problems are involved. • By adopting various mitigation measures, the environmental scenario in respect of ambient

<table>
<tr><td></td><td>for implementation.</td><td>air quality, water quality, Noise levels, water aspects, biological aspects etc. during the operation of the project will be maintained within the statutory prescribed levels.
• As such, impact due to the projects will be positive on socio-economic aspects. It will be ensured that the buffer zone of the quarry will be properly preserved environmentally in all respects within sustainable limits through necessary monitoring.
• The project will be operated with care for minimizing environmental impacts with proper EMP measures for pollution control.
• Veeriyapalayam Multi Colour Granite Quarry project is not going to have any negative impact on the social or cultural life of the villagers in the near vicinity. The quarry activity will provide job opportunities, which will help them to develop economically.
• The proposed project will be done with the vision of leaving a positive impact on socio-economics of people living in the nearby villages. A first-aid centre to meet the basic medical needs of employees will be provided.
• Employment potential will be generated, general financial status and socio economic condtions of approx. 35 labors will be improved.
• Various developmental works will be carried out in the nearby region based on the need of the locals.</td></tr>
<tr><td>38</td><td>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.</td><td>The EMP details are given as a separately as Chapter 10 along with EMP Cost details are provide in Section 10.3.
<table>
<tr><th>S. No</th><th>Description</th><th>Capital Cost (Rs.)</th><th>Reccuring Cost (Rs)</th></tr>
<tr><td>1.</td><td>Ambient Air Quality Monitoring</td><td>9,03,000</td><td>6,46,500</td></tr>
<tr><td>2.</td><td>Noise Environment</td><td>50000</td><td>6,15,030</td></tr>
<tr><td>3.</td><td>Water Environment</td><td>23,000</td><td>11,500</td></tr>
<tr><td>4.</td><td>Waste Management</td><td>1,10,000</td><td>5000</td></tr>
<tr><td>5.</td><td>Implementation of EC, Mining Plan and DGMS Condition</td><td>16,44,000</td><td>9,76,000</td></tr>
<tr><td>6.</td><td>Green Belt Development</td><td>2,50,000</td><td>12,000</td></tr>
<tr><td colspan="2">Total EMP Cost</td><td>29,80,000</td><td>22.66.000</td></tr>
</table></td></tr>
</table>

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 will be submitted for Public Hearing and the minutes will be incorporated after obtaining official minutes from TNPCB portal.
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.	There is no litigation pending against the project.
41	The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.	The project Cost is **Rs. 1,37,48,000/-** the breakup is addressed in **Chapter 2, Section 2.8, Table 2-10.**
42	A Disaster Management Plan shall be prepared and include in the EIA/EMP Report.	Detailed Disaster Management Plan is given in **Chapter 7 and Section 7.2.3.**
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.	**Project benefits:** • The quarrying activities in this belt will benefit to the local people 35 Nos. • The direct beneficiaries will be those who get employed in the mines as skilled and unskilled workers. • Improvement in Per Capita Income. • The socio - Economic conditions of the village and distance will enhance due to the project, hence the project should be allowed after considering all the parameters.
44	Besides the above, the below mentioned general points are also to be followed: -	
a)	Executive Summary of the EIA/EMP report.	Executive Summary of EIA Report enclosed separately
b)	All documents to be properly referenced with index and continuous page numbering.	All documents addressed are properly referenced with index and continuous page numbers.
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, sources for all tables are addressed.
d)	Project Proponent shall enclose all the analysis/testing reports of Water, Soil, Air, Noise etc. using the MoEF&CC/NABL accredited laboratories. All the original analysis/testing reports should be available during appraisal of the Project.	All the analysis/testing reports of Water, Soil, Air, Noise etc. are conducted by MoEF&CC & NABL accredited laboratories. The disclosure of Consultant is given in **Chapter 12.**

e)	Where the documents provided are in a language other than English, an English translation should be provided.	The entire document is prepared in English only.
f)	The Questionnaire for environmental appraisal of mining projects as devised earlier by the ministry shall also be filled and submitted.	Questionnaire for environmental appraisal of mining projects is prepared as per prescribed format.
g)	While preparing the EIA report, the instructions for the Proponents and instructions for the consultants issued by MoEF&CC vide O.M No. J-11013/41/2006-IA.II (I) dated 4th August, 2009, which are available on the website of this Ministry, should be followed.	EIA is Prepared as per generic structure prescribed in **Appendix–III** of EIA Notification 2006 and covered the all ToR Compliance.
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.	The basic scope and project parameters were not changed.
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 condition 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.	The Certified Compliance Report has obtained andattached as **Annexure 20**.
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 adjoin area.	All the Sectional Plates including Surface Plan, Yearwise Production Plan, and Afforestation Plan were enclosed as **Annexure-5.**

2 PROJECT DESCRIPTION

2.1 Condensed description of those aspects of the project (based on project feasibility study), likely to cause environmental effect

Type of Project including interlinked and interdependent projects

The Veeriyapalayam Multi Colour Granite quarrying operation is proposed to be carried out by open cast semi mechanized method by formation of benches. Benches are proposed with a height of 6m & 6m width with vertical slope. The area applied for quarry lease exhibits almost plain topography; the altitude of the area is above ~ 128m to 129m (max) MSL. Total estimated Geological reserves are 7,38,502 m^3 of Colour Granite. Total Mineable Reserves is estimated as 1,87,835 m^3 of Colour granite. Production Capacity will be 1,24,703 m^3 of Colour granite for five years as per the ToR issued. Summary of quarry reserves are given in **Table 2.1.**

The extent of the quarry lease area is 2.30.0 Ha; at survey number 12/1A, 12/1B, 12/1C, 12/1D, 12/1E, 12/2A, 12/2B, 12/2C, 12/3A, 12/3B, 12/3C, 12/3D, 12/3E, 12/4A, 12/4B and 12/5A, Veeriyapalayam Village, Krishnarayapuram Taluk, Karur District, Tamil Nadu State. Quarry lease area falls in the survey of India Toposheet no C44G1&5 and lies between the GPS coordinates of 10°52'40.64" N to 10°52'47.86" N and 78°16'58.79" E to 78°17'04.43" E.

Table 2-1 Summary of Project Reserves

S. No	Description	Colour Granite (m^3)
1	Geological Resource	7,38,502
2	Mineable Reserves	1,87,835
3	Production capacity	1,24,703

2.2 Type of Project

The project falls under Schedule 1(a) Mining of Minor Minerals 'B2' category as per EIA Notification 2006 and its Amendments thereafter and as per the O.M issued vide F.No. L-11011/175/2018-IA-II (M), dated: 12.12.2018 considering the cluster the project is termed under Schedule 1(a) Mining of Minor Minerals 'B1' category.

2.3 Need of the Project

The Multi Colour Granite quarrying project falls in the area of Karur District, Tamilnadu where scanty agricultural activities are been carried out and the new industries are springing up in the district and more specifically the area applied for quarry lease is devoid of any major industries and agricultural activities. The earning source in the targeted area is limited, most ofthe people in and around the area depend upon the seasonal agriculture and much of the people migrate to nearby towns where good and industries and factories are growing up.

This project will give employment opportunities to 35 members directly and 10 members will be get benefited indirectly, besides this Multi Colour Granite is well known in the international supermarket of Granite which will fetch a good foreign exchange to the nation.

Mineral Industries of the state of Tamil Nadu provides employment opportunities for the people of the state as well as in the specific project area. The Mining and Quarrying is one among the major core sector industries.

2.4 Location of the Quarry

The Veeriyapalayam Multi Colour Granite Quarry over an extent of 2.30.0Ha, located in survey number 12/1A, 12/1B, 12/1C, 12/1D, 12/1E, 12/2A, 12/2B, 12/2C, 12/3A, 12/3B, 12/3C, 12/3D, 12/3E, 12/4A, 12/4B and 12/5A, Veeriyapalayam Village, Krishnarayapuram Taluk, Karur District, and Tamil Nadu State. Quarry lease area falls in the survey of India Topo sheet C44G1&5 and lies between the GPS coordinates of 10°52'40.64" N to 10°52'47.86" N and 78°16'58.79"E to 78°17'04.43"E. The topography of the lease area is flat terrain. The highest elevation of the lease area is ~128m to 129m (max) AMSL.

The project location map is given in **Figure 2-1.** 0.3km and 0.5km Google image of the lease area is shown in **Figure 2-2 and Figure 2-3.** 1km radius Google imagery of the lease area is shown in **Figure 2-4**. Google Imagery of 5 & 10km radius of the lease area is shown in **Figure 2.5 and Figure 2.6.** Environmental Sensitive areas within 15km radius of the lease area demarcated on Google image is shown in **Figure 2.7 and Figure 2.8**. Topo map of the study is shown in **Figure 2.9**. Salient Features within 15km radius of the project boundary is given in **Table 2.2**. Project Summary is provided in **Table 2.3002E**

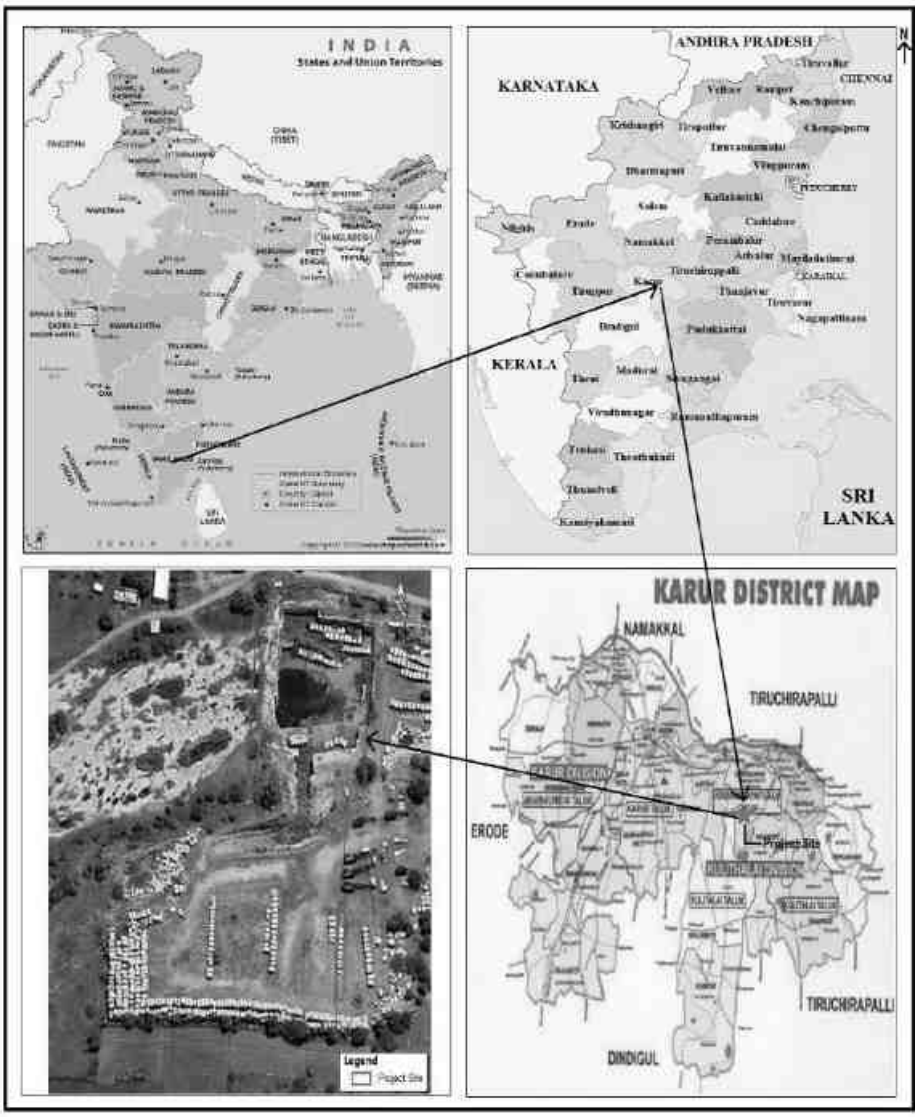


Figure 2-1 Project Location Map

Figure 2-2 0.3km Radius Google Image of the Lease Area

Figure 2-3 0.5km Radius Google Image of the Lease Area

Figure 2-4 1km Radius Google Imagery of the Lease Area

Figure 2-5 Google Imagery of 5km Radius of the Lease Area

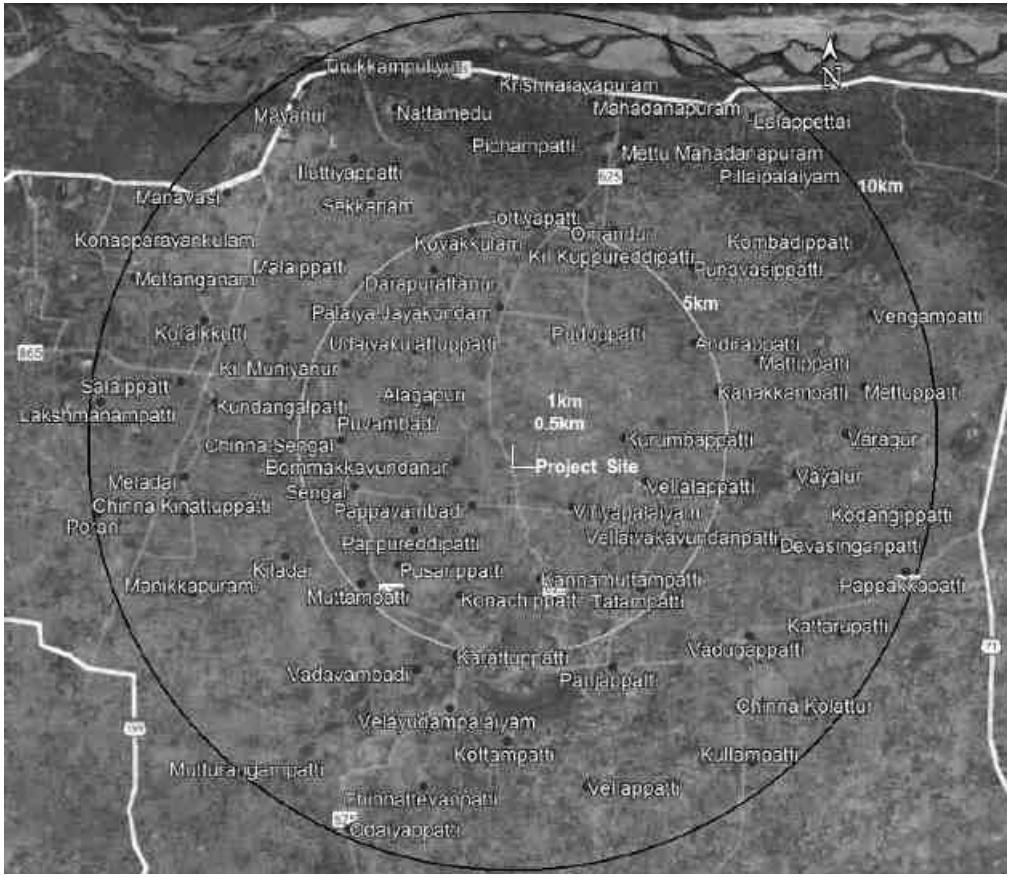


Figure 2-6 Google Imagery of 10km Radius of the Lease Area

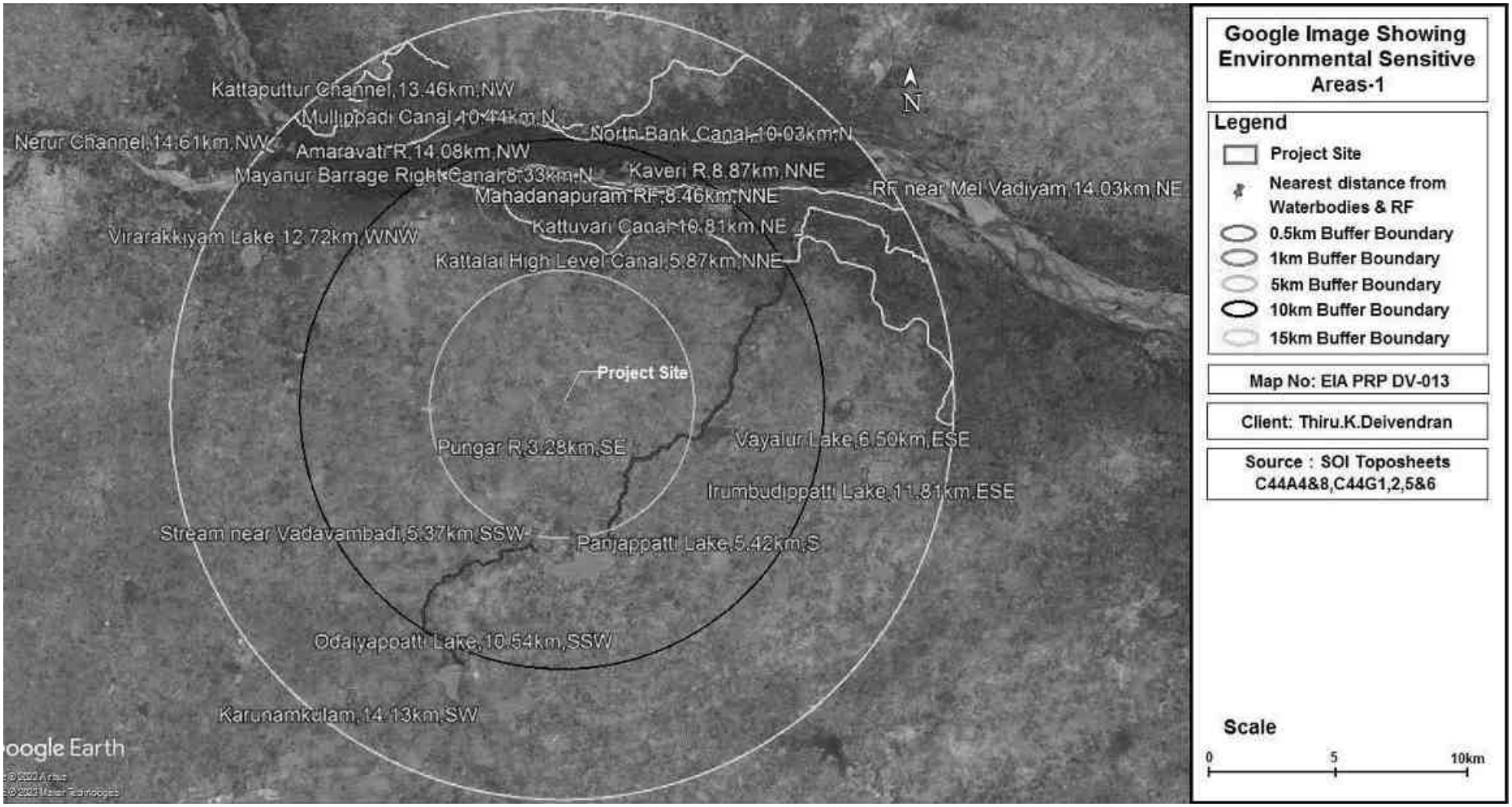


Figure 2-7 Environmental Sensitive areas (1) within 15km Radius of the Lease Area Demarcated on Google image

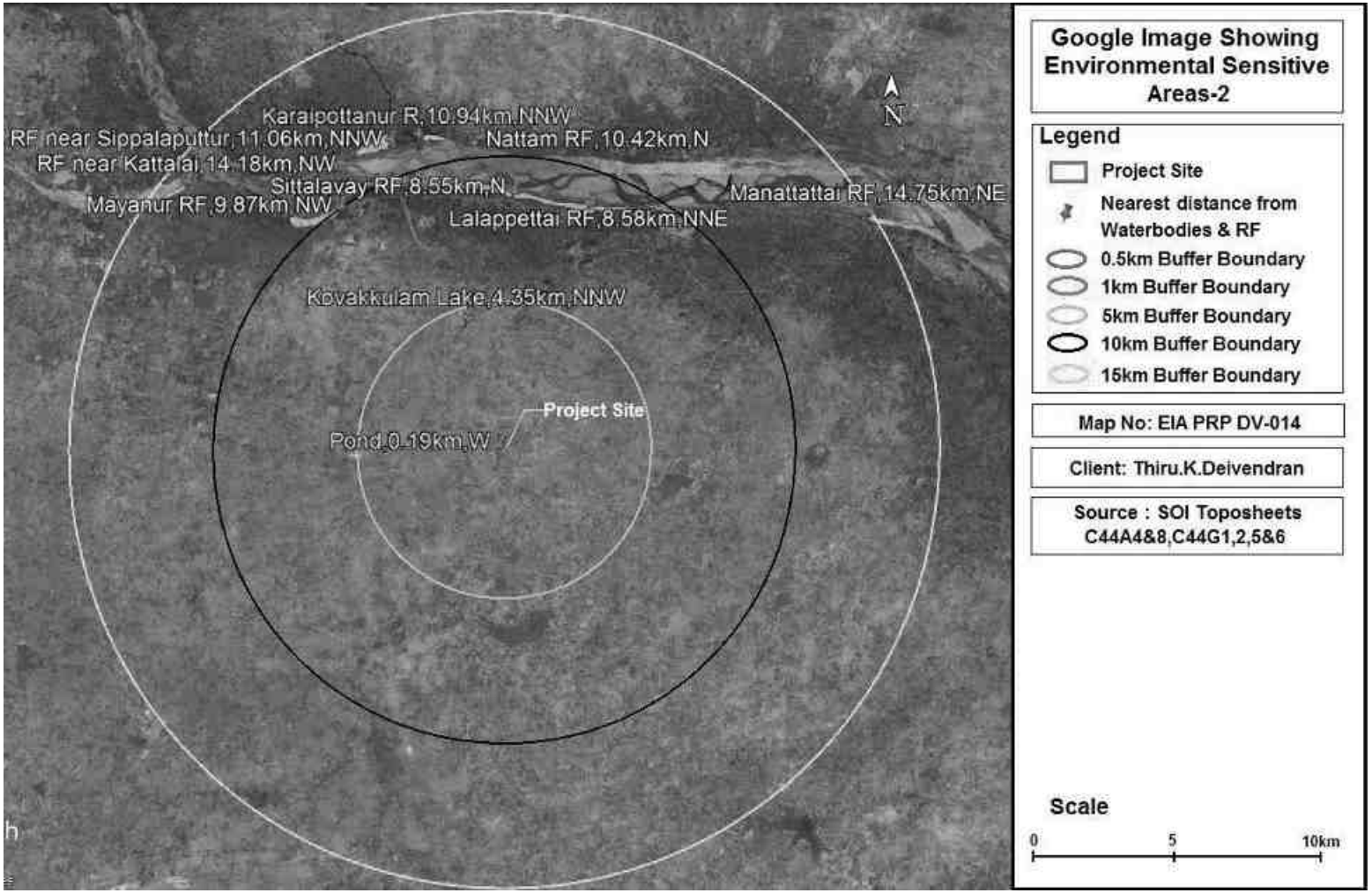


Figure 2-8 Environmental Sensitive areas (2) within 15km Radius of the Lease Area Demarcated on Google Image

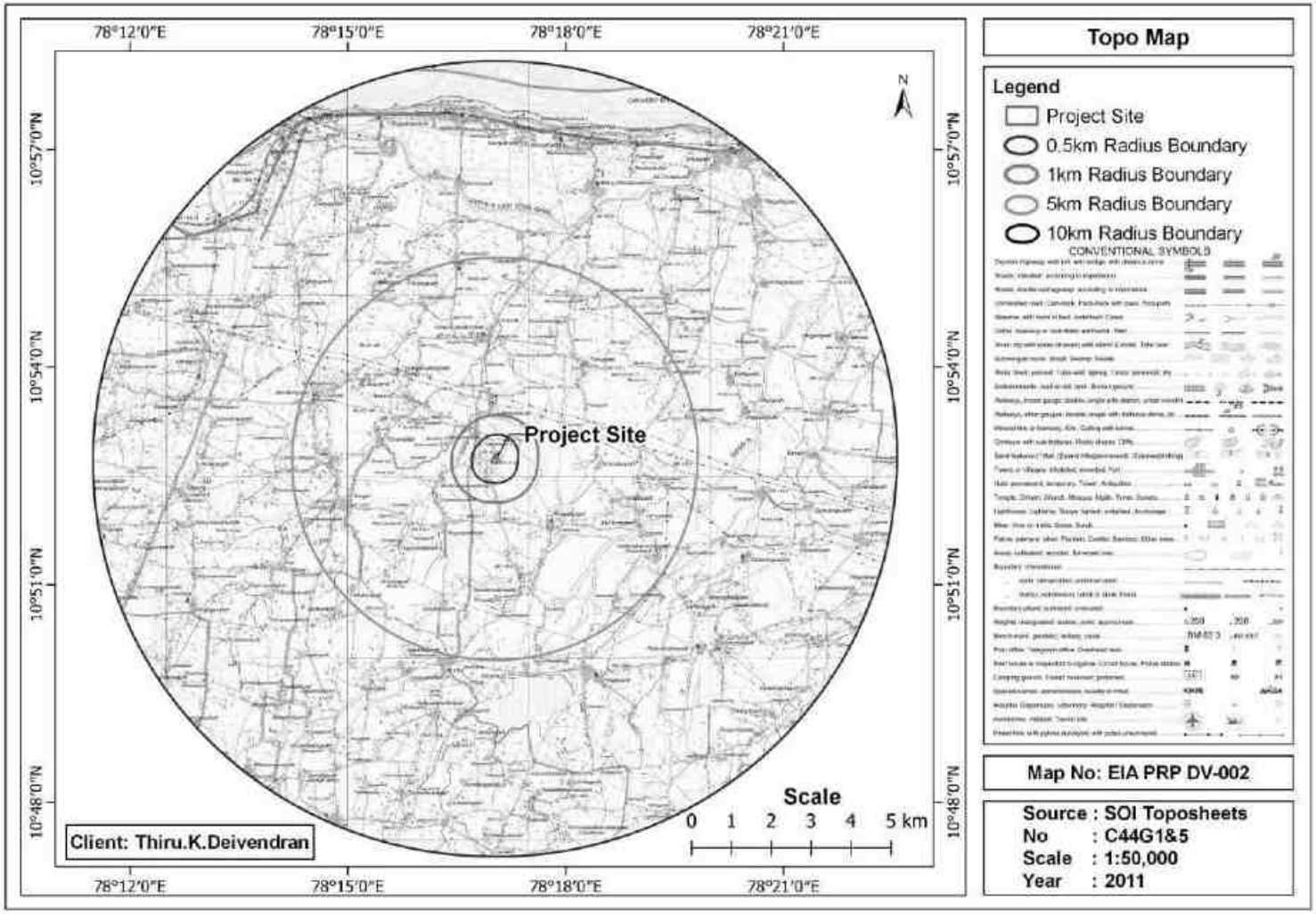


Figure 2-9 Topo Map of the Study Area

Table 2-2 Salient Features of the Project Site

<table>
<tr><th>S. No</th><th>Particulars</th><th>Details</th></tr>
<tr><td>1.</td><td>Latitude & Longitude</td><td>10°52'40.64"N to 10°52'47.86"N and 78°16'58.79"E to 78°17'04.43"E</td></tr>
<tr><td>2.</td><td>Site Elevation above MSL (m)</td><td>~128m to 129m (AMSL)</td></tr>
<tr><td>3.</td><td>Topography</td><td>Plain Terrain</td></tr>
<tr><td>4.</td><td>Lease area Topo Sheet details</td><td>C44G1&5</td></tr>
<tr><td>5.</td><td>Land classification</td><td>Patta Land –Punjai (2.30.0 Ha.)</td></tr>
<tr><td>6.</td><td>Nearest Habitation</td><td>Kaikaluviyur at 0.14km in NW direction of the project site.</td></tr>
<tr><td>7.</td><td>Nearest Roads</td><td>➢ MDR-625 (Mahadhanapuram-Mylampatti) ~0.17km, W
➢ SH-199 (Vaiyampatti-Karur road) ~ 10.41km, WSW
➢ NH-81 (Coimbatore-Karur-Chidambaram)~ 8.27km, N</td></tr>
<tr><td>8.</td><td>Nearest Railway station</td><td>➢ Railway Station - Mahadhanapuram Railway Station ~ 8.31km, N
➢ Railway Track - (Sithalavai RS- Mahadhanapuram RS) ~ 8.31km, N</td></tr>
<tr><td>9.</td><td>Nearest Airport & Port</td><td>➢ Tiruchirapalli International Airport ~47.40km, ESE</td></tr>
<tr><td>10.</td><td>Nearest Town / City</td><td>Tiruchirapalli ~ 38km, ESE
Thottiyam~13km, NNE</td></tr>
<tr><td>11.</td><td>Water Bodies</td><td><u>Water Bodies:</u>
<table>
<tr><th>S. No</th><th>Place</th><th>Distance (~km)</th><th>Direction</th></tr>
<tr><td>1.</td><td>Pond near Project Site</td><td>0.19</td><td>W</td></tr>
<tr><td>2.</td><td>Pungar R</td><td>3.28</td><td>SE</td></tr>
<tr><td>3.</td><td>Kovakkulam Lake</td><td>4.35</td><td>NNW</td></tr>
<tr><td>4.</td><td>Stream near Vadavambadi</td><td>5.37</td><td>SSW</td></tr>
<tr><td>5.</td><td>Panjappatti Lake</td><td>5.43</td><td>S</td></tr>
<tr><td>6.</td><td>Kattalai High Level Canal</td><td>5.87</td><td>NNE</td></tr>
<tr><td>7.</td><td>Vayalur Lake</td><td>6.50</td><td>ESE</td></tr>
<tr><td>8.</td><td>Mayanur Barrage Right Canal</td><td>8.33</td><td>N</td></tr>
<tr><td>9.</td><td>Kaveri/Cauvery R</td><td>8.87</td><td>NNE</td></tr>
<tr><td>10.</td><td>North Bank Canal</td><td>10.03</td><td>N</td></tr>
<tr><td>11.</td><td>Mullippadi Canal</td><td>10.44</td><td>N</td></tr>
<tr><td>12.</td><td>Odaiyappatti Lake</td><td>10.54</td><td>SSW</td></tr>
<tr><td>13.</td><td>Kattuvari Canal</td><td>10.81</td><td>NE</td></tr>
<tr><td>14.</td><td>Karaipottanur R</td><td>10.94</td><td>NNW</td></tr>
<tr><td>15.</td><td>Irumbudippatti Lake</td><td>11.81</td><td>ESE</td></tr>
<tr><td>16.</td><td>Virarakkiyam Lake</td><td>12.72</td><td>WNW</td></tr>
<tr><td>17.</td><td>Kattaputtur Channel</td><td>13.46</td><td>NW</td></tr>
<tr><td>18.</td><td>Amaravati R</td><td>14.08</td><td>NW</td></tr>
<tr><td>19.</td><td>Karunamkulam</td><td>14.13</td><td>SW</td></tr>
<tr><td>20.</td><td>Nerur Channel</td><td>14.61</td><td>NW</td></tr>
</table></td></tr>
</table>

<table>
<tr><td>12.</td><td>Reserve Forests</td><td><u>Reserve Forests:</u>
<table>
<tr><th>S. No</th><th>Place</th><th>Distance (~km)</th><th>Direction</th></tr>
<tr><td>1.</td><td>Mahadanapuram RF</td><td>8.46</td><td>NNE</td></tr>
<tr><td>2.</td><td>Sittalavay RF</td><td>8.55</td><td>N</td></tr>
<tr><td>3.</td><td>Lalappettai RF</td><td>8.58</td><td>NNE</td></tr>
<tr><td>4.</td><td>Mayanur RF</td><td>9.87</td><td>NW</td></tr>
<tr><td>5.</td><td>Nattam RF</td><td>10.42</td><td>N</td></tr>
<tr><td>6.</td><td>RF near Sippalaputtur</td><td>11.06</td><td>NNW</td></tr>
<tr><td>7.</td><td>RF near Mel Vadiyam</td><td>14.03</td><td>NE</td></tr>
<tr><td>8.</td><td>RF near Kattalai</td><td>14.18</td><td>NW</td></tr>
<tr><td>9.</td><td>Manattattai RF</td><td>14.75</td><td>NE</td></tr>
</table></td></tr>
<tr><td>13.</td><td>Seismic Zone</td><td>Zone-III</td></tr>
<tr><td>14.</td><td>Defense Installations</td><td>Nil within 15 km radius of the project boundary</td></tr>
<tr><td>15.</td><td>Interstate Boundary</td><td>Nil within 15 km radius of the project boundary</td></tr>
<tr><td>16.</td><td>HACA Regions</td><td>Nil within 15 km radius</td></tr>
</table>

Table 2-3 Project Summary

S. No	Particulars	Details
1.	Project Location	S.F. No: 12/1A, 12/1B, 12/1C, 12/1D, 12/1E, 12/2A, 12/2B, 12/2C, 12/3A, 12/3B, 12/3C, 12/3D, 12/3E, 12/4A, 12/4B and 12/5A, Veeriyapalayam Village, Krishnarayapuram Taluk, Karur District, Tamil Nadu State.
2.	Land classification	Patta Land
3.	Extent of lease area	2.30.0 Ha
4.	Geological Reserves	Colour Granite – 7,38,502 m^3
5.	Mineable Reserves	Colour Granite – 1,87,835 m^3
6.	Proposed Production capacity	Colour Granite – 1,24,703 m^3
7.	Depth of Mining	Depth of Mining – 39.5m (BGL) Existing Depth – 27.5m (BGL) Proposed Depth – 31.5m (BGL)
8.	Method of Mining	Open cast semi mechanized method
9.	Water Requirement	1.8 KLD
10.	Source of Water	Approved water vendors and existing bore wells
11.	Sewage produced	0.4 KLD
12.	Fuel requirements (litres of HSD for 5 years)	1,99,520 Litres
13.	Manpower	35 Nos
14.	Municipal Solid Waste Generation	15.75 kg/day
15.	Project Cost	Rs. 1,37,48,000/-

2.5 Size or Magnitude of operation

The Veeriyapalayam Multi Colour Granite operations are carried out by opencast semi mechanized method by formation of benches with a height of 6m & 6m. Proposed production capacity is 1,24,703 m^3 of Colour Granite, the depth of mining is restricted to 39.5m from below ground level (Existing depth – 27.5m ; Proposed depth – 31.5m) for five years.

The total quantity of reserves has been computed on the geological cross sections up to the depth of mining is 39.5m from below ground level with 7,38,502 m^3 of Colour granite, and the mineable reserves has been computed as 1,87,835 m^3 of Colour granite as per the mining plan. The Land Use break up summarized as **Table 2.5.**

Table 2-4 Land use details of the quarry area

S. No	Description	Present Area (Ha.)	Area in use during the quarrying period (Ha.)	Area at end of the life of Quarry(ha)
1.	Area under quarry	0.71.32	0.74.11	1.86.70
2.	Waste dump	0.34.00	0.20.80	Nil
3.	Roads	0.02.00	0.01.00	0.03.00
4.	Green Belt	0.03.00	0.14.26	0.38.50
5.	Stocking blocks	1.19.68	0.09.51	0.01.80
	Total	**2.30.00**	**1.19.68**	**2.30.00**

2.6 Proposed Schedule for Approval and Implementation

The time schedule for the completion of the proposed mining project is given in the below as

Particulars	Time Schedule
Submission of Draft EIA/EMP	May 2024
Conduciting Public Hearing and submitting final EIA/EMP and PoD	July 2024
Presentation before SEAC and Obtaining EC	August 2024
Obtaining CTO	September 2024
Commencement of Mining Activity	October 2024

2.7 Estimation of Reserves

The Geological reserves of Colour granite based on the Geological cross sections was 7,38,502 m^3 of Colour granite. The mineable reserves have been arrived as 1,87,835 m^3 of Colour granite. Colour Granite Quarry Reserves is given in **Table 2.6**. Geological Resources are given in the **Table 2.7**. Available Mineable Resources are given in **Table 2.8**. Proposed and Achieved Production details are given in **Table 2.9**. The Year wise production and development details are given in **Table 2.10**. Quarry lease Plan of the Quarry is given in **Figure 2.8**. Surface plan of the quarry is shown in **Figure 2.9,** Geological Plan and Section of the quarry **Figure 2.10,** Yearwise development and production plan and section of the quarry is shown in **Figure 2.11**, Conceptual & Mine Plan and section of the quarry area is shown in **Figure 2.12** & Progressive closure plan and section of the quarry is shown in **Figure 2.13**.

Table 2-5 Colour Granite Quarry Reserves

S.No	Description	Colour Granite (m^3)
1.	Geological Resource	7,38,502
2.	Mineable Reserves	1,87,835
3.	Production Capacity	1,24,703

Table 2-6 Geological Resources

Section	Length (m)	Width (m)	Depth (m)	ROM (m^3)	Recovery @ 40% (m^3)	Granite waste@60% (m^3)	Weathered rock (m^3)	Top soil (m^3)
XY-AB	71	102	3.5	-	-	-	-	25,347
	71	102	4	-	-	-	28,968	-
	71	102	6	43,452	17,381	26,071	-	-
	71	102	6	43,452	17,381	26,071	-	-
	71	102	6	43,452	17,381	26,071	-	-
	71	102	6	43,452	17,381	26,071	-	-
	71	102	6	43,452	17,381	26,071	-	-
	71	102	2	14,484	5,794	8,690	-	-
			Total	**2,31,744**	**92,699**	**1,39,045**	**28,968**	**25,347**
XY-CD	80	97	3.5	-	-	-	-	27,160
	80	128	4	-	-	-	40,960	-
	80	128	6	61,440	24,576	36,864	-	-
	80	128	6	61,440	24,576	36,864	-	-
	80	128	6	61,440	24,576	36,864	-	-
	80	128	6	61,440	24,576	36,864	-	-
	80	128	6	61,440	24,576	36,864	-	-
	80	128	2	20,480	8,192	12,288	-	-
			Total	**3,27,680**	**1,31,072**	**1,96,608**	**40,960**	**27,160**
X1Y1-CD	70	7.5	1	-	-	-	-	525
	70	7.5	1.5	-	-	-	787.5	-
	70	7.5	3.5	1,838	735	1,103	-	-
	70	13	2	1,820	728	1,092	-	-
	70	27	0.5	945	378	567	-	-
	70	27	1.5	2,835	1,134	1,701	-	-
	70	40	3	8,400	3,360	5,040	-	-
	70	88	1.5	9,240	3,696	5,544	-	-
	70	88	6	36,960	14,784	22,176	-	-
	70	88	6	36,960	14,784	22,176	-	-
	70	88	6	36,960	14,784	22,176	-	-
	70	88	6	36,960	14,784	22,176	-	-
	70	88	1	6,160	2,464	3,696	-	-
			Total	**1,79,078**	**71,631**	**1,07,447**	**788**	**525**
			Grand Total	**7,38,502**	**2,95,402**	**4,43,100**	**70,716**	**53,032**

Total Geological Reserves in ROM : **7,38,502 m^3**

Total Recoverable Reserves @ 40% : **2,95,402 m^3**

Granite waste @ 60% : **4,43,100 m^3**

Weathered Rock (WR) : **70,716 m^3**

Total waste (Granite waste+WR) : **5,13,815 m^3**

Top soil : **53,032 m^3**

Granite waste ratio : **1:1.74**

Table 2-7 Available Mineable Reserves

Section	Length (m)	Width (m)	Depth (m)	ROM (m^3)	Recovery @ 40% (m^3)	Granite waste @ 60% (m^3)	Weathered rock (m^3)	Top soil (m^3)
XY-AB	60	80	3.5	-	-	-	-	16,800
	50	59	4	-	-	-	11,800	-
	45	52	6	14,040	5,616	8,424	-	-
	38	39	6	8,892	3,557	5,335	-	-
	32	27	6	5,184	2,074	3,110	-	-
	26	15	6	2,340	936	1,404	-	-
			Total	**30,456**	**12,183**	**18,273**	**11,800**	**16,800**
XY-CD	69	86	3.5	-	-	-	-	20,769
	58	107	4	-	-	-	24,824	-
	55	103	6	33,990	13,596	20,394	-	-
	48	97	6	27,936	11,174	16,762	-	-
	42	91	6	22,932	9,173	13,759	-	-
	36	85	6	18,360	7,344	11,016	-	-
	30	79	6	14,220	5,688	8,532	-	-
	18	67	2	2,412	965	1,447	-	-
			Total	**1,19,850**	**47,940**	**71,910**	**24,824**	**20,769**
X1Y1-CD	44	14	0.5	308	123	185	-	-
	27	14	1.5	567	227	340	-	-
	40	27	3	3,240	1,296	1,944	-	-
	40	70	1.5	4,200	1,680	2,520	-	-
	37	69	6	15,318	6,127	9,191	-	-
	25	63	6	9,450	3,780	5,670	-	-
	13	57	6	4,446	1,778	2,668	-	-
			Total	**37,529**	**15,011**	**22,518**	**-**	**-**
			Grand Total	**1,87,835**	**75,134**	**1,12,701**	**36,624**	**37,569**

Mineable Reserves in ROM : **1,87,835 m^3**

Total Recoverable Reserves @40% : **75,134 m^3**

Granite waste @60% : **1,12,701 m^3**

Weathered rock (WR) **: 36,624 m^3**

Total waste (Granite waste+WR) : **1,49,325 m^3**

Top soil : **37,569 m^3**

Granite waste ratio : **1:2.0**

Table 2-8 Proposed and Achieved Production Details

Proposed						
Year	**ROM in m^3**	**Production 40% (m^3)**	**Granite waste 60% (m^3)**	**Weathered rock (m^3)**	**Top soil (m^3)**	**Period**
20.03.2018-17.09.2018	11,655	4,662	6,993	Nil	Nil	**Approved mining plan**
Total	**11,655**	**4,662**	**6,993**	**Nil**	**Nil**	
20.09.2018 - 19.03.2019	16,417	6,567	9,850	2,838	1,800	**Approved Modified mining plan**
2019-20	26,772	10,138	16,634	Nil	Nil	
2020-21	27,450	10,980	16,470	5,978	3,935	
2021-22	32,094	12,838	19,256	5,246	3,935	
2022-23	27,972	11,189	16,783	5,124	3,843	
Total	**1,30,705**	**51,711**	**78,994**	**19,186**	**13,513**	
Grand Total	**1,42,360**	**56,373**	**85,987**	**19,186**	**13,513**	-

Acheived						
Previous lease period (Tmt.S. Shanthi excavation (Overburden+ Mineral)	**ROM in m^3 (a)**	**Production and despatch (m^3)**	**Recovery**	**Granite waste (m^3)**	**Gravel (m^3) (b)**	Total excavated Volume **(m^3) (a+b)**
	13,385	13,385	100	nil	10,140	23,525

Year (Present lease)	**Granite**				**Over Burden**		**Total excavated volume (a+b+c) (m^3)**
	ROM in m^3 (a)	**Production and despatch (m^3)**	**Recovery**	**Granite waste (m^3)**	**Top soil**	**w.Rock**	
2018-19	25,563	4225.223	16.5	21,337.77	1,480	1,840	28,883
2019-20	4,261	945.784	22.2	3,315.216	934	519	5,714
2020-21	687	153.797	22.4	533.203	1,190	753	2,630
2021-22	86	20.451	23.8	65.549	1,650	688	2,424
2022-23	-	-	-	-	1,136	978	2,114
Total	**30,597**	**5,345.255**	**-**	**25251.745**	**6,390**	**4,778**	**41,765**
Grand Total							**65,290**

Table 2-9 Year wise production and development details (2023-2028)

Year	Section	Bench	Length (m)	width (m)	Depth (m)	ROM in m^3	Recovery 40% (m^3)	Granite waste 60% (m^3)	Weathered rock (m^3)	Top soil (m^3)
I	XIYI–CD		40	14	3	1,680	672	1,008	-	-
		iii	40	57	1.5	3,420	1,368	2,052	-	-
		iv	37	53	6	11,766	4,706	7,060	-	-
		v	25	41	6	6,150	2,460	3,690	-	-
		vi	13	28	6	2,184	874	1,310	-	-
		Total				**25,200**	**10,080**	**15,120**	**-**	**-**
II	XIYI–CD	ii	44	14	0.5	308	123	185	**-**	**-**
			27	14	1.5	567	227	340	**-**	**-**
		iii	40	14	4.5	2,520	1,008	1,512	**-**	**-**
		iv	37	16	6	3,552	1,421	2,131	**-**	**-**
		V	25	22	6	3,300	1,320	1,980	**-**	**-**
		vi	13	29	6	2,262	905	1,357	**-**	**-**
	XY–CD	i	14	20	3.5	-	-	-	**-**	**-**
		ii	17	26	4	-	-	-	**1,768**	**980**
		iii	42	22	6	5,544	2,218	3,326	**-**	**-**
		iv	42	12	6	3,024	1,210	1,814	**-**	**-**
		v	42	7	6	1,764	706	1,058	**-**	**-**
		Total				**22,841**	**9,136**	**13,705**	**1,768**	**980**
III	XY–CD	i	73	40	3.5	-	-	-	-	10,220
		ii	63	29	4	-	-	-	7,308	-
		iii	59	26	6	9,204	3,682	5,522	-	-
		iv	45	30	6	8,100	3,240	4,860	-	-
		v	33	25	6	4,950	1,980	2,970	-	-
		vi	21	26	6	3,276	1,310	1,966	-	-
		Total				**25,530**	**10,212**	**15,318**	**7,308**	**10,220**
IV	XY–CD	i	73	46	3.5	-	-	-	-	11,753
		iii	63	52	4	-	-	-	13,104	-
		iv	59	27	6	9,558	3,823	5,735	-	-
		v	45	27	6	7,290	2,916	4,374	-	-
		vi	33	27	6	5,346	2,138	3,208	-	-
		vii	21	27	6	3,402	1,361	2,041	-	-
		Total				**25,596**	**10,238**	**15,358**	**13,104**	**11,753**
V	XY–AB	i	15	31	3.5	-	-	-	-	1,628
		ii	5	10	4	-	-	-	200	-
	XY–CD	iii	59	28	6	9,912	3,965	5,947	-	-
		iv	45	28	6	7,560	3,024	4,536	-	-
		v	33	28	6	5,544	2,218	3,326	-	-
		vi	21	20	6	2,520	1,008	1,512	-	-
		Total				**25,536**	**10,215**	**15,321**	**200**	**1,628**
Grand Total						**1,24,703**	**49,882**	**74,821**	**22,380**	**24,581**

Total Proposed ROM : **1,24,703 m^3**

Total Recoverable Reserves @ 40% : **49,882 m^3**

Granite waste @60%	: **74,821 m^3**
Weathered rock (WR)	**: 22,380 m^3**
Total waste (Granite waste+WR)	: **97,201 m^3**
Top soil	: **24,581 m^3**
Granite waste ratio	: **1:1.95**

Veeriyapalayam Multi Colour Granite Quarry, over an extent of 2.30.0. Ha, with Production Capacity is 1,24,703 m^3 of Colour granite, the depth of mining is 39.5m from below ground level (Existing depth of mine – 27.5m; Proposed depth of mine – 31.5m) for 5 years.

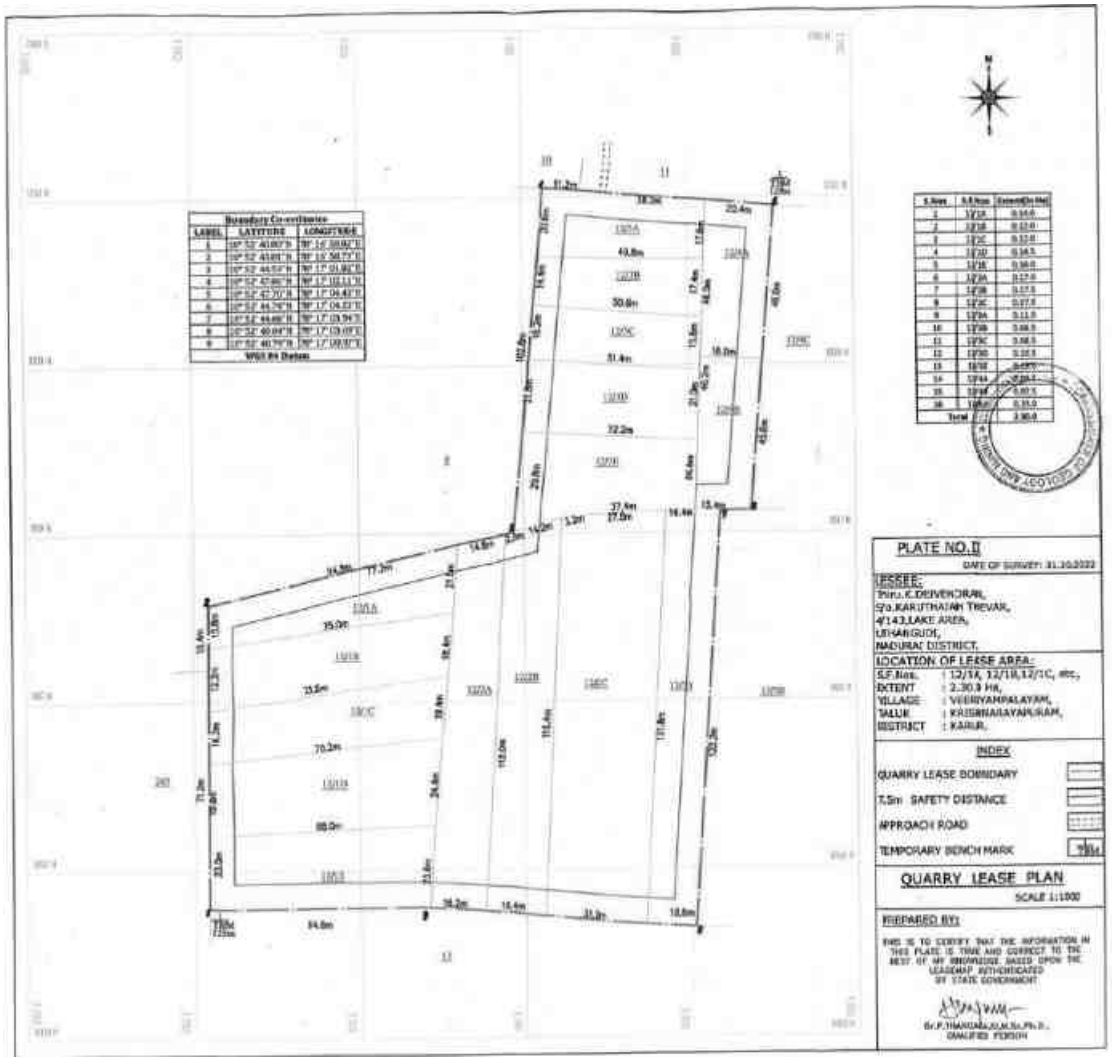


Figure 2-10 Quarry Lease Plan of the Quarry

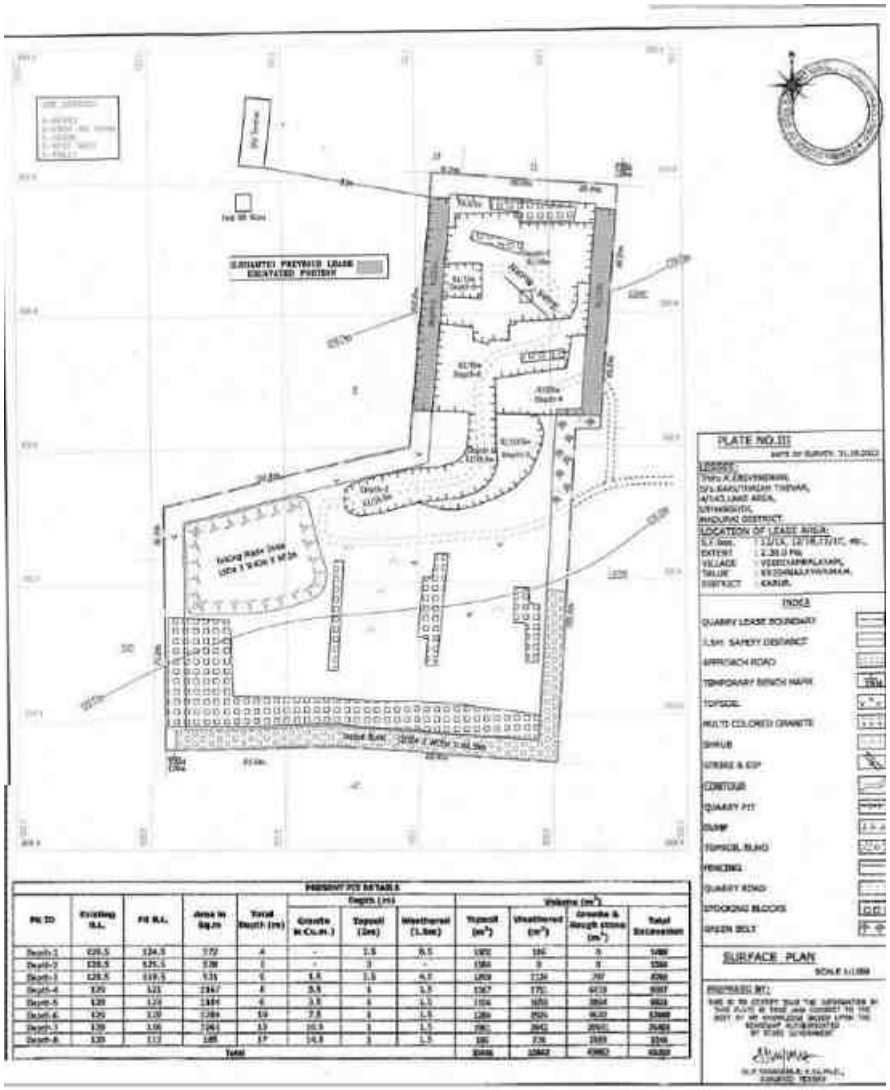


Figure 2-11 Surface Plan of the quarry

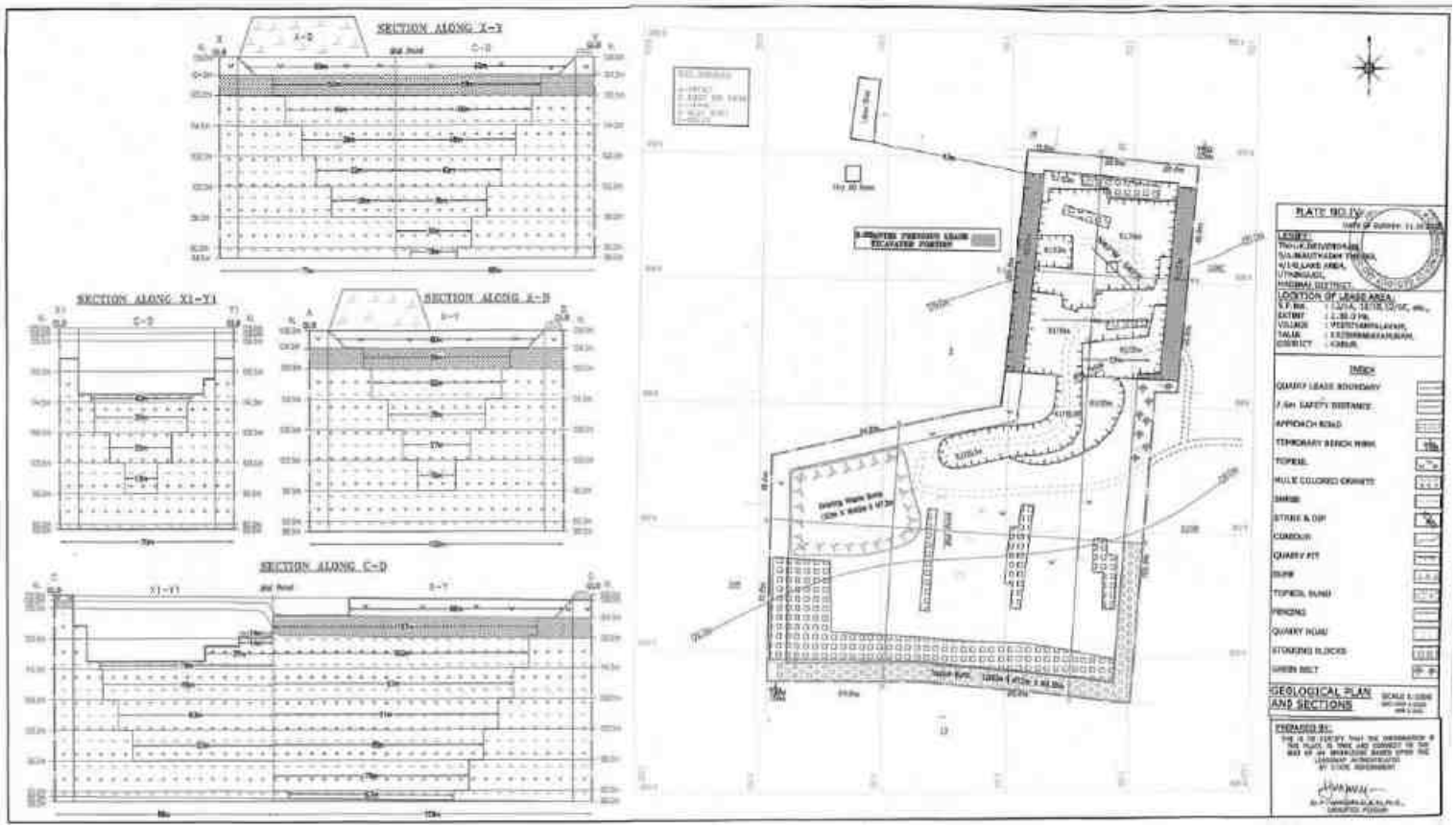


Figure 2-12 Geological Plan and Section of the quarry

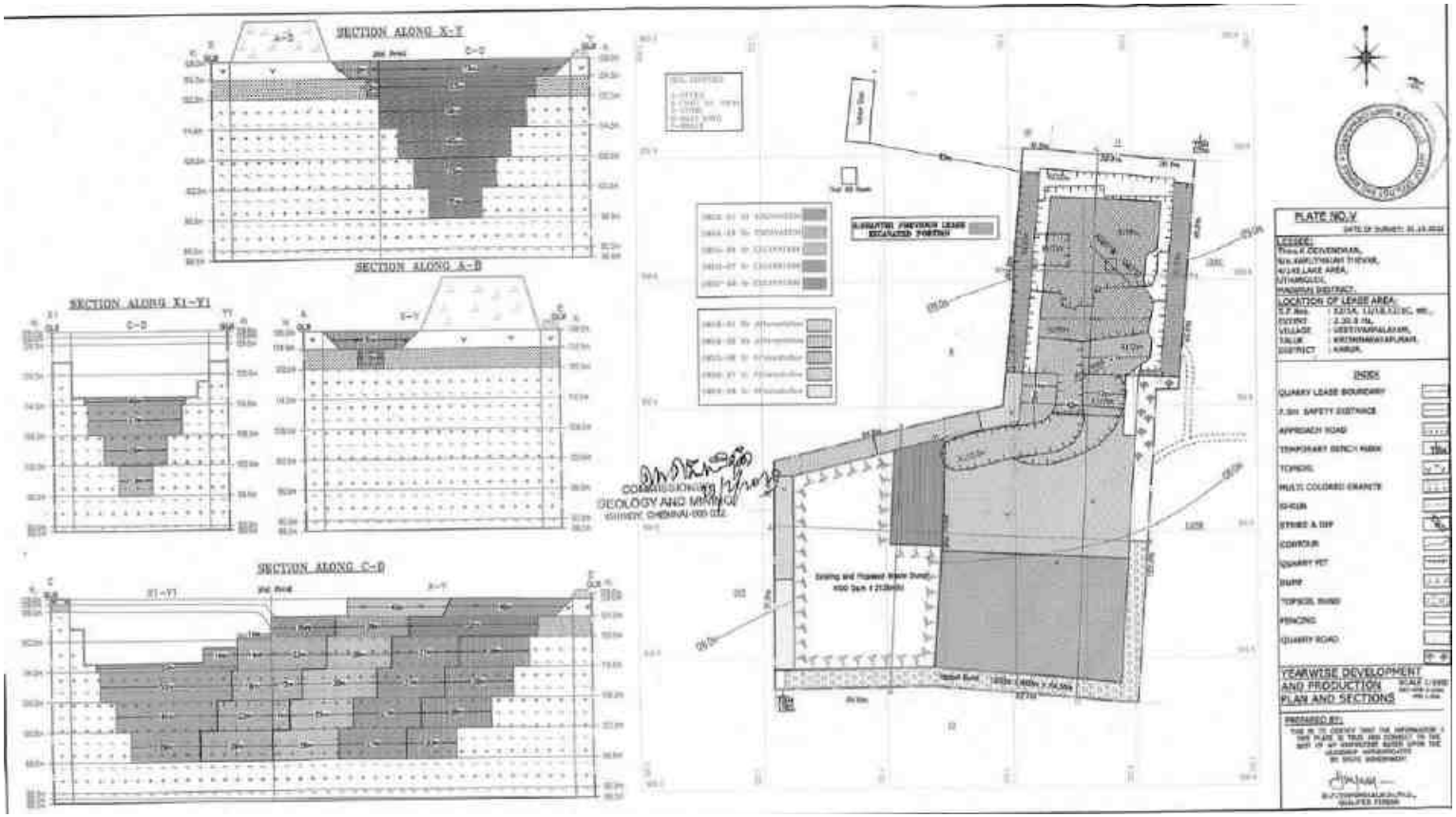


Figure 2-13 Yearwise Development and Production Plan and Section of the quarry

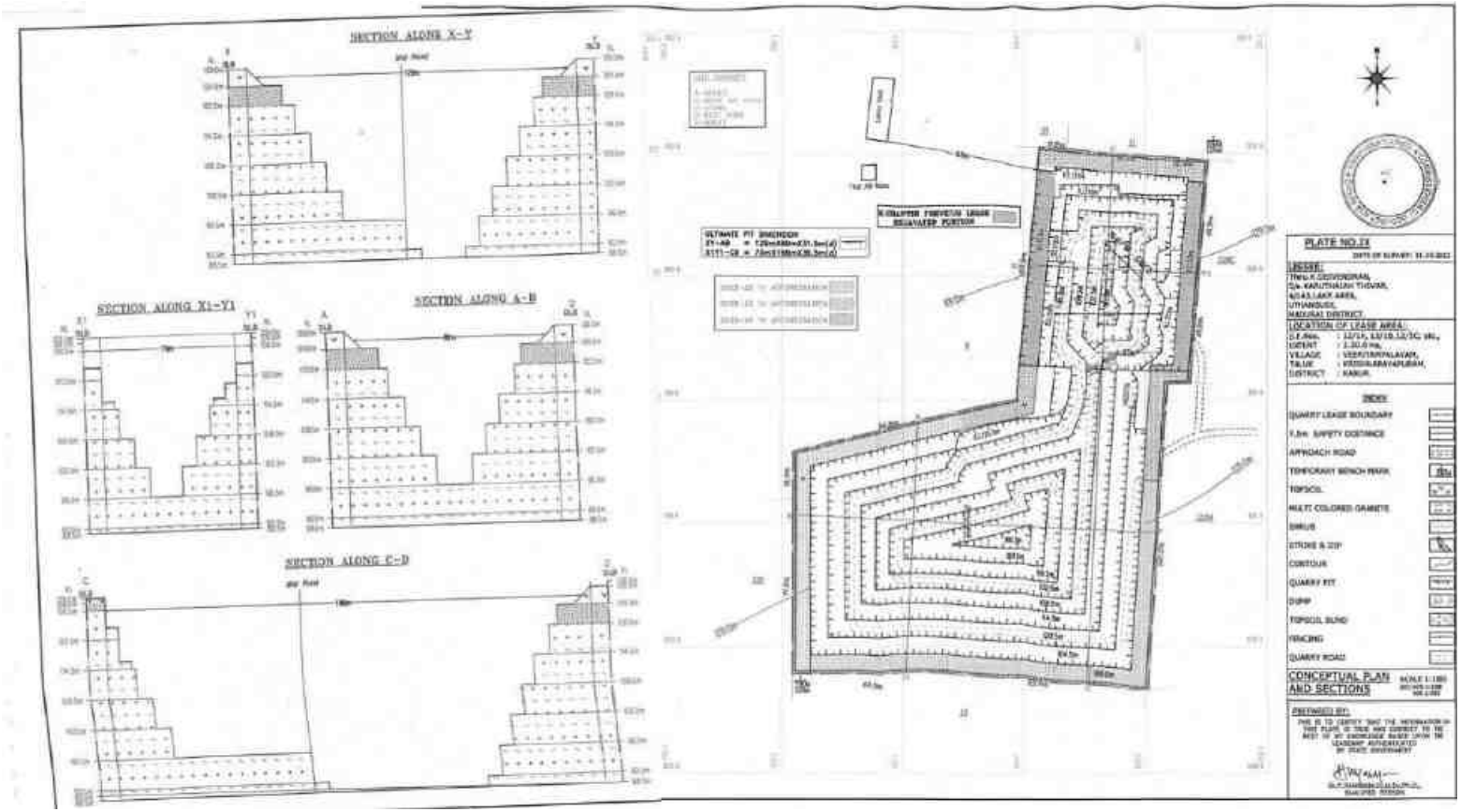


Figure 2-14 Conceptual Plan and Section of the quarry

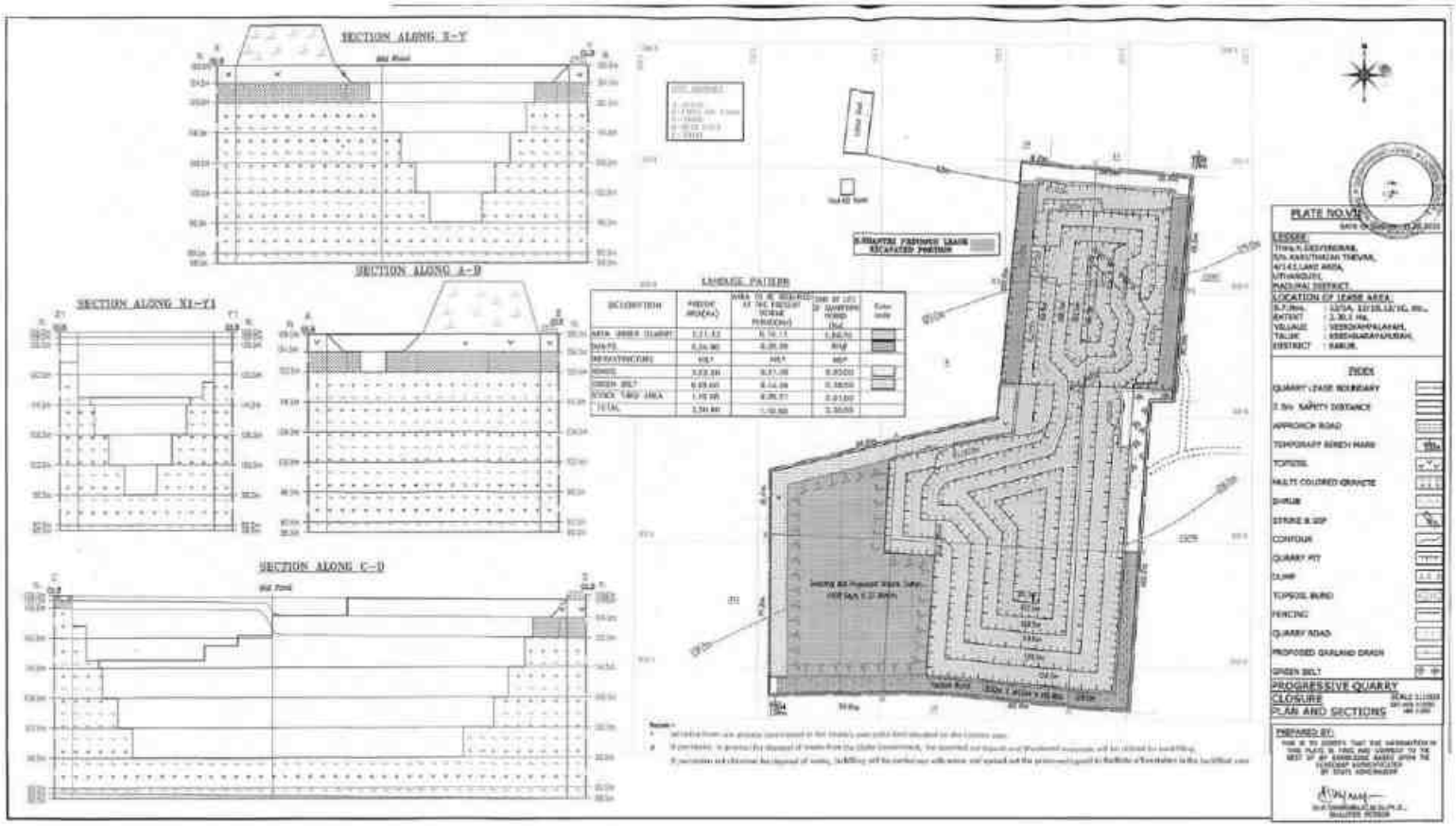


Figure 2-15 Progressive Quarry Closure Plan and Section of the quarry

2.8 Project Cost

The project cost is summarized in **Table 2.10**

Table 2-10 Project cost

S.No	Description of the Cost	Amount in Rs.
A. Operational Cost		
1.	Land Cost S.F.Nos.12/1A to 12/3E and 12/5A=2.13.0HaxRs.1,91,000/Ha=4,06,830/- S.F.Nos.12/4A to 12/4B=0.17.0HaxRs.2,12,500/Ha=36,125/-	4,43,000
2.	Labourers shed (already constructed)	2,00,000
3.	Sanitary facilities	75,000
4.	First aid room and Accessories & safety kits	50,000
5.	Excavator (2nos)	35,00,000
6.	Crawler crane (1 no)	15,00,000
7.	Diesel generator (1 no)	7,50,000
8.	Tipper (1 no)	12,00,000
9.	Diamond wire saw (2 nos)	6,00,000
10.	Compressor with loose tools (2 nos) & jack hammer (4 nos)	12,00,000
11.	Wagon drill (2 nos)	8,00,000
12.	Drinking water facility & water sprinkling	1,00,000
13.	Fencing cost (700m lengthxRs.300/- per meter)	2,10,000
14.	Garland Maintenance	1,00,000
15.	Greenbelt development under safety zone during this scheme period (200m saplimgxRs.200/-per saplimg)	40,000
	Total	**1,07,68,000**
C. EMP Cost		
1.	Air Environment	9,03,000
2.	Noise	50,000
3.	Water Environement	23,000
4.	Waste Management	1,10,000
5.	Implementation of EC, Mining Plan & DGMS Condition	16,44,000
6.	Greenbelt	2,50,000
	Total	**29,80,000**
	Total Project Cost	**1,37,48,000**

2.9 Technology & Process Description

2.9.1 Technology

Primary step of mining of minerals is the removal of the deposits from the ground. Once the minerals / ore are removed, additional preparation process is required to isolate the valuable minerals from their waste gangue minerals. There are two basic method of mining of minerals opencast and underground mining. The choice of method depends on the geologic, hydrological, geo-technical, geographic, economic, technological, environmental, safety, Socio - political and financial considerations. Schematic Diagram of Mining Process is given in **Figure 2.13.**

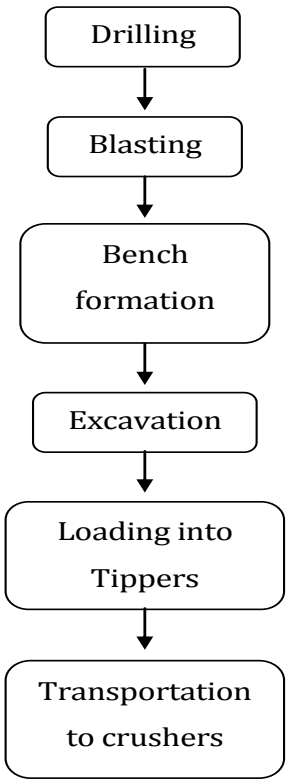


Figure 2-16 Schematic Diagram of Mining Process

2.9.2 Method of mining-Open Cast Working

Open cast method of semi mechanized mining with 6.0m vertical bench width of the bench is not less than bench height. As far as quarrying of multi colour granite is concerned, observance of the provisions of Regulation 106(2) (b) as above is seldom (possible due to various inherent petro genetic factors coupled with mining difficulties). Hence it is proposed to obtain relaxation to the provisions of the above regulation from the Director of mines safety for which necessary provision is available with the regulation 106 (2) (b) of MMR-1961, under Mine Act-1952.

2.10 Process Description

2.10.1 Blasting

The blasting design will be properly planned with ideal spacing and burden, ensuring appropriate stemming column with optimized explosive charge, so that ground vibratory effect, fly rocks, etc., are properly regulated and controlled. Necessary approvals for using of explosives are already obtained from explosive department. Blasting will be carried out at designed time with proper safety measures to prevent unauthorized entry and to avert mishaps. The blasting is proposed by adopting all the safety measures as per "MMR 1961' and with due permission of DGMS.

The portion to be extricated from the parent rock body is free in all planes by adopting different methods. Only mild explosives such as detonating cord, ordinary detonators etc will be used for

the production of multi colour granite. The blast holes of 32mm-36mm diameter are drilled up to the bottom of the horizontal plane all along the required planes without deviations.

Conventional 32mm-36mm dia blast holes are drilled perfectly parallel to each other at 0.6m intervals without any hole deviations, all along the required plane of splitting. The holes are drilled up to a depth of 1m to 1.5m above the required horizontal plane. Sub grade drilling is not necessary, since the splitting will be affected up to a further distance of few cms from the drill hole on blasting.

Explosives such as gelatin, delay detonators etc. may also be used occasionally at places further away from the multi colour granite deposit for certain development works such as forming approach roads to the working faces below ground level for forming flat surfaces to be used as dumping yard etc. The explosives required for this mine is obtained from the authorized, licensed dealer for which necessary permission will be obtained from the authority concerned. Blasting is carried out at appointed hours only with prior precaution to the local public.

2.10.2 Loading & Transportation

Colour granite will be loaded manually. If huge volume of the colour granite accumulates the same will be loaded with the help of excavator of 0.90m^3 bucket capacity. Material loaded in to the tippers will be sent to needy crusher units located outside the lease area, 1 no Tipper with capacity of 20 tonnes are proposed for the project.

2.10.3 Explosives

In granite quarries, only heaving effect is required and not the shattering effect. The aim is to recovery as large s block as possible. Hence only low intense explosives like D-cord and Gelatin sticks are used.In granite quarrying it is very difficult to prescribe the charge/hole as it depends upon the various factors like type of rock, texture, planes of weakness, required size of block etc.

2.10.4 Storage of Explosives

The proponent will engage an authorized explosive agency to carry out the small amount of blasting and it will be supervised by competent and statutory foreman/mines manager. The Proponent has been advised to one portable Magazine of ‘M” type at the earliest possible opportunity.

2.10.5 Mine Drainage

The lease applied area exhibits plain topography. The water level is at 63m as observed in nearby wells. The Production faces are operated at shallow depths. During the rainy seasons the surface run of water and the gorund water are collected at one point called as sump and dewatered nearby agricultural field with the help of 10 H.P water pump.

2.10.6 Disposal of Waste

The overburden in the form of Top soil, after the excavation top soil will be directly loaded into tipper to the needy buyers for road project and construction works for filling and leveling of low lying areas.

2.10.7 Stabilization of Dump

As the waste generation in the mine includes hard rock fragments of considerable size and irregular shape with varying angularity, the waste dump will be stable on its own even at higher slopes of the sides. However, suitable variety of soil will be identified and brought from outside and used for increasing the stability of the sides of the waste dumps and also for planting trees over the dumps in a phased manner.

2.11 Requirements

2.11.1 Land Requirement and Land Use Planning

Quarry Land details are shown in **Table 2.12** and Land use pattern is provided in**Table 2.13.**

Table 2-11 Quarry Land details

District and State	Taluk	Village	S.F. No	Area in (Ha)	Land Classification
Karur, Tamil Nadu	Krishnarayapuram	Veeriyapalayam	12/1A, 12/1B, 12/1C, 12/1D, 12/1E, 12/2A, 12/2B, 12/2C, 12/3A, 12/3B, 12/3C, 12/3D, 12/3E, 12/4A, 12/4B and 12/5A	2.30.0	Patta Land

Table 2-12 Land Use Pattern of the lease area

S. No	Description	Present Area (Ha.)	Area in use during the quarrying period (Ha.)	Area at end of the life of Quarry(ha)
1.	Area under quarry	0.71.32	0.74.11	1.86.70
2.	Waste dump	0.34.00	0.20.80	Nil
3.	Roads	0.02.00	0.01.00	0.03.00
4.	Green Belt	0.03.00	0.14.26	0.38.50
5.	Stocking blocks	1.19.68	0.09.51	0.01.80
Total		**2.30.00**	**1.19.68**	**2.30.00**

2.11.2 Water Requirement

The total water requirement is 1.8 KLD. The total water requirement will be met through private tankers. The Veeriyapalayam Multi Colour Granite quarry will not produce toxic effluent in the form of solid, liquid or gas. No waste water will be generated by quarry operation except domestic sewage. Domestic sewage will be disposed to septic tank followed by soak pit. Septic tank will be cleaned periodically. The water requirement details are given in **Table 2.14.**

Table 2-13 Water requirement breakup

S. No	Description	Water Requirement (KLD)
1.	Drinking &Domestic purpose	0.5
2.	Dust suppression	0.7
3.	Green Belt	0.6
	Total	**1.8**

2.11.3 Power & Fuel Requirement

No power is required during mining operations. Working is restricted on day time only between 7AM to 5PM. Diesel (HSD) will be used for quarrying machineries and it will be brought from nearby diesel pumps. Fuel requirement details are given in **Table 2.15.**

Table 2-14 Power Requirements

S. No	Details	Quantity	Source
1.	Diesel Requirements approx. (Litres of HSD for 5 years)	1,99,520	Nearby diesel pumps

2.11.4 List of Equipments

The list of Equipments is given in**Table 2.16.**

Table 2-15 Lists of Machineries

S.No	Machinery	Capacity	Numbers
1.	Jack Hammer	1.2 to 6m	4
2.	Excavator with bucket	0.30m^3	2
3.	Tippers	20 tonnes	1
4.	Compressor	450/150 psi	2
5.	Diesel generator	125kVA	1
6.	Diamond wire saw	20m^3/day	2
7.	Wagon drill	20hp	2
8.	Crawler crane	0.85m^3	1

2.11.5 Man power Requirement

Manpower details are given in**Table 2.17**.

Table 2-16 Manpower Details

S. No	Description	No of persons (Direct)
1.	Machinery Operator	6
2.	Mines Manager	1
3.	Mines manager/Mate	1
Workers		
1.	Skilled labour	5
2.	Semi skilled	12
3.	Unskilled	10
	Total	**35**

2.12 Infrastructure facilities

Sanitation facility, office room and rest room facilities will be provided.

2.13 Description of Mitigation Measures Incorporated Into the Project to Meet the Environmental Standards

From an environmental perspective, this phase is of paramount significance due to its potential to invoke long-term impacts. The adverse effects that are likely to occur during operational phase of the project are: Air Pollution (gaseous emissions), Effluent/Sewage generation, Noise generation, Solid waste generation etc.

2.13.1 Solid Waste Management

The municipal solid waste generation and management details are given in **Table 2.18.**

Table 2-17 Municipal Solid Waste generation & Management

S. No	Type	Quantity Kg/day	Disposal method
1.	Organic	9.45	Municipal bin including food waste
2.	Inorganic	6.30	TNPCB authorized recyclers
Total		**15.75**	

As per CPHEEO guidelines: MSW per capita/day =0.45

2.13.2 Hazardous waste Management

The type of hazardous waste and the quantity generated are detailed in**Table 2.19.**

Table 2-18 Hazardous Waste Management

Waste Category No	Description	Quantity (L/Year)	Mode of Disposal
5.1	Waste Oil	3.0	Will be Collected in leak proof containers and disposed to TNPCB Authorized Agencies for Reprocessing/ Recycling

2.13.3 Assessment of New & untested technology for the risk of technological failure

Semi mechanized opencast method will be used for this mining project. So, no new and untested technology has been adopted for this proposed project.

2.13.4 Mine Closure Plan

The site boundaries shall be safely fenced and used as a reservoir after mining activities are over. There is no proposal for back filling, reclamation and rehabilitation. The quarried pits after the end of the life of lease will be fenced to prevent inherent entry of public and cattle. There is no proposal for back filling, reclamation and re-habitation.

2.13.4.1 Progressive Mine Closure Plan

The various schedules for mining activities regarding mining of Multi Colour Granite, waste disposal, proposed land use pattern, environmental preservation measures, disaster management plan, etc. have been fully covered in the earlier chapters in this EIA/EMP report.

Concurrent planning for various steps to be adopted for final mine closure, along with regular working schedules and systems of the mine, will facilitate to effect smooth switchover to final mine closure stages ultimately.

3 DESCRIPTION OF THE ENVIRONMENT

This chapter depicts the establishment of baseline for valued environmental components, as identified in and around the proposed Veeriyapalayam Multi Colour Granite Quarry leased over an extent of 2.30.0 hectares at S.F. Nos: 12/1A, 12/1B, 12/1C, 12/1D, 12/1E, 12/2A, 12/2B, 12/2C, 12/3A, 12/3B, 12/3C, 12/3D, 12/3E, 12/4A, 12/4B and 12/5A of Veeriyapalayam Village, Krishnarayapuram Taluk, Karur District, and Tamil Nadu State by Thiru.K. Deivendran. The primary baseline data monitoring covered one season (three (3) months) i.e., from March 2023 to May 2023 and secondary data was collected from government and semi-government organization's published data. The primary baseline data has been generated by M/s. Hubert Enviro Care Systems (P) Ltd, Chennai, a MoEF&CC approved and National Accreditation Board for Testing and Calibration Laboratories (NABL) accredited environmental testing laboratory for the following terrestrial environmental components.

- **Meteorology:** Temperature, Relative Humidity, Rainfall, Wind Speed & Direction- **Refer Section - 3.5**
- **Ambient Air Quality:** Particulate matter <10 micron size (PM_{10}), Particulate matter <2.5 micron size ($PM_{2.5}$), Sulphur Dioxide (SO_2), Nitrogen Dioxide (NO_2), Carbon Monoxide (CO), Lead (Pb), Ozone (O_3), Benzene (C_6H_6), Benzo (a) pyrene ($C_{20}H_{12}$), Arsenic (As), Nickel (Ni), free Silica and Ammonia (NH_3)- **Refer Section - 3.6**
- **Ambient Noise Levels:** Day equivalent noise levels, Night equivalent noise levels **- Refer Section - 3.7**
- **Inland Water Quality:** Groundwater Quality, Surface Water Quality **- Refer Section - 3.8**
- **Soil Quality - Refer Section - 3.9**
- **Ecology - Refer Section - 3.10**
- **Social Economic Status - Refer Section - 3.11**

3.1 Study Area

A 10 km radial distance from the proposed project site boundary has been identified as the General study area for assessing the baseline environmental status. The core study area is the project area and its immediate surroundings to the tune of 1.0 km radius from the boundary. Further the Project Impact/Influence Area (PIA) is 10 km from the boundary of the project site which covers parts of Karur District, Tamil Nadu State. The primary baseline data monitored covered three (3) months i.e., from **March 2023 to May 2023.**

3.2 Description of Study Area

As described in **Chapter 1**, Thiru.Deivendran proposes Veeriyapalayam Multi Colour Granite Quarry leased over an extent of 2.30.0 hectares at S.F.No: 12/1A, 12/1B, 12/1C, 12/1D, 12/1E, 12/2A, 12/2B, 12/2C, 12/3A, 12/3B, 12/3C, 12/3D, 12/3E, 12/4A, 12/4B and 12/5A of

Veeriyapalayam Village, Krishnarayapuram Taluk, Karur District, and Tamil Nadu State. An overall idea of the study area with reference to the physical conditions are presented for better understanding in the following sections before proceeding into the section on the prevailing environmental conditions of the study area. The map showing the satellite image of the study area is given in **Figure 3.1** and Topo Map of the study area is given in **Figure 3.2.**

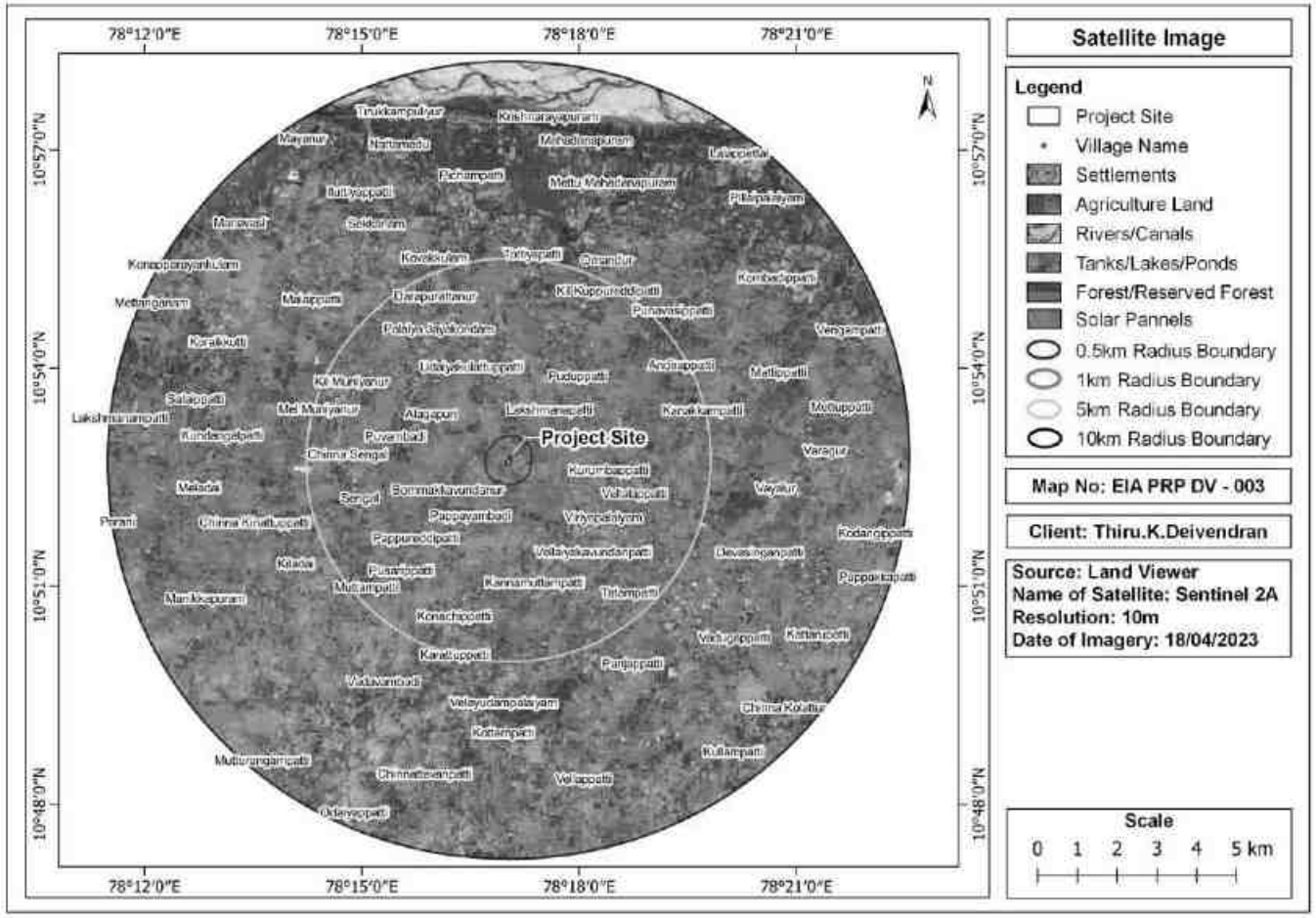


Figure 3-1 Map showing the satellite Image of the study

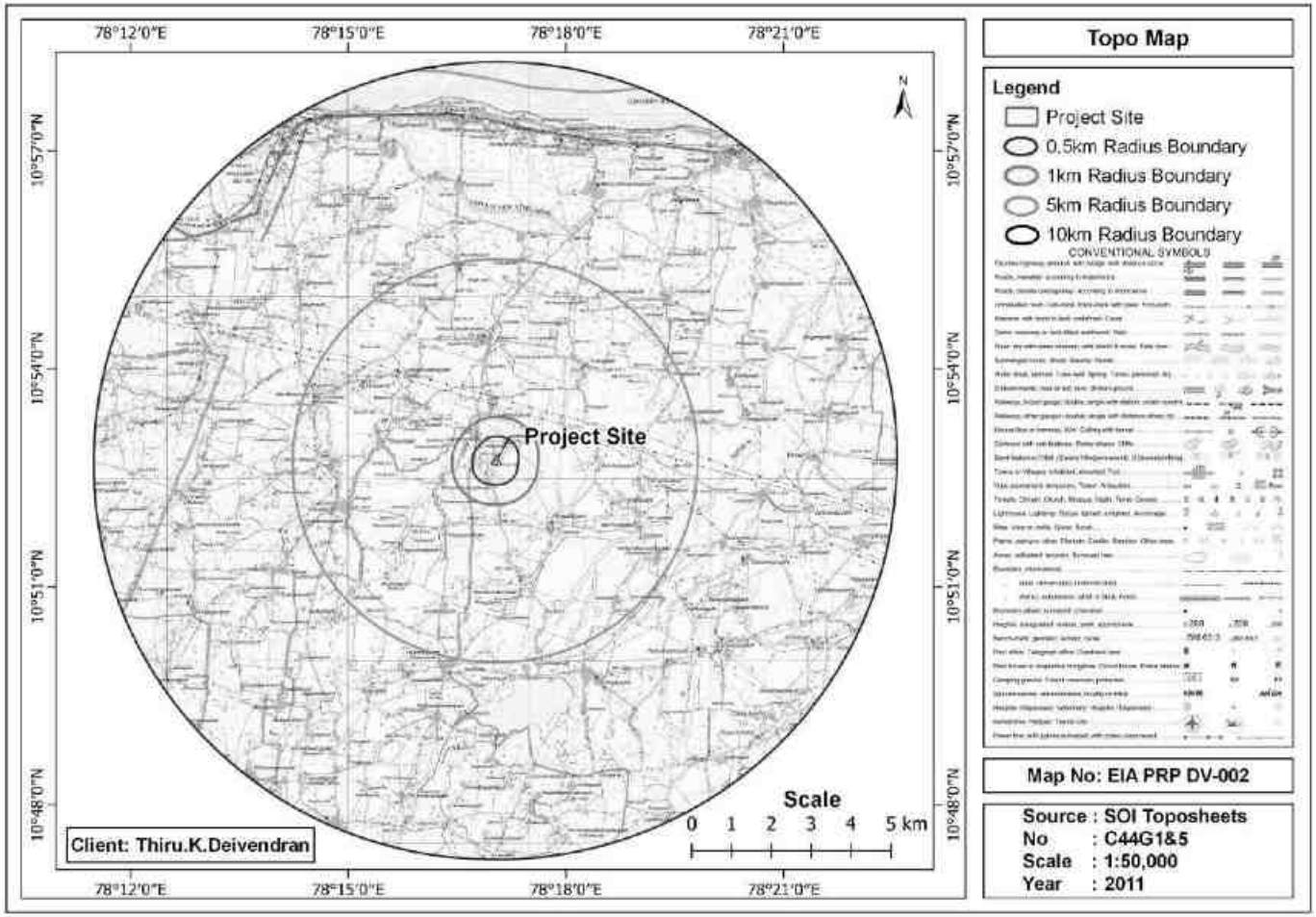


Figure 3-2 Topo Map of Study Area

3.3 Environmentally/Ecologically Sensitive areas

This section details with the environmentally sensitive areas present within the project site and surrounding environs. It included national parks, state forest, essential habitats etc. The environmental sensitive areas covering an aerial distance of 15 km from the project boundary is given in **Table 3.1.**

Table 3-1 Environmentally sensitive Areas within 15km Project Boundary

<table>
<tr><th>S.No.</th><th>Areas</th><th>Distance & Direction from project boundary</th></tr>
<tr><td>1.</td><td>Monuments</td><td>
<table>
<tr><th>S. No</th><th>Places</th><th>Distance (~km)</th><th>Direction</th></tr>
<tr><td>1.</td><td>Kundankal Jain Monument</td><td>11.57</td><td>E</td></tr>
<tr><td>2.</td><td>Sirnivasanallur Koranganatha Temple</td><td>13.38</td><td>NE</td></tr>
</table>
</td></tr>
<tr><td>2.</td><td>Reserved Forests</td><td>
<table>
<tr><th>S.No</th><th>Places</th><th>Distance (~km)</th><th>Direction</th></tr>
<tr><td>1.</td><td>Mahadanapuram RF</td><td>8.46</td><td>NNE</td></tr>
<tr><td>2.</td><td>Sittalavay RF</td><td>8.55</td><td>N</td></tr>
<tr><td>3.</td><td>Lalappettai RF</td><td>8.58</td><td>NNE</td></tr>
<tr><td>4.</td><td>Mayanur RF</td><td>9.87</td><td>NW</td></tr>
<tr><td>5.</td><td>Nattam RF</td><td>10.42</td><td>N</td></tr>
<tr><td>6.</td><td>RF near Sippalaputtur</td><td>11.06</td><td>NNW</td></tr>
<tr><td>7.</td><td>RF near Mel Vadiyam</td><td>14.03</td><td>NE</td></tr>
<tr><td>8.</td><td>RF near Kattalai</td><td>14.18</td><td>NW</td></tr>
<tr><td>9.</td><td>Manattattai RF</td><td>14.75</td><td>NE</td></tr>
</table>
</td></tr>
<tr><td>3.</td><td>Water Bodies</td><td>
<table>
<tr><th>S. No</th><th>Places</th><th>Distance (~km)</th><th>Direction</th></tr>
<tr><td>1.</td><td>Pond near Project Site</td><td>0.19</td><td>W</td></tr>
<tr><td>2.</td><td>Pungar R</td><td>3.28</td><td>SE</td></tr>
<tr><td>3.</td><td>Kovakkulam Lake</td><td>4.35</td><td>NNW</td></tr>
<tr><td>4.</td><td>Stream near Vadavambadi</td><td>5.37</td><td>SSW</td></tr>
<tr><td>5.</td><td>Panjappatti Lake</td><td>5.43</td><td>S</td></tr>
<tr><td>6.</td><td>Kattalai High Level Canal</td><td>5.87</td><td>NNE</td></tr>
<tr><td>7.</td><td>Vayalur Lake</td><td>6.50</td><td>ESE</td></tr>
<tr><td>8.</td><td>Mayanur Barrage Right Canal</td><td>8.33</td><td>N</td></tr>
<tr><td>9.</td><td>Kaveri/Cauvery R</td><td>8.87</td><td>NNE</td></tr>
<tr><td>10.</td><td>North Bank Canal</td><td>10.03</td><td>N</td></tr>
<tr><td>11.</td><td>Mullippadi Canal</td><td>10.44</td><td>N</td></tr>
<tr><td>12.</td><td>Odaiyappatti Lake</td><td>10.54</td><td>SSW</td></tr>
<tr><td>13.</td><td>Kattuvari Canal</td><td>10.81</td><td>NE</td></tr>
<tr><td>14.</td><td>Karaipottanur R</td><td>10.94</td><td>NNW</td></tr>
<tr><td>15.</td><td>Irumbudippatti Lake</td><td>11.81</td><td>ESE</td></tr>
<tr><td>16.</td><td>Virarakkiyam Lake</td><td>12.72</td><td>WNW</td></tr>
<tr><td>17.</td><td>Kattaputtur Channel</td><td>13.46</td><td>NW</td></tr>
<tr><td>18.</td><td>Amaravati R</td><td>14.08</td><td>NW</td></tr>
<tr><td>19.</td><td>Karunamkulam</td><td>14.13</td><td>SW</td></tr>
<tr><td>20.</td><td>Nerur Channel</td><td>14.61</td><td>NW</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><td>4.</td><td>Nearest Highways</td><td>➢ MDR-625(Mahadhanapuram-Mylampatti) ~ 0.17km, W
➢ SH-199 (Vaiyampatti-Karur Road) ~ 10.41km, WSW
➢ NH-81(Coimbatore-Karur-Chidambaram) ~ 8.27km, N</td></tr>
<tr><td>5.</td><td>Nearest Railway access</td><td>➢ Railway Station - Mahadanapuram Railway Station ~ 8.31km, N.
➢ Railway Track - (Sithalavai RS – Mahadhanapuram RS) ~ 8.31km, N</td></tr>
<tr><td>6.</td><td>Nearest Airport/ Port</td><td>➢ Tiruchirappalli International Airport ~ 47.40km, ESE</td></tr>
<tr><td>7.</td><td>Densely populated or built-up area
(Nearest Town, City, District)</td><td>Town:Thottiyam~13km
City: Tiruchirapalli~38km

<table><tr><th>S. No</th><th>Places</th><th>Distance (~km)</th><th>Direction</th><th>Population</th></tr><tr><td>1.</td><td>Kaikaluviyur</td><td>0.14</td><td>NNW</td><td>120</td></tr><tr><td>2.</td><td>Uthuppatti</td><td>0.41</td><td>ENE</td><td>100</td></tr><tr><td>3.</td><td>Ellammankovilpatti</td><td>0.80</td><td>WNW</td><td>250</td></tr><tr><td>4.</td><td>Lakshmanapatti</td><td>0.89</td><td>N</td><td>1000</td></tr><tr><td>5.</td><td>Bommakkavundanur</td><td>1.23</td><td>WSW</td><td>100</td></tr></table></td></tr>
<tr><td>8.</td><td>Seismic Zone</td><td>The project site comes under Zone-II (Low Damage Risk Zone)</td></tr>
<tr><td>9.</td><td>Man Made</td><td>School
<table><tr><th>S.No</th><th>Places</th><th>Distance (~km)</th><th>Direction</th></tr><tr><td>1.</td><td>Pappayambadi Panchayat Union Middle School</td><td>2.02</td><td>SW</td></tr><tr><td>2.</td><td>Palayajayankondam Government High School</td><td>2.61</td><td>N</td></tr><tr><td>3.</td><td>Chinna Sengal Goverment Higher Secondary School</td><td>3.74</td><td>W</td></tr><tr><td>4.</td><td>Kuppureddipatti Panchayat Union Middle School</td><td>4.23</td><td>NNE</td></tr><tr><td>5.</td><td>Panjapatti Goverment Higher Secondary School</td><td>5.16</td><td>SSE</td></tr><tr><td>6.</td><td>Punavasippatti Government Higher Secondary School</td><td>6.05</td><td>NE</td></tr><tr><td>7.</td><td>Krishnarayapuram Goverment High School</td><td>8.54</td><td>N</td></tr><tr><td>8.</td><td>Lalapettai Goverment High School</td><td>9.61</td><td>NE</td></tr><tr><td>9.</td><td>Marist Higher Secondary School</td><td>10.2</td><td>SSW</td></tr><tr><td>10.</td><td>Virarakkiyam Goverment Higher Secondary School</td><td>12.55</td><td>WNW</td></tr></table>Colleges
<table><tr><th>S.No</th><th>Places</th><th>Distance (~km)</th><th>Direction</th></tr><tr><td>1.</td><td>Kulithalai Government Arts College</td><td>10.81</td><td>E</td></tr><tr><td>2.</td><td>Suba Sakthi Women's Arts and Science College</td><td>11.53</td><td>E</td></tr></table></td></tr>
</table>

3.	Kaniyalampatti Government Polytechnic College	12.55	SW
4.	VKS College of Engineering and Technology	12.85	ESE
5.	Kongunadu Institution	14.36	N
6.	Vetri Vinayaha Institution	14.75	N

Hospitals

S.No	Places	Distance (~km)	Direction
1.	Palayajayankondam Government Veterinary Hospital	2.58	N
2.	Sengal Government Veterinary Hospital	4.16	WSW
3.	Sengal Goverment PHC	4.8	WSW
4.	Kovakkulam Goverment Hospital	5.81	N
5.	Panjapatti Goverment UPHC	5.85	SSE
6.	Chinthalavadi Government Hospital	8.65	NE
7.	Ayyarmalai Goverment PHC	11.59	E
8.	Kaniyalampatti Goverment PHC	12.4	SW
9.	Thoittyam Government Hospital	12.89	NNE
10.	Kaduvetti Goverment PHC	13.15	NNW
11.	Kattuputhur Goverment UPHC	14.59	NNW

Government Buildings

S.No	Places	Distance (~km)	Direction
1.	Pappayambadi Gram Panchayat Office	1.99	SW
2.	Palayajayankondam VAO Office	2.80	N
3.	Krishnarayapuram Registration Office	8.73	NNw
4.	Krishnarayapuram Taluk Office	8.85	NNW
5.	Mayanur Police Station	9.36	NW
6.	Kulithalai RTO Office	11.21	E
7.	Thottiyam Taluk Office	13.48	NNE

Religious Place

S.No	Places	Distance (~km)	Direction
1.	Kilikoottu Mariyamman Temple	0.49	NW
2.	Vinayagar Temple	0.60	S
3.	Ellai Amman Kovil	0.88	NW
4.	Arulmigu Aalavanthiswar Aalayam	3.15	N
5.	Arulmigu Meenaktchi Sundreswarar Temple	4.09	W
6.	Karuppasamy Temple	5.88	SSE
7.	Shri Yoga Narasimhar Temple	8.46	NNE
8.	Sree Thirukkanmaleeswarar Temple	8.63	N
9.	E.C.I Church	9.26	NW
10.	Lalapettai Masjid	9.70	NE
11.	Madukkarai Sri Sellandiamman Temple	9.89	NW
12.	Arulmigu Mariamman Kovil	10.20	S
13.	Arulmigu Rathnagireeswarar Temple	10.75	E
14.	Analadeeshwarar Temple	13.42	NNE
15.	E.C.I Immanuel Church	13.52	W
16.	Arulmigu Ellaiamman Thirukovil	13.55	WNW
17.	Shri Ayyappan Temple	13.59	NNE
18.	Madura Kaliamman Temple	13.69	NNE
19.	Kattalai Malayala Swamy Kovil	14.11	NW

Industries

S.No	Places	Distance (~km)	Direction
1.	Walwhan Renewable Energy Limited	0.72	SSE
2.	HILD Energy Solar Power Plant	3.63	SE
3.	Solar Power Plant near Panjapatti	5.46	SE
4.	Ayyarmalai Solar Power Plant	6.09	E
5.	Quick Solar Pvt Ltd	6.51	SSE
6.	SKT Power Plant	7.20	E
7.	Sarjan Realities Solar	7.36	ESE

			Power Plant			
		8.	Ambal Bricks Pvt Ltd	7.46	ENE	
		9.	KCP Packaging Ltd	8.64	NW	
		10.	TNPL Mayanur	9.27	NW	
		11.	Solar Power Plant near Pothuravuthanpatti	9.33	SSE	
		12.	Magna Green Building Products	9.63	WNW	
		13.	Tamilnadu Bricks Works	10.06	W	
		14.	PVG Chambers	10.37	W	
		15.	Manjanaickenpatti Solar Park	12.30	SW	
		16.	Solar power plant near Desiyamangalam	13.90	SE	
		17.	Arthanari Loom Centre Pvt Ltd	14.40	SE	

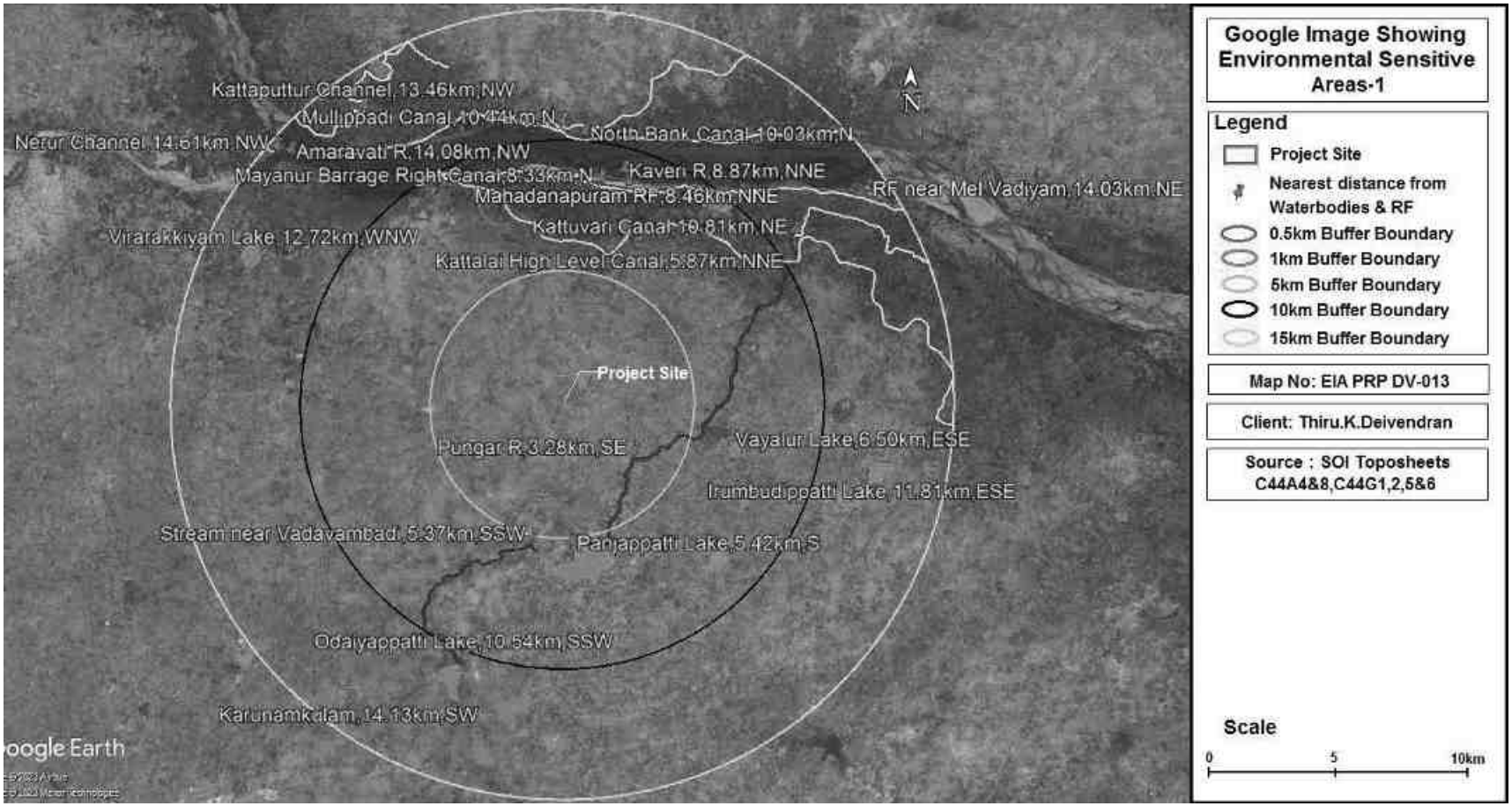


Figure 3-3 Environmental sensitive areas covering within 15 km from project boundary

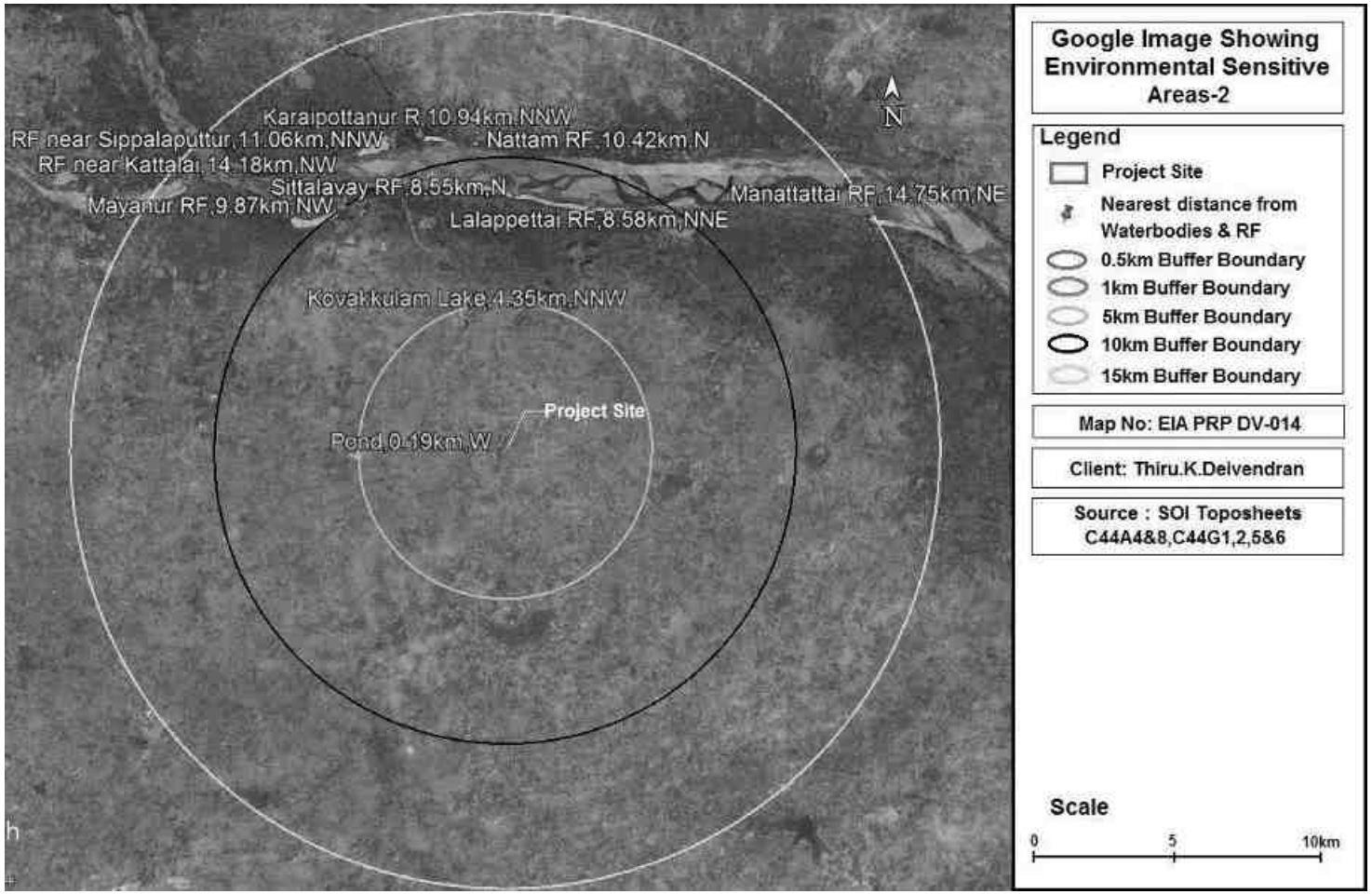


Figure 3-4 Environmental sensitive areas covering within 15 km from project boundary

3.4 Physical Conditions of PIA district

In this section, the physical conditions of PIA district are discussed in general and wherever possible references to the conditions prevailing in the study area in particular are also provided. The physical conditions are discussed as under:

- District profile
- Drainage, land use, geology, Physiographic profile
- Natural resources
- Climatic conditions, eismic zone characteristics and natural hazard

3.4.1 PIA District Profile

Karur district has an area of 2904 sq kms and 9th biggest from the lowest to the highest. It is located between 10º 45' and 11º 45' of the Northern latitude and 77º 45' and 78º 07' of the Eastern longitude. The district is bounded by Tiruchirappalli district on the east, Namakkal and Tiruchirappalli districts on the north, Dindigul district on the south and Erode district on the west. Rangamalai hills and Kadavur hills in the southern side of the district constitutes the remnants of the much denuded Eastern Ghats and rise to the height of over 1031 m above mean sea level. From these hills, the district slopes gently towards northeast and forms a vast stretch of plain country till the eastern border of the district.

Source: *https://karur.nic.in/about-district/district-profile-2/*

(**Ref**: Directorate of Census Operations-Tamil Nadu, "District Census Handbook-2011,Karur District",Series-34 Part XII-A)

3.4.2 Climatic Conditions

The district enjoys a tropical climate. The period from March to May is generally hot and dry. The weather is pleasant during the period from November to January. Usually morning is more humid than afternoon. The relative humidity is generally between 40% and 80%. But, from February to July, the air is comparatively drier in the afternoon. The mean maximum temperature ranges from 26.7° C to 38.56° C and the mean minimum temperature ranges from 18.7° C to 29.3° C. The daytime heat is oppressive and the temperature is as high as 43.9°C. The lowest temperature recorded is of the order of 13.9°C. The district receives rain under the influence of both southwest and northeast monsoons. The northeast monsoon chiefly contributes to the rainfall in the district. Most of the precipitation occurs in the form of cyclonic storms caused due to the depressions in Bay of Bengal.

The southwest monsoon rainfall is highly erratic and summer rains are negligible. In 2009-10, Karur district received 637.1 mm of rainfall as compared to a normal of 740.4 mm.

Source: *https://karur.nic.in/about-district/district-profile-2/*

(**Ref**: Directorate of Census Operations-Tamil Nadu, "District Census Handbook-2011, Karur District",Series-34 Part XII-A)

3.4.3 Natural Resources of PIA District

3.4.3.1 Flora & Fauna

The flora and fauna sources in this district are moderate. The fruit trees commonly found here are Tamarind. In the hilly tracks, Navel, Elanthai etc., are found in the wild. The varieties of timber found in the hilly tracks are Neem, Malai Vembu, Manja Kadambu, Navel etc. As regards fauna, animals like Elephant, Tigers, etc are not found anywhere in the district. Only small animals like Rabbits, Foxes and Reptiles are seen in the forests in very small numbers.

Source: *https://karur.nic.in/about-district/district-profile-2/*

(**Ref**: Directorate of Census Operations-Tamil Nadu, "District Census Handbook-2011,Karur District",Series-34 Part XII-A)

3.4.3.2 Forest Resources

The forest resources of this district are very meagre when compared to the State as a whole. Karur district has only about 2.38% of its land under forest cover. The forest available in this district is situated mostly in Kadavur Panchayat Union and in small patches in the other parts of the district. They are not only small in area but also poor in quality. All the forests are degraded forests and tropical dry thorny forests. The main forest produce in this area is firewood and to a lesser extent country wood small timber.The Reserve forests in this district are identified as degraded forests and therefore Karur forest division is implementing Tamil Nadu Afforestation Project since 1997. The specific objectives of this project are improving the productivity of forests by creating rich tree cover through intensive soil conservation and water harvesting measures, preservation of areas which are rich in bio-diversity, enhancing the capabilities of Tamil Nadu Forest Department by establishing geographic information system and management of natural resources through joint forest management.

Source: *https://karur.nic.in/about-district/district-profile-2/*

(**Ref**: Directorate of Census Operations-Tamil Nadu, "District Census Handbook-2011,Karur District",Series-34 Part XII-A).

3.4.3.3 Irrigation

The Cauvery system channels are the main source of irrigation. The irrigation facilities are often found inadequate to raise crops throughout the year. Because of inadequate storage and seasonal variations in the river flow, there are severe shortages of water during critical months. Irrigation wells provide an unfailing supply of water and form important source of irrigation in the district. There are 47316 wells in the district during 2009-10, used exclusively for irrigation; 43067 pumpsets were

energised till march 2010 and 21725 huts were electrified in 2009. As per the village records, net area sown in Karur district in 2009-10 was 82597.5 hectares. Out of this, 47747.5 hectares were irrigated, which constitutes 57.81% of the Net sown area.

Source: *https://karur.nic.in/about-district/district-profile-2/*

(**Ref**: Directorate of Census Operations-Tamil Nadu, "District Census Handbook-2011,Karur District",Series-34 Part XII-A).

3.4.3.4 Agricultural Resources

The Department of Agriculture implements the Integrated Cereal development programme, National Pulses development programme, Oilseeds Production Programme, Oil Palm Development Programme and National Watershed Development Programme for Rain fed Areas in the district. The district has one State Seed Farm situated at Inungur in Kulithalai Taluk. The main objective of this farm is production and distribution of quality seed of Paddy and Millets. There are 24 wholesale fertilizer retail shops and 232 Fertilizer dealer shops in the district. While, 82 Primary Agriculture Credit Societies are also functioning to meet the fertilizer and pesticide needs of the farmers.

Source: *https://karur.nic.in/about-district/district-profile-2/*

(**Ref**: Directorate of Census Operations-Tamil Nadu, "District Census Handbook-2011,Karur District",Series-34 Part XII-A).

3.4.3.5 Mineral Resources

The district is rich in mineral deposits. Good building stones and road metal, sand, impure bands of crystalline limestone, scattered bladed aggregates of sillimenite crystals and quartz and feldspar are found in the district. At Thogamalai and surrounding areas multi-coloured Granites are available. The cement and quartz powder industries are the most important in this district. Chettinad Cements at Puliyur produces around 2,400 tonnes of cement per day. The revenue obtained from the mineral sector is around 3 crores per annum.

Source: *https://karur.nic.in/about-district/district-profile-2/*

(**Ref**:Directorate of Census Operations-Tamil Nadu, "District Census Handbook-2011,Karur District",Series-34 Part XII-A).

The mineral map of Tamilnadu is shown in the **Figure 3-5.**

Figure 3-5 Mineral Map of Tamilnadu

3.4.4 Land Use & Land Cover

Total geographic area of Karur district is 3004 Sq.Km. Urban Built-up area is 40.98 Sq.Km and Rural Built-up area is 207 Sq.Km.

3.4.4.1 Land Use and Land Cover of the Study Area

Total Project Study area is **323.23** Sq.km. The Land Use Pattern is given in **Table 3-2.** The Land Use Pattern and Land Use Map of the Study area are given in **Figure 3-6** and **Figure 3-7** respectively.

Table 3-2 Land Use Pattern of the Study Area

S.No.	Description	Area (Sq. Km)	Area (Acres)	Area (Hectares)	Area (%)
1.	Crop Land	159.05	39302.05	15905	49.21
2.	Fallow	102.43	25310.97	10243	31.69
3.	Rural	24.35	6017.01	2435	7.53
4.	River / Stream / Canals	13.64	3370.51	1364	4.22
5.	Scrub Land	8.41	2078.15	841	2.60
6.	Plantation	6.40	1581.47	640	1.98
7.	Tanks / Lakes / Canals	5.07	1252.82	507	1.57
8.	Grass / Grazing Land	2.40	593.05	240	0.74
9.	Mining	1.35	333.59	135	0.42
10.	Urban	0.13	32.12	13	0.04
	Total	**323.23**	**79871.75**	**32323**	**100**

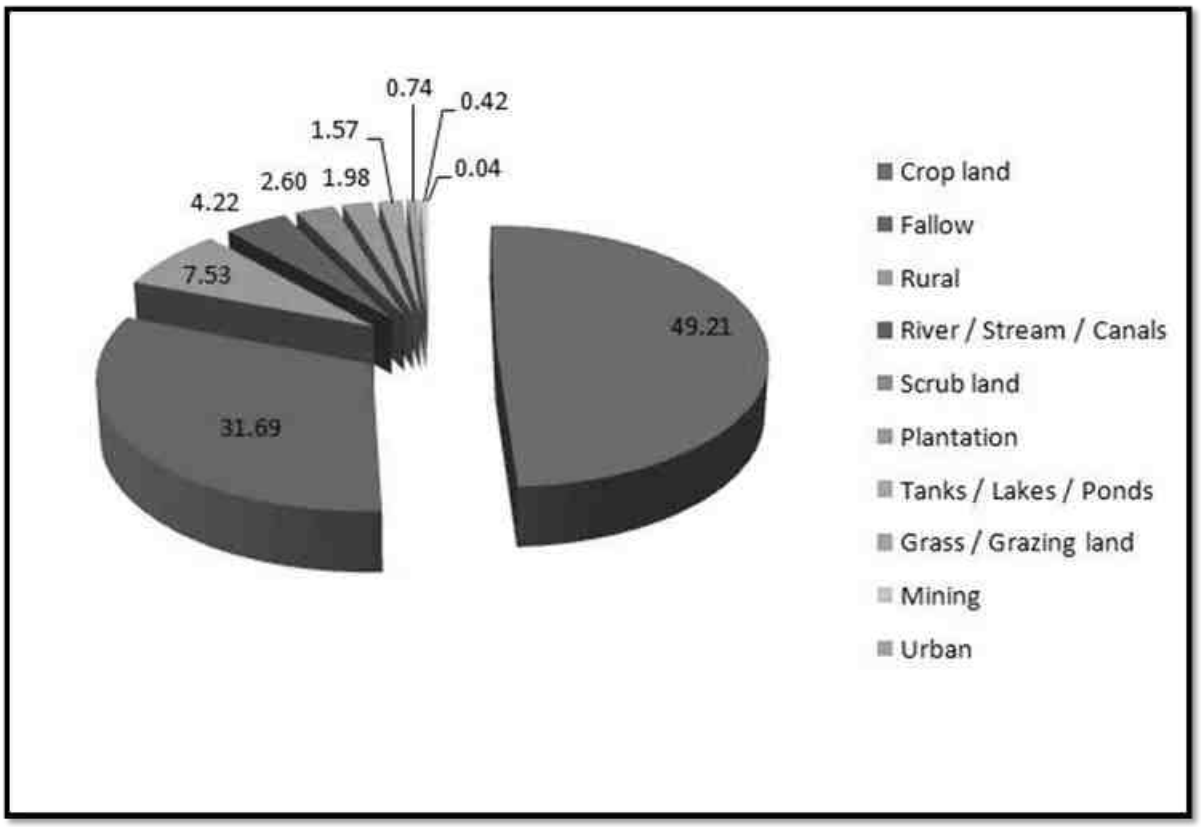


Figure 3-6 Land Use Pattern of the Study Area

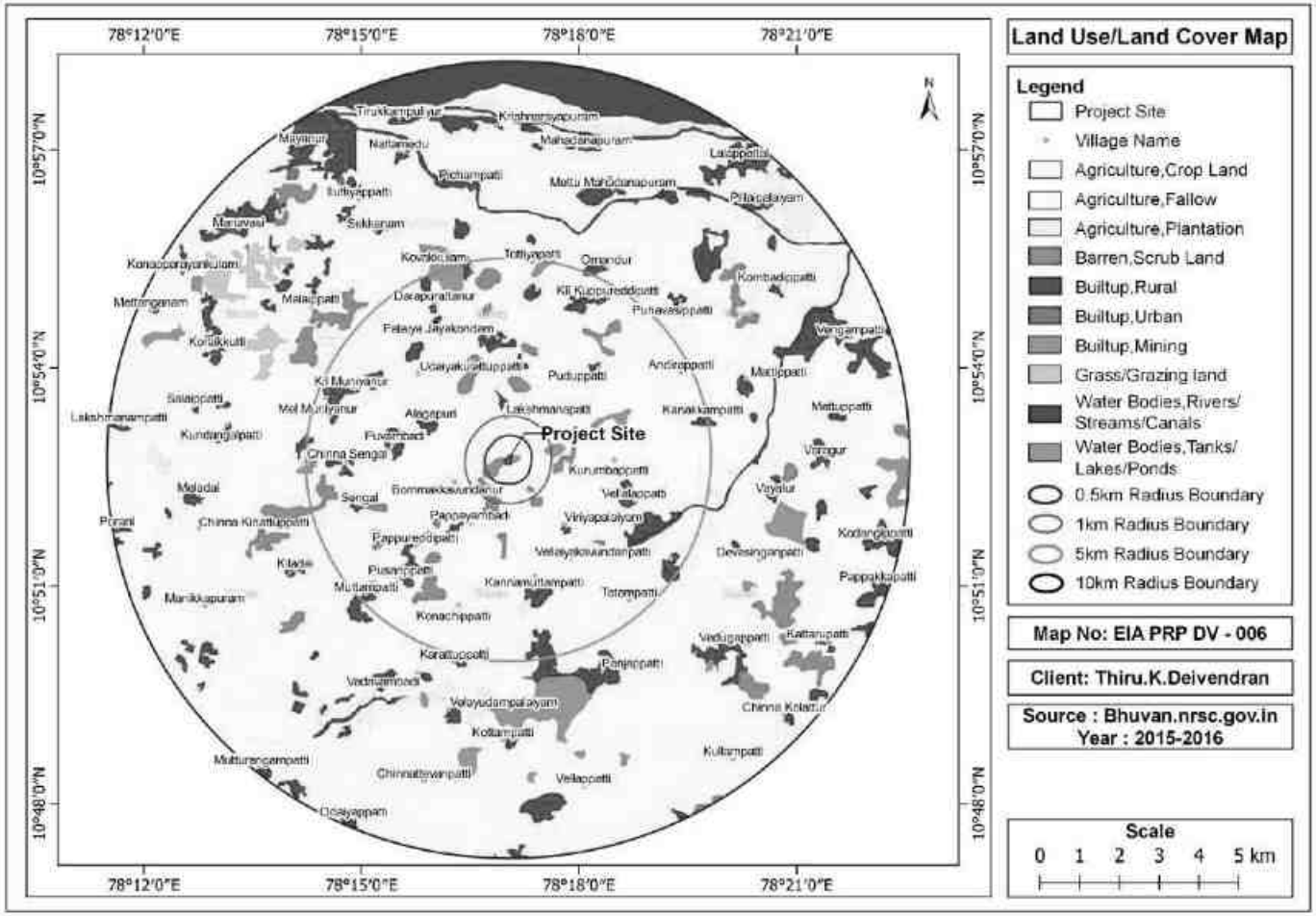


Figure 3-7 Land Use Map of the Study Area

3.4.5 Topography

The Rangamalai hills and Kadavur hills occurring in the southern side of the district constitutes the remnants of the much denuded Eastern Ghats and rise to heights of over 1031 m above mean sea level. From these hills the district slopes gently towards north east and forms a vast stretch of plain country till the eastern boarder of the district. There are numerous small residual hills represented by Ayyarmalai, Thanthonimalai and Velayuthampalayam hills. The general elevation of the area is ranging between 100 m and 200m above mean sea level. Topo map of study area is given as **Figure 3-2**.and contour map of the study area is given as **Figure 3-8.**

Source: *https://www.spc.tn.gov.in/Exe_Summary_DHDR/Karur.pdf*

(Ref: State planning Comission –Tamil Nadu, "District Human Development Report-2017, Karur District")

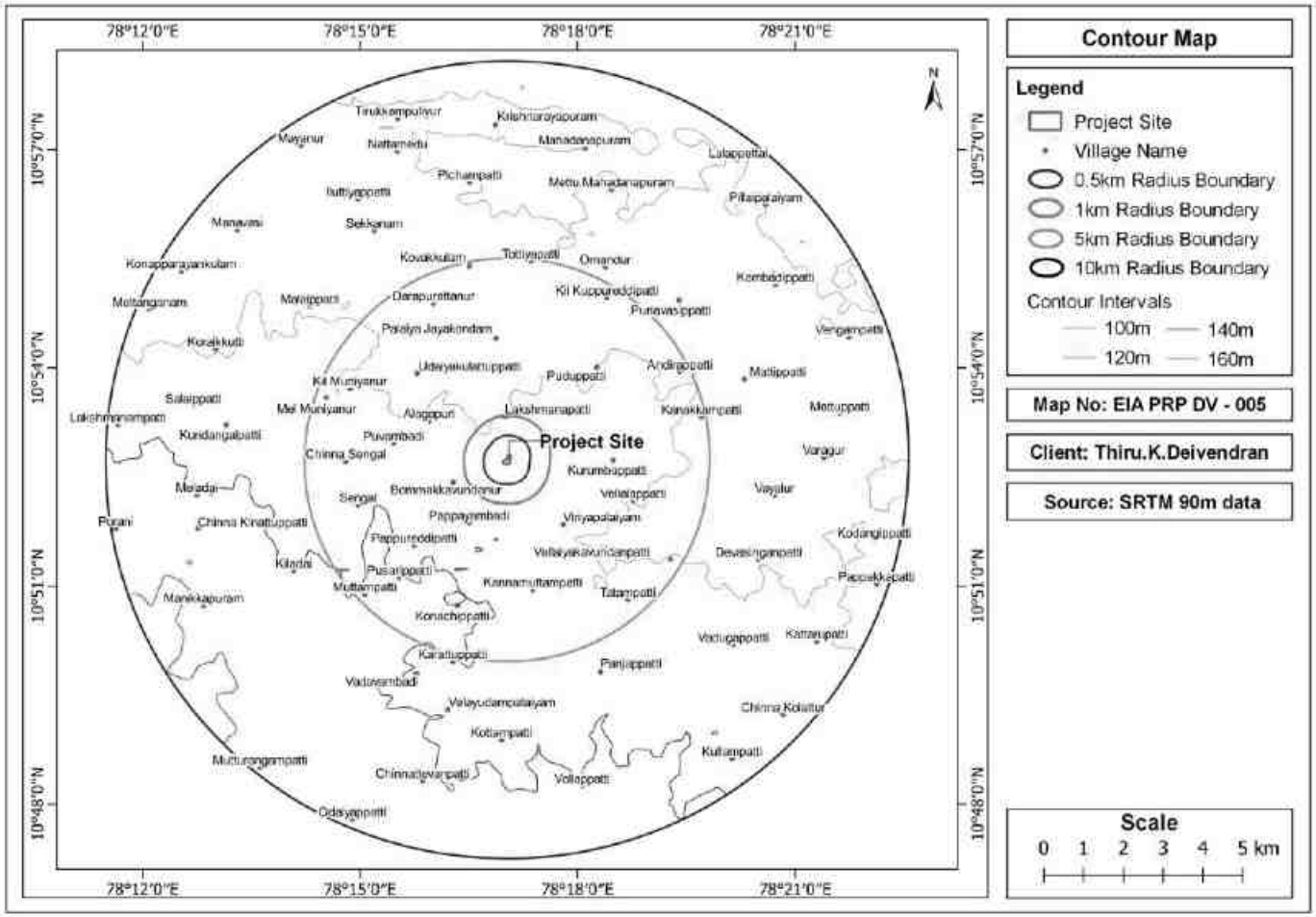


Figure 3-8 Contour Map of Study Area

3.4.6 Geomorphology of the PIA district

The entire area of the district is a pediplain. The Rangamalai hills and Kadavur hills occurring in the southern side of the district constitutes the remnants of the much denuded Eastern Ghats and rise to heights of over 1031 m above mean sea level. From these hills the district slopes gently towards north east and forms a vast stretch of plain country till the eastern boarder of the district. There are numerous small residual hills represented by Ayyarmalai, Thanthonimalai and Velayuthampalayam hills. The general elevation of the area is ranging between 100 m and 200m above mean sea level The prominent geomorphic units identified in the district through interpretation of Satellite imagery are Structural hill, Pediments, Shallow Pediments, Buried Pediments and Alluvial plain.

The Geomorphology Map of the Karur District is shown as Figure 3-12**.**

Source: *http://cgwb.gov.in/sites/default/files/2022-10/karur.pdf*

(**Ref**:Government of India Ministry of Water Resources Central Ground Water Board South Eastern Coastal Region Chennai, "District Ground Water Brochure Karur District")

3.4.6.1 Geomorphology of the Study Area

Total geographical area of the study area is **323.23 Sq.Km**. The Geomorphology of the study area is given in **Table 3-3,** Geomorphology pattern of the study area is given in **Figure 3-8.** Geomorphology map of the study area is given in **Figure 3-9.**

Table 3-3 Geomorphology of the Study Area

S.No	Description	Area in Sq.km	Area in Acre	Area in Ha.	Total area in %
1.	Denudational Origin-Pediment-PediPlain Complex	290.71	71835.89	29071	89.94
2.	Waterbodies	18.71	4623.33	1871	5.79
3.	Fluvial Origin-Older Flood Plain	6.49	1603.71	649	2.01
4.	Fluvial Origin-Active Flood Plain	6.46	1596.30	646	2.00
5.	Anthropogenic Origin-Anthropogenic Terrain	0.86	212.51	86	0.27
Total		**323.23**	**79871.75**	**32323**	**100.00**

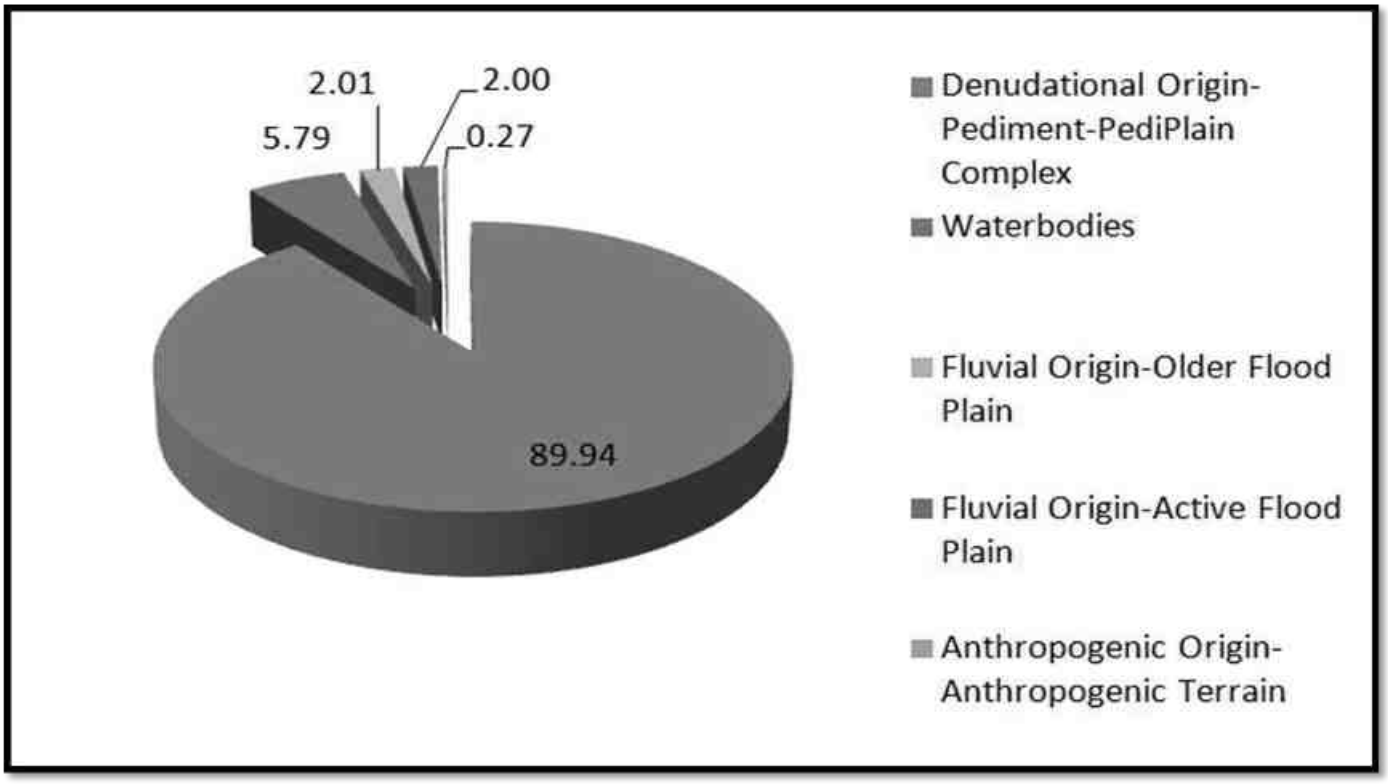


Figure 3-9 Geomorphology Pattern of the Study Area

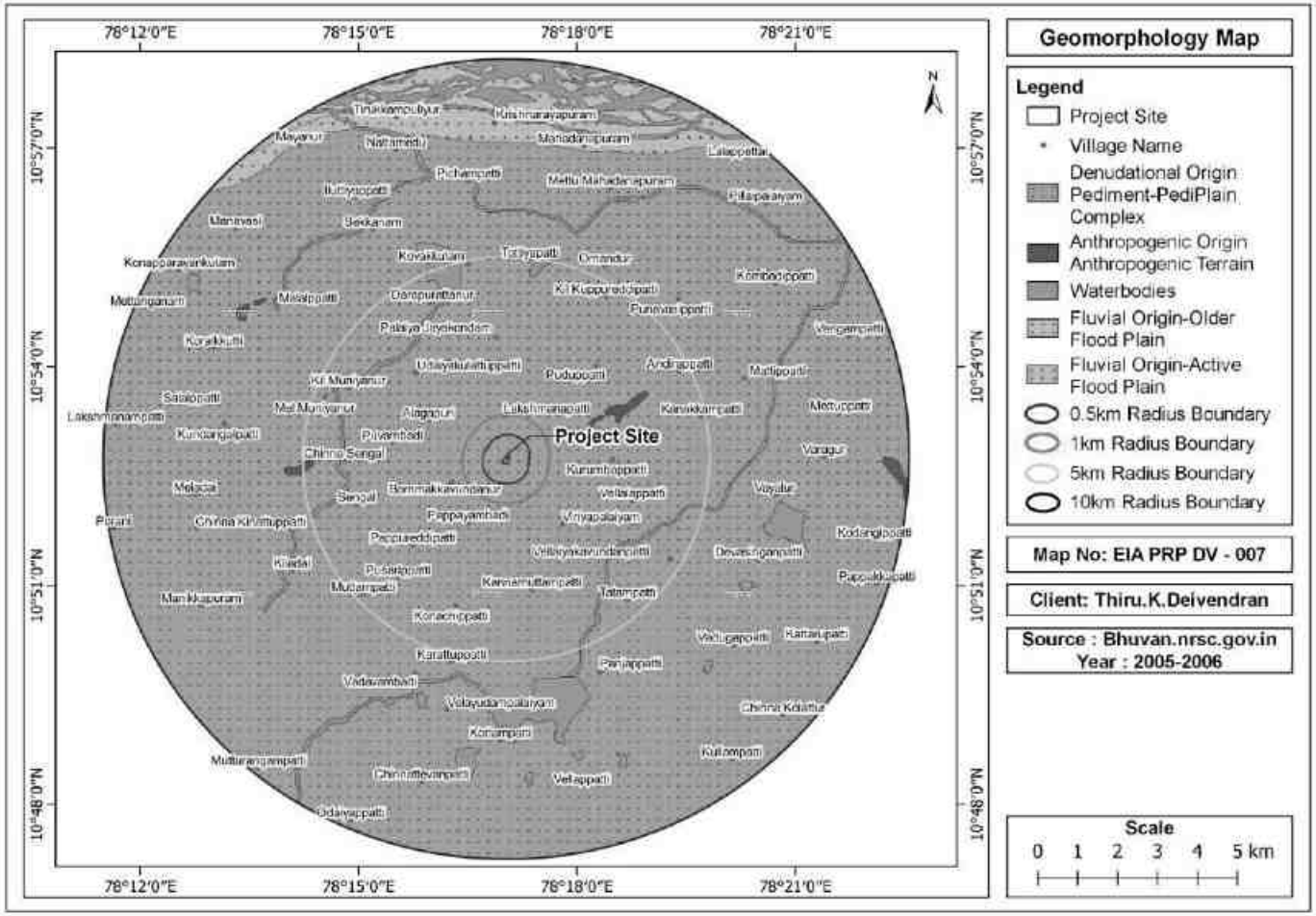


Figure 3-10 Geomorphology Map of the Study Area

3.4.7 Hydrogeology of PIA district

Karur district is underlain entirely by Archaean Crystalline formations with Recent alluvial deposits occurring along the river and streams courses.Weathered,fissured and fractured crystalline rocks and the recent alluvial deposits constitute the important aquifer systems in the district. The porous formations in the district are represented by river alluvium. These alluvial deposits are confined to the Major River and stream courses only.Groundwater occurs under phreatic conditions.The maximum saturated thickness of the seaquifers is upto 10 m depending upon the topographic conditions. The yield of bore wells drilled down to a depth of 70 to 100 m, by various state agencies mainly for domestic purposes ranged from 100 to 600 lpm. The yield of successful bore wells drilled down to a depth of 200 m bgl during the ground water exploration programme of Central Ground Water Board ranged from 0.50 to 14.00 lps. The aquifer and well parameters of the wells show wide variation. The depth to water level in the district varied between 1.97 – 7.80 m bgl during premonsoon period (May 2006) and varied between 1.35 – 6.83 m bgl during post monsoon depth to water level (Jan 2007). The seasonal fluctuation shows a rise in water level, which ranges from 0.46 to 1.98m. The piezometric head varied between 3.53 to 5.34 m bgl (May 2006) during premonsoon and 2.04 to 7.59 m bgl during post monsoon.

The hydrogeology map of Karur District is given in **Figure 3-11 & 3-12.**

Source:http://cgwb.gov.in/District_Profile/TamilNadu/KARUR.pdf

(**Ref**:Government of India Ministry of Water Resources Central Ground Water Board South Eastern Coastal Region Chennai, "District Ground Water Brochure Karur District")

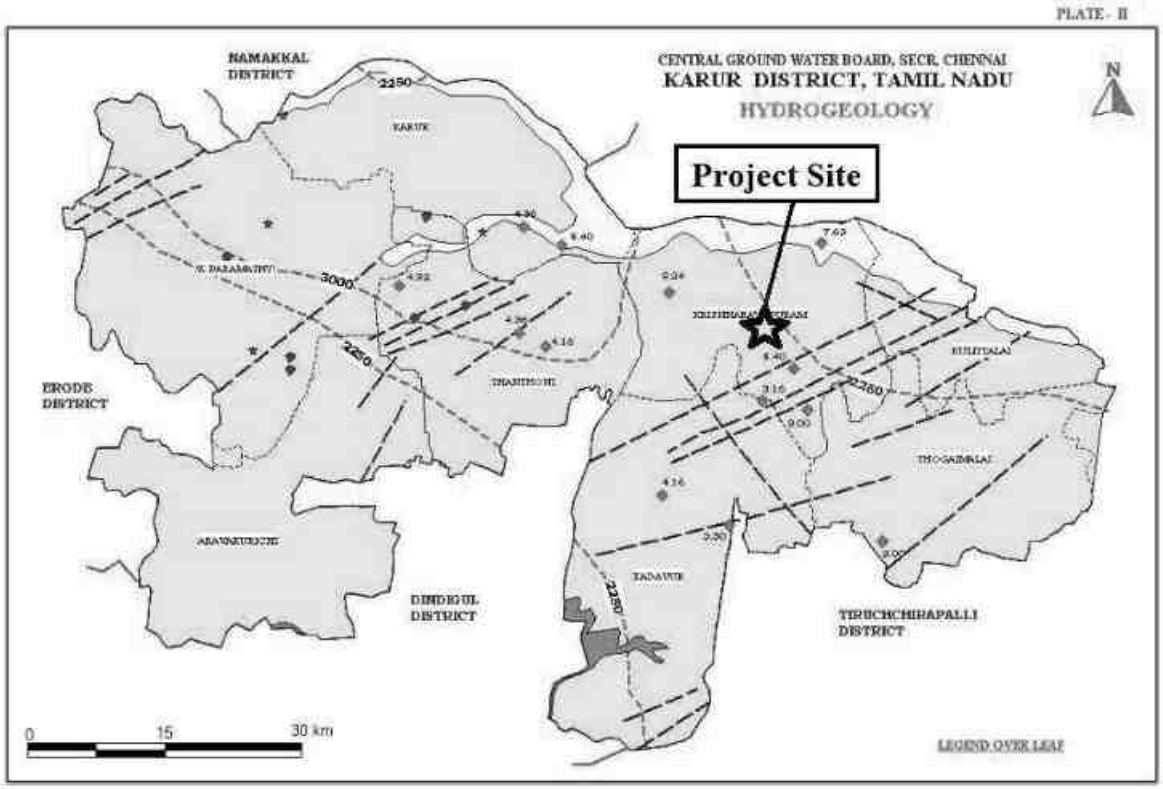
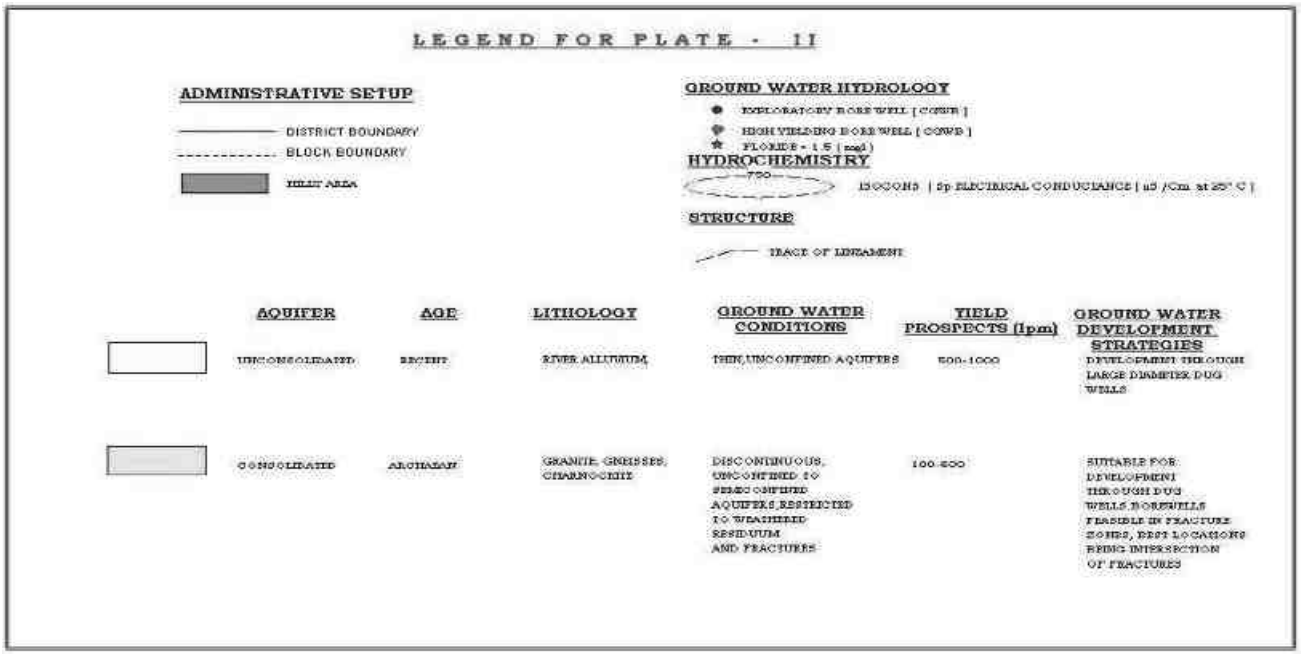


Figure 3-11 Hydrogeology Map of Karur District



Source: http://cgwb.gov.in/District_Profile/TamilNadu/KARUR.pdf

Figure 3-12 Hydrogeology Map of Karur District

3.4.8 Drainage Pattern in PIA district

Major part of Karur district is drained by Cauvery River. Amaravathi, Kodavanar and Pungar are the important rivers draining the western part of the district and the river Pungar drains in eastern part of the district. The drainage pattern, in general, is dendritic. All the rivers are seasonal and carry substantial flows during monsoon period. The river Cauvery is flowing on the northern and eastern boundaries. The river Amaravathi is flowing through Kparamathi, Aravakurichi, Thanthoni and Karur blocks and joins with Cauvery at Nerur. Kodavanar, which is one of the important tributary of Amaravathi River, drains the western part of the district.Originating in Rangamalai hills located in the boarder of Karur and Dindigul district,. It flows from south to north and joins with the river Amaravathi at Karuvadampatti. The Nanganji river, flowing in the western part of the district, has its origin from the Kottaivali hills in Dindigul district. It flows towards north through Aravakurichi and K.Paramathi blocks and joins with the river Amaravathi at Ariyur. The Pungar river, flowing across the eastern part of the district, has its origin in the Kadavur hills located in the southern part of Karur district. It flows towards north through Kadavur and Krishnarayapuram blocks and joins with the river Cauvery at Timmachalapuram.

The drainage map of the Study Area is given as **Figure 3-13.**

Source:http://cgwb.gov.in/District_Profile/TamilNadu/KARUR.pdf

(**Ref**:Government of India Ministry of Water Resources Central Ground Water Board South Eastern Coastal Region Chennai, "District Ground Water Brochure Tiruvallur District"

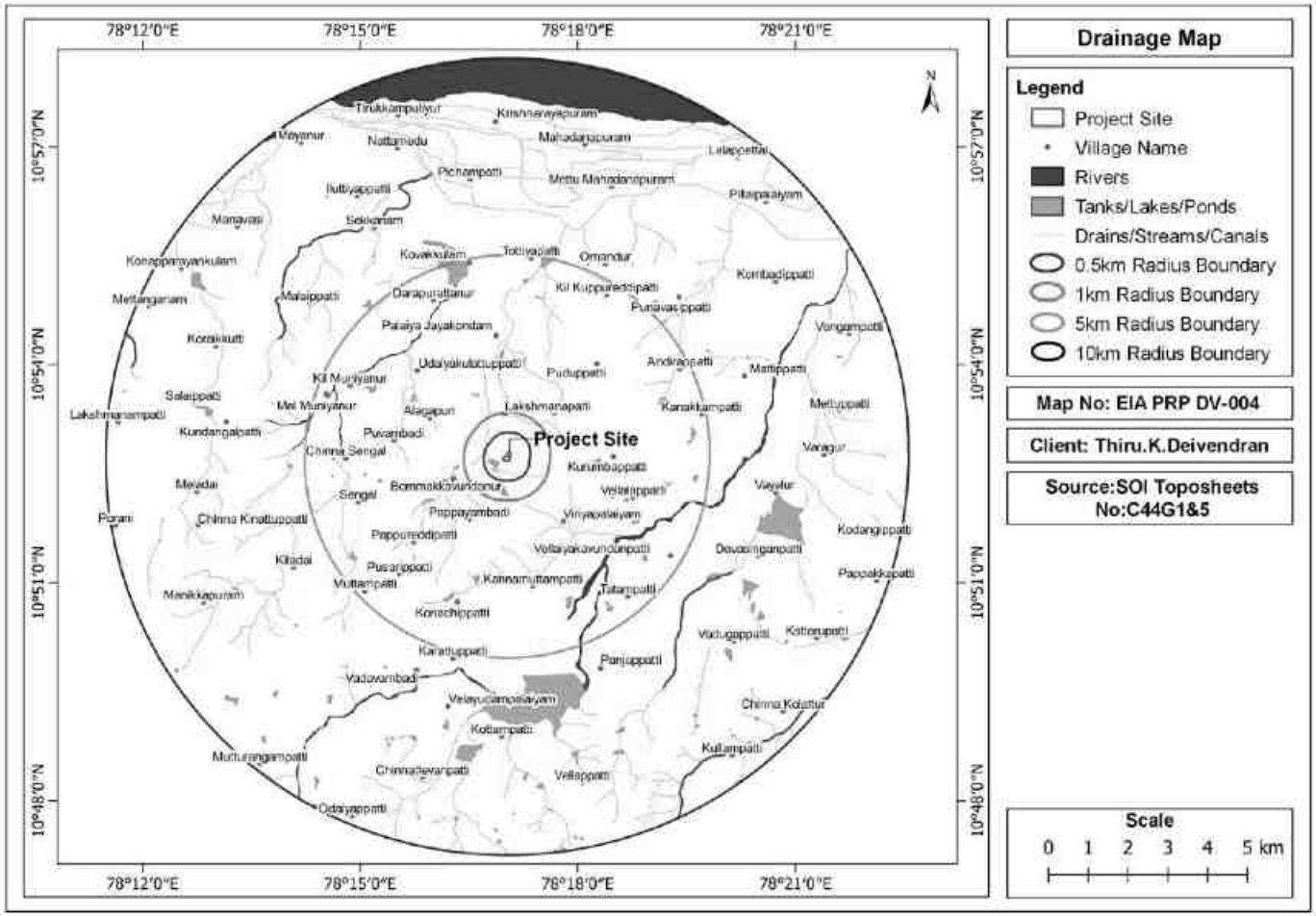


Figure 3-13 Drainage map of the study are

3.4.9 Geology

Geologically, the entire district can be broadly classified into hard rock and sedimentary formations. More than 90% of the district is underlain by hard rock of Archaean age. The gneissic type of formation is the major formation among the various types of hard rocks Charnockite occurs in this district as pockets in Karur and Aravakurichitaluks. Quartzites which are resistant to weathering are also seen as patches in charnockite and gneissis varieties. Recent alluvial deposits such as sand, silt, clay, gravel, etc., which are transported sediments by river are found on either side of Cauvery river in Karur, Krishnarayapuram and Kulithalai blocks. These formations are overlying the hard rock.

Geological map of Tamilnadu is given as **Figure 3-14.**

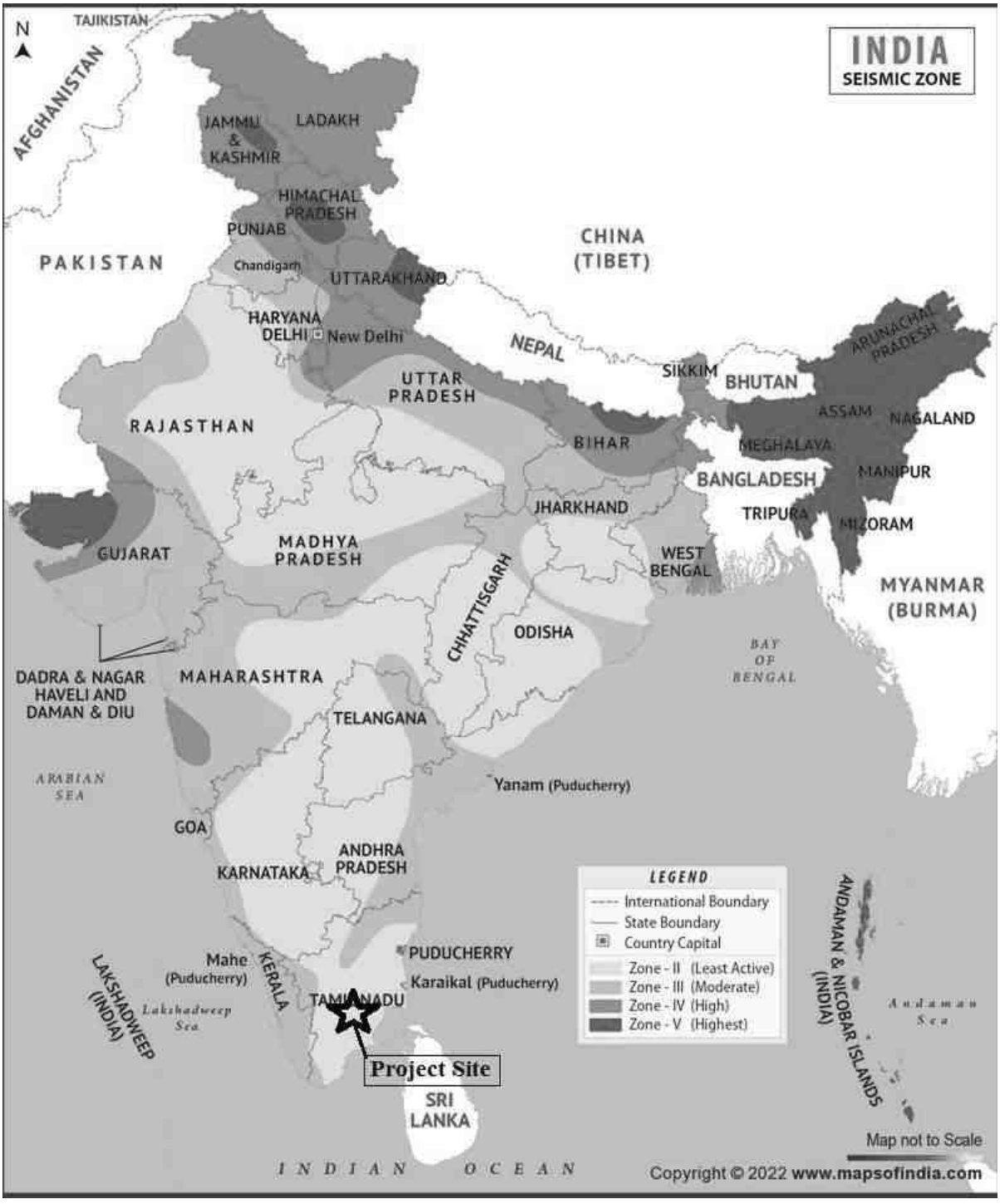
Source: *https://nwm.gov.in/sites/default/files/Notes%20on%20Karur%20District.pdf*

Source: Geological Survey of India

Figure 3-14 Geology Map of Tamil nadu

3.4.10 Seismicity

As per Earthquake hazard map of India, The project location/study area falls in Zone II, which is categorized as a Low Damage Risk Zone. The Earthquake hazard map of India is shown in **Figure 3-15.**



Source: Maps of India

Figure 3-15 Seismicity Map of India

3.4.11 Soils in PIA District

The soils of Karur district can be broadly classified into 4 major soil types viz., Red Soil, Thin Red Soil, Red Loam and River Alluvium Soil. Red soil is the predominant one covering major part of the district followed by Thin Red soil and Red loam.The red soil is predominantly seen in Kadavur, Kulit halai, Krishnarayapuram, Thant honi and Thogamalai blocks. The thin red soil is seen in Aravakurichi and K.Paramathy blocks. Major portion of the Karur block is covered by red loam.

3.4.12 Natural Hazards in PIA District

Karur is landlocked district, restricted to few natural disasters viz. geological (Earthquake), hydro-meteorological (Cyclone, Flood, Drought, Heat wave) and epidemics. Apart from natural disasters with the development in the field of science and technology the life of mankind has become complex and also vulnerable to man-made disaster like road, railway accidents and industrial disaster, etc.

3.5 Air Environment

Baseline ambient air quality assessment gives the status in the vicinity of site and is an indispensable part of environmental impact assessment studies. Significant changes, in predominant winds and weather conditions are observed in winter, summer and post-monsoon seasons apart from the local topographic influences. The baseline status of air environment in the study area is assessed through a systematic air quality surveillance programme.

3.5.1 Meteorological Conditions

The regional air quality is influenced by the meteorology of that region. The principal weather parameters that influence the concentration of the air pollutants in the surroundings are wind speed, wind direction and temperature. The meteorological data is useful for proper interpretation of the baseline data. It is used as input for air quality dispersion models for predicting the post project environmental scenario i.e. ground level concentrations due to proposed utilities like DG sets etc.

3.5.2 Meteorological Data Collection

Available secondary data pertaining to the meteorological parameters was obtained from the IMD Climatological tables. In addition, baseline meteorological data (primary data) was generated during the study period (**March 2023 to May 2023**). The methodology adopted for monitoring surface observations is as per the standard norms laid down by Bureau of Indian Standards (BIS) i.e. IS:8829 and India Meteorological Department (IMD).

3.5.3 General Meteorological Scenario based on IMD Data

The nearest India Meteorological Department (IMD) station located to project site is **Karur Paramarthi**. The Climatological data published by the IMD, based on daily observations at 08:30 and 17:30 hour IST for a 30-year period (1991-2020), is presented in the following sections on the

meteorological conditions of the region. The monthly variations of the relevant meteorological parameters are reproduced in **Table 3-4**.

Table 3-4 Climatological Summary – Karur Paramarthi (1991-2020)

Month	Temp (°C)		Rainfall (mm)		Relative Humidity (%)		Vapour Pressure (hPa)		Mean Wind Speed (kmph)	Predominant Wind Directions (From)*	
	Daily Max.	Daily Min.	Total	No. of days	08:30	17:30	08:30	17:30		08:30	17:30
Jan	30.5	18.7	1.9	0.3	84	51	23.4	21.5	2.2	NE	NE
Feb	33.1	20	3.8	0.1	80	43	24.6	21.1	3.1	SE	NE
Mar	36	22.5	6.4	0.6	76	37	27	21	3.3	NE	NE
Apr	37	25.1	35.3	2.1	72	40	29.5	23.8	3.5	SW	NE
May	36.1	25.1	80.5	4.3	72	47	29.4	26.3	5.4	S	S
Jun	33.8	24.8	22.6	1.4	71	53	27.9	25.5	9.4	SW	SW
Jul	32.7	24.2	23.2	1.6	74	58	27.8	26.5	10.3	SW	SW
Aug	32.7	24.1	44.2	3.4	76	59	27.9	27.1	8.9	SW	SW
Sep	33.3	23.9	90.7	4.7	76	56	27.7	26.4	6.1	SW	SW
Oct	31.4	23	14.4	7.7	82	65	28.2	27.3	2.4	SW	SW
Nov	29.7	21.5	147.7	7	87	71	27.3	27.4	1.4	NW	NE
Dec	29.2	19.4	44.8	3.2	86	66	24.1	24.6	1.4	NW	NE
Max.	**37**	**25.1**	**147.7**	**7.7**	**87**	**71**	**29.5**	**27.4**	**10.3**	**Annual Predominant wind direction is SOUTH WEST**	
Min.	**29.2**	**18.7**	**1.9**	**0.1**	**71**	**37**	**23.4**	**21**	**1.4**		
Annual total / Mean	**35**	**22.1**	**606.5**	**36.9**	**67**	**56**	**25.8**	**25.4**	**2.3**		

As per the above IMD climatological Data given in **Table 3.6,** the observations drawn are as follows

- Highest Daily maximum temperature is 37°C and the lowest daily minimum temperature is 29.2°C were recorded in the months of May and January respectively.
- Maximum and minimum relative humidity of 67% and 56% were recorded in the months of January and June respectively.
- Maximum and minimum rainfall of 147.7 mm and 1.9 mm was recorded in the months of November and March respectively.

3.5.4 Meteorological Scenario during Study Period

The meteorological scenario in and around the project site is an essential requirement during study period for proper interpretation of baseline air quality status. Meteorological data was collected during the study period (**March 2023 to May 2023**) and is presented in **Table 3-5**. The wind rose for the study period is given as **Figure 3-16.**

Table 3-5 Meteorological Data for the Study period (March 2023 to May 2023)

S. No	Parameter	Observation
1.	Temperature	Max Temperature: 39°C Min Temperature: 22°C Avg Temperature: 30.15°C
2.	Relative Humidity	67.48%
3.	Average Wind Speed	2.71m/s (9.75kmph)
4.	Predominant Wind Direction during study period	East

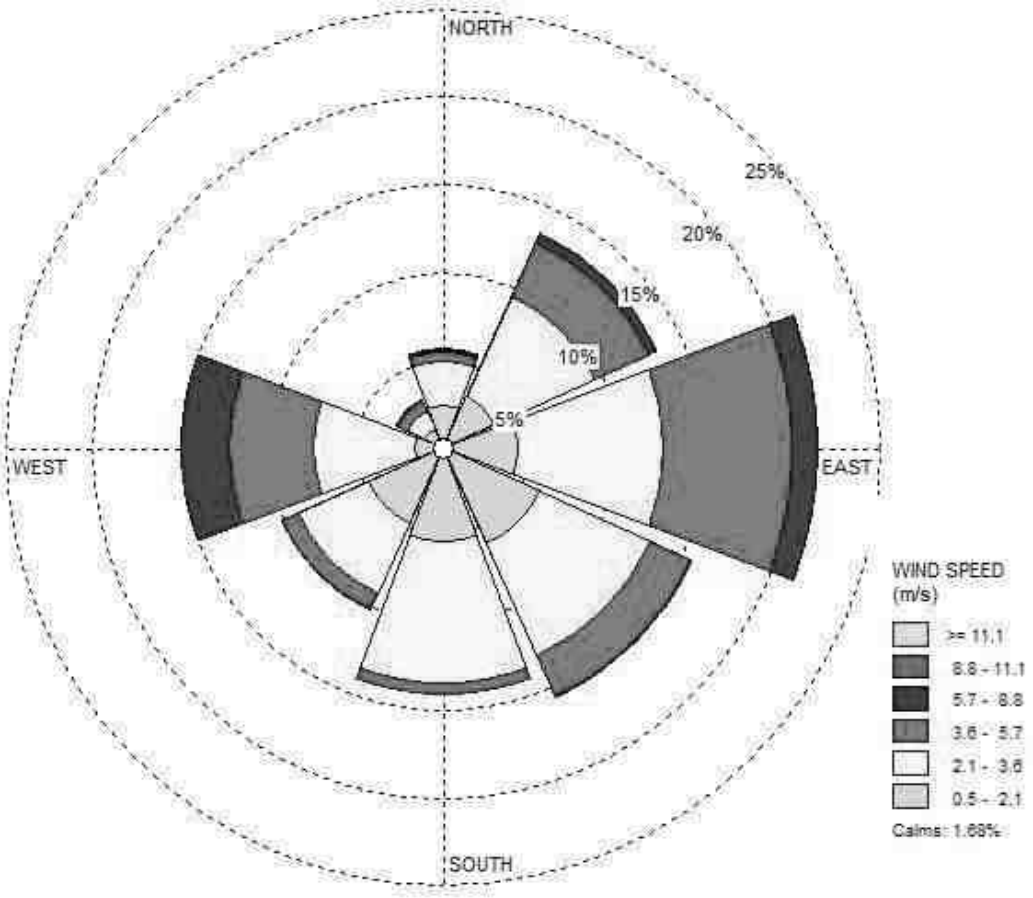


Figure 3-16 Wind rose during study period (March 2023 to May 2023)

3.5.5 Atmospheric Inversion

Atmospheric inversion level at the project site was monitored; the results observed at the site during the study period are as follows;

- Average atmospheric temperature: 30.15°C
- Average Relative humidity: 67.48 %
- Average Wind speed: 2.71 m/s

The daily inversion level calculated based on the average temperature and average wind speed at the project site and the maximum inversion height is derived by the graph plotted based on the average temperature and average wind speed. The daily inversion level at the project site varies from 50 to 4000 m during 6 AM to 5 PM, the maximum recorded at 4000 m during May 2023. This is shown in the following **Figure 3-17.**

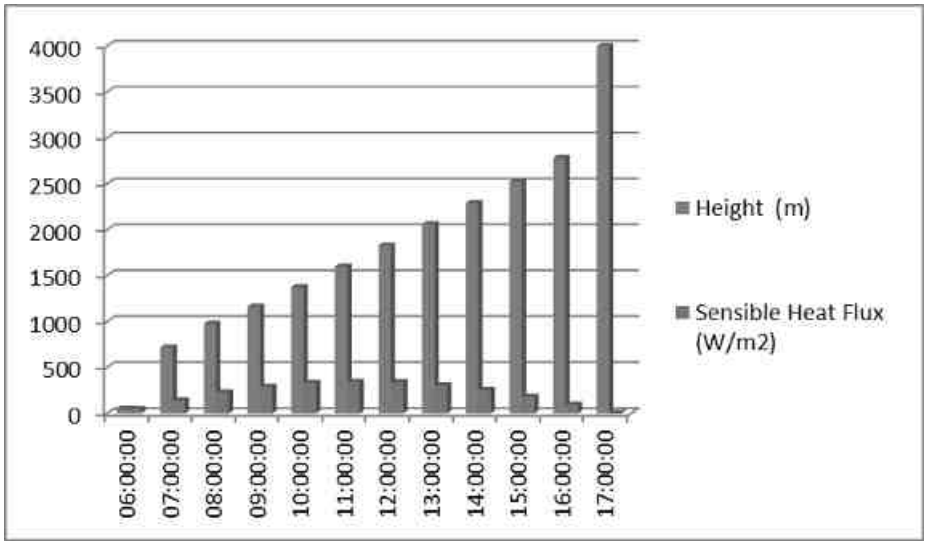


Figure 3-17 Atmospheric inversion level at the project site

3.6 Ambient Air Quality

The selection criteria for monitoring locations are based on the following:

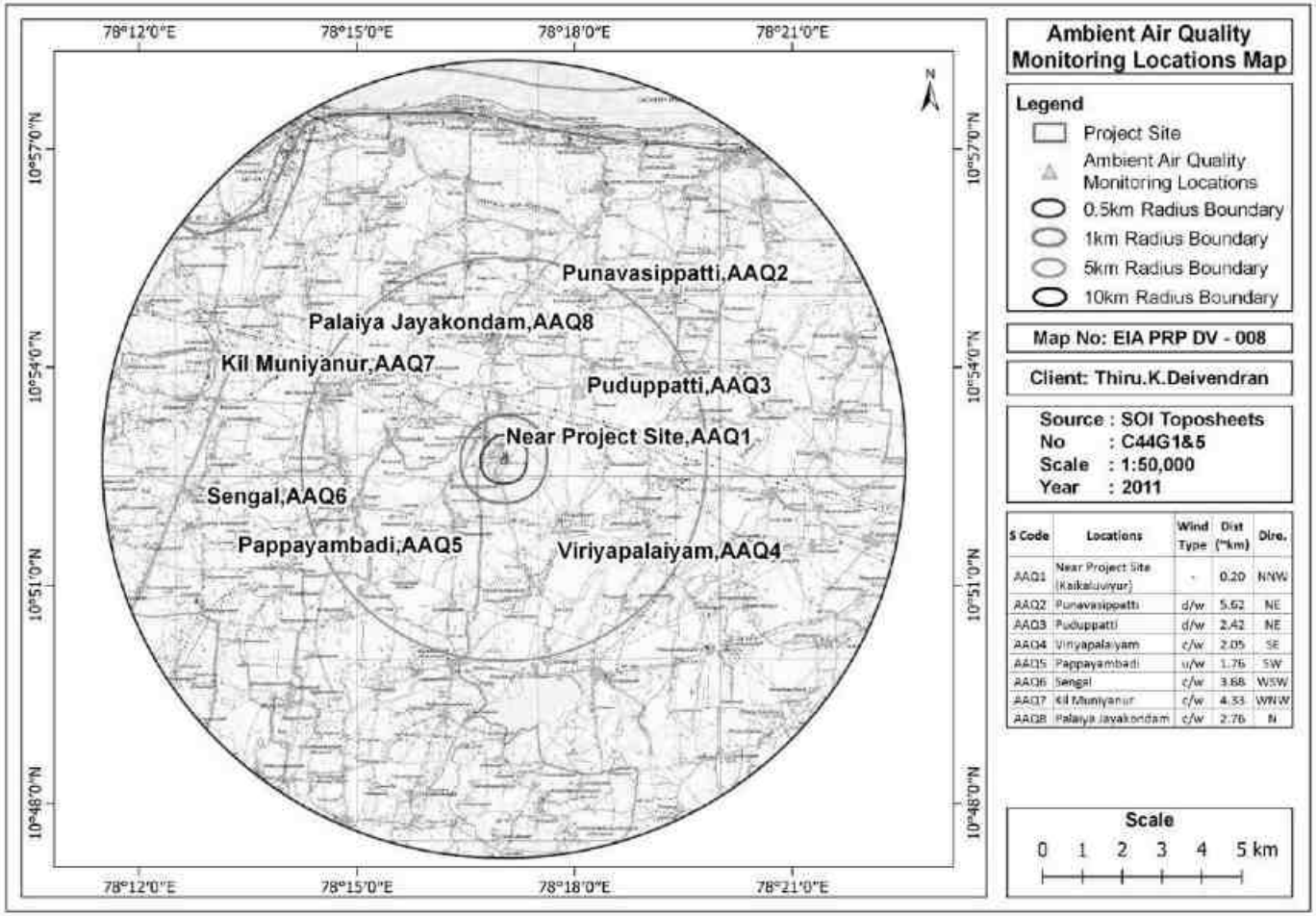
- Topography/Terrain
- Meteorological conditions – Upwind and Downwind locations
- Residential and sensitive areas within the study area
- Representatives of regional background air quality/pollution levels and
- Representation of likely impacted areas

3.6.1 Ambient Air Quality Monitoring Stations

To evaluate the baseline air quality of the study area, Eight (08) monitoring locations have been identified as per annual wind predominance of Karur from IMD data (1991-2020). The wind predominance during study period (March 2023 to May 2023) is from East. AAQ monitoring locations are selected based on Annual wind predominance, map showing the AAQ monitoring locations is given in **Figure 3-18** and the details of the locations are given in **Table 3-6.**

Table 3-6 Details of Ambient Air Quality Monitoring Locations

Station Code	Location	Type of Wind	Distance (~km) from Project boundary	Directions
AAQ1	Near Project Site (kaikaluviyur)	-	0.20	NNW
AAQ2	Punavasippatti	d/w	5.62	NE
AAQ3	Puduppatti	d/w	2.42	NE
AAQ4	Viriyapalaiyam	c/w	2.05	SE
AAQ5	Pappayambadi	u/w	1.76	SW
AAQ6	Sengal	c/w	3.68	WSW
AAQ7	Kil Muniyanur	c/w	4.33	WNW
AAQ8	Palaiya Jayakondam	c/w	2.76	N



S Code	Locations	Wind Type	Dist (*km)	Dire.
AAQ1	Near Project Site (Kalkaluvivur)	-	0.20	NNW
AAQ2	Punavasippatti	d/w	5.62	NE
AAQ3	Puduppatti	d/w	2.42	NE
AAQ4	Viriyapalaiyam	c/w	2.05	SE
AAQ5	Pappayambadi	u/w	1.76	SW
AAQ6	Sengal	c/w	3.68	WSW
AAQ7	Kil Muniyanur	c/w	4.33	WNW
AAQ8	Palaiya Jayakondam	c/w	2.76	N

Figure 3-18 Map showing the Air monitoring locations

3.6.2 Ambient Air Quality Monitoring Techniques and Frequency

Ambient air quality was monitored twice in a week for One (01) season (shall cover 12 weeks), i.e. during (March 2023 – May 2023). PM10, PM2.5, SO2, NOx, CO, Pb, O3, NH3, C6H6, C20H12, As, Ni, was monitored. Sampling was carried out as per Central Pollution Control Board (CPCB) monitoring guidelines at each location. Analytical methods used for analysis of parameters are given in **Table 3-7.**

Table 3-7 Analytical Methods for Analysis of Ambient Air Quality Parameters

S. No	Parameters	Analytical method	NAAQ standards: 2009		Sampling Time
1.	Sulphur Dioxide (SO_2), µg/m^3	IS:5182(Part-2):2001 (Reaff:2006)	50 (Annual)	80(24 Hours)	24 Hours
2.	Nitrogen Dioxide (NO_2), µg/m^3	IS: 5182 (Part - 6): 2006	40 (Annual)	80 (24 Hours)	24 Hours
3.	Particulate Matter ($PM_{2.5}$), µg/m^3	IS: 5182 (Part - 23): 2006	40 (Annual)	60 (24 hours)	24 Hours
4.	Particulate Matter (PM_{10}), µg/m^3	IS:5182 (Part– 23): 2006	60 (Annual)	100 (24 hours)	24 Hours
5.	CO mg/m^3	IS:5182(Part–10):1999 (Reaff:2006)	2 (8 hours)	4 (1hour)	8 Hours
6.	Pbµg/m^3	IS:5182(Part–22):2004 (Reaff:2006)	0.5(Annual)	1(24 hours)	24 Hours
7.	O_3, µg/m^3	IS: 5182 (Part – 9): 1974	100(8hours)	180 (1hour)	8 Hours
8.	NH_3, µg/m^3	APHA (air) 2nd edition (Indophenol-blue method)	100(Annual)	400(24 hours)	8 Hours
9.	Benzene, µg/m^3	IS:5182(Part–11):1999 (RA:2009)	5 (Annual)	5 (Annual)	24 Hours
10.	Benzo (a) pyrene, ng/m^3	IS:5182(Part–12):2004 (RA:2009)	1 (Annual)	1 (Annual)	24 Hours
11.	Arsenic, ng/ m^3	APHA (air) 2nd edition	6 (Annual)	6 (Annual)	24 Hours
12.	Nickel ng/ m^3	In house method (AAS method) based on CPCB guidelines volume 1	20(Annual)	20(Annual)	24 Hours
13.	Free Silica	NIOSH Manual- Method 7601	--	--	8 hours

3.6.3 Results and Discussions

The variations of the pollutants PM_{10}, $PM_{2.5}$, SO_2, NO_2, CO, Pb, O_3, NH_3, C_6H_6, C_{20} H_{12}, As and Ni are compared with National Ambient Air Quality Standards (NAAQS), MoEF&CC Notification, November, 2009. Ambient Air Quality Monitoring Data (**March 2023 to May 2023**) for the study area is given in **Table 3-8** and trends of measured ambient concentration in the study area were graphically represented in **Figure 3-19.**

Table 3-8 Summary of the average baseline concentrations of pollutants

Parameters	Conc.	NAAQ Standards	Locations							
			Near Project Site (kaikaluviyur)	Punavasippatti)	Puduppatti	Viriyapalaiyam	Pappayambadi	Sengal	Kil Muniyanur	Palaiya Jayakondam
			A1	A2	A3	A4	A5	A6	A7	A8
PM_{10} Conc. ($\mu g/m^3$)	Min.	100 (24 Hours)	44.74	40.57	39.85	37.47	38.86	39.92	40.42	42.75
	Max.		63.76	57.82	56.80	53.40	55.38	56.89	57.61	60.93
	Avg.		**53.65**	**48.66**	**47.79**	**44.93**	**46.60**	**47.87**	**48.48**	**51.27**
	98th 'tile		63.39	57.49	56.47	53.09	55.06	56.56	57.27	60.57
$PM_{2.5}$ Conc. ($\mu g/m^3$)	Min.	60 (24 Hours)	27.74	23.53	21.92	20.23	21.37	23.15	23.44	25.22
	Max.		39.53	33.54	31.24	28.83	30.46	33.00	33.41	35.95
	Avg.		**33.27**	**28.22**	**26.29**	**24.27**	**25.63**	**27.77**	**28.12**	**30.25**
	98th 'tile		39.30	33.34	31.06	28.67	30.28	32.81	33.22	35.74
SO_2 Conc. ($\mu g/m^3$)	Min.	80 (24 Hours)	8.78	7.92	7.50	7.03	7.15	8.19	8.29	9.05
	Max.		12.52	11.29	10.69	10.01	10.19	11.67	11.82	12.90
	Avg.		**10.54**	**9.51**	**9.00**	**8.43**	**8.58**	**9.83**	**9.95**	**10.86**
	98th 'tile		12.45	11.23	10.62	9.96	10.13	11.61	11.75	12.82
NO_2 Conc. ($\mu g/m^3$)	Min.	80 (24 Hours)	17.57	15.85	15.00	14.05	14.30	16.38	16.58	18.10
	Max.		25.04	22.59	21.37	20.03	20.37	23.35	23.63	25.80
	Avg.,		**21.07**	**19.01**	**17.99**	**16.86**	**17.15**	**19.65**	**19.89**	**21.71**
	98th 'tile		24.89	22.46	21.25	19.91	20.25	23.21	23.50	25.65
Lead (Pb) ($\mu g/m^3$)	Avg.	1 (24 hour)	BLQ (LOQ 0.05)	BLQ (LOQ 0.05)	BLQ (LOQ 0.05)	BLQ (LOQ 0.05)	BLQ (LOQ 0.05)	BLQ (LOQ 0.05)	BLQ (LOQ 0.05)	BLQ (LOQ 0.05)
Carbon monoxide (CO) (mg/m^3)	Avg.	4 (1hour)	0.37	0.24	0.26	0.23	0.24	0.35	0.39	0.42
Ozone O_3	Avg.	180	BLQ(LOQ	BLQ(LO	BLQ(LOQ	BLQ(LOQ10	BLQ(LOQ10)	BLQ(LOQ	BLQ(LOQ10)	BLQ(LO

Parameters	Conc.	NAAQ Standards	Locations							
			Near Project Site (kaikaluviyur)	Punavasippatti)	Puduppatti	Viriyapalaiyam	Pappayambadi	Sengal	Kil Muniyanur	Palaiya Jayakondam
			A1	A2	A3	A4	A5	A6	A7	A8
($\mu g/m^3$)		**(1hour)**	10)	Q10)	10)	)		10)		Q10)
Benzene (C_6H_6) ($\mu g/m^3$)	**Avg.**	**5(Annual)**	BLQ (LOQ 1)	BLQ (LOQ 1)	BLQ (LOQ 1)	BLQ (LOQ 1)	BLQ (LOQ 1)	BLQ (LOQ 1)	BLQ (LOQ 1)	BLQ (LOQ 1)
Benzo (a) Pyrene ($C_{20}H_{12}$ (a)) , (ng/m^3)	**Avg.**	**1 (Annual)**	BLQ (LOQ 1)	BLQ (LOQ 1)	BLQ (LOQ 1)	BLQ (LOQ 1)	BLQ (LOQ 1)	BLQ (LOQ 1)	BLQ (LOQ 1)	BLQ (LOQ 1)
Arsenic (As) (ng/ m^3)	**Avg.**	**6 (Annual)**	BLQ (LOQ 2)	BLQ (LOQ 2)	BLQ (LOQ 2)	BLQ (LOQ 2)	BLQ (LOQ 2)	BLQ (LOQ 2)	BLQ (LOQ 2)	BLQ (LOQ 2)
Nickel as Ni (ng/m^3)	**Avg.**	**20 (Annual)**	BLQ(LOQ 10)	BLQ(LOQ 10)	BLQ(LOQ 10)	BLQ(LOQ 10)	BLQ(LOQ 10)	BLQ(LOQ 10)	BLQ(LOQ 10)	BLQ(LOQ 10)
Ammonia (NH_3) ($\mu g/m^3$)	**Avg.**	**400 (24 hour)**	BLQ(LOQ 5)	BLQ(LOQ5)	BLQ(LOQ 5)	BLQ(LOQ5)	BLQ(LOQ5)	BLQ(LOQ 5)	BLQ(LOQ5)	BLQ(LOQ5)
Free Silica	mg/m^3	**Avg.**	0.05	0.04	BLQ(LOQ 0.01)	BLQ(LOQ0.01)	BLQ(LOQ0.01)	BLQ(LOQ 0.01)	BLQ(LOQ0.01)	BLQ(LOQ0.01)

Note: BLQ- Below Limit of Quantification, LOQ- Limit of Quantification

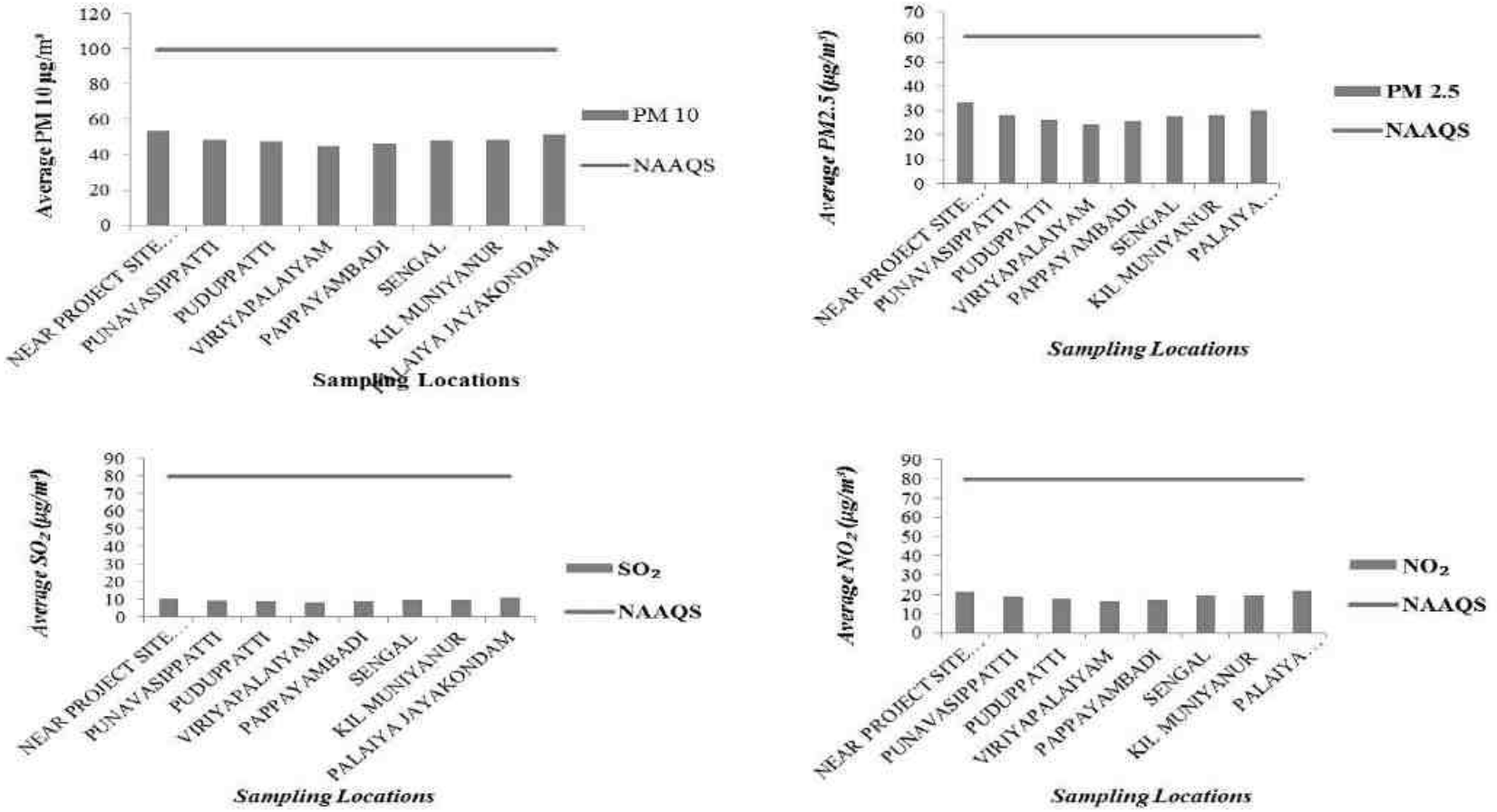


Figure 3-19 Trends of Measured Ambient Concentrations in the Study Area

3.6.3.1 *Observations*

The ambient air quality has been monitored at 8 locations for 13 parameters as per CPCB guidelines within the study area. The results obtained are summarised as below:

- The average baseline levels of PM_{10} are 44.93 to 53.65 µg/m³,
- The average baseline levels of $PM_{2.5}$ is 24.27 to 33.27 µg/m³,
- The average baseline levels of SO_2 is 8.43 to 10.86 µg/m³,
- The average baseline levels of NO_2 is 16.86 to 21.71µg/m³,

  All the parameters are well within the National Ambient Air Quality Standards, the impacts are significant.

3.7 Noise Environment

The prevailing ambient noise level at a particular location is nothing but the resultant (total) of all kinds of noise sources existing at various distances around that location. The ambient noise level at a location varies continuously depending on the type of surrounding activities. Ambient noise levels have been established by monitoring noise levels at Eight (08) locations in and around 10Km distance from project area during the study period using precision noise level meter. The noise monitoring locations in the study area were selected after giving due consideration to the various land use categories. The land use categories include commercial, residential, rural and sensitive areas. Noise levels were recorded on an hourly basis for one complete day at each location using pre- calibrated noise levels. A map noise showing the noise monitoring locations is given in **Figure 3-20.**

3.7.1 Results and Discussions

Based on the recorded hourly noise levels at each monitoring location, the day equivalent (Ld) and night equivalent (Ln) were calculated;

- Ld: Average noise levels between 6:00 hours to 22.00 hours.
- Ln: Average noise levels between 22:00 hours to 6.00 hours.

The day and night equivalent noise levels given in **Table 3-9.**

Table 3-9 Day and Night Equivalent Noise Levels

Location Code	Location	Distance (km) from Project boundary	Direction	Noise level in dB(A) Leq		CPCB Standard		Environmental Setting
				Day	Night	Lday (Ld)	LNight (Ln)	
N1	Near project site (kaikaluviyur)	With in the site		63.8	42.6	75	70	Industrial
N2	Punavasippatti	5.62	NE	50.6	42.7	55	45	Residential
N3	Puduppatti	2.42	NE	51.3	41.9	55	45	Residential
N4	Viriyapalaiyam	2.05	SE	50.8	43.7	55	45	Residential
N5	Pappayambadi	1.76	SW	53.9	42.9	55	45	Residential
N6	Sengal	3.68	WSW	51.8	40.9	55	45	Residential
N7	Kil muniyanur	4.33	WNW	50.7	40.2	55	45	Residential
N8	Palaiya jayakondam	2.76	N	54.1	42.4	55	45	Residential

3.7.2 Observations

The observations of day equivalent and night equivalent noise levels at all locations are given below

- In Industrial areas day time noise levels was about 63.8 dB (A) and 42.6 dB (A) during night time, which is within prescribed limit by CPCB (75 dB(A) Day time & 70 dB(A) Night time).
- In residential areas day time noise levels varied from 50.6 dB (A) to 54.1 dB (A) and night time noise levels varied from 40.2 dB (A) to 43.7 dB(A) across the sampling stations. The field observations during the study period indicate that the ambient noise level is within the prescribed limit by CPCB (55 dB (A) Day time & 45 dB (A) Night time).

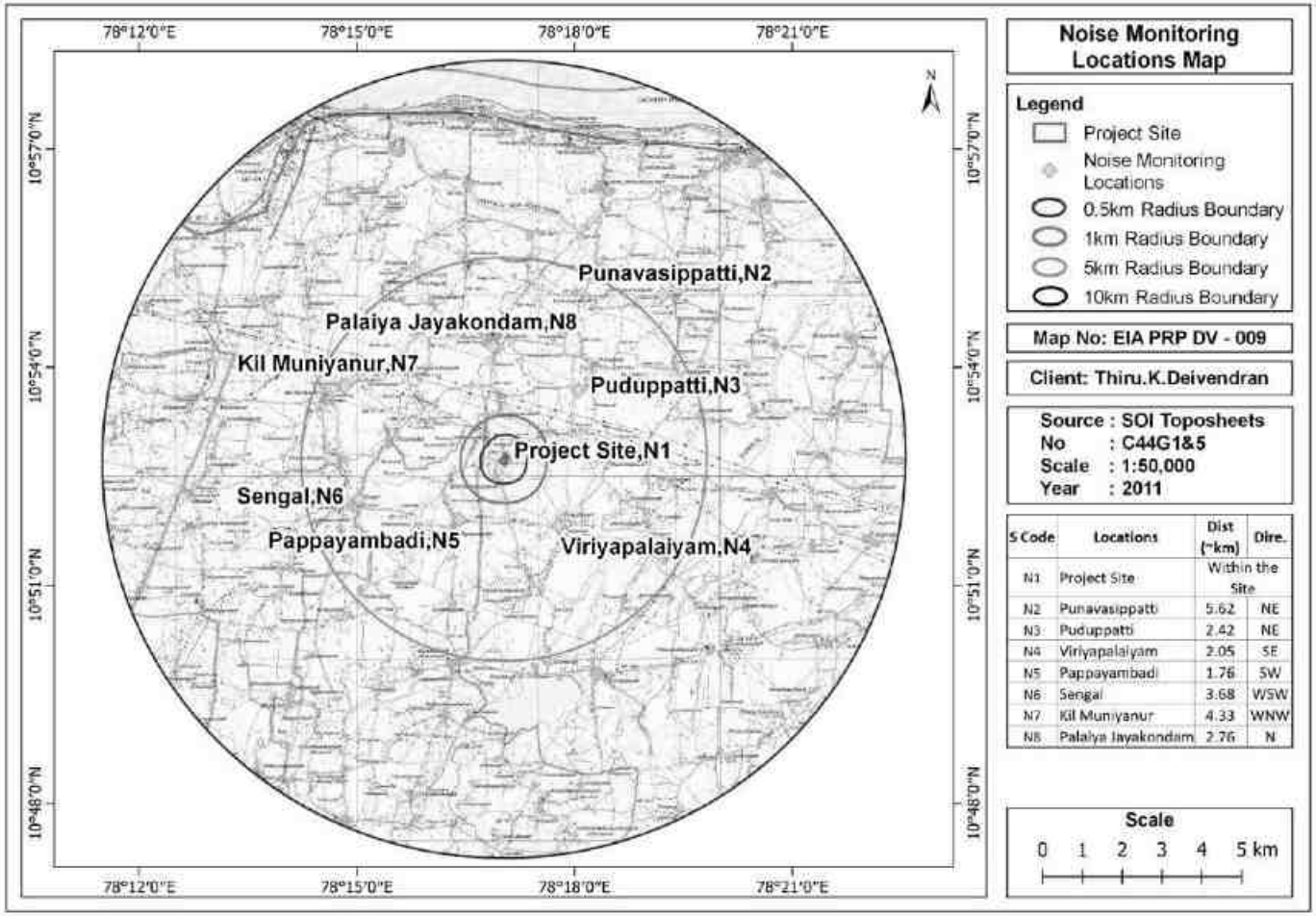


Figure 3-20 Map showing the Noise Monitoring locations

3.8 Water Environment

The district is part of the composite East flowing river basin having Araniyar, Korattalaiyar and Cooum sub basins.

3.8.1 Surface Water Resources

The entire area of this district is drained by the river Cauvery, which flows on the northern boundary of the district. The major river courses which come under Cauvery basin areBhavani, Noyyal and Amaravathi. The tributary rivers namely Amaravathi, Kodaganar and Noyyal drain the western part of the district.

Source: https://tnmines.tn.gov.in/pdf/dsr/29.pdf

3.8.2 Surface Water Quality Assessment

To establish the baseline status of water environment, the representative sampling locations for surface water within a radial distance of 10 km from project site have been selected as per CPCB guidelines of Water Quality Monitoring through an adequate survey of the project area. Test methods used for the analysis of water quality parameters is given in **Table 3-10.**

Table 3-10 Test methods used for the analysis of water quality parameters

Sl. No	Parameter Measured	Test Method
1	Turbidity	IS 3025(Part - 10):1984
2	pH	IS:3025 (Part - 11): 1983 (Reaff: 2006)
3	Electrical Conductivity	IS:3025 (Part - 14): 1983 (Reaff: 2006)
4	Total Dissolve Solids	IS: 3025:1(Part - 16) 1984 (Reaff 2006)
5	Total Suspended Solids	IS 3025 (Part - 17) 1984 (Reaff 1996)
6	Total Alkalinity as CaCO3	IS:3025,1 (Part - 23) 1986 (Reaff 2009)
7	Total Hardness as CaCo3	IS:3025 (Part - 21) 1983 (Reaff 2006)
8	Sodium as Na	IS:3025,5(Part - 45) 1993 (Reaff 2006)
9	Potassium as K	IS:3025,5(Part - 45) 1993 (Reaff 2006)
10	Calcium as Ca	IS 3025 (Part - 40):1991
11	Magnesium as Mg	IS 3025 (Part - 46) 1994
12	Chloride as cl	IS 3025 (Part - 32):1988
13	Sulphate as SO4	IS 3025(Part - 24):1986
14	Nitrate as NO3	ASTM (Part - 31)1978
15	Phosphate as PO4	IS 3025 (Pt 45) 1993 (R 2006)
16	Fluorides as F	IS 3025 (Part - 60):2008
17	Cyanide as Cd	IS 3025 (Part-27):1986
18	Arsenic as As	IS 3025:(Part-37):1988(Reaff 2009)
19	Cadmium as Cd	IS 3025 (Part - 41)1991

Sl. No	Parameter Measured	Test Method
20	Chromium, Total	IS:3025 (Part - 52) 2003 (Reaff 2009)
21	Lead as Pb	IS:3025 (Part - 47) 1994 (Reaff 2009)
22	Manganese as Mn	IS 3025:(Part - 59):2006
23	Boron as B	IS 3025:(Part - 57):2005
24	Copper as Cu	IS 3025:(Part - 42):1992
25	Mercury as Hg	IS 3025 (Part48):1994 RA 1999
26	Nickel as Ni	IS 3025:(Part-54):2003(Reaff 2009)
27	Selenium as Se	IS 3025 Part (56)2003
28	Zinc as Zn	IS:3025 (Part - 49) 1994 (Reaff 2009)
29	Dissolved Oxygen (DO)	IS:3025 (Part - 38)1989 (Reaff 2009)
30	BOD, 3 days @ 27°C as O_2	5210B APHA22nd Edn 2012
31	Chemical Oxygen Demand as O_2	IS:3025 (Part-58)-2006

The prevailing status of surface water quality has been assessed during the study period. Surface water quality results are provided in **Table 3-11**. A map showing the surface water monitoring locations is given in **Figure 3-21**.

Table 3-11 Details of Surface water sampling locations

Location code	Water bodies	Distance from project boundary (~km)	Direction from project boundary
SW1	Kaveri/Cauvery R	8.95	N
SW2	Kattalai High Level Canal	6.65	NNE
SW3	Vayalur Lake	7.33	E
SW4	Pungar R	3.94	ESE
SW5	Panjappatti Lake	5.65	SSE
SW6	Stream near vadavambadi	5.86	SSW
SW7	Mayanur Barrage	9.44	NNW
SW8	Kovakkulam Lake	5.28	NNW

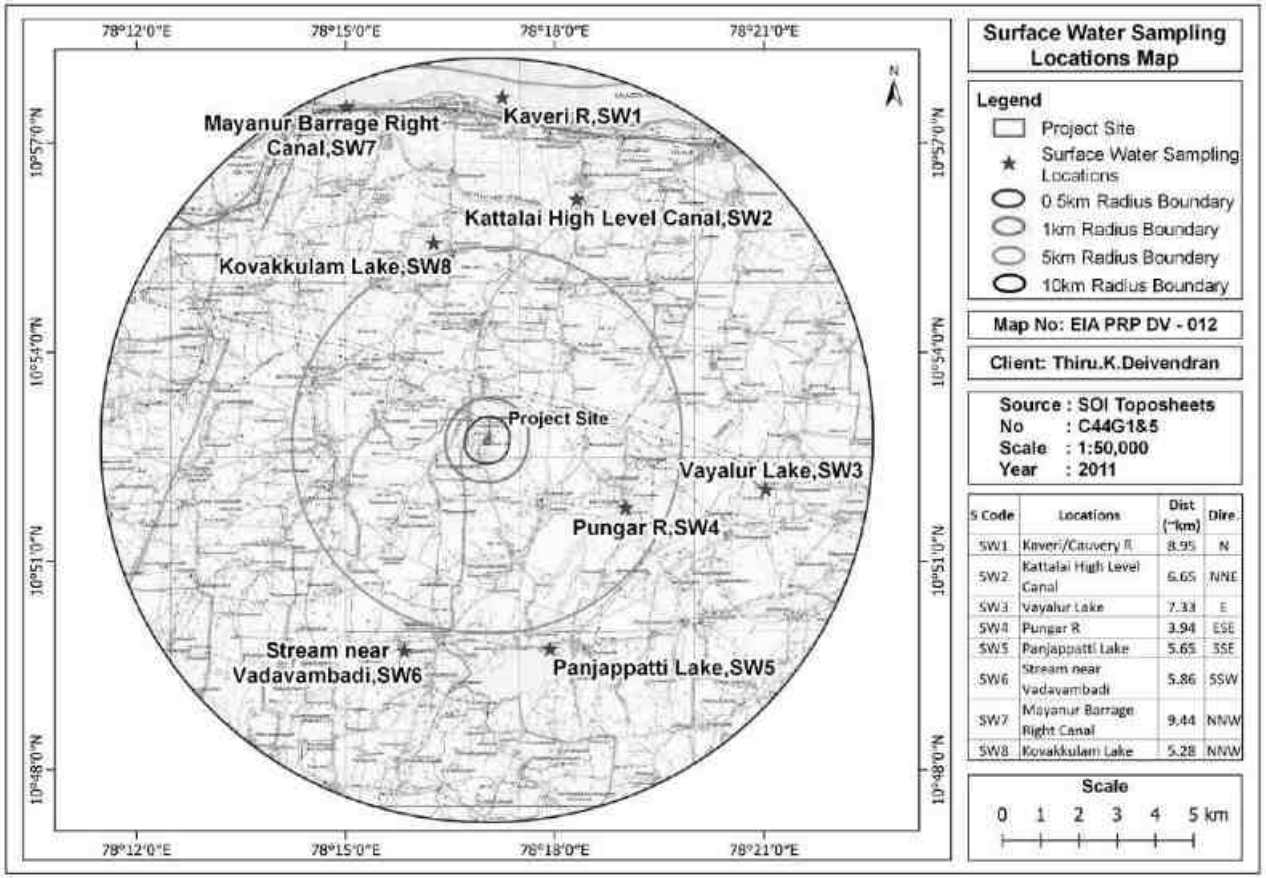


Figure 3-21 Map showing the surface water monitoring locations

Table 3-12 Surface water Monitoring Results

S. No	Parameter	Unit	Surface water standards (IS 2296 Class-A)	kaveri/cauvery R	kattalai High level canal	vayalur lake	pungar r	panjappatti lake	stream near vadavambadi	mayanur barrage right canal	kovakkulam lake
				SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8
1.	Turbidity	NTU	1	2.2	2.6	3.5	1.7	6.5	5.2	6.1	7.0
2.	pH (at 25°C)	--	6.5-8.5	7.34	7.56	8.10	7.86	7.26	7.81	7.42	7.72
3.	Electrical Conductivity	µS/cm	-	743	805	789	870	811	781	820	906
4.	Total Dissolved Solids	mg/l	500	391	424	415	458	427	411	432	477
5.	Total Suspended Solids	mg/l	-	5	6	8	4	15	12	14	16
6.	Total Alkalinity as CaCO3	mg/l	-	88	85	89	103	98	103	108	118
7.	Total Hardness as CaCO3	mg/l	300	142	146	151	168	157	159	167	185
8.	Sodium as Na	mg/l	-	76	86	82	91	83	77	82	92
9.	Potassium as K	mg/l	-	9	10	10	11	10	9	10	11
10.	Calcium as Ca	mg/l	-	33.01	33.94	35.10	39.05	36.50	36.96	38.82	43.01
11.	Magnesium as Mg	mg/l	-	14.5	14.9	15.4	17.1	16.0	16.2	17.0	18.9
12.	Chloride as Cl	mg/l	250	127	143	137	151	139	128	137	153
13.	Sulphate as SO4	mg/l	400	50.11	56.42	54.05	59.58	54.84	50.50	54.05	60.37
14.	Nitrate as NO3	mg/l	20	0.38	0.46	0.39	0.41	0.48	0.46	0.32	0.47
15.	Phosphate as PO4	mg/l	-	0.41	0.42	0.42	0.27	0.21	0.23	0.21	0.24
16.	Fluorides as F	mg/l	1.5	0.39	0.40	0.38	0.31	0.28	0.22	0.41	0.32
17.	Cyanide	mg/l	0.05	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)
18.	Arsenic	mg/l	0.05	BLQ(LOQ 0.005)	BLQ(LOQ 0.005)	BLQ(LOQ 0.005)	BLQ(LOQ 0.005)	BLQ(LOQ 0.005)	BLQ(LOQ 0.005)	BLQ(LOQ 0.005)	BLQ(LOQ 0.005)
19.	Boron as B	mg/l	-	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)
20.	Cadmium as Cd	mg/l	0.01	BLQ(LOQ 0.001)	BLQ(LOQ 0.001)	BLQ(LOQ 0.001)	BLQ(LOQ 0.001)	BLQ(LOQ 0.001)	BLQ(LOQ 0.001)	BLQ(LOQ 0.001)	BLQ(LOQ 0.001)
21.	Chromium, Total	mg/l	0.05	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)

S. No	Parameter	Unit	Surface water standards (IS 2296 Class-A)	kaveri/cauvery R	kattalai High level canal	vayalur lake	pungar r	panjappatti lake	stream near vadavambadi	mayanur barrage right canal	kovakkulam lake
				SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8
22.	Copper as Cu	mg/l	1.5	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)
23.	Lead as Pb	mg/l	0.1	BLQ(LOQ 0.005)	BLQ(LOQ 0.005)	BLQ(LOQ 0.005)	BLQ(LOQ 0.005)	BLQ(LOQ 0.005)	BLQ(LOQ 0.005)	BLQ(LOQ 0.005)	BLQ(LOQ 0.005)
24.	Manganese as Mn	mg/l	0.5	BLQ(LOQ :0.05)	BLQ(LOQ :0.05)	BLQ(LOQ :0.05)	BLQ(LOQ :0.05)	BLQ(LOQ :0.05)	BLQ(LOQ :0.05)	BLQ(LOQ :0.05)	BLQ(LOQ :0.05)
25.	Mercury	mg/l	0.001	BLQ(LOQ :0.005)	BLQ(LOQ :0.005)	BLQ(LOQ :0.005)	BLQ(LOQ :0.005)	BLQ(LOQ :0.005)	BLQ(LOQ :0.005)	BLQ(LOQ :0.005)	BLQ(LOQ :0.005)
26.	Nickel as Ni	mg/l	-	BLQ(LOQ :0.01)	BLQ(LOQ :0.01)	BLQ(LOQ :0.01)	BLQ(LOQ :0.01)	BLQ(LOQ :0.01)	BLQ(LOQ :0.01)	BLQ(LOQ :0.01)	BLQ(LOQ :0.01)
27.	Selenium as Se	mg/l	0.01	BLQ(LOQ :0.005)	BLQ(LOQ :0.005)	BLQ(LOQ :0.005)	BLQ(LOQ :0.005)	BLQ(LOQ :0.005)	BLQ(LOQ :0.005)	BLQ(LOQ :0.005)	BLQ(LOQ :0.005)
28.	Zinc	mg/l	15	BLQ(LOQ :0.1)	BLQ(LOQ :0.1)	BLQ(LOQ :0.1)	BLQ(LOQ :0.1)	BLQ(LOQ :0.1)	BLQ(LOQ :0.1)	BLQ(LOQ :0.1)	BLQ(LOQ :0.1)
29.	Dissolved Oxygen	mg/l	6	6.8	6.7	6.6	6.6	6.4	6.7	6.6	6.4
30.	Chemical Oxygen Demand as O2	mg/l	-	20	20	16	20	24	20	16	16
31.	BOD, 3 days @ 27°C as O2	mg/l	2	2	2	2	2	4	3	2	2

*(**Note:** BLQ – Below Limit of Quantification; LOQ – Limit Of Quantification)*

3.8.2.1 *Results and Discussions*

Surface water sample results are discussed below:

- pH in the collected surface water samples varies between 7.26 to 8.10 where all the samples are within the limit of IS 2296:1992.
- The Total Dissolved Solids (TDS) value of collected surface water sample ranges from 391 mg/l to 477 mg/l.
- The Total hardness value of the collected surface water sample ranges between 142 mg/l to 185 mg/l.
- BOD value of the collected surface water sample ranges from 2.0 mg/l to 4.0 mg/l.
- COD value of collected surface water varies from 16 to 24 mg/l.
- The concentration of heavy metals like As, Cd, Cr, Pb, Mn, Hg, Ni and Se are within the limits of IS 2296:1992.

The Surface water standards (IS 2296:1992) given in **Table 3-13**

Table 3-13 Surface water Standards (IS 2296:1992)

S.No	Parameters	Unit	A	B	C	D	E
1	Turbidity	NTU	---	---	---	---	---
2	pH	--	8.5	8.5	8.5	8.5	8.5
3	Conductivity	µS/cm	---	---	---	1000	2250
4	Total Dissolved Solids	mg/l	500	---	1500	---	2100
5	Alkalinity as $CaCO_3$	mg/l	---	---	---	---	---
6	Total Hardness as $CaCo_3$	mg/l	300	---	---	---	---
7	Calcium as Ca	mg/l	---	---	---	---	---
8	Magnesium as Mg.	mg/l	---	---	---	---	---
9	Sodium Na	mg/l	---	---	---	---	---
10	Potassium	mg/l	---	---	---	---	---
11	Chloride as Cl	mg/l	250	---	600	---	600
12	Sulphate as SO4	mg/l	400	---	400	---	1000
13	Phosphate	mg/l	---	---	---	---	---
14	Nitrate as NO_3	mg/l	20	---	50	---	---
15	Fluorides as F	mg/l	1.5	1.5	1.5	---	---
16	Cyanide	mg/l	0.05	0.05	0.05	---	---
17	Arsenic	mg/l	0.05	0.2	0.2	---	---
18	Cadmium	mg/l	0.01	---	0.01	---	---
19	Chromium, Total	mg/l	0.05	0.05	0.05	---	---
20	Copper	mg/l	1.5	---	1.5	---	---
21	Iron	mg/l	0.3	---	50	---	---
22	Lead	mg/l	0.1	---	0.1	---	---
23	Zinc	mg/l	15	---	15	---	---

S.No	Parameters	Unit	A	B	C	D	E
24	Manganese	mg/l	0.5	---	---	---	---
25	Selenium	mg/l	0.01	---	0.05	---	---
26	Mercury	mg/l	0.001	---	---	---	---
27	Dissolved Oxygen	mg/l	6	5	4	4	---
28	COD	mg/l	---	---	---	---	---
29	BOD	mg/l	2	3	3	---	---

Class A – Drinking water without conventional treatment but after disinfection.

Class B –Water for outdoor bathing.

Class C – Drinking water with conventional treatment followed by disinfection.

Class D – Water for fish culture and wild life propagation.

Class E – Water for irrigation, industrial cooling and controlled waste disposal

3.9 Groundwater resources

Out of the total groundwater recharge, about 10% is kept reserved for natural recharge during non - monsoon period. The balance is earmarked a suitable groundwater recharge for further development of irrigation. When the groundwater development is more than 100%, it is categorized as over exploited. When it is between 90 and 100%, it is categorized as critical. When it is between 70 and 90%, it is categorized assemi-critical. When it is less than 70% it is categorized as safe. The groundwater quality is being monitored by PWD by analysing water samples from the monitoring wells in pre and post monsoon period. In Karur district 18 shallow open wells and 21 boreholes were selected for groundwater monitoring since 1972. . In Karur District, totally 19 Firkas, 10 Firkas are categorized as Over Exploited and remaining 9 Firkas are categorized as Semi Critical and Safe blocks. Instead of taking Block as an assessment, Firka can be taken as assessment unit is to concentrate the assessment in micro level. For Eg, a block contains more than three to four Firkas. In this block, two Firkas may have good groundwater potential than other two Firkas but it may to categorize as Over Exploited. To avoid this, assessment done on the basis of Firkas for the benefit of farmers to the implementation of schemes related to Irrigation. The percentage of over exploited and critical Firkas has been increased by changing the concept from Block to Firka assessment. The total percentage of over exploited and critical Blocks for 2009 Assessment is 62.5%, but, the total percentage of over exploited and critical Firkas as on March 2011 Assessment is 52.63%, in the Karur District.

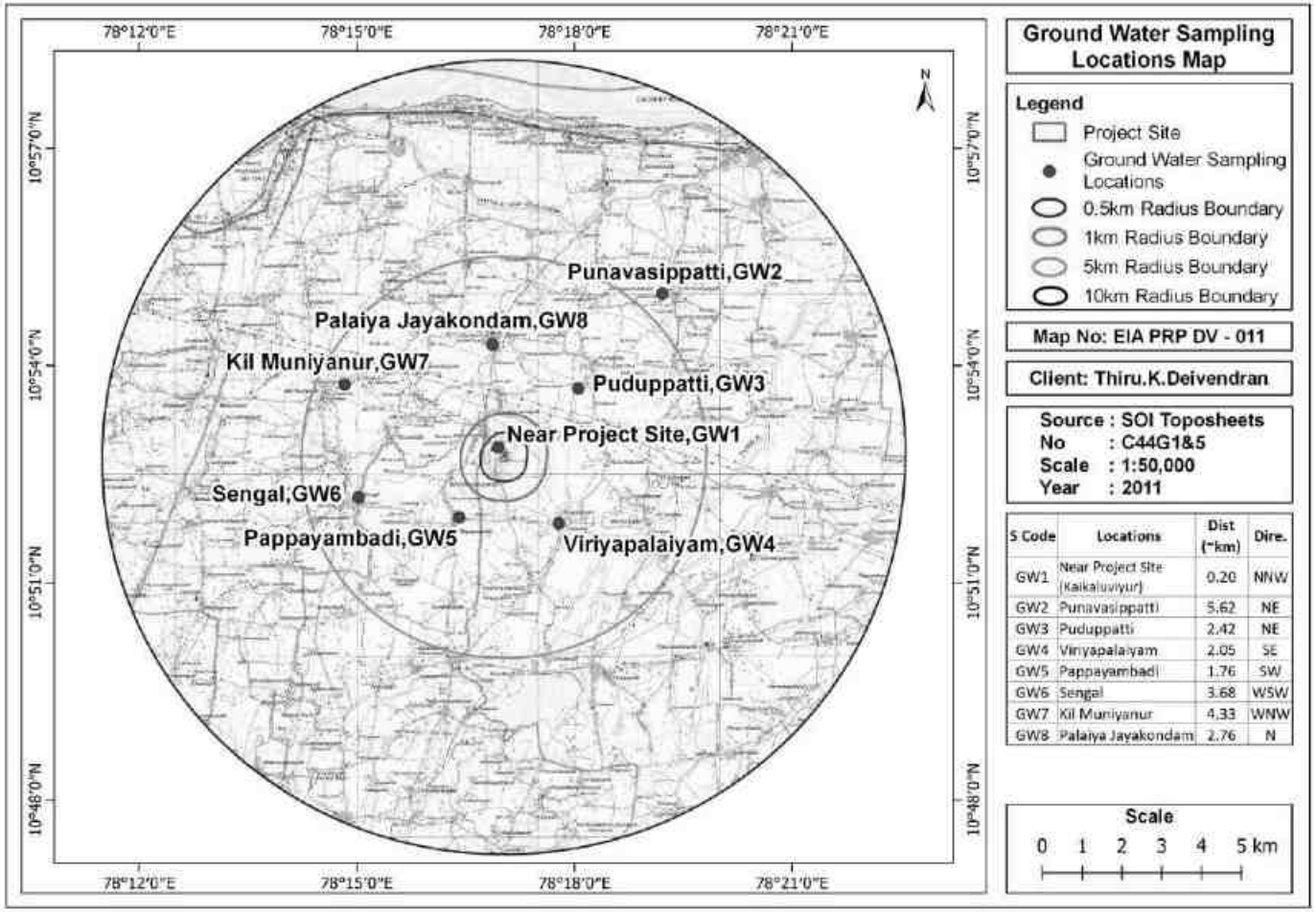
3.9.1 Ground Water Quality

Total **Eight (08)** ground water monitoring locations were identified for assessment in different villages around the project site based on the usage of sub surface water by the settlements/ villages in

the study area. The groundwater results are compared with the acceptable and permissible water quality standards as per IS: 10500 (2012) for drinking water. Groundwater quality monitoring locations and results are given in **Table 3-14** and **Table 3-15**. A map showing the groundwater monitoring locations is given in **Figure 3-22**.

Table 3-14 Details of Groundwater Quality Monitoring Locations

Station Code	Location	Distance (km) from Project boundary	Directions
GW1	Near Project Site (Kaikaluviyur)	0.20	NNW
GW2	Punavasippatti	5.62	NE
GW3	Puduppatti	2.42	NE
GW4	Viriyapalyam	2.05	SE
GW5	Pappayambadi	1.76	SW
GW6	Sengal	3.68	WSW
GW7	Kil Muniyanur	4.33	WNW
GW8	Palaiya Jayakondam	2.76	N



S Code	Locations	Dist (~km)	Dire.
GW1	Near Project Site (Kaikaluviyur)	0.20	NNW
GW2	Punavasippatti	5.62	NE
GW3	Puduppatti	2.42	NE
GW4	Viriyapalaiyam	2.05	SE
GW5	Pappayambadi	1.76	SW
GW6	Sengal	3.68	WSW
GW7	Kil Muniyanur	4.33	WNW
GW8	Palaiya Jayakondam	2.76	N

Figure 3-22 Map showing the Groundwater Monitoring Locations

Table 3-15 Ground Water Monitoring Results

S. No	Parameters	Unit	Drinking water Standard (IS 10500: 2012) Permissible Limit	Drinking water Standard (IS 10500: 2012) Acceptable Limit	near project site (kaikaluviyur)	punavasippatti	puduppatti	viriyapalaiyam	pappayambadi	sengal	kil muniyanur	palaiya jayakondam
					GW1	GW2	GW3	GW4	GW5	GW6	GW7	GW8
1.	Colour	Hazen	15	5	BLQ (LOQ 1)	BLQ (LOQ 1)	BLQ (LOQ 1)	BLQ (LOQ 1)	BLQ (LOQ 1)	BLQ (LOQ 1)	BLQ (LOQ 1)	BLQ (LOQ 1)
2.	Turbidity	NTU	5	1	BLQ (LOQ 0.1)	BLQ (LOQ 0.1)	BLQ (LOQ 0.1)	BLQ (LOQ 0.1)	BLQ (LOQ 0.1)	BLQ (LOQ 0.1)	BLQ (LOQ 0.1)	BLQ (LOQ 0.1)
3.	pH	--	NR	6.5-8.5	7.32	7.21	7.56	6.89	7.26	7.85	7.64	7.18
4.	Conductivity	µS/cm	-	-	2065	2042	2231	2406	2221	1716	1745	1678
5.	Total Dissolve Solids	mg/l	2000	500	1087	1075	1174	1266	1169	903	919	883
6.	Total Suspended Solids		-	-	BLQ(LOQ 1)	BLQ(LOQ 1)	BLQ(LOQ 1)	BLQ(LOQ 1)	BLQ(LOQ 1)	BLQ(LOQ1)	BLQ(LOQ1)	BLQ(LOQ 1)
7.	Alkalinity as CaCO3	mg/l	600	200	98	147	94	104	98	101	97	107
8.	Total Hardness as CaCO3	mg/l	600	200	285	322	301	341	302	261	253	258
9.	Sodium as Na	mg/l	-	-	263	247	287	308	285	211	217	205
10.	Potassium asK	mg/l	-	-	30.66	28.84	33.53	35.98	33.25	24.64	25.34	23.87
11.	Calcium as Ca	mg/l	200	75	66.25	74.85	69.97	79.27	70.20	60.67	58.81	59.98
12.	Magnesium as Mg	mg/l	100	30	29.1	32.9	30.7	34.8	30.8	26.6	25.8	26.3
13.	Chloride as Cl	mg/l	1000	250	438	412	479	514	475	352	362	341
14.	Sulphate SO4	mg/l	400	200	172.81	162.56	188.99	202.80	187.41	138.88	142.83	134.54
15.	Nitrate as NO3	mg/l	NR	45	0.48	0.35	0.42	0.58	0.32	0.42	0.47	0.41

S. No	Parameters	Unit	Drinking water Standard (IS 10500: 2012) Permissible Limit	Drinking water Standard (IS 10500: 2012) Acceptable Limit	near project site (kaikaluviyur)	punavasippatti	puduppatti	viriyapalaiyam	pappayambadi	sengal	kil muniyanur	palaiya jayakondam
					GW1	GW2	GW3	GW4	GW5	GW6	GW7	GW8
16.	Phosphate PO4	mg/l	-	-	0.32	0.42	0.24	0.25	0.67	0.43	0.35	0.46
17.	Fluorides as F		1.5	1	0.43	0.31	0.53	0.34	0.72	0.58	0.64	0.32
18.	Cyanide	mg/l	NR	0.05	BLQ(LOQ : 0.01)	BLQ(LOQ : 0.01)	BLQ(LOQ : 0.01)	BLQ(LOQ: 0.01)	BLQ(LOQ : 0.01)	BLQ(LOQ: 0.01)	BLQ(LOQ: 0.01)	BLQ(LOQ : 0.01)
19.	Arsenic as As	mg/l	0.05	0.01	BLQ(LOQ : 0.005)	BLQ(LOQ : 0.005)	BLQ(LOQ : 0.005)	BLQ(LOQ: 0.005)	BLQ(LOQ : 0.005)	BLQ(LOQ: 0.005)	BLQ(LOQ: 0.005)	BLQ(LOQ : 0.005)
20.	Boron as B	mg/l	1	0.5	BLQ(LOQ : 0.1)	BLQ(LOQ : 0.1)	BLQ(LOQ : 0.1)	BLQ(LOQ: 0.1)	BLQ(LOQ : 0.1)	BLQ(LOQ: 0.1)	BLQ(LOQ: 0.1)	BLQ(LOQ : 0.1)
21.	Cadmium as Cd	mg/l	NR	0.003	BLQ(LOQ : 0.001)	BLQ(LOQ : 0.001)	BLQ(LOQ : 0.001)	BLQ(LOQ: 0.001)	BLQ(LOQ : 0.001)	BLQ(LOQ: 0.001)	BLQ(LOQ: 0.001)	BLQ(LOQ : 0.001)
22.	Chromium as Cr	mg/l	NR	0.05	BLQ(LOQ : 0.01)	BLQ(LOQ : 0.01)	BLQ(LOQ : 0.01)	BLQ(LOQ: 0.01)	BLQ(LOQ : 0.01)	BLQ(LOQ: 0.01)	BLQ(LOQ: 0.01)	BLQ(LOQ : 0.01)
23.	Copper as Cu	mg/l	1.5	0.05	BLQ(LOQ : 0.01)	BLQ(LOQ : 0.01)	BLQ(LOQ : 0.01)	BLQ(LOQ: 0.01)	BLQ(LOQ : 0.01)	BLQ(LOQ: 0.01)	BLQ(LOQ: 0.01)	BLQ(LOQ : 0.01)
24.	Total Iron	mg/l	NR	0.3	0.21	0.25	0.15	0.19	0.17	0.16	0.23	0.28
25.	Lead as Pb	mg/l	NR	0.01	BLQ(LOQ : 0.005)	BLQ(LOQ : 0.005)	BLQ(LOQ : 0.005)	BLQ(LOQ: 0.005)	BLQ(LOQ : 0.005)	BLQ(LOQ: 0.005)	BLQ(LOQ: 0.005)	BLQ(LOQ : 0.005)
26.	Manganese as Mn	mg/l	0.3	0.1	BLQ(LOQ : 0.05)	BLQ(LOQ : 0.05)	BLQ(LOQ : 0.05)	BLQ(LOQ: 0.05)	BLQ(LOQ : 0.05)	BLQ(LOQ: 0.05)	BLQ(LOQ: 0.05)	BLQ(LOQ : 0.05)
27.	Mercury	mg/l	NR	0.001	BLQ(LOQ : 0.0005)	BLQ(LOQ : 0.0005)	BLQ(LOQ : 0.0005)	BLQ(LOQ: 0.0005)	BLQ(LOQ : 0.0005)	BLQ(LOQ: 0.0005)	BLQ(LOQ: 0.0005)	BLQ(LOQ : 0.0005)
28.	Nickel as Ni	mg/l	NR	0.02	BLQ(LOQ : 0.01)	BLQ(LOQ : 0.01)	BLQ(LOQ : 0.01)	BLQ(LOQ: 0.01)	BLQ(LOQ : 0.01)	BLQ(LOQ: 0.01)	BLQ(LOQ: 0.01)	BLQ(LOQ : 0.01)
29.	Selenium as Se	mg/l	NR	0.01	BLQ(LOQ : 0.005)	BLQ(LOQ : 0.005)	BLQ(LOQ : 0.005)	BLQ(LOQ: 0.005)	BLQ(LOQ : 0.005)	BLQ(LOQ: 0.005)	BLQ(LOQ: 0.005)	BLQ(LOQ : 0.005)
30.	Zinc as Zn	mg/l	15	5	BLQ(LOQ	BLQ(LOQ	BLQ(LOQ	BLQ(LOQ:	BLQ(LOQ	BLQ(LOQ:	BLQ(LOQ:	BLQ(LOQ

S. No	Parameters	Unit	Drinking water Standard (IS 10500: 2012) Permissible Limit	Drinking water Standard (IS 10500: 2012) Acceptable Limit	near project site (kaikaluviyur)	punavasippatti	puduppatti	viriyapalaiyam	pappayambadi	sengal	kil muniyanur	palaiya jayakondam
					GW1	GW2	GW3	GW4	GW5	GW6	GW7	GW8
					: 0.1)	: 0.1)	: 0.1)	0.1)	: 0.1)	0.1)	0.1)	: 0.1)
31.	Chemical Oxygen Demand as O2	mg/l	-	5	BLQ(LOQ 1.0)	BLQ(LOQ 1.0)	BLQ(LOQ 1.0)	BLQ(LOQ 1.0)	BLQ(LOQ 1.0)	BLQ(LOQ1.0)	BLQ(LOQ1.0)	BLQ(LOQ 1.0)

*(**Note:** BLQ – Below Limit of Quantification; LOQ – Limit Of Quantification; NR – No Relaxation)*

3.9.1.1 Results and Discussions

A summary of analytical results are presented below:

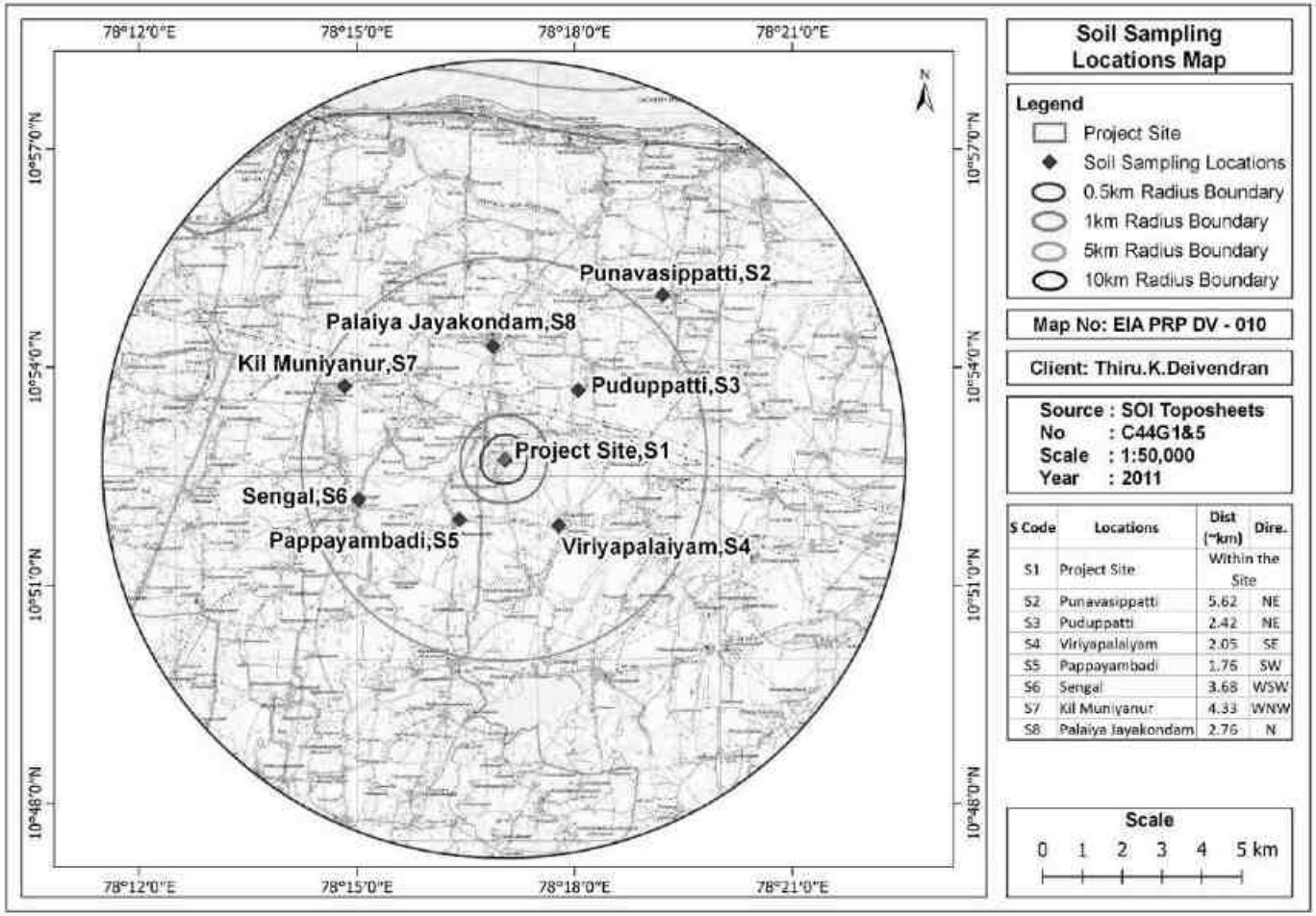
- The ground water results of the study area indicate that the pH range varies between 6.89 and 7.25. It is observed that the pH range is within the permissible limit of IS 10500:2012.
- The Total Dissolved Solids range of the collected ground water sample is varied between 883 mg/l – 1266 mg/l. All the samples are within the permissible limit of IS 10500: 2012.
- The acceptable limit of the chloride content is 250mg/l and permissible limit is 1000 mg/l. The chloride content in the collected ground water samples in the study area ranges between 341 mg/l – 514 mg/l. It is observed that all the samples are within the permissible limit of IS 10500:2012.
- The acceptable limit of the sulphate content is 200mg/l and permissible limit is 400mg/l. the sulphate content in the collected ground water samples in the study area is varied between 135 mg/l – 203 mg/l. It is observed that all the samples are meeting the acceptable limit of the IS 10500: 2012.
- The Total hardness ranges is between 253 mg/l – 341 mg/l for ground water samples. It is observed that all the samples are within the permissible limit of the IS 10500: 2012.
- It is observed that all ground water sample collected within the study area are meeting the drinking water standards IS 10500:2012.

3.10 Soil as a resource and its quality

Soil quality monitoring locations & results are given in **Table 3-16** & **Table 3-17.** Map showing the soil monitoring locations are given in **Figure 3-23.**

Table 3-16 Soil & Sediment Quality Monitoring Locations

Location Code	Location	Distance (km) from Project boundary	Directions
S1	Project Site	Within the Site	
S2	Punavasippatti	5.62	NE
S3	Puduppatti	2.42	NE
S4	Viriyapalyam	2.05	SE
S5	Pappayambadi	1.76	SW
S6	Sengal	3.68	WSW
S7	Kil Muniyanur	4.33	WNW
S8	Palaiya Jayakondam	2.76	N



S Code	Locations	Dist (*km)	Dire.
S1	Project Site	Within the Site	
S2	Punavasippatti	5.62	NE
S3	Puduppatti	2.42	NE
S4	Viriyapalaiyam	2.05	SE
S5	Pappayambadi	1.76	SW
S6	Sengal	3.68	WSW
S7	Kil Muniyanur	4.33	WNW
S8	Palaiya Jayakondam	2.76	N

Figure 3-23 Map showing the Soil monitoring locations

Table 3-17 Soil & Sediment Quality Monitoring Results

S. No	Parameters	Units	Project Site	Punavasippatti	Pudupp atti	Viriyap alyam	Pappa yamb adi	Sengal	Kil Muniy anur	Palaiy a Jayak onda m
			S1	S2	S3	S4	S5	S6	S7	S8
1.	**Soil Texture**	-	Sandy Loam	Sandy Loam	Sandy Clay	Sandy Clay Loam	Sandy Clay	Sandy Clay Loam	Sandy Clay	Sandy Clay Loam
2.	**Sand**	%	65.2	58.8	53.7	52.1	50.7	48.5	52.3	55.6
3.	**Silt**	%	19.6	25.7	10.8	24.5	8.1	17.7	12.2	19.7
4.	**Clay**	%	15.2	15.5	35.5	23.4	41.2	33.8	35.5	24.7
5.	**pH**	-	4.51	4.81	4.94	5.28	5.48	5.31	5.27	5.54
6.	**Electrical conductivity**	µS/cm	196	153	101	127	134	155	169	197
7.	**Organic matter**	%	0.83	0.67	0.54	0.97	1.14	1.23	0.89	0.92
8.	**Nitrogen as N**	mg/kg	103.58	130.52	125.89	128.74	105.87	112.87	121.52	134.57
9.	**Potassium**	mg/kg	6.94	8.74	8.43	8.62	7.09	7.56	8.14	9.01
10.	**Phosphorus**	mg/kg	107.28	135.18	130.39	133.34	109.65	116.90	125.86	139.38
11.	**Boron as B**	mg/kg	0.4	0.32	0.24	0.32	0.47	0.52	0.48	BLQ(LOQ 0.1)
12.	**Cadmium as Cd**	mg/kg	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)
13.	**Chromium as Cr**	mg/kg	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)
14.	**Copper as Cu**	mg/kg	0.21	0.26	0.25	0.26	0.21	0.23	0.24	0.27
15.	**Iron as Fe**	mg/kg	4.60	5.80	5.60	5.72	4.71	5.02	5.40	5.98
16.	**Manganese as Mn**	mg/kg	2.35	2.97	2.86	2.93	2.41	2.57	2.76	3.06
17.	**Zinc as Zn**	mg/kg	0.26	0.33	0.31	0.32	0.26	0.28	0.30	0.34
18.	**Porosity**	-	0.43	0.42	0.42	0.42	0.43	0.42	0.43	0.42
19.	**Water Holding Capacity**	%	16.00	15.50	16.80	16.50	16.00	15.90	16.10	16.20

Note: *BLQ: Below Limit of Quantification; LOQ: Limit Of Quantification*

3.10.1 Results and Discussions

Summary of analytical results

- The pH of the soil samples ranged from 4.51 to 5.54.
- Conductivity of the soil samples ranged from 101 to 197 µmhos/cm.
- Nitrogen content in the collected soil samples ranged from 103.58 mg/kg to 134.57 mg/kg.
- Phosphorous content ranged from 6.94 mg/kg to 9.01 mg/kg.
- Potassium content ranges from 107.28 mg/kg to 139.38 mg/kg.

3.11 Biological Environment

An ecological study of the ecosystem is essential to understand the impact of industrialization and urbanization on existing flora and fauna of the study area. Studies on various aspects of ecosystem play an important role in identifying sensitive issues for under taking appropriate action to mitigate the impact, if any. The biological study was under taken as a part of the EIA study report to understand the present status of ecosystem prevailing in the study area, to compare it with past condition with the help of available data, to predict changes in the biological environment as a result of present activities and to suggest measures for maintaining its health. Secondary information was collected to study the flora & fauna in 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.

During the collection of secondary information, following aspects were considered for ecological studies:

- Assessment of present status of flora and fauna;
- Identification of rare and endangered species of plants and animals (if any);
- Identification of ecologically sensitive areas within the study area;
- Assessment of migratory route of wildlife (if any); and
- Assessment of Aquatic Ecology with specific reference to aquatic birds and plankton resources;

3.11.1 *Methodology*

Terrestrial investigations for flora and fauna records were collected by secondary information like research article, periodicals, floras and forest checklist.

Floral Study

- Plants species were identified based on their specific diagnostics characters of family, genus and species using available floral, other related literature.
- Besides the identification of plant species, information was collected on the vernacular names and uses of plants made by local inhabitants.

Faunal Study

- Secondary information collected from published government data etc.

- List of the endangered and endemic species as per the schedule of The Wildlife Protection Act, 1972.
- Emphasis is given to identify avifauna and mammals to determine the presence and absence of Schedule-1 species, listed in The Wildlife Protection Act 1972, as well as in Red List of IUCN.

3.11.2 *Floristic composition within the study area*

Based on secondary information a total 80 species under 32 families was found in the study area. The detailed list of plant species found in each quadrat provided in **Table 3-18**.

Table 3-18 list of flora reported/observed in the study area

S.No	Species	Family	Common Name	Habit	IUCN
1.	*Abrus precatorius*	Fabaceae	Kundumani	Shrub	NA
2.	*Abutilon indicum*	Malvaceae	Perun thuthi	Shrub	NA
3.	*Acacia nilotica*	Mimosaceae	Karuvelam	Tree	LC
4.	*Acacia planifrons*	Mimosaceae	Kodaivelam	Tree	NA
5.	*Acalypha indica*	Euphorbiaceae	Kuppaimeni	Herb	NA
6.	*Acanthospermumhispidum*	Compositae	--	Herb	NA
7.	*Achyranthes aspera*	Amaranthaceae	Nayurivi	Herb	NA
8.	*Aegle marmelos*	Rutaceae	Vilvam	Tree	NA
9.	*Aerva lanata*	Amaranthaceae	Sirupeelai	Shrub	NA
10.	*Aerva persica*	Amaranthaceae	Perumpeelai	Shrub	NA
11.	*Aeschynomene aspera*	Fabaceae	Thakkai	Shrub	NA
12.	*Ageratum conyzoides*	Compositae	Poom pillu	Herb	NA
13.	*Alloteropsiscimicina*	Poaceae	--	Grass	NA
14.	*Alternanthera sessilis*	Amaranthaceae	Ponnanganni	Herb	NA
15.	*Anisomeles indica*	Labiatae	--	Herb	NA
16.	*Annona squamosa*	Annonaceae	Seetha	Tree	NA
17.	*Arachis hypogaea*	Fabaceae	Verkadalai	Herb	NA
18.	*Argemone mexicana*	Papaveraceae	Braman Thandu	Herb	NA
19.	*Aristida adscensionis*	Poaceae	--	Grass	NA
20.	*Aristida hystrix*	Poaceae	--	Grass	NA
21.	*Aristolochiabracteolata*	Aristolochiaceae	Aduthinnappalai	Herb	NA
22.	*Barleria acuminata*	Acanthaceae	Vellai kurinji	Shrub	NA
23.	*Barlerialongiflora*	Acanthaceae	--	Shrub	NA
24.	*Barlerianoctiflora*	Acanthaceae	Barleria	Shrub	NA
25.	*Boerhaviadiffusa*	Nyctaginaceae	Mookarattai	Herb	NA
26.	*Carissa carandas*	Apocynaceae	Kalaa, Perun kala	Shrub	NA
27.	*Cassia fistula*	Caesalpiniaceae	Kondrai	Tree	NA
28.	*Celosia argentea*	Amaranthaceae	Pannaikeerai	Herb	NA
29.	*Cissus quadrangularis*	Vitaceae	Pirandai	Shrub	NA
30.	*Citrullus colocynthis*	Cucurbitaceae	Peikkumatti	Herb	NA
31.	*Citrus aurantifolia*	Rutaceae	Elumichai	Tree	NA
32.	*Cleome viscosa*	Capparidaceae	Nai kadugu	Herb	NA
33.	*Coccinia grandis*	Cucurbitaceae	Kovai	Climber	NA

34.	*Croton bonplandianum*	Euphorbiaceae	Rail poondu	Herb	NA
35.	*Cyperus bulbosus*	Cyperaceae	–	Sedge	NA
36.	*Ecliptaprostrata*	Compositae	Karisaalai	Herb	NA
37.	*Euphorbia antiquorum*	Euphorbiaceae	Sadura-kalli	Tree	NA
38.	*Evolvulusalsinoides*	Convolvulaceae	Vishnukarandi	Herb	NA
39.	*Ficus benghalensis*	Moraceae	Aala maram	Tree	NA
40.	*Ficus religiosa*	Moraceae	Arasu	Tree	NA
41.	*Indigofera linnaei*	Fabaceae		Herb	NA
42.	*Indigofera tinctoria*	Fabaceae	Avuri, Neeli	Herb	NA
43.	*Ipomoea pes-caprae*	Convolvulaceae	Kudhirai Kulambu	Creeper	NA
44.	*Jatropha gossypifolia*	Euphorbiaceae	Kaatu-amanakku	Shrub	NA
45.	*Justicia adhatoda*	Acanthaceae	Adathodai	Shrub	NA
46.	*Justicia simplex*	Acanthaceae		Herb	NA
47.	*Lagenaria siceraria*	Cucurbitaceae	Surakkaai	Climber	NA
48.	*Lantana camara*	Verbenaceae	Unnichedi	Shrub	NA
49.	*Leucaena leucocephala*	Mimosaceae	Soundil	Tree	NA
50.	*Merremia hederacea*	Convolvulaceae		Herb	NA
51.	*Nyctanthes arbor-tristis*	Nyctanthaceae	Parijaatham	Tree	NA
52.	*Ocimumamericanum*	Labiatae	Ganjaankorai	Herb	NA
53.	*Phyllanthus amarus*	Euphorbiaceae	Kizha-nelli	Herb	NA
54.	*Pongamia pinnata*	Fabaceae	Punga maram	Tree	NA
55.	*Portulaca oleracea*	Portulacaceae	Kari keerai	Herb	NA
56.	*Prosopis juliflora*	Mimosaceae	Velikkaathaan	Tree	NA
57.	*Rhynchosiaviscosa*	Fabaceae		Climber	NA
58.	*Ricinus communis*	Euphorbiaceae	Amanakku	Shrub	NA
59.	*Riveahypocrateriformis*	Convolvulaceae	Boodhikeerai	Climber	NA
60.	*Ruellia tuberosa*	Acanthaceae		Herb	NA
61.	*Senna auriculata*	Caesalpiniaceae	Avaram	Shrub	NA
62.	*Senna occidentalis*	Caesalpiniaceae	Peiyavarai	Tree	NA
63.	*Sida acuta*	Malvaceae	Malai thangi	Herb	NA
64.	*Sida cordata*	Malvaceae	Pazhampaasi	Herb	NA
65.	*Sida cordifolia*	Malvaceae	Nilatutthi	Herb	NA
66.	*Solanum americanum*	Solanaceae	Manatakkali	Herb	NA
67.	*Solanum torvum*	Solanaceae	Chundai	Shrub	NA
68.	*Solanum trilobatum*	Solanaceae	Thoodhuvalai	Climber	NA
69.	*Spermacocehispida*	Rubiaceae	Nathaichoori	Herb	NA
70.	*Tamarindus indica*	Caesalpiniaceae	Puliyamaram	Tree	NA
71.	*Tectona grandis*	Verbenaceae	Thekku	Tree	NA
72.	*Tephrosia purpurea*	Fabaceae	Kozhinji	Undershrub	NA
73.	*Terminalia catappa*	Combretaceae	Badam	Tree	NA
74.	*Thespesia populnea*	Malvaceae	Poovarasu	Tree	NA
75.	*Tinospora cordifolia*	Menispermaceae	Seenthilkodi	Climber	NA
76.	*Tridax procumbens*	Asteraceae	Vettukayapoonduthalai	Herb	NA
77.	*Vitex negundo*	Verbenaceae	Nochi	Tree	NA
78.	*Waltheria indica*	Sterculiaceae	Chempoodu	Herb	NA

79.	*Wrightia tinctoria*	Apocynaceae	Vetpaalai	Tree	NA
80.	*Ziziphus mauritiana*	Rhamnaceae	Illandhai	Tree	NA

Source:

1. Flora of Tamil Nadu. Botanical survey of India.1983.

2. IUCN Status **:** **https://www.iucnredlist.org/**

3.11.3 Fauna Diversity

Fauna diversity was collected from secondary information and cross check with relevant literatures (Smith 1933-43, Ali and Ripley 1983, Daniel 1983, Prater 1993, Murthy and Chandrasekhar 1988).

3.11.3.1 *Birds species*

A total of 41 species belonging to 27 families have been identified from Agricultural area. A comparative chart of the total bird species belonging to different families along with their feeding preference and abundance are provided. List of Bird species reported/observed in the study area is given in **Table 3-19**

Table 3-19 Birds from the study area

S.No	Common Name	Scientific Name	IUCN status
	Phasianidae		
1	Grey francolin	*Franco linuspondicerianus*	LC
	Anatidae		
2	Indian spot billed duck	*Anas poecilorhyncha*	LC
	Threskiornithidae		
3	Black headed Ibis	*Threskiornis melano*	NT
	Ardeidae		
4	Indian pond heron	*Ardeo lagrayii*	LC
5	Purple heron	*Ardea purpurea*	LC
6	Grey heron	*Ardea cinerea*	LC
7	Cattle egret	*Bubulcus ibis*	LC
	Phalacrocoracidae		
8	Little cormorant	*Phalacrocorax niger*	LC
	Accipitridae		
9	Brahminy kite	*Halias turindus*	LC
10	Black kite	*Milvus migrans*	LC
	Rallidae		
11	White breasted waterhen	*Amaurornis phoenicurus*	LC
12	Purple swamphen	*Porphyrio porphyrio*	LC
	Charadriidae		
13	Red wattled lapwing	*Vanellus indicus*	LC
14	Common ringed plover	*Charadrius hiaticula*	LC
	Columbidae		
15	Common pigeon	*Columba livia*	LC
	Psittaculidae		
16	Rose ringed parakeet	*Psittacula krameri*	LC
	Cuculidae		

17	Common hawk cuckoo	*Hierococcyx varius*	LC
18	Asian koel	*Eudynamyss colopaceus*	LC
19	Southern coucal	*Centropus parroti*	LC
	Strigidae		
20	Spotted owlet	*Athene brama*	LC
	Upupidae		
21	Common hoopoe	*Upupa epops*	LC
	Coraciidae		
22	Indian roller	*Coracias benghalensis*	LC
	Alcedinidae		
23	White throated king fisher	*Halcyon smyrnensis*	LC
24	Pied kingfisher	*Cerylerudis*	LC
	Meropidae		
25	Green bee eater	*Meropsorientalis*	LC
	Ramphastidae		
26	Brown headed barbet	*Megalaima zeylanica*	LC
27	Copper smith barbet	*Megalaimaha emacephala*	LC
	Picidae		
28	Flame back	*Dinopium benghalense*	LC
	Dicruridae		
29	Greater racket tailed drongo	*Dicrurus paradiseus*	LC
30	Black drongo	*Dicrurus macrocercus*	LC
	Monarchidae		
31	Indian paradise flycatcher	*Terpsiphone paradise*	LC
	Corvidae		
32	House crow	*Corvus splendens*	LC
33	Rufous treepie	*Dendrocitta vagabunda*	LC
	Sturnidae		
34	Common myna	*Acridotheres tristis*	LC
	Estrildidae		
35	Scaly breasted munia	*Lonchurapunctulata*	LC
36	White rumped munia	*Lonchura striata*	LC
	Motacillidae		
37	White browed wagtail	*Motacilla maderaspatensis*	LC
	Ploceidae		
38	Baya weaver	*Ploceus philippinus*	LC
	Muscicapidae		
39	Pied Bushchat	*Saxicola caprata*	LC
	Nectariniidae		
40	Purple sunbird	*Cinnyris asiaticus*	LC
	Scolopacidae		
41	Wood sandpiper	*Tringa glareola*	LC

3.11.3.2 *Mammals:*

Based on secondary information, the following Mammals are recorded from the Primary Survey in the Study area. List of mammals reported/observed in the study area their Conservation Status is given in **Table 3-20.**

Table 3-20 Mammals recorded from the Secondary Data in the Study area and their Conservation Status

S.No	Species name	Common name	IUCN Conservation Status
1.	*Mus musculus*	Common Mouse	Not assessed
2.	*Funambulus pennanti*	Palm -Squirrel	Not assessed
3.	*Mus rattus*	Indian rat	Not assessed
4.	*Lepus nigricollis*	Indian Hare	Least Concern
5.	*Rattus norvegicus*	Brown Rat	Least Concern
6.	*Felis catus*	Cat	Not assessed

3.11.3.3 *Reptiles & Amphibians*

List of Reptiles and amphibian reported/observed in the study area their Conservation Status is given in **Table 3-21**. Reptiles and amphibian species were prepared based on secondary information

Table 3-21 Reptiles & Amphibians recorded from the Primary Survey in the Study area and their Conservation Status

S.No	Species name	Common name	IUCN Conservation Status
1.	*Eutropis macularia*	Common skink	Not assessed
2.	*Plyas mucosus*	Rat Snake	Not assessed
3.	*Nerodia sipedon*	Fresh water snake	Not assessed
4.	*Rana tigrina*	Common yellow frog	Least Concern
5.	*Calotes versicolor*	Common Garden Lizard	Not assessed
6.	*Hemidactylus sp.*	House lizard	Not assessed
7.	*Ophisopsles chenaultiix*	Snake-eyed lizard	Not assessed
8.	*Rana hexadactyla*	Frog	Least Concern

3.11.3.4 *Butterfly Species*

Butterfly can also serve as useful indicators of habitat biodiversity. They are responsible for a large part of the complex interconnections that characterize natural ecosystems. The butterfly communities that are present in forests help to maintain crucial ecological processes and preserve biodiversity as a whole. They participate in most of the ecological processes that sustain ecosystems. A totally 10 species belonging to five families of butterflies recorded.

Table 3-22 Occurrence of butterfly species in buffer zone

Family	Species name	Common name	Status	WPA 72 Shedule
Nymphalidae	*Danaus chrysippus*	Plain Tiger	LC	Sch-IV
Nymphalidae	*Danaus genutia*	Striped Tiger	LC	Sch-IV
Nymphalidae	*Ariadne merione*	Common Caster	LC	Sch-IV
Nymphalidae	*Neptishylas*	Common Sailor	LC	Sch-IV
Nymphalidae	*Phalanta phalantha*	Common Leopard	LC	Sch-IV
Nymphalidae	*Melanitis leda*	Common Evening Brown	LC	Sch-IV
Nymphalidae	*Mycalesis perseus*	Common Bush Brown	LC	Sch-IV
Nymphalidae	*Ypthimaas terope*	Common Three Ring	LC	Sch-IV
Nymphalidae	*Euthala nais*	Baronet	LC	Sch-IV
Nymphalidae	*Argynnis hyperbius*	Indian Fritillary	LC	Sch-IV
Nymphalidae	*Byblia ilithya*	Joker	LC	Sch-IV
Pieridae	*Colotis danae*	Crimson Tip	LC	Sch-IV
Pieridae	*Colotise trida*	Small Orange Tip	LC	Sch-IV
Pieridae	*Eurema hecabe*	Common Grass Yellow	LC	Sch-IV
Pieridae	*Catopsillia pomona*	Common Emigrant	LC	Sch-IV
Pieridae	*Larsus Canus*	Common Gull	LC	Sch-IV
Pieridae	*Leptosia nina*	Psyche	LC	Sch-IV
Lycaenidae	*Castaliusro simon*	Common Pierrot	LC	Sch-IV
Lycaenidae	*Arhopala centaurus*	Large Obakblue	LC	Sch-IV
Lycaenidae	*Euchryso pscnejus*	Gram Blue	LC	Sch-IV
Lycaenidae	*Jamides celeno*	Common Cerulin	LC	Sch-IV
Lycaenidae	*Freyeriatrochylus*	Grass Jewel	LC	Sch-IV
Papilionidae	*Papilio polytes*	Common Mormon	LC	Sch-IV
Papilionidae	*Papilio demoleus*	Lime Butterflies	LC	Sch-IV
Papilionidae	*Atrophaneuraaristolochiae*	Common Rose	LC	Sch-IV
Hesperiidae	*Borbo cinnara*	Rice Swift	LC	Sch-IV

LC- Least Concern, NT- Near Threatened, EN- Endangered, NE-Not Evaluated, DD -Data Deficient, VU-Vulnerable, IUCN- International Union for Conservation of Nature.

Source:

- List of Birds: Ali, S. (2002). The Book of Indian Birds (13th Revised Edition). Oxford University Press, New Delhi, 326pp.
- List of Butterflies: Kehimkar I. The Book of Indian Butterflies. Bombay Natural History Society, 2008, 497.
- List of Mammals: Kamalakannan, M.& P.O.Nameer (2019). A checklist of mammals of Tamil Nadu, India. Journal of Threatened Taxa 11(8): 13992–14009; https://doi.org/10.11609/jott.4705.11.8.13992–14009.
- List of Reptiles: Aengals, R., Sathish Kumar, V.M., Palot, M.J. & Ganesh, S.R. (2018). A Checklist of Reptiles of India. 35 pp. Version 3.0. Online publication is available at www.zsi.gov.in (Last update: May 2018)

3.11.4 Impact on Biological Environment

The proposed project will not have any impact of terrestrial ecology of the area. Quarry area can be developed with greenbelt by planting native species to maintain the good environment.

Impact on Wildlife

There is no National Park, Wildlife Sanctuary, Biosphere Reserve, Wildlife corridors and Tiger/Elephant Reserve found within 10 km radius of the project site.

Impact on Flora

Plantation will be developed in the undevelopment area as per plantation programme. These activities will help to improve the floral cover of the area. The greenery and plantation development will eventually attract micro fauna, birds etc in the area. Assistance will be taken from local forest department in selection of species of plants so that green coverage may improve fast. The varieties would include those plants, which are suitable to the area. The following plant species will be planted according to CPCB guidelines: Acacia nilotica, Azadirachta indica, Albizza lebbek, Butea monosperma,Cassia fistula, Delbergiasisso, Delonix regia, Ficus benghalensis, Prosopis cineraria, Tectona grandis, Wrightia tinctoriaetc.

Impact on Fauna

As such, there will be little adverse impact of the plant unit activity on fauna around the plant unit area. A comprehensive Central Legislation Namely Wild Life (Protection) Act was enforced in 1972 to provide protection to wild animals. Schedule-I of this act contains the list of rare and endangered species, which are completely protected throughout the country. The list of wild animals and their conservation status as per Wild Life Act (1972) are presented in for the study area.

3.12 Socio Economic Profile

Karur district having a population of 1064493 consists of 528184 male populations and 536309 female populations.

Source: http://censusindia.gov.in/2011census/dchb/DCHB_A/33/3301_PART_A_DCHB KARUR.pdf

(**Ref**: Directorate of Census Operations-Tamil Nadu, "District Census Handbook-2011, Karur District", Series-34 Part XII-A)

3.12.1 *Socio Economic Aspects*

A socio-economic study was undertaken in assessing aspects which are dealing with social and cultural conditions, and economic status in the study area. The study provides information such as demographic structure, population dynamics, infrastructure resources, and the status of human health and economic attributes like employment, per-capita income, agriculture, trade, and industrial development in the study area. The study of these characteristic helps in identification, prediction and evaluation of impacts on socio-economic and parameters of human interest due to proposed project developments. The parameters are:

- Demographic structure
- Infrastructure Facility
- Economic Status
- Health status
- Cultural attributes
- Awareness and opinion of people about the project and Industries in the area.

Table 3-23 shows some important Social Indicators of Karur District in Tamil Nadu.

Table 3-23 Social Indicators of Karur District

S.No	Social Indicators	Karur District
1.	Decadal variation %	13.77
2.	Urban population %	40.82
3.	Sex ratio	1015
4.	0-6 age group %	9.19
5.	Population density (Persons per square Km)	367
6.	Scheduled caste population %	20.79
7.	Scheduled tribe population %	0.05
8.	Literacy rate %	75.60
9.	Work Participation rate %	51.04
10.	Main Workers %	93.60
11.	Marginal Workers %	6.40
12.	Cultivators %	15.81
13.	Agricultural labourers %	36.97
14.	Workers in household industries %	2.09
15.	Other workers %	45.14

Source:

Source:http://censusindia.gov.in/2011census/dchb/DCHB_A/33/3301_PART_A_DCHB_KARUR.pdf(Ref:Directorate of Census Operations-Tamil Nadu, "District Census Handbook-2011,Karur District",Series-34 Part XII-A)

3.12.1.1 Population

Karur district having a population of 1064493 consists of 528184 male populations and 536309 female populations.

Source: http://censusindia.gov.in/2011census/dchb/DCHB_A/33/3301_PART_A_DCHB_KARUR.pdf(Ref:Directorate of Census Operations-Tamil Nadu, "District Census Handbook-2011,Karur District",Series-34 Part XII-A).

3.12.1.2 Sex Ratio

The sex ratio of the population is calculated for number of females for every 1000 males, irrespective of age. The child sex ratio is also calculated in the same manner for the children aged upto 6 years. According to 2011 census, the sex ratio of the State was 996, and the district reported with 1,015 and the child sex ratio of the State was 943 and the district was 939. In 2001 census, the sex ratio of the State was 987 and the district reported with 1,010 and the child sex ratio of the State was 942 and the district was 930.

Source:http://censusindia.gov.in/2011census/dchb/DCHB_A/33/3301_PART_A_DCHB_KARUR.pdf

(**Ref**:Directorate of Census Operations-Tamil Nadu, "District Census Handbook-2011,Karur District",Series 34 Part XII-A)

3.12.1.3 Scheduled Castes and Scheduled Tribes

The total, rural and urban SC population of the state is 20%, 25.5% and 14.2% respectively out of total population and the total SC population of the district is 20.8% and the rural and urban SC population of the district is 24.3% and 15.8% respectively out of total population.

Source:http://censusindia.gov.in/2011census/dchb/DCHB_A/33/3301_PART_A_DCHB_THIRUVALLUR.pdf

(**Ref**:Directorate of Census Operations-Tamil Nadu, "District Census Handbook-2011,Thiruvallur District",Series-34 Part XII-A)

3.12.1.4 Education & Literacy

The study of the education and literacy profile in the region is relevant in order to have an understanding whether the proposed project can utilize skilled human resources available within the area. According to 2011 census data, the literacy rate in the Karur district is 75.6 %.The literacy rate has been the major determinant of the rise or fall of the other indicators. The accessibility of Primary and Upper Primary education has increased the literacy rate as well as reducing the dropout rate. **Table 3-24** Show the details of education infrastructures in Karur District.

Table 3-24 Education Infrastructures in the Karur District

Type of school	Total schools		Rural Schools	
	Government	Private	Government	Private
Primary	537	116	472	49
Primary + Upper Primary	173	12	138	6
P + UP+ Secondary + Higher Secondary	4	26	2	14
UP only	1	0	1	0
UP + Secondary + Higher Secondary	54	25	42	16
P + UP + Secondary	5	27	4	17
UP + Secondary	53	9	44	4

*(**Source:** District Information Systems on Education (DISE report card 2016-17))*

3.12.1.5 Employment and Livelihood

In Karur district, as per the Census 2011, there were a total of 543298 workers, comprising 85872 cultivators, 200837 agricultural labourers, 11340 household Industry workers and 245249 other workers.

Source: http://censusindia.gov.in/2011census/dchb/DCHB_A/33/3301_PART_A_DCHB_KARUR.pdf

(**Ref**:Directorate of Census Operations-Tamil Nadu, "District Census Handbook-2011,Karur District",Series-34 Part XII-A)

3.12.2 *Socio Economic Profile of the study area*

The villages and towns covering 10 km radius from the boundary of the project site is taken for the study.

Table 3-25 shows the list of locations which comes under the study are

Table 3-25 Population profile within study area

Sl. No	Name	Households	Total Population	Male	Female	Children below 6	Scheduled Caste	Scheduled Tribe
0-5 km								
Karur Dt-Krishnarayapuram Taluk								
1.	Krishnarayapuram (TP)	2946	10792	5326	5466	1045	2255	15
2.	P.J. Cholapuram (TP)	2016	7484	3731	3753	776	1539	2
3.	Thirukkampuliyur	1708	6487	3246	3241	670	1044	0
4.	Manavasi	812	2963	1482	1481	283	1457	2
5.	Sithalavai	1004	3706	1859	1847	395	779	0
6.	Mahadhanapuram(North)	1409	5396	2670	2726	511	2087	0
7.	Chinthalavadi	2708	10325	5252	5073	1099	2032	0
8.	Vayalur	1041	3899	1957	1942	444	825	0
9.	Veeriyapalayam	908	3530	1764	1766	419	991	1
10.	Sengal	1020	3849	1902	1947	415	554	4
0-5 km								
Karur Dt-KadavurTaluk								
11.	Pappayambadi	342	1432	726	706	159	297	0
12.	Vadavambadi	656	2752	1393	1359	311	355	0
5-10 km								
Karur Dt-Krishnarayapuram Taluk								
13.	Renganathapuram (North)	903	3070	1467	1603	283	2081	3
14.	Renganathapuram (South)	684	2412	1157	1255	211	1444	0
15.	Mayanur	1240	4574	2254	2320	477	1773	13
16.	Kammanallur	576	2121	1025	1096	183	846	0
17.	Pillapalayam	1206	4671	2363	2308	473	2029	1
18.	Kallapalli	1576	6043	3069	2974	637	870	10
19.	Karuppathur	1558	5968	3038	2930	624	1059	0
20.	Muthurengampatti	350	1409	700	709	175	261	0
21.	Panjapatti	1093	4278	2096	2182	461	1082	1

Sl. No	Name	Households	Total Population	Male	Female	Children below 6	Scheduled Caste	Scheduled Tribe
22.	Pothuravuthanpatti	1233	5263	2592	2671	675	601	0
23.	Pappakkapatti	1303	5354	2648	2706	662	842	0
5-10 km								
Karur Dt-Kulithalai Taluk								
24.	Karuvappanaickenpettai	1248	4844	2362	2482	482	2065	0
25.	Vaiganallur(South)	1690	6538	3240	3298	722	111	0
26.	Sathiyamangalam	1565	5949	2985	2964	668	564	0
5-10 km								
Karur Dt-Karur Taluk								
27.	Uppidamangalam (TP)	3189	11292	5575	5717	1002	2878	4
28.	Jegadabi	1760	6788	3351	3437	714	2042	0
5-10 km								
Karur Dt-KadavurTaluk								
29.	Manjanaickenpatti	1205	4637	2273	2364	539	580	0
30.	Pannapatti	935	3680	1828	1852	370	359	1
31.	Vellapatti	962	3854	1954	1900	408	543	0
32.	Keeranur	1244	5469	2725	2744	698	460	1
5-10 km								
Tiruchirapalli Dt - ThottiyamTaluk								
33.	M.Puthur (Musiri)	1346	4782	2398	2384	520	1114	0
	Total	**43436**	**165611**	**82408**	**83203**	**17511**	**37819**	**58**

*(**Source:** Census 2011)*

3.12.3 Employment and livelihood

Majority of population in the study area comes under other working categories. As agriculture cannot be a main sustenance for most of farmers, they have dual professions. Farming is mostly seasonal, they involve in other livelihood activities like business, non-agriculture labour, agriculture labour and other service sectors. Fragmentation of landholding leads to adopt to have additional occupation.Summaries of employment and livelihood within the study are given in **Table 3-26.**

Table 3-26 Summaries of Employment and Livelihood within the study area

Sl. No	Name	Total Workers	Main Workers	Marginal Workers	Agriculture Workers				Household Industry Workers		Other Workers	
					Cultivators		Agri. Labourers					
					Main	Marginal	Main	Marginal	Main	Marginal	Main	Marginal
0-5 km												
Karur Dt-Krishnarayapuram Taluk												
1)	Krishnarayapuram (TP)	5035	4878	157	686	47	2508	70	93	7	1591	33
2)	P.J. Cholapuram (TP)	4117	4041	76	723	14	2139	45	163	0	1016	17
3)	Thirukkampuliyur	3668	3637	31	396	1	2363	18	10	1	868	11
4)	Manavasi	1588	1569	19	148	3	919	10	17	1	485	5
5)	Sithalavai	2015	2013	2	595	1	846	1	20	0	552	0
6)	Mahadhanapuram(North)	2587	2096	491	134	10	1325	420	23	13	614	48
7)	Chinthalavadi	5197	4776	421	668	9	2793	335	100	8	1215	69
8)	Vayalur	2331	1951	380	364	193	1208	147	19	5	360	35
9)	Veeriyapalayam	2207	2189	18	399	2	1206	5	25	0	559	11
10)	Sengal	2116	2083	33	621	1	817	6	17	0	628	26
0-5 km												
Karur Dt-KadavurTaluk												
11)	Pappayambadi	882	872	10	120	0	563	6	1	0	188	4
12)	Vadavambadi	1749	1554	195	400	0	892	194	0	0	262	1
5-10 km												
Karur Dt-Krishnarayapuram Taluk												
13)	Renganathapuram (North)	1780	1740	40	145	1	1103	26	33	3	459	10
14)	Renganathapuram (South)	1274	1216	58	189	0	574	48	16	3	437	7
15)	Mayanur	2080	1742	338	41	9	447	64	61	6	1193	259
16)	Kammanallur	1224	1005	219	103	0	663	215	4	0	235	4
17)	Pillapalayam	2248	2228	20	118	3	1698	7	3	3	409	7
18)	Kallapalli	2712	2665	47	334	3	1637	15	74	3	620	26
19)	Karuppathur	3436	3364	72	616	2	2357	26	31	4	360	40
20)	Muthurengampatti	855	844	11	442	0	202	2	2	0	198	9

Sl. No	Name	Total Workers	Main Workers	Marginal Workers	Agriculture Workers				Household Industry Workers		Other Workers	
					Cultivators		Agri. Labourers					
					Main	Marginal	Main	Marginal	Main	Marginal	Main	Marginal
21)	Panjapatti	2190	2157	33	385	5	1165	8	67	4	540	16
22)	Pothuravuthanpatti	3166	2865	301	1019	13	1187	219	23	1	636	68
23)	Pappakkapatti	2767	2736	31	544	3	1753	17	26	0	413	11
5-10 km												
Karur Dt-Kulithalai Taluk												
24)	Karuvappanaickenpettai	2328	2261	67	167	3	1500	45	21	5	573	14
25)	Vaiganallur(South)	3482	3389	93	267	0	2289	75	94	6	739	12
26)	Sathiyamangalam	3211	2869	342	457	10	1639	254	57	4	716	74
5-10 km												
Karur Dt-Karur Taluk												
27)	Uppidamangalam (TP)	6763	6454	309	1679	8	1993	184	171	26	2611	91
28)	Jegadabi	3988	3719	269	776	3	2322	223	38	0	583	43
5-10 km												
Karur Dt-KadavurTaluk												
29)	Manjanaickenpatti	2777	2722	55	800	7	1221	25	46	1	655	22
30)	Pannapatti	2409	2081	328	1014	9	675	227	30	7	362	85
31)	Vellapatti	2324	1878	446	920	48	534	331	22	6	402	61
32)	Keeranur	3238	2419	819	946	23	826	695	5	3	642	98
5-10 km												
Tiruchirapalli Dt - ThottiyamTaluk												
33)	M.Puthur (Musiri)	2648	1341	314	194	5	1535	205	13	27	592	77
	Total	**90392**	**84347**	**6045**	**16410**	**436**	**44899**	**4168**	**1325**	**147**	**21713**	**1294**

*(**Source:** Census 2011)*

3.12.3.1 *Educational infrastructure within study area*

The district has good primary and secondary education infrastructure in urban and rural areas. The people around the study area have well connected to educational infrastructures. **Table 3-27** shows the literates population. Details of Literacy population available in the study area are given in **Table 3-28**.

Table 3-27 Details of Education facilities within study area

S. No	Type of School	Numbers
1	Government Pre-Primary school	126
2	Private Pre-Primary school	6
3	Government Primary school	146
4	Private Primary school	15
5	Government Middle school	62
6	Private Middle school	9
7	Government Secondary school	18
8	Private Secondary school	7
9	Government Senior Secondary school	8
10	Private Senior Secondary school	2

***(Source:** Census 2011)*

Table 3-28 Details of Literacy population in the study area

Sl. No	Name	Total Population	Literates Population Male	Literates Population Female	Literates Population	% Literates	Illiterates Population	% Illiterates
0-5 km								
Karur Dt-Krishnarayapuram Taluk								
1.	Krishnarayapuram (TP)	10792	4058	3371	7429	68.84	3363	31.16
2.	P.J. Cholapuram (TP)	7484	2683	2025	4708	62.91	2776	37.09
3.	Thirukkampuliyur	6487	2443	1900	4343	66.95	2144	33.05
4.	Manavasi	2963	1070	810	1880	63.45	1083	36.55
5.	Sithalavai	3706	1298	914	2212	59.69	1494	40.31
6.	Mahadhanapuram(North)	5396	2085	1738	3823	70.85	1573	29.15
7.	Chinthalavadi	10325	4058	3179	7237	70.09	3088	29.91
8.	Vayalur	3899	1297	855	2152	55.19	1747	44.81
9.	Veeriyapalayam	3530	1087	738	1825	51.70	1705	48.30
10.	Sengal	3849	1264	901	2165	56.25	1684	43.75
0-5 km								
Karur Dt-KadavurTaluk								
11.	Pappayambadi	1432	490	359	849	59.29	583	40.71
12.	Vadavambadi	2752	835	546	1381	50.18	1371	49.82
5-10 km								
Karur Dt-Krishnarayapuram Taluk								
13.	Renganathapuram (North)	3070	1105	932	2037	66.35	1033	33.65
14.	Renganathapuram (South)	2412	898	665	1563	64.80	849	35.20
15.	Mayanur	4574	1809	1501	3310	72.37	1264	27.63
16.	Kammanallur	2121	815	724	1539	72.56	582	27.44
17.	Pillapalayam	4671	1849	1514	3363	72.00	1308	28.00
18.	Kallapalli	6043	2462	1932	4394	72.71	1649	27.29
19.	Karuppathur	5968	2117	1478	3595	60.24	2373	39.76
20.	Muthurengampatti	1409	417	304	721	51.17	688	48.83

Sl. No	Name	Total Population	Literates Population Male	Literates Population Female	Literates Population	% Literates	Illiterates Population	% Illiterates
21.	Panjapatti	4278	1509	1201	2710	63.35	1568	36.65
22.	Pothuravuthanpatti	5263	1573	1103	2676	50.85	2587	49.15
23.	Pappakkapatti	5354	1510	1113	2623	48.99	2731	51.01
5-10 km								
Karur Dt-Kulithalai Taluk								
24.	Karuvappanaickenpettai	4844	1855	1593	3448	71.18	1396	28.82
25.	Vaiganallur(South)	6538	2228	1716	3944	60.32	2594	39.68
26.	Sathiyamangalam	5949	2102	1588	3690	62.03	2259	37.97
5-10 km								
Karur Dt-Karur Taluk								
27.	Uppidamangalam (TP)	11292	4336	3124	7460	66.06	3832	33.94
28.	Jegadabi	6788	2110	1480	3590	52.89	3198	47.11
5-10 km								
Karur Dt-KadavurTaluk								
29.	Manjanaickenpatti	4637	1630	1237	2867	61.83	1770	38.17
30.	Pannapatti	3680	1321	1076	2397	65.14	1283	34.86
31.	Vellapatti	3854	1318	881	2199	57.06	1655	42.94
32.	Keeranur	5469	1778	1181	2959	54.10	2510	45.90
5-10 km								
Tiruchirapalli Dt - ThottiyamTaluk								
33.	M.Puthur (Musiri)	4782	1751	1394	3145	65.77	1637	34.23
Total		**165611**	**59161**	**45073**	**104234**	**62.03**	**61377**	**37.97**

(Source: Census 2011)

3.12.3.2 Health facilities within the study area

The majority of people visit nearby Hospitals/health services provided by the Government. The area has got good public health facilities at easily reachable distances. There was no major health issues reported in our survey. Even for any minor ailments they contact medical facilities immediately as it is very accessible to them. The local transport facilities and the communication facilities are the main reasons to get immediate medical attention. The emergency medical service facility "108" is very familiar and being used by the people in this area. The incidents of institutional delivery are high due to awareness, education, economic development, proximity to health delivery system. The Infant mortality rate and the maternal mortality rate have significantly reduced.

Table 3-29 Health facilities available in the study area

Sl.No	Type	Numbers
1	Community health centre	1
2	Primary health centre	7
3	Primary health sub-centre	35
4	Maternity and Child Welfare Centre	18
5	TB hospital/Clinic	9
6	Hospital Allopathic	1
7	Hospital Alternative Medicine	2
8	Dispensary Health Centre	9
9	Veterinary hospital	10
10	Mobile health clinic	0
11	Family Welfare Centre	9
12	Non-Government Medical facilities Out Patient	10

*(**Source:** Census 2011)*

3.12.3.3 Summary

The Socioeconomic profile of the study area shows that the majority of people in the study area work in non-agricultural sector, however in rural area majority of the people in the rural area depends on agricultural sector. They have good educational infrastructures and the people in the study area are well connected to the educational infrastructures. The average literacy rate of the study area is 79.82%. The people in the study area are well connected to Government primary health centres and Primary health sub-centres shows the socio-economic indicators within the study area given in **Table 3-30.**

Table 3-30 Summary of Socioeconomic indicators within the study area

S.No	Particulars	Study area	Unit
1	Number of villages in the Study Area	30	Nos.
2	Number of Wards in the Study Area	03	Nos.
3	Total Households	43436	Nos.
4	Total Population	165611	Nos.
5	Children Population (<6 Years Old)	17511	Nos.
6	SC Population	37819	Nos.
7	ST Population	58	Nos.

8	Total Working Population	90392	Nos.
9	Main Workers	84347	Nos.
10	Marginal Workers	6045	Nos.
11	Cultivators	16846	Nos.
12	Agricultural labours	49067	Nos.
13	Household Industries	1472	Nos.
14	Other Workers	23007	Nos.
15	Literates	104234	Nos.

(Census 2011)

4 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.1 Details of Investigated Environmental impacts due to project location, possible accidents, project design, project construction, regular operations, final decommissioning or rehabilitation of a completed project

The impacts due to mining operation and its mitigation measures adopted are detailed in this chapter. In general, the opencast mining operations cause environmental problems such as degradation of land, deteriorating air, water and soil quality, affecting the biological and socio-economicenvironment of the area, if adequate control measures are not taken to prevent/mitigate the adverse environmental impacts, these operations may cause irreversible damage to the eco-system.

The opencast mining operations involve development of benches, approach roads, haul roads, blasting, excavation and handling & transportation of materials. Various environmental impacts, which have been identified due to the mining operations proposed project, are discussed in the following sections. The environmental parameters most commonly affected by mining activities are:

- Air quality including Climate
- Noise levels and ground vibrations
- Water resources and quality
- Land use Pattern
- Soil quality
- Flora and Fauna
- Socio-Economic conditions
- Occupational Health.

4.1.1 Environmental impacts during operarion phase

4.1.2 Land Degradation

The impact on land area will be due to

- Land degradation due to disposal of large volume of waste materials.
- Creation of infrastructural facilities like office, rest shelter, first-aid centre and other service facilities.

Table 4-1 Land Use Pattern of the lease area

S. No	Description	Present Area (Ha.)	Area in use during the quarrying period (Ha.)	Area at end of the life of Quarry(ha)
1.	Area under quarry	0.71.32	0.74.11	1.86.70
2.	Waste dump	0.34.00	0.20.80	Nil

3.	Roads	0.02.00	0.01.00	0.03.00
4.	Green Belt	0.03.00	0.14.26	0.38.50
5.	Stocking blocks	1.19.68	0.09.51	0.01.80
Total		**2.30.00**	**1.19.68**	**2.30.00**

4.2 Air Environment

The main source of air pollution is from open cast mining activities is dust generation from excavation of Multi Colour Granite Granite, movement of vehicles for transportation of product to consumers, drilling, loading and unloading operation and wind erosion of dumps and also gaseous emission due to operation of diesel driven mining equipment. The sources of air emission are detailed below in **Table 4-2.**

Table 4-2 Sources of air pollution at quarry

S. No	Source of emission	Pollutant
1.	Excavation of Multi Colour Granite	PM
2.	Operation of diesel driven equipment	Gaseous emission
3.	Transportation of product	PM

The major air pollution sources from the mining operations are mining activities like drilling, and transportation. The emissions mainly generated from the mining activities are Blasting, Drilling, Excavation, Loading, Unloading, and transportation etc. Machinery like compressors and jack hammers are used for Drilling.

4.2.1 Meteorological Data

The meteorological data for 3 months, i.e. from March 2023 to May 2023 was considered for the study. Data included for AERMET were daily wind speed, wind direction, temperature, relative humidity, air pressure, precipitation, and solar radiation recorded during the period. AERMET reformats meteorological data so that it can be used as input for AERMOD model. Meteorology considered for modelling is shown below.

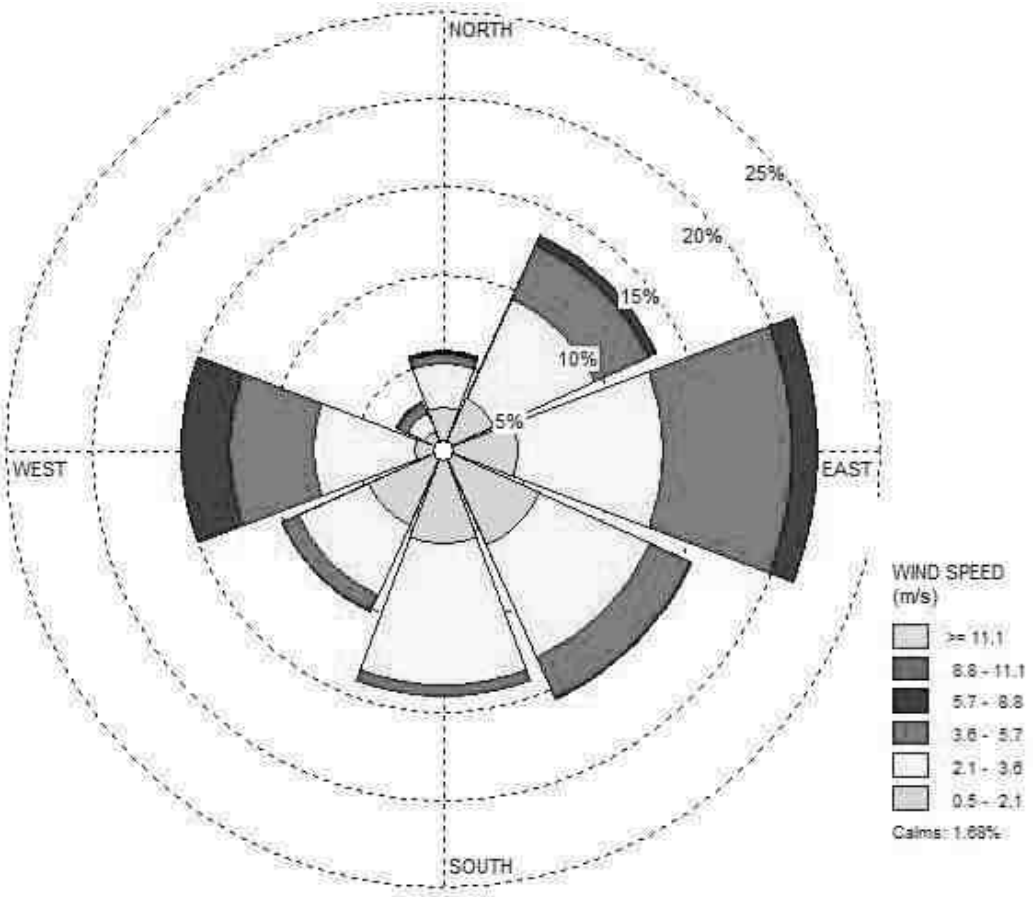


Figure 4-1 Wind rose for Site period (March 2023 to May 2023).

4.2.2 AERMOD Process

AERMOD Software Version 8.0.5 was used for air dispersion modeling and is applicable to a wide range of buoyant or neutrally buoyant emissions up to a range of 50 km. In addition to more straight forward cases, AERMOD is also suitable for complex terrain and urban dispersion scenarios.

AERMOD is a steady-state plume model. In the Stable Boundary Layer (SBL), it assumes the concentration distribution to be Gaussian in both the vertical and horizontal. In the Convective Boundary Layer (CBL), the horizontal distribution is also assumed to be Gaussian, but the vertical distribution is described with a bi-Gaussian probability density function (pdf). This behavior of the concentration distributions in the CBL was demonstrated by Willis and Deardorff (1981) and Briggs (1993). Additionally, in the CBL, AERMOD treats "plume lofting," whereby a portion of plume mass, released from a buoyant source, rises to and remains near the top of the boundary layer before becoming mixed into the CBL. AERMOD also tracks any plume mass that penetrates into the elevated stable layer, and then allows it to re-enter the boundary layer when and if appropriate. For sources in both the CBL

and the SBL, AERMOD treats the enhancement of lateral dispersion resulting from plume meander. The emissions mainly generated from the mining activities are Blasting, Drilling, Scrapping, Excavation, Loading, Unloading, and transportation etc. Machinery like compressors and jack hammers are used for Drilling are estimated and used as inputs for the air dispersion modeling as shown in **Table 4.5 to Table 4.7.**

Maximum incremental value for SO_2, NO_x and PM are shown in **Figure 4.2 to Figure 4.6** and Top 10 highest Ground Level Concentration (GLC) obtained from modeling are given in **Table 4.10 to Table 4.14** respectively.

4.2.2.1 Emission Calculations

Each mining activities is a source of emission and the estimation of emissions depends on parameters such as meteorological, topographic conditions and material characteristics**.** It is necessary to calculate the qty of emissions for work or a source on site to the atmosphere. The following emission formulas are used to calculate the emission rate for the different emission source.

Table 4-3 Overview of the Source Parameters

S. NO	Description	Symbol	Quantity
1	Moisture Content (%)	m	1.64
2	Silt Content (%)	s	6
3	Production / Day (Tonn/Day)		91.45
4	Waste Dumping Area (Sq.Km)	a	0.002
5	Open Pit Area (Sq.Km)	Aa	0.0074

Source:

Emission Estimation Technique Manual for Mining and Processing of Non-Metallic Minerals by NPI, Nov 1999

Determination of the emission rate from various opencast mining operations, S. K. CHAULYA∗, M. K. CHAKRABORTY, et. Al. *Water, Air, and Soil Pollution 140: 21–55, 2002.*

Chaulya, S., 2006. Emission rate formulae for surface iron mining activities. *Environmental Modeling Assessment,* Issue 11, pp. 361-370.

EPA. August, 2004. Section 11.19.2, Crushed Stone Processing and Pulverized Mineral Processing. In: Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources, Fifth Edition, AP-42. U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards. Research Triangle Park, North Carolina.

4.2.2.2 Emission dispersion models

Each mining activities is a source of emission and the estimation of emissions depends on parameters such as meteorological, topographic conditions and material characteristics. The emission factors for $PM_{2.5}$, which is particulate matter of 2.5µm or less in diameter, were not available in literature. Thus, $PM_{2.5}$ emissions have been calculated considering an assumption that 60% for PM_{10} emissions contribute to $PM_{2.5}$.

Table 4-4 Emission from Mining Equipments

Source	Fuel used	Stack Details					Emissions (g/s)		
		No of Stack	Height (m) AGL	Dia (m)	Temp (°C)	Exit Velocity (m/s)	PM_{10}	SO_2	NO_X
125 KVA DG	Diesel	1	3	0.3	180	10	5.81E-03	5.38E-03	8.16E-02

Table 4-5 Vehicular Sources Emission details

Source	Emission (g/s)		
	PM_{10}	$PM_{2.5}$	NO_X
4 Wheeler (1 no.)	6.94E-05	4.17E-05	6.94E-04
Heavy Duty Vehicles (1 no.)	5.56E-05	3.33E-05	9.72E-03
Total	**1.25E-04**	**7.50E-05**	**1.04E-02**

Table 4-6 Controlled Emissions considered for mining

Activities	PM_{10} Emission rate (g/s)	$PM_{2.5}$ Emission rate (g/s)
Wet Drilling (g/s)	1.92E-06	1.15E-06
Haulage (g/s)	5.12E-05	3.07E-05
Waste Dumping (g/s)	1.89E-06	1.13E-06
Open Pit (g/s.m2)	9.99E-08	5.99E-08

Table 4-7 Emission input for Modelling

Activities	PM_{10}	$PM_{2.5}$	SO_2	NO_x
Line Source (Haul Road) (g/s)	5.12E-05	3.07E-05	-	-
Area Source (Open Pit) (g/s.m^2)	9.99E-08	5.99E-08	-	-
Area Source (Waste Dumping) (g/s)	1.89E-06	1.13E-06	-	-
Point Source (DG) (g/s)	5.81E-03	3.48E-03	5.38E-03	8.16E-02
Point Source (Drilling) (g/s)	1.92E-06	1.15E-06	-	-
Point Source (Vehicle)(g/s)	1.25E-04	7.50E-05	-	1.04E-02

Note:

a. Since emission factors are available for PM_{10} the following assumptions are made for PM_{10} and $PM_{2.5}$ estimation

1. 60% of PM_{10} is considered as $PM_{2.5}$

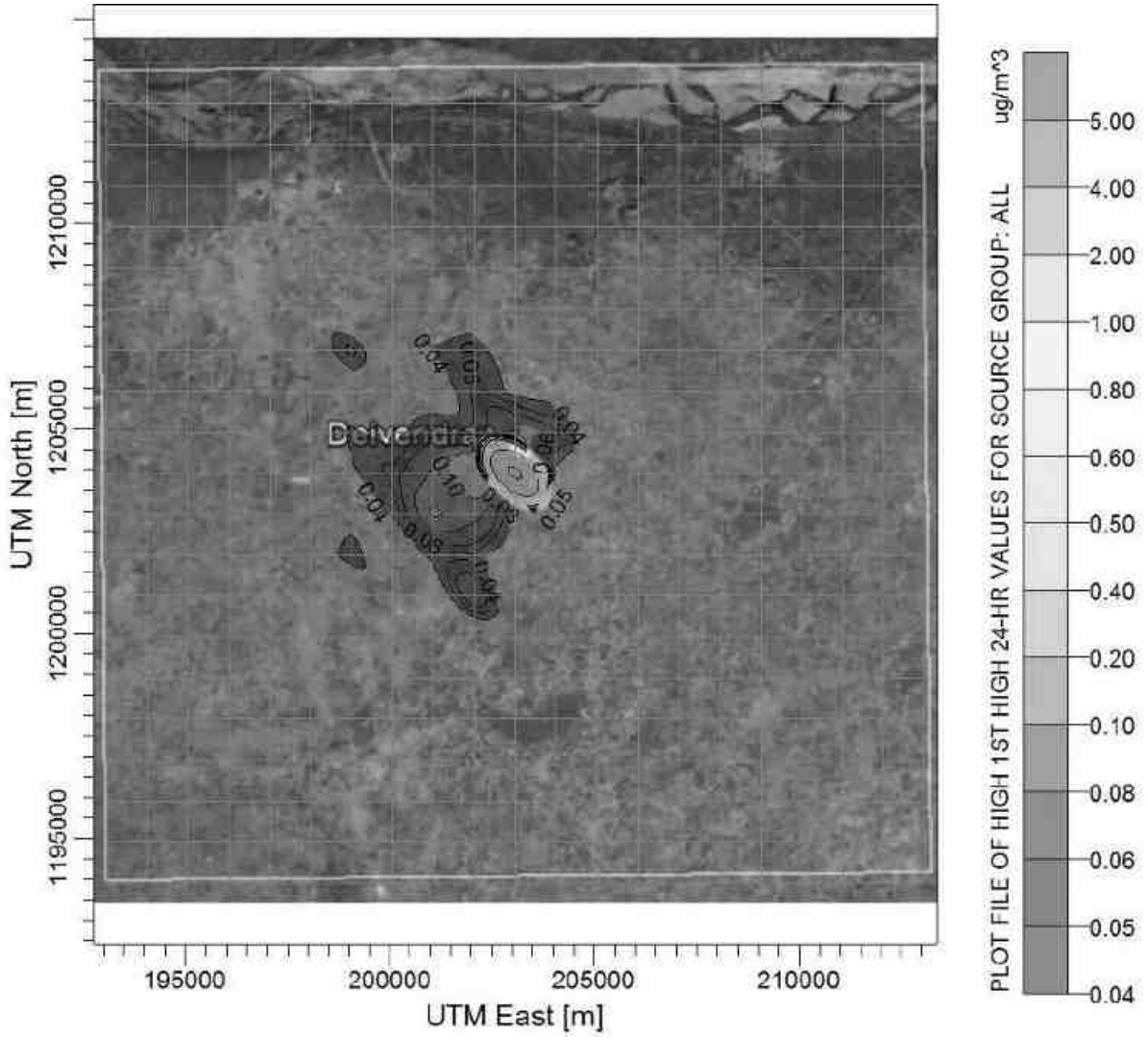


Figure 4-2 Predicted 24-Hrs GLC of Particulate matter PM_{10} within 10 km radius of the study area

Table 4-8 Predicted Top 10 Highest Concentrations Particulate Matter PM_{10}

S.NO	UTM coordinates (m)		Conc. (µg/m^3)	Distance from Centre of the project Site (km)	Direction from project Site Centre
	E	N			
1.	203062	1203915	4.71471	Project Site	Project Site
2.	202062	1203915	0.13726	1.00	W
3.	201062	1202915	0.10449	2.23	WSW
4.	202062	1202915	0.0886	1.41	SW
5.	201062	1203915	0.08306	2.00	W
6.	203062	1204915	0.08193	1.00	N
7.	202062	1200915	0.07711	3.16	SSW
8.	204062	1204915	0.06294	1.41	NE
9.	201062	1204915	0.05714	2.23	WNW
10.	199062	1206915	0.05433	5.00	WNW

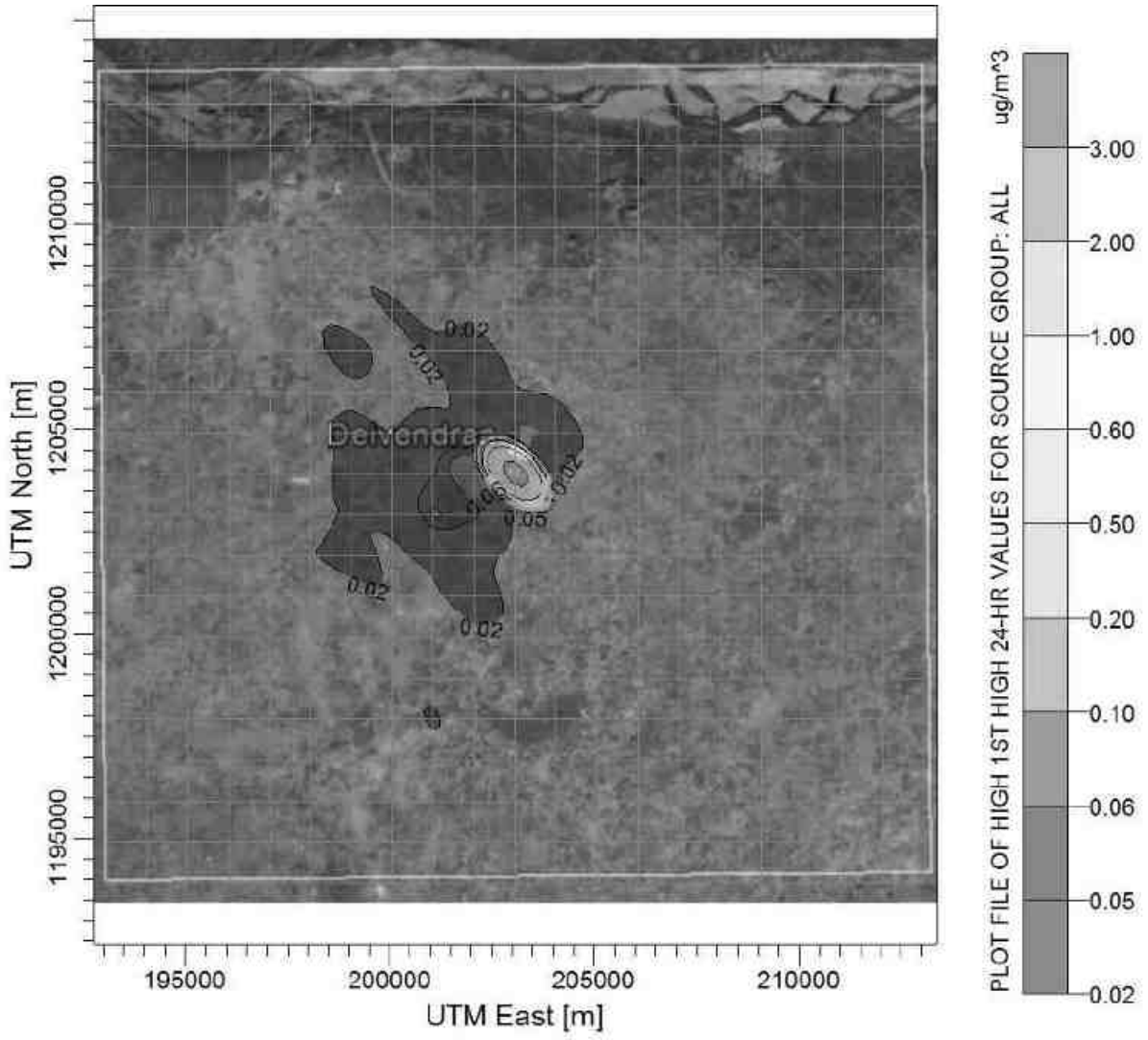


Figure 4-3 Predicted 24-Hrs' GLC's of Particulate matter $PM_{2.5}$ within 10 km Radius of the Study Area

Table 4-9 Predicted Top 10 Highest Concentrations of Particulate Matter PM2.5

S.NO	UTM coordinates (m)		Conc. (µg/m^3)	Distance from Centre of the project Site (km)	Direction from project Site Centre
	E	N			
1.	203062	1203915	2.82689	Project Site	Project Site
2.	202062	1203915	0.08235	1.00	W
3.	201062	1202915	0.06267	2.23	WSW
4.	202062	1202915	0.05309	1.41	SW
5.	201062	1203915	0.04977	2.00	W
6.	203062	1204915	0.04913	1.00	N
7.	202062	1200915	0.04621	3.16	SSW
8.	204062	1204915	0.03771	1.41	NE
9.	201062	1204915	0.03427	2.23	WNW
10.	199062	1206915	0.03259	5.00	WNW

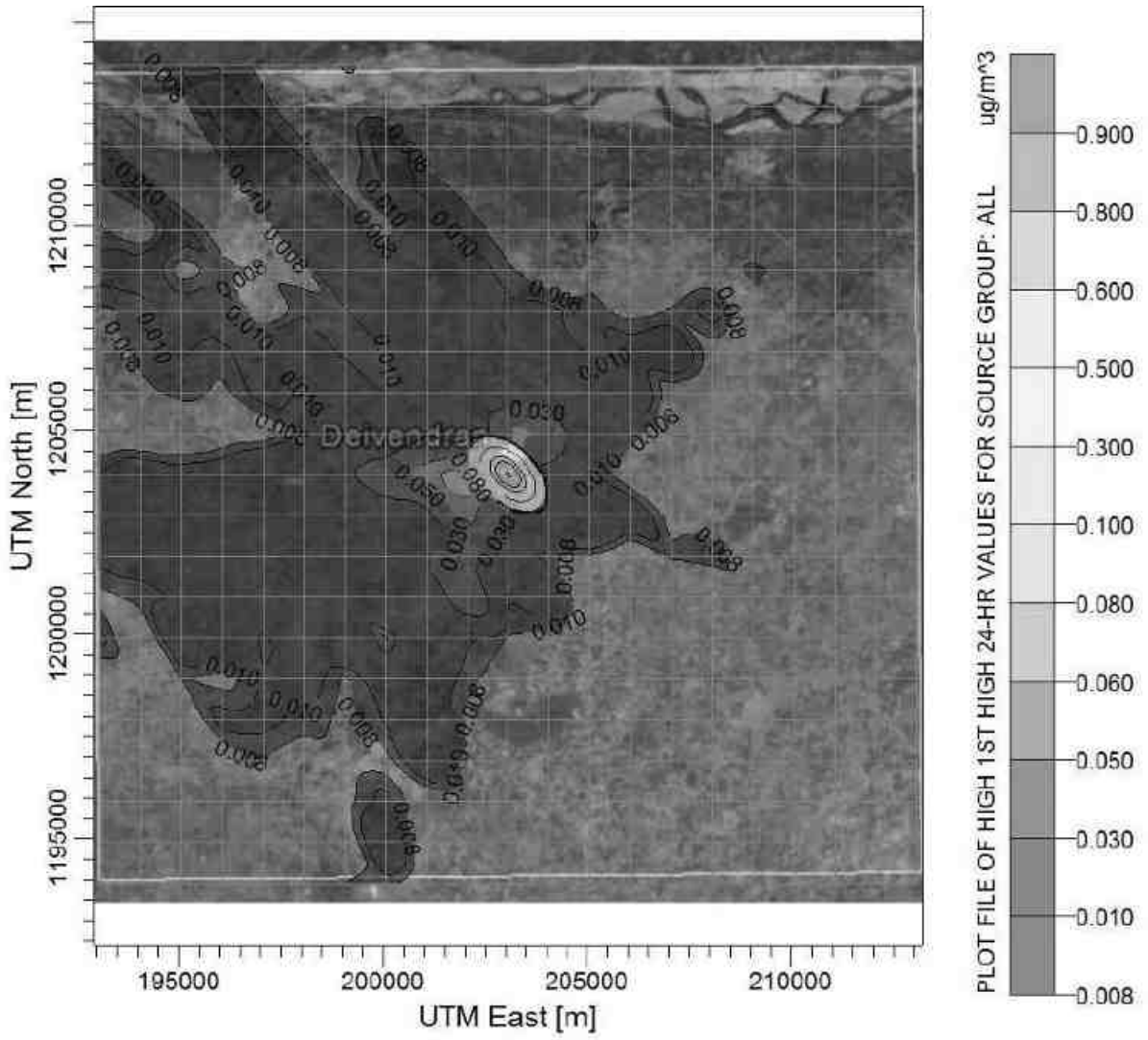


Figure 4-4 Predicted 24-Hrs' GLC's of SO2 within 10 km Radius of the Study Area

Table 4-10 Predicted Top 10 Highest Concentrations SO2

S.NO	UTM coordinates (m)		Conc. (µg/m^3)	Distance from Centre of the project Site (km)	Direction from project Site Centre
	E	N			
1.	203062	1203915	0.85106	Project Site	Project Site
2.	202062	1203915	0.06742	1.00	W
3.	201062	1203915	0.05832	2.00	W
4.	202062	1202915	0.05724	1.41	SW
5.	202062	1200915	0.04971	3.16	SSW
6.	204062	1204915	0.04397	1.41	NE
7.	203062	1204915	0.04067	1.00	N
8.	200062	1203915	0.03949	3.00	W
9.	202062	1201915	0.03223	2.23	SSW
10.	201062	1201915	0.03016	2.82	SW

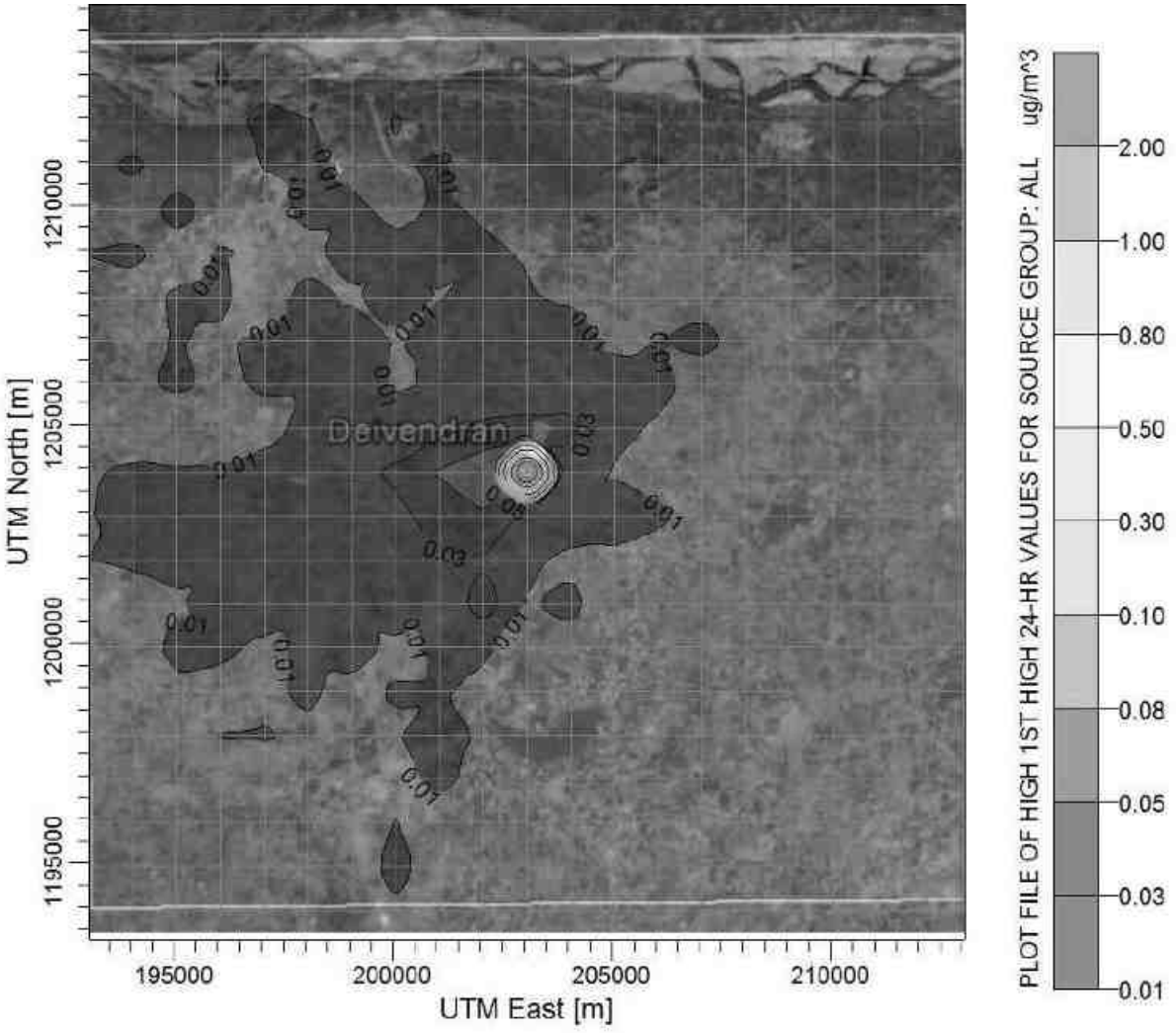


Figure 4-5 Predicted 24-Hrs GLC of NO_X within 10 km Radius of the Study Area

Table 4-11 Predicted Top 10 Highest Concentrations Oxides of Nitrogen

S.NO	UTM coordinates (m)		Conc. (µg/m^3)	Distance from Centre of the project Site (km)	Direction from project Site Centre
	E	N			
1.	203062	1203915	1.46695	Project Site	Project Site
2.	202062	1203915	0.06953	1.00	W
3.	201062	1203915	0.05167	2.00	W
4.	202062	1202915	0.04852	1.41	SW
5.	202062	1200915	0.04447	3.16	SSW
6.	201062	1202915	0.03977	2.23	WSW
7.	204062	1204915	0.03681	1.41	NE
8.	203062	1204915	0.03416	1.00	N
9.	200062	1203915	0.03397	3.00	W
10.	202062	1204915	0.03361	1.41	NW

4.2.2.3 Conclusion

The total increase in concentrations above baseline status to estimate the percentage increase is summarised in **Table 4.14.**

Table 4-12 Total maximum GLCs from the Mining Emissions

Pollutant	Max. Base Line Conc. ($\mu g/m^3$)	Estimated Incremental Conc. ($\mu g/m^3$)	Total Conc. ($\mu g/m^3$)	NAAQ standard
PM_{10}	63.76	4.71	68.47	100
$PM_{2.5}$	39.53	2.82	42.35	60
SO_2	12.9	0.85	13.75	80
NO_X	25.8	1.46	27.26	80

4.2.3 Impacts due to Transportation

The granite is transported to consumer directly as per buyer's requirement. The Multi Colour Granite will be transported through existing road by tippers. This minimum trip does not create impact on existing transportation. The vehicular movement for the proposed project is given in **Table 4.38.**

Table 4-13 Existing & proposed vehicular movement per day

MDR-625(Mahadhapuram-Mylampatti

S. No	Type of Vehicle	Existing vehicles	Existing PCU	Proposed vehicles	Proposed PCU	Total vehicles after project implementation	PCU Factors IRC (SP 41)	Total PCU after project implementation
1	2 wheeler	178	134	0	0	178	0.75	134
2	3 wheelers	87	174	0	0	87	2	174
3	4 wheelers/ cars	72	72	1	1	73	1	73
4	Truckes/Bus/ -HCV	78	289	1	4	79	3.7	292
5	agricultural tractor	36	180	0	0	36	5	180
6	light emission vehicle-LCV	87	174	0	0	87	2.0	174
	Total	538	1022	2	5	540	-	1027

Table 4-14 Traffic Volume after Implementation of the Project

For the Road	Volume of Traffic	Volume (V)	Road Capacity (C)	V/C Ratio	LOS Category*	Traffic Classification
Existing	538	1022	6000	0.17	"A"	Free Flow
After	540	1027	6000	0.17	"A"	Free Flow

implementation						

*LOS (Level of Service) categories are A-Free Flow, B- Reasonably Free Flow, C-Stable Flow, D-Approaching unstable flow, E- Unstable flow, F- Forced or breakdown flow

*LOS (Level of Service) categories are

Level of Service	V/C	Classification
A	<0.35	Free Flow Traffic
B	0.35 - 0.55	Stable Traffic Flow
C	0.55 - 0.77	Restricted Flow
D	0.77 - 0.92	High Density Flow
E	0.92 - 1.0	Unstable Flow
F	>1.0	Forced Traffic Flow

Due to propose project there will be slight increment in the vehicle movement but the level of service (LOS) anticipated will be **Free Flow.**

4.3 Water Environment

The water environment quality has been studied and the study results are discussed in **Chapter-III**, which show that generally the water quality in the area is well within statutory standards.

The major sources of water pollution due to this quarry operation will be as below:

- Domestic sewage from the mine.
- Waste water from machineries
- Waste water from the mining area.
- Depletion of ground water.
- Affecting natural drainage system.

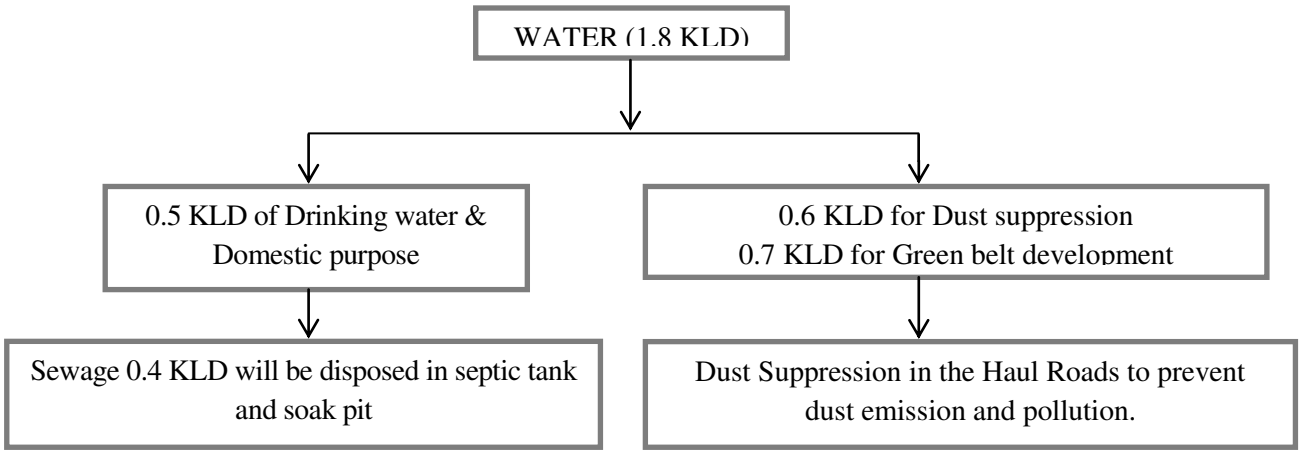


Figure 4-6 Water balance Chart

4.4 Impact of Noise

4.4.1 Impact of Noise on Working Environment

The main sources of noise in the mine are as follows:

- Transportation vehicles
- Loading & unloading of minerals.
- Drilling
- Blasting

4.4.2 Noise due to Drilling, Excavation and Transportation

The noise levels in the working environment will be maintained within the standards prescribed by Occupational Safety and Health Administration (OSHA). These standards were established with the emphasis on reducing the hearing loss. The permissible limits, as laid down by OSHA, are presented in **Table 4.15.**

Table 4-15 Permissible Exposure in Cases of Continuous Noise (OSHA, Govt. of India)

S.No	Sound Level dB(A)	Continuous Duration (Hours)
1.	85	8
2.	88	4
3.	91	2
4.	94	1
5.	97	0.5
6.	100	0.25

4.4.3 Noise Due to Blasting

The Blasting activity being minimum, the noise generated will be minimal.

4.4.4 Impact of Vibration

Blasting activities being minimum in granite quarry operations. The vibration during the movement of machinery will be minimal for a short span that will be well within the prescribed limit.

4.4.5 Mitigation Measures on Vibration

- Low vibration generating machines/equipment will be selected to meet international standards and foundations will be so designed to minimize vibrations and secured properly.
- Vibration generating sources and their platforms should be maintained properly to minimize vibrations and related impacts.
- Vibration dampers will be provided around the source of generation.
- Transportation Management Plan will be prepared and the transportation of materials will be planned in line with the same.

4.5 Biological Environment

- Mahadanapuram, Sittalavay, Lalappettai, Mayanur, Nattam, RF near Sippalaputtur, RF near Mel Vadiyam, RF near Kattalai, Manattattai Reserved forests are located with the 15km radius of the project. There will not be any adverse impact due to mining operations in this lease. Since only small production is involved from this lease and there will not be any major polluting source from the mining operations. Besides, all necessary mitigation measures will be implemented.
- There is no perennial water body near the site and there will be no discharge of effluent from the mine.
- In the Quarry area or its proximate areas there is no wetland and the natural flow of water not available.
- There is no rare or endangered species.
- There are no wild animals in the area. The barbed wire fencing is done and same is attached as **Annexure 14** which will prevent fall of animals in the mine pits.
- No such significantly important medicinal value species within both the ML areas and its nearby region.
- There are no any wetlands, fish breeding grounds, marine ecology nearby the quarry area, which will not be affected due to this project.

Table 4-16 Impacts on Biodiversity

S.No	Activity	Examples of aspects	Examples of biodiversity impact
1.	Extraction	Land clearing	Loss of habitat, introduction of plant diseases, Siltation of water courses
2.	Blasting, Digging and hauling	Dust, noise, vibration, water pollution	Disruption of water courses, impacts on aquatic ecosystems due to changes in hydrology and water quality
3.	Waste dumping	Clearing, water and soil pollution	Loss of habitat, soil and water contamination, sedimentation.
4.	Air emissions	Air pollution	Loss of habitat or species
5.	Waste disposal	Oil and water pollution	Encouragement of pests, disease transfer, contamination of groundwater and

			soil
6.	Building power lines	Land clearing	Loss or fragmentation of habitat
7.	Provision of Accommodation	Land clearing, soil and water pollution, waste generation	Loss of habitat, sewage disposal and disease impacts
8.	Access roads	Land clearing	Habitat loss or fragmentation, water logging upslope and drainage shadows down slope
9.	Population growth	Land clearing or increased hunting	Loss of habitat or species, stress on local and regional resources, pest introduction, clearing
10.	Water supply (potable or industrial)	Water abstraction or mine dewatering	Loss or changes in habitat or species composition

4.5.1 Flora and Fauna

Activities of Mine development and operations & transportation to end users will cause the following impacts on flora and fauna.

- Displacement of existing fauna
- Loss of vegetation

4.5.2 Impacts on Occupational Health

Anticipated occupational illness sequel to mining activities involved in the project. Occupational health problems due to dust & noise and Occupational illness by quarry activities as follows;

- Dust related pneumonia
- Tuberculosis
- Rheumatic arthritis
- Segmental vibration

4.6 Impacts on Social Environment

The entire lease area of the project has no habitations or hutments inthe core zone area, no rehabilitation or resettlement problems are involved. By adopting various mitigation measures as explained earlier, the environmental scenario in respect of ambient air quality, water quality, Noise levels, water aspects, biological aspects etc. during the operation of the project will be maintained within the statutorily prescribed levels. As such, impact due to the projects will be positive on socio-economic aspects. It will be ensured that the buffer zone of the quarry will be properly preserved environmentally in all respects within sustainable limits through necessary monitoring. The project will be operated with care for minimizing environmental impacts with proper EMP measures for pollution control. People will be benefited by gainful indirect employment opportunities through various service related activities connected with the project operations.

4.7 Project Measures for Minimizing and/or offsetting Adverse Impacts Identified

4.7.1 Land Degradation Control Measures

- Dust suppression on exposed areas using water tankers and automatic sprinkling systems
- Contour overburden dump to minimize erosion
- Plantation using native plant sapling.
- Compliance with mine decommissioning plan.
- Drainage control structures like garland drain to be made around OB dump area to avoid water flow during monsoon below the OB dump.
- Leveling, grading and drainage arrangement for top of OB dumps.
- Topsoil to be stored in small heaps (5m high) at appropriate moisture content with proper vegetation.
- Top soil shall be used in afforestation work, as early as possible.
- Top soil will be removed & stored on the inner boundary of the mining lease area. To improve its quality, soil stabilizers shall be mixed and leguminous plantation will be done over these stacks.
- After complete extraction of estimated reserves of granite. The deeper working pits, after completion of Mining /Quarrying left as it is which would serve as water ponds / water reservoirs.
- The quarried pits after the end of the life of lease will be fenced to prevent inherent entry of public and cattle's.
- Management plan for topsoil utilization and conservation.
- Progressive year-wise green belt development inside and outside the lease area.
- The DG set are provided with stacks of adequate height so as to disperse the emanating flue gases containing suspended particulate matters, oxides of sulphur and nitrogen without affecting the ground level concentrations.

4.7.2 Air Environment Mitigation Measures

- Retrofit Emission control Device will be installed by the Proponent for enhancing air quality with efficiency more than 70% by capturing Particulate Matter.
- The mining activity will be restricted from 7.00am to 5.00pm
- Use of dust aprons on drilling equipment and adopting wet drilling methods.
- Usage of wire saw machine to reduce blasting and drilling.
- Delay blasting under unfavorable wind and atmospheric conditions

The production of blast fumes containing noxious gases will be reduced by the following methods:

- Use of adequate booster/primer
- Proper stemming of the blast hole.

- Drills fitted with dust collection system to be deployed or using wet drilling method.
- Development of greenbelt.

Table 4-17 Fugitive dust control in mine

S. No	Activities	Best practices
1	Drilling	➢ Drills should be provided with dust extractors (dry or wet system)
2	Blasting	➢ Water spray before blasting ➢ Water spray on blasted material prior to transportation ➢ Use of controlled blasting technique
3	Transportation of mined mineral Black Granite	➢ Covering of the trucks/dumpers to avoid spillage

4.7.3 Mitigation Measures for transportation activity

The increment in the dust emissions will be mainly due to transportation activity. Therefore emissions due to mineral handling during mining operation are not much and restricted to the lease area only.Proper mitigation measures are practiced during mining activities to control air pollution load below the prescribed limits are as follows:

- Regular water sprinkling on haul and access roads.
- Haul roads to be maintained by surface grading to minimize excessive road surface wearing.
- Watering of haul roads and other roads at regular intervals
- Provision of green belt by vegetation for trapping dust.
- Greenbelt development along the haul roads, dumps and along the boundaries of the lease area.
- Utmost care will be taken to prevent spillage of sand and stone from the trucks.

4.7.4 Water Environment Mitigation Measures

The proposed quarry is located in Veeriyapalayam village, Krishnarayapuram Taluk, Karuru District. As pe the Central Ground Water Board (CGWB) report, Karur District is falling in Cauvery river basin. More or less, 90 percent of Karur district is covered by crystalline formation of Archaean age and hard rock formation. The thickness of aquifer in hard rock formation varies from 15 to 35 m. The depth of observation wells in the Karur district varies from 115m – 200m BGL (as per CGWB Report). The proposed depth of mining will be 39.5m below ground level (Existing depth of mining 27.5m; Proposed depth of mining – 31.5m). The depth of groundwater in the open wells are observed during monitoring period is at 63m, hence, no groundwater intersection.

The proposed quarry is situated at Krishnarayapuram Taluk, and the estimated groundwater resources by CGWB, in Krishnarayapuram Taluk is indicated that the proposed quarry area falls under “Semi Critical” Category based on groundwater utilisation and exploration. The seasonal fluctuation shows a rise in water level, which ranges from 0.46 to 1.98 m. The piezometric head varied between 3.53 to

5.34 m BGL in the month of May, during pre monsoon and 2.04 to 7.59 m BGL during post monsoon.

In the Karur district, the yield ranges from 45.40 to 441.60 cum/day, storage coefficient varies from 0.001 to 0.019 and specific capacity ranges from 6.89 to 117.92 lpm/m/dd. The deeper fractured aquifer is developed through bore wells. The discharge of the successful bore wells ranges from 0.5 lps to 14 lps. The transmissivity values ranges from 11.42 to 669.12 sqm/day.

4.7.4.1 Impact Surface Water and its mitigation measures:

It was observed that, there are no seasonal nallas and water bodies within the quarry area, hence no impact on surface water. However, the following mitigation measures suggested:

- Construction of garland drains of suitable size around mine area and dumps to prevent rain water descent into active mine areas.
- During monsoon season, the rain water is being collected by natural slope of area to water fed tank of the mine and it will be utilized for dust suppression and greenbelt development.
- The dump tops will be provided with inner slopes to control water flow to prevent erosion washouts. The dumps tops and slopes of in active areas will be covered with grasses, shrubs, mulching, etc, to prevent erosion,
- Retaining walls of adequate dimensions will be provided at the top of dumps and the unstable OB benches within the mine to prevent wash off from dumps and sliding of material from benches. This will help in preventing silting of water drains/channels
- The water channels/drains carrying the rain water from the mine will be provided with baffles and settling pits to arrest the suspended solids, if any, present in this water
- The worked out slopes will be stabilized by planting appropriate shrub/grass species on the slopes.
- The mine water will be regularly tested for presence of any undesirable elements and appropriate measures will be taken in case any element is found exceeding the limits prescribed by CPCB.

- During mining operation there will be no use of toxic chemicals and colour granite didn't contain any harmful chemical substance which may contaminate surface/ground water.

4.7.4.2 Impact on Ground Water and its Mitigation Measures

Groundwater pollution can take place only if dumps and stock piles contain harmful chemicals substances, which may get leached by precipitation of water and percolate to the groundwater table, thus causing ground water pollution. However, this is not the case with this quarry operations, as neither the granite nor the overburden contains any harmful substances which may leach down to the

water table and contaminate groundwater. Therefore no adverse impact on groundwater quality is anticipated considering this aspect.

Marginal amount of sanitary waste, expected to be generated from various facilities it will be treated properly through septic tanks and soak pits and is not anticipated to cause any water pollution.

However, it is cautioned that the depth of mining operations should be restricted upto 39.5m only., hence, there will not be any impact on groundwater due to quarry operations.

- The domestic sewage from the canteen and toilets will be routed to septic tanks.
- Regular monitoring of water levels and quality in the existing open wells and bore well in the vicinity will be carried out.

Rain Water Harvesting

- The rainwater will be diverted by garland drains to the sump area within the mine lease. The stored water will be used for agriculture activities.
- Construct barriers at suitable intervals along the path of the drains.
- Provide necessary overflow arrangement to maintain the natural drainage system.

Drainage pattern and Hydrogeology

- Catchment area inside the mine will be affected.
- The study has recommended new alignment in line with upstream drainage slope of the area to facilitate smooth entry of water into the diversion channel and ultimate discharge of water into the original stream. No reduction in surface run-off is envisaged.

4.7.5 Noise Environment Mitigation Measures

The following mitigation measures should be taken to control noise pollution:

- Plan Blasting in a way keeping the atmospheric conditions to reduce the fallout.
- Controlled blasting techniques to be utilised.
- Wherever the noise levels exceed 85 dB A, workers should be provided with earmuffs, ear plugs etc.
- All vehicles and machinery will be properly lubricated and maintained regularly.
- Speed of the vehicles entering and leaving the quarrying lease will be limited to 25 kmph.
- Unnecessary use of horns by the drivers of the vehicles shall be avoided.
- Controlled blasting with proper spacing,burden and stemming will be maintained
- No secondary blasting

- Minimum quantity of detonating fuse will be consumed by using alternatively excel non- electrical initiation system
- The blasting will be carried out during favourable atmospheric condition and less human activity timings
- The prime movers/diesel engines will be properly maintained
- Provision of sound insulated chambers for the workers deployed on machines (HEMM)
- Proper designing of plant & machinery by providing inbuilt mechanism like silencers, mufflers and enclosures for noise generating parts and shock absorbing pads at the foundation of vibrating equipment
- A thick tree belt will be provided in phased manner around the periphery of the mine to attenuate noise
- Trees will be planted on both sides of haul roads
- Personal Protective Equipment (PPE) like ear muffs/ear plugs will be providedto the operators of HEMM and persons working near HEMM and reducing the exposure time of workers to the higher noise levels.

Mitigate Measures for blasting activity

- MSDD Millisecond Delayed Detonator and Muffle Blasting technologies are going to be used for this proposed project to avoid noise pollution and also Rock Breaking Powder ($Ca(OH)_2$) is going to be used for rock splitting to avoid blasting. Hence the adverse impact of blasting will be reduced.
- Safe blasting zones are kept around the periphery of the quarry
- Overcharging will be avoided
- The charge per delay will be minimized and preferably a greater number of delays will be used per blasts.

4.7.6 Biological Environment Mitigation Measures

To reduce the adverse effects on flora/fauna status that are found in project area due to deposition of dust generating from mining operations, water sprinkling and water spraying systems will be ensured in all dust prone areas to arrest dust generation.

- Renovation of ponds
- Construction of check dams and water holes; Engagement of fire watchers.

The objectives of the green belt cover will cover the following

- Noise abatement
- Reuse of waste water to the extent possible

- Prevention of soil erosion
- Ecological restoration
- Aesthetic, biological and visual improvement of area due to improved vegetative and plantation covers.
- Green belt around mine, dumps, etc
  - Tall growing, closely spaced, evergreen trees native to the area
  - Easy, quick early growth and establishment
  - Uniform spreading of crown habit.
  - Timber trees having long gestation period.
  - Trees with high foliage density, leaves with larger leaf area
  - Attractive appearance with both good flowering and fruit bearing.
  - Bird and insect attracting species
  - Suitable green cover with minimal maintenance
- Avenue Trees:
  - Trees with conical canopy and with attractive flowering
  - Trees with medium spreading branches to avoid obstruction to the traffic
  - Trees with branching at 10 feet and above.

4.8 Green Belt Development

The green belt plantation programme will be continued till the end of the mining operation in the area. In framing out this programme on a sustainable and scientific base, due consultation and coordination with the forest department will be sought.

An area of 0.14.26 Ha land was alloted for greenbelt development during 5 years of mining plan, Veeriyapalayam Multi Colour Granite quarry proposed to plant 400 No's of trees per year and Rs.2,50,000/- will spend for proposed greenbelt development and maintenance.

Table 4-41 Proposed Green Belt development plan

Year	No of trees proposed to be planted	Area to be covered in m^2	Name of the species to be plant	Survival rate expected in %	No of trees expected to be grown
2023-28	400	1426	Neem, Vilvam, Aathi, Panai	80	320

Plants are chosen to provide aesthetic, ecological and economical value. Trees will help to arrest propagation of noise and help to lessen dust pollution due to dust arresting action. The plantation will be developed around 7.5m safety zone of the quarry. The soil dumps, are planted to prevent erosion and for stabilization of the soil. Plants are chosen to provide aesthetic, ecological and economical

value. Trees will help to arrest propagation of noise and help to lessen dust pollution due to dust arresting action.

Also the Proponent has completed planting of around 150 of trees species including Neem, Vagai, Pungam around the periphery of proposed project site. The photographs of the same has been attached as Annexure 15.

4.9 Mitigate Measures for Occupational Health

- Adoption of dust suppression measures like spraying water, use of drill with dust collection system or wet drills etc.
- Plantation
- Avoid blasting during unfavorable wind & atmospheric conditions
- Use of personal protective equipment. Compliance with DGMS circulars
- Emergency response plan that includes installation of emergency response equipment to combat events such as fire.
- All personnel required to handle hazardous materials will be provided with personal protective equipment suitable for the hazardous material being handled.
- On-site first aid facilities will be provided and employees will be extended to the local community in emergencies.

Table 4-18 Mitigation for occupational health and safety

S. No	Activity	Mitigation measures
1	Excavation	Planned excavation, avoid haphazard mining
2	Drilling and blasting	➢ Driller should be equipped with a closed cabin to reduce exposure to noise and dust. ➢ In addition, the operators and other workers should be provided with masks, helmets, gloves and earplugs.
3	Safety zone	➢ Provisions for a buffer zone between the local habitation and the mine lease in the form of a green belt of suitable width. ➢ Restricted entry, use of sirens and cordoning of the blasting area are some of the good practices to avoid accidents.
4	Overburden stabilization	➢ Accidents are known to happen due to overburden collapse. ➢ Therefore, slope stabilization and dump stability are critical issues for safety and environment.
5	Workers health surveillance	➢ Health survey programmes for workers and local community. ➢ Regular training and awareness of employees to be conducted to meet health and safety objectives.

4.10 Mitigate Measures for Safety Aspects

- To reduce pollution emanation from quarry operations carry out splitting of sheet rock by diamond wire saw which largely reduces the dust and noise generation.Water sprinkling on haul roads and dumping yards, etc.
- Green belt creation wherever possible to arrest dust and reduce noise propagation.
- All staff and workers will be provided with PPE to guard against excess noise levels
- Provision of safety Helmets, goggles, safety boots, ear muffs, gas masks, etc.
- To provide appropriate instruction, training, retraining, vocational training, etc.
- Organization of safety contests and safety campaigns regularly to update knowledge of safe operational procedures, etc.
- Observation and compliance of all precautions, control measures and stipulations on above lines will ensure that in this project, health and safety problems will be minimal.

4.11 Irreversible and Irretrievable commitments of environmental components

Irreversible and Irretrievable commitments of environmental components are not envisaged in the proposed project.

4.12 Assessment of Significance of Impacts

This chapter comprises the information regarding the identified beneficially or adversely environmental impacts due to possible aspects predicted because of location of the plant, expected / predicted accidents scenario, conceptualization of project, preconstruction & construction activities and due to operation of machineries/equipment. Environmental aspect-impact relationship will be identified and quantified with its scale of magnitude and scale of importance, accordingly significance of impact will be determined along with mitigation measures.

The impact assessment essentially consists of three steps:

1. Impact Identification
2. Impact Predictions
3. Impact Analysis for determination of significance of impacts

Here, impact assessment has been done based on matrix method in which each action and its potential in creating impact is expressed in terms of its magnitude and importance. For quantitative representation, both magnitude & importance are represented by values as described below:

4.12.1 Scale of Importance:

Importance of an interaction is related to its significance, or an assessment of probable consequences of anticipated impact. It ranges from 1 to 10; with 10 representing a very important interaction and 1 of relatively low.

4.12.2 Scale of Magnitude:

Impact score or magnitude ranges from 0-5 with positive and negative values, depending upon the impact rising out of the project activity.

Table 4-19 Severity Criteria for Magnitude of Impacts

S. No	Category	Description of category	Impact	
			Adverse	Beneficial
1	No impact	-	0	0
2	No appreciable impact	Short term reversible	-1	1
3	Significant impact	Long term reversible	-2	2
4	Major impact	Irreversible but of lesser extent	-3	3
5	High impact	Irreversible but of medium extent	-4	4
6	Permanent impact	Severe irreversible impact	-5	5

Score of each of the component is to be multiplied by "Importance factor" and total score is to be obtained by summation of products. Score ranges of impact evaluation based on matrix score is given below

Table 4-20 Score ranges for Beneficial and Adverse Impacts

S. No	Total score	Outcome
1	+ve / -ve	Beneficial impact / adverse impact
2	0-300	No appreciable Beneficial impact / adverse impact
3	300-600	Appreciable but reversible adverse impact-mitigation measures are needed
4	600-900	Significant adverse impacts: most of the impacts are reversible. Mitigation measures are crucial.
5	900-1200	Major adverse impacts; most of the impacts are reversible. Alternative site selection to be considered.
6	>1200	Permanent irreversible impact; alternatives to the project need to be explored

Table 4-21 Impact Matrix without EMP

S.No	Environmental components likely to be affected	Air quality			Noise & Vibration			Surface water			Ground water			Soil quality			Flora & fauna			Land use pattern			Socio economics			Impact score
		Magnitude	Importance	(M * I)	Magnitude	Importance	(M * I)	Magnitude	Importance	(M * I)	Magnitude	Importance	(M * I)	Magnitude	Importance	(M * I)	Magnitude	Importance	(M * I)	Magnitude	Importance	(M * I)	Magnitude	Importance	(M * I)	(Sum of M * I)
1	Site clearance and removal of vegetation	-	-	0	-	-	0	-	-	0	-	-	0	-3	5	-15	-1	4	-4	-4	6	-24	-	-	0	-43
2	Drilling and blasting operation	-5	8	-40	-5	8	-40	-	-	0	-	-	0	-4	-6	24	-1	4	-4	-2	7	-14	-	-	0	-74
3	Dust generation due to mining activity	-5	8	-40	-	-	0	-3	5	-15	-	-	0	-	-	0	-2	4	-8	-	-	0	-5	6	-30	-93
4	Loading & Unloading of granite	-4	7	-28	-3	6	-18	-	-	0	-	-	0	-2	4	-8	-1	3	-3	-	-	0	-2	4	-8	-65
5	Fall in pit, Accidents, fall of side walls etc.	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	-4	6	-24	-2	4	-8	-3	5	-15	-47
6	Change in Topography and slopes	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	-3	6	-18	-	-	0	-18
7	Granite Resource Depletion	-	-	0	-	-	0	-	-	0	-	-	0	-3	8	-24	-	-	0	-2	8	-16	-	-	0	-40
8	Stacking and handling of Mineral Rejects and Overburden	-2	5	-10	-	-	0	-	-	0	-	-	0	-3	6	-18	-	-	0	-2	7	-14	-	-	0	-42
9	Noise generation due to vehicular movement	-	-	0	-3	5	-15	-	-	0	-	-	0	-	-	0	-1	4	-4	-	-	0	-2	4	-8	-27

10	Usage of DG sets	-2	5	-10	-2	5	-10	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	-20
11	Sewage Generation	-	-	0	-	-	0	-3	6	-18	-2	6	-12	-3	5	-15	-	-	0	-	-	0	-	-	0	-45
12	Consumption of water	-	-	0	-	-	0	-1	5	-5	-2	5	-10	-	-	0	-	-	0	-	-	0	-1	2	-2	-17
13	Employment opportunities	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	3	6	18	18
14	Greenbelt development	2	7	14	2	7	14	-	-	0	-	-	0	2	4	8	2	5	10	2	4	8	-	-	0	46
Total impact score		-16	40	-114	-11	31	-69	-7	16	-38	-4	11	-22	-16	26	-48	-8	30	-37	-13	42	-86	-10	27	-45	-459

Interpretation:

Based on assumption of importance and magnitude, the final impact score without EMP is -459 which concludes that the proposed project has, **"Appreciable but reversible adverse impact-mitigation measures are needed".**

Table 4-22 Impact Matrix with EMP

S.No	Environmental components likely to be affected	Air quality			Noise & Vibration			Surface water			Ground water			Soil quality			Flora & fauna			Land use pattern			Socio economics			Impact score	Mitigation Measures
		Magnitude	Importance	(M * I)	Magnitude	Importance	(M * I)	Magnitude	Importance	(M * I)	Magnitude	Importance	(M * I)	Magnitude	Importance	(M * I)	Magnitude	Importance	(M * I)	Magnitude	Importance	(M * I)	Magnitude	Importance	(M * I)	(Sum of M * I)	
1	Site clearance and removal of vegetation	-	-	0	-	-	0	-	-	0	-	-	0	-2	5	-10	-1	4	-4	-2	6	-12	-	-	0	-26	Development of green belt and plantation
2	Drilling and blasting operation	-3	8	-24	-3	8	-24	-	-	0	-	-	0	-2	-6	12	-1	4	-4	-2	7	-14	-	-	0	-54	1. Ensure to use PPEs and well-maintained vehicles 2. Regular Water

																										Sprinkling 3. Safe blasting zones are kept around the periphery of the quarry
3	Dust generation due to mining activity	-2	8	-16	-	-	0	-1	5	-5	-	-	0	-	-	0	-1	4	-4	-	-	0	-1	3	-3	-23	Water Sprinkling to control dust emission
4	Loading & Unloading of granite	-3	7	-21	-2	6	-12	-	-	0	-	-	0	-	-	0	-1	3	-3	-	-	0	-2	4	-8	-44	1. Dust filter mask to be provided to all workers 2. Vehicles will be covered by Tarpaulin sheets 3. Speed limits of vehicles will be maintained
5	Fall in pit, Accidents, fall of side walls etc.	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	-1	6	-6	-1	4	-4	-1	5	-5	-15	Proper fencing and PPE's will be provided.
6	Change in Topography and slopes	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	-2	5	-10	-	-	0	-10	Mine closure plan will be implemented after completion of mining activity.
7	Granite Resource Depletion	-	-	0	-	-	0	-	-	0	-	-	0	-2	8	-16	-	-	0	-2	8	-16	-	-	0	-32	Deletion of granite has positive & negative impacts. Even though it plays a vital role in improvement of country's economic development.
8	Stacking and handling of Mineral Rejects and Overburden	-1	5	-5	-	-	0	-	-	0	-	-	0	-2	6	-12	-	-	0	-2	7	-14	-	-	0	-31	1. Garland drains will be provided to prevent the back flow of OB material into nearby water bodies.

																									2. Granite rejects will be dumped into southwest side of the quarry
9	Noise generation due to vehicular movement	-	-	0	-1	5	-5	-	-	0	-	-	0	-	-	0	-1	4	-4	-	-	0	-1	4	-4	-13	1. All vehicles and machinery will be properly lubricated and maintained regularly. 2. Speed of the vehicles entering and leaving the quarrying lease will be limited to 25 kmph.
10	Usage of DG sets	-2	5	-10	-1	5	-5	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	-15	The DG set are provided with stacks of adequate height so as to disperse the emanating flue gases containing suspended particulate matters, oxides of sulphur and nitrogen without affecting the ground level concentrations.
11	Sewage Generation	-	-	0	-	-	0	-1	6	-6	-1	6	-6	-	-	0	-	-	0	-	-	0	-	-	0	-12	Sewage will be disposed in soak pit Garland drains are provided
12	Consumption of water	-	-	0	-	-	0	-1	5	-5	-1	5	-5	-	-	0	-	-	0	-	-	0	-1	1	-1	-11	Water requirement will be met by private tankers Rain water management will be provided

13	Employment opportunities	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	3	6	18	18	Employment will be provided to local workers
14	Greenbelt development	2	7	14	2	7	14	-	-	0	-	-	0	-	-	0	2	5	10	-	-	0	-	-	0	38	1. The plantation will be developed around 7.5m safety zone of the quarry. 2. Plants are chosen to provide aesthetic, ecological and economical value.
Total impact score		-9	40	-62	-5	31	-32	-3	16	-16	-2	11	-11	-8	13	-26	-4	30	-15	-11	37	-70	-3	23	-3	**-235**	

Interpretation:

Based on the assumption of importance and magnitude, the final impact score with the implementation of mitigation measures is -235, which concludes that the proposed project has, "**No appreciable beneficial impact / adverse impact**".

5 ANALYSIS OF ALTERNATIVES

5.1 Introduction

The proposed Veeriyapalayam Multi Colour Granite Quarry over an extent of 2.30.0Ha, located in survey number 12/1A, 12/1B, 12/1C, 12/1D, 12/1E, 12/2A, 12/2B, 12/2C, 12/3A, 12/3B, 12/3C, 12/3D, 12/3E, 12/4A, 12/4B and 12/5A, Veeriyapalayam Village, Krishnarayapuram Taluk, Karur District.

5.2 Description of each alternatives with its adverse impacts

Alternative site is not considered.

5.3 Selection of Alternate Sites

No alternative site selection was carried out for this project since the project is site specific because of the availability of mineral in the location

5.4 Site Connectivity

The Site connectivity details are given in **Table 5-1**.

Table 5-1 Site Connectivity Details

Nearest State Highway	SH- 199 (Vaiyampatti-Karur Road),~10.41km, WSW
Nearest National Highway	NH-81 (Coimbatore-Karur-Chidamabaram), ~ 8.27km, N
Nearest Railway Station	Mahadanapuram Railway Station, ~ 8.31 km, N
Nearet Town	Thottiyam, ~13 km, NNE
Nearest City	Tiruchirappalli, ~38 km, ESE

5.4.1 Technology Alternatives

No new technologies have been considered for this quarry. The open cast, semi-mechanized method with bench 6 m height and width not less than height has been proposed.

Table 5.1 Alternative Technology Analysed

S.No	Activity involved in mining Operation	Technology	Impact
1.	Cutting	Burner Cutting	Adverse level of Noise
		Wire saw Cutting	No adverse impact to environment
2.	Drilling	Manual Drilling using jack hammer	Dust emission and Noise
		Wet drilling	Negligible dust emission

		Tamrac – Machine Drilling	Negligible dust emission and Noise
		Wagon Drill	Dust emission and Noise
		LD Bore	Dust emission
		PRD Drilling	Negligible dust emission
3.	Blasting	Conventional Blasting	Noise
		Muffle Blasting	Mininmal Noise impact
		Rock Breaking Powder or Expansive Mortar for secondary breaking	Negligible impact on noise

6 ENVIRONMENTAL MONITORING PROGRAMME

6.1 Introduction

Environmental monitoring is an essential tool for sustainable development & ensuring effective implementation of environmental management plan & mitigation measures adopted.The monitoring schedules are planned for systematic study of various pollution levels with respect to air and water qualities, noise levels, etc. to ensure that they conform to the standards laid down by Environmental Protection Act and various Central and State Pollution Control Board Limits. The various methodologies and frequency of studies of all environmental quality parameters also conform to norms lay down by MOEF, CPCB and SPCB in this respect.

The Project proponent will be overseeing/reviewing following activities:

- To observe the implementation of environmental control measures.
- To ensure implementation of planned plantation programme with monitoring of survival rate, etc.
- To keep monitoring records properly for submission of periodical returns to statutory authorities and for checking by them.
- To evaluate periodically the performance of existing pollution control equipment and systems for taking prompt action in this respect to rectify the defects.
- Conducting safety audits and programmes to create safety awareness in workers/staff.
- Monitoring of dumps and benches for slope stability, monitoring of OB dumps, laying of check dams, garland drains around the dumps and excavated areas and their regular maintenance for de-silting.
- To study the effects of project activities on the environment.
- To interact and liaise with State and Central Government Departments.
- To take immediate preventive action in case of some unforeseen environmental pollution attributable to the project.
- Imparting training on safety and conduct safety drills to educate employees.
- To ensure that fire fighting equipment, etc, are kept in ready-to-use condition.

For each of the environmental attributes, the monitoring plan specifies the parameters to be monitored, location of monitoring sites, frequency and duration of monitoring and it also denotes the applicable standards, implementation and supervising responsibilities.

6.2 Technical Aspects of Post Project Environmental Monitoring Program

The Summarized forms of post monitoring details are presented in **Table 6-1.**

Table 6-1 Post Project Environmental Monitoring Program

S. No	Area of Monitoring	Number of Sampling Stations	Frequency of Sampling	Parameters to be Analyzed
1.	Meteorology	One	Hourly and Daily basis.	Wind speed and direction, Temperature, Relative Humidity, Atmospheric pressure, Rainfall.
2.	Ambient Air Quality	3 Stations (1 within site premises and 2 outside site premises)	Twice a week:24 hourly period	PM_{10}, $PM_{2.5}$, SO_2, and NO_2
3.	Noise	3 Stations (1 within site premises and 2 outside site premises)	Once every season	Ambient Equivalent continuous Sound Pressure Levels (Leq) at day and Night time.
4	Exhaust from DG set	Stack of DG set	Quarterly	PM_{10}, $PM_{2.5}$, SO_2 & CO
5	Vehicular Emissions	Parking area	Periodic monitoring of vehicles	Air emission and noise, PCU
6	Soil	3 locations (1 within site premises and 2 outside site premises)	Six months once	Physico chemical properties, Nutrients, Heavy metals
7	Terrestrial Ecology	Within 10km, around the project	Once in three years	Symptoms of injuries on plants

6.3 Measurement Methodologies

The monitoring schedules are planned for systematic study of various pollution levels with respect to air and water qualities, noise levels, etc. to ensure that they conform to the standards laid down by Environmental Protection Act and various Central and State Pollution Control Board Limits. The various methodologies and frequency of studies of all environmental quality parameters also conform to norms laid down by MOEF, CPCB and SPCB in this respect.

6.4 Emergency procedures on reporting & documentation

All the necessary reports and documents shall be prepared complying with the statutory rules & regulations. Proper and due care shall be taken to adhere to the laid down rules and regulation by the government. Regular and periodic record shall be kept in order to ensure easier, comparable and brisk review and projection of past, present and future performances. Also, the management shall ensure to prepare separate records for water, wastewater, solid waste, air, emission, regularly and periodically in order to provide better and smooth vigilance.

The management shall look into the fact that as soon as the preparation of reports gets over it shall be forwarded to the concerned authority with due care for the purpose of reviewing. Adhering to the rules and regulations the management shall ensure that the outcome of the reports and the conclusions

been drawn shall be prepared as per the laid down regulations and procedures. No breach of any convention shall be availed.

These reports/documents shall be regularly and periodically reviewed and any changes/discrepancies found in mitigation measures/ operation/ management/ technology shall be brought into notice instantaneously and all possible corrective actions shall be taken to match the discrepancies been witnessed.

7 ADDITIONAL STUDIES

7.1 Public Consultation

The project falls under Schedule 1(a) Mining of Minor Minerals 'B2' category as per EIA Notification 2006 and its Amendments thereafter and As per the O.M issued vide F.No. L-11011/175/2018-IA-II (M), dated: 12.12.2018 considering the cluster the project is termed under Schedule 1(a) Mining of Minor Minerals 'B1' category. The total area of the quarry is 2.30.00 Ha.

However, the proposed project falls under 'B1' category, Schedule 1(a), Public Hearing is Mandatory. So, EIA report has been prepared as per the obtained ToR vide. **Letter No. SEIAA-TN/F.No.10272/SEAC/ToR-1621/2023, dated: 28.11.2023**. After Public Hearing, minutes will be incorporated in the EIA report along with action plan or commitment by the proponent.Risk Identification & Management

7.1.1 Introduction

Mining and allied activities are associated with several potential hazards both to the employees and the public at large. A worker in a mine should be able to work under conditions that are adequately safe and healthy. At the same time the environmental conditions should be such as not to impair his working efficiency.

The various safeguards to be taken to ensure the safety of the mine and that of employees are provided in the Mines Act, 1952. Risk involves the occurrence or potential occurrence of some accidents consisting of an event or sequence of events. The risk assessment study covers the following:

- Identification of potential hazard areas
- Identification of representative failure cases
- Visualization of the resulting scenarios in terms of fire (thermal radiation) and explosion
- Assess the overall damage potential of the identified hazardous events and the impact zones from the accidental scenarios
- Assess the overall suitability of the site from hazard minimization and disaster mitigation point of view
- Furnish specific recommendationson the minimization of the worst accident possibilities

The complete mining will be carried out under the management control and direction of a qualified mine manager holding a first class manager's certificate of competency. Moreover, mining staff will be sent to refresher courses from time to time to keep them alert. However, following natural/industrial hazards may occur during normal operation:

- Accident due to explosives.

- Accident due to heavy mining equipment

In order to take care of above hazard/disasters, the following control measures will be adopted.

- All safety precautions and provisions of the Mine Act, 1952, the MMR 1961 and the Mines Rules, 1955 will be strictly followed during all mining operations
- Entry of unauthorized persons will be prohibited.
- Firefighting and first-aid provisions in the mines office complex and mining area;
- Provisions of all the safety appliances such as safety boot, helmets, goggles etc. will be made available to the employees and regular check for their use.
- Training and refresher courses for all the employees working in hazardous premises; Under mines rules all employees of mines will have to undergo the training at a regular interval.
- Working of mine, as per approved plans and regularly updating the mine plans;
- Cleaning of mine faces will be regularly done
- Handling of explosives, charging and blasting will be carried out by competent persons only.
- Regular maintenance and testing of all mining equipment as per manufacturer's guidelines.
- Suppression of dust on the haulage roads.
- Increasing the awareness of safety and disaster through competitions, posters and other similar drives.
- For any type of above disaster, a rescue team will be formed by training the mining staff with specialized training.

7.1.2 Identification of Hazards in Open Cast Mining

There are various factors, which can cause disaster in the mines. These hazards are as follows:

- Drilling
- Blasting
- Overburden handling
- Heavy Machinery

7.1.2.1 Drilling

Drilling is an important activity in mining. This activity releases particulate matter into the air and noise in the vicinity of the operation. The particulate matter/dust can be arrested by employing dust extractor, wet or dry type. The usage of standard drill bits also reduces the dust formation. The noise is also arrested by the usage of dust extractors.

The compressors which feed the compressor air to the drilling jack hammers can be covered in acoustic enclosures which reduce the dust and noise. The hard strata will be excavated after drilling and blasting. Drilling will be done with jack hammers up to 1 to1.5m depth having a diameter of 32-36mm.

7.1.2.2 Blasting

Most of the accidents from blasting occur due to the projectiles, as they may sometimes go even beyond the danger zone, mainly due to overcharging of the shot-holes as a result of certain special features of the local ground. Flying rocks are encountered during initial and final blasting operations. Vibrations also lead to displacement of adjoining areas. Dust and noise are also problems commonly encountered during blasting operations.

- The damaging impacts on environment are evident noise, gas, flyrock and ground vibration.
- The last factor is most important for safety of constructions, buildings and various natural objects in the vicinity of mining area.
- The ground vibration parameters, crucial for safety of endangered objects have a significant correlation with charge weight and distance of blasting.
- This study tried to associate the main vibration parameter, particle velocity with blasting parameters and properties of vibration medium.

7.1.2.3 Precautionary Measures to Avoid Accidents Due to Blasting

- The provisions laid down in the MMR 1961 related to Blasting shall strictly be followed. However, some of the main provisions are written here
- The Wire saw and crack powder will be utilized extensively to reduce the requirement for blasting.
- The blasting will be done under supervision of blaster/mine mate/mine foreman/mine manager
- Shots shall not be fired except during the hours of daylight.
- The holes charged on any particular day shall be fired on the same day.
- Adequate blasting shelters or other protection shall be provided at mines.
- The shot-firer shall give sufficient warning by effective signals over the entire area falling within a radius of danger zone.
- Multi-shot exploder shall be used. A shot-firer will fire maximum 120 Shots.
- During the approach and progress of electrical storm, adequate precautions shall be taken.

7.1.2.4 Overburden Handling

The overburden in the form of topsoil and weathered rock, after the excavation of topsoil and weathered rock will be directly loaded into tipper to the needy buyers for road project and construction works for filling and leveling of low lying areas.

7.1.2.5 Heavy Machinery

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

7.1.2.6 Precautionary Measures to Prevent Accidents due to Trucks and Dumpers

- All transportation within the main working shall be carried out directly under the supervision and control of the management.
- The vehicles must be maintained in good conditions and checked thoroughly at least once a week by the competent person authorized for the purpose by the Management.
- Road signs shall be provided at each and every turning point especially for the guidance of the drivers.
- To avoid danger while reversing of vehicles especially at the embankment and tipping points, all areas for reversing of lorries should as far as possible be made man free. A statutory provision of the fences, constant education, training etc. will go a long way in reducing the incidents of such accidents.
- Generally, oversize rocks shall be dealt with in the pit by secondary blasting.
- A Load consisting of large rocks must not be over the edge. This is unsafe and may damage equipment.
- The movement of the dumpers will be governed under the Code of Traffic rule; this is already formulated & implemented.

7.1.2.7 Storage of Explosives

The explosive requirement of the quarry operation is minimal. The blasting requirement will be carried out using contractors approved by the Controller of Explosives. No Explosive storage is envisaged in this quarry.

7.1.2.8 Safety Measures at the quarry

- Adequate care has been taken in deciding the size of the bench for the working pit.
- The benches are properly sloped at an angle of 60 degree to avoid any spillage of benches.
- Adequate drainage system at the top of the pit and also on the benches shall be made to prevent erosion of the benches.
- The quarries will be protected by garland drains around the periphery for storm water drainage.

7.1.3 Disaster Management Plan

The disaster management plan is aimed to ensure safety of life, protection of environment, protection of installation, restoration of production and salvage operations in this same order of priorities. For effective implementation of the disaster management plan, it should be widely circulated and personnel training through rehearsals/drills. The objective of the disaster management plan is to make use of the combined resources of the mining operation and the outside services to achieve the following:

- Effect the rescue and medical treatment of casualties

- Safeguard other people
- Minimize damage to property and the environment
- Initially contain and ultimately bring the incident under control
- Identify any dead
- Provide for the needs of relatives
- Provide authoritative information to the news media
- Secure the safe rehabilitation of affected area
- Preserve relevant records and equipment for the subsequent inquiry into the cause and circumstances of the emergency
- In effect, it is to optimize operational efficiency to rescue rehabilitation and render medical help and to restore normalcy.

Emergency Organization (EO)

It is recommended to setup an emergency organization. A senior executive (Mine Manager) who has control over the affairs of the mine would be heading the emergency organization. He would be designated as site controller. As per the general organization chart, in the mines, the Mines Foreman would be designated as the Incident Controller (IC). The incident controller would be reporting to the site controller. Emergency coordinators would be appointed who would undertake the responsibilities like firefighting, rescue, rehabilitation, transport and provide essential and support services.

Emergency Communication (EC)

Whoever notices an emergency situation such as fire, growth of fire etc. would inform the Mines Foreman. The Mines Foreman would appraise the site controller. Site Controller verifies the situation from the incident controller takes a decision about an impending on site emergency. Simultaneously, the emergency warning system would be activated on the instructions of the site controller.

In order to handle disaster/emergency situations, the following personnel shall deal with the disaster/Emergency

- Mines Manager-site controller
- Mines Forman-incident controller
- Mine mate –Fire controller
- Senior most Driver-Transport coordinator
- Senior most operator- Medical coordinator

7.1.3.1 Emergency Services

This includes the fire-fighting system, first aid center, etc. Alternate sources of power supply for operating fire pumps, communication with local bodies, fire brigade etc. will also be clearly identified. Adequate number of external and internal telephone connections shall be installed.

1. Fire Protection System
2. Off Site Emergency Plan

7.1.3.2 Fire Protection System

The fire protection system for the project maintained will consist of Portable hand appliances of suitable types/capacities for extinguishing small fires in selected mine areas, storages areas such as that of Diesel, Explosives, etc.

7.1.3.3 Off-Site Emergency Plan

The offsite emergency plan defining the various steps to tackle any offsite emergencies, which may affect surrounding areas of the project, has to be prepared after due finalizing discussion in this respect with local Panchayat official, Revenue officials and District Collector. As per this off-site plan, in case of any off-site emergencies, actions have to be promptly initiated to deal with the situation in consultation with Collector and other revenue officials.

7.1.4 Mine Closure Plan

The site boundaries shall be safely fenced and used as a reservoir after mining activities are over. There is no proposal for back filling, reclamation and rehabilitation. The quarried pits after the end of the life of lease will be fenced to prevent inherent entry of public and cattle. There is no proposal for back filling, reclamation and re-habitation.

7.1.4.1 Progressive Mine Closure Plan

The various schedules for mining activities regarding mining of Multi Colour Granite, waste disposal, proposed land use pattern, environmental preservation measures, disaster management plan, etc. have been fully covered in the earlier chapters in this EIA/EMP report.

Concurrent planning for various steps to be adopted for final mine closure, along with regular working schedules and systems of the mine, will facilitate to effect smooth switchover to final mine closure stages ultimately.

7.1.4.2 Water Quality Management

The ground water quality in the region indicates neutral range with pH values. Most of the analytical results for ground and surface water showed parameter concentrations well within the permissible limits. Garland drains will be provided all along the periphery of the mining pit and along the toes of the side burden dumps. These drains will be aligned in such a way that all the surface drainage water will be carried away from the mining zone to settling tanks.

The mining pit's catchment water will be coursed to the main sump and used for dust suppression and green belt development & plantation activities.

7.1.4.3 Air Quality Management

Ambient air quality was monitored twice in a week for One (01) season (shall cover 12 weeks), i.e. during Pre-Monsoon season (March 2023 – May 2023). PM_{10}, $PM_{2.5}$, SO_2, NOx, Pb, NH_3, C6H6, $C_{20}H_{12}$, As, Ni, were monitored. Sampling was carried out as per Central Pollution Control Board (CPCB) monitoring guidelines at each location.

The following precautions have been considered for abatement of air pollution in the mine area:

- Water sprinkling shall be carried out at the active working faces, on all haul-roads and the dump surfaces.
- Regular cleaning and removal of spillage from haul roads and weighbridge areas.
- Proper and regular maintenance of mining equipments.
- Development of comprehensive green belt around overburden dumps to reduce fugitive dust emissions in order to create clean and healthy environment.

7.1.4.4 Solid waste Management

As is stated earlier, mining is being carried out by opencast semi-mechanized method using conventional mining equipments i.e. hydraulic excavators / shovels and dumpers combination with ancillary mining equipment like compressor, generator etc. Adequate space has been identified within the lease applied area for dumping such waste material on barren land covered with soil. The 7.5 m safety distance as well as the defective portion of the deposit may also be used for waste dumping purpose.

7.1.4.5 Stabilization of Dump

As the waste generation in the mine includes hard rock fragments of considerable size and irregular shape with varying angularity, the waste dump will be stable on its own even at higher slopes of the sides. However, suitable variety of soil will be identified and brought from outside and used for increasing the stability of the sides of the waste dumps and also for planting trees over the dumps in a phased manner.

7.1.4.6 Mine Drainage

The lease applied area exhibits plain topography. Through the area receives scanty rainfall, the ground water level is at 63m depth. The Production faces are operated at shallow depths. During the rainy seasons the surface run of water and the gorund water are collected at one point called as sump and dewatered nearby agricultural field with the help of 10HP water pumps.

7.1.4.7 Disposal of Waste

The Mine waste in the mine includes the over burden, side burden, rock fragments and rubbles generated as mineral rejects during production works and the country rock fragments generated during development works as approach road formation, formation of dumping yard sites etc., During the five years of Mining Plan period, such waste material are proposed to be dumped along the sidest of the lease area where it comprises of country rock terrain.

7.1.4.8 Top Soil Management

Topsoil will be properly stacked at earmarked dump site with adequate measures. It will be used for growing plants along the fringes of the site roads and reclamation of external dump and backfilled area. The topsoil stockpiles will be low height and will be grassed to retain fertility. Besides these topsoil stacks there will be temporary stacks near the excavation area and area to be reclaimed which will be made use of for concurrent lying without bringing the topsoil to the soil stack near the OB dump.

7.1.4.9 Disposal of Mining Machinery

Machineries like Tractor mounted compressor attached with Jack hammers, Excavators are proposed to deploy for quarrying operation. These machines are complaint to the RTO conditions and CPCB conditions. These machineries are written off and disposed on completion of their normal life as per the set guidelines of the Government.

7.1.4.10 Other Infrastructure

Mine office, store room, first-aid room etc, will be provided on semi-permanent structures within the lease applied area.

7.1.4.11 Safety & Security

The water ponds developed in the reclaimed areas shall be properly fenced for safety. The water from these ponds is likely to be potable and shall be used for human & cattle consumption and for agriculture purposes.

7.2 Social Impact Assessment R & R plan

There will be no Rehabilitation and Resettlement in this proposed project.

8 PROJECT BENEFITS

- The colour granite dimensional material by virtue of its pleasing color and texture such as and its best ability to take polishing and appealing look in polished product has attracted the consumers in the building construction and interior decoration industries.
- Bulk quantity of the blocks produced are exported as raw blocks and some quantity is being processed Granite processing units and exported as value added finished products.
- The proposed quarry will provides employment opportunities for the people of the state as well as in the specific project area. The quarrying is one among the major core sector for industries, which plays a vital process of country's economic development.
- The quarrying activity will benefit the employment of local people both (35persons) with requirement of 5 numbers of Skilled labour, 12 Semi skilled labour and 10 number of unskilled labour which will improvement in Per Capita Income.
- The socio - economic conditions of the village and distance will enhance due to the project, hence the project should be allowed after considering all the parameters.
- It can thus be concluded that the project is environmentally compatible, financially viable and would be in the interest of construction industry thereby indirectly benefiting the masses.
- As a part of improvement of social infrastructure the lessee indents to involve Corporate Environment Responsbilities activity like water purifier, Renovation of class room, Plantation in school campus, Additional sanitary facilities to the Palaya Jayankondam Govt.school
- As a part of improvement of physical infrastructure in the Mining Lease area the following facilities were provided by the proponent in the Mining Lease area.
    1. Drinking Water R.O Plant
    2. Provision of First Aid Kits at the site
    3. In site Sanitation facilities
    4. Siltation Pond with pump
    5. Settling Tank

9 ENVIRONMENTAL COST & BENEFIT ANALYSIS

(Not recommended during scoping stage.)

10 ENVIRONMENTAL MANAGEMENT PLAN

10.1 Description of the administrative aspects of ensuring that mitigative measures are implemented and their effectiveness monitored, after approval of the EIA Management Plan

The Environmental Management Plan for Veeriyapalayam Multi Colour Granite Quarry identifies the principles, procedures and methods that will be used to control and minimize the environmental impacts for the proposed project.

10.2 Environmental Management Plan & its Control Measures

10.2.1 Control Measures

10.2.1.1 Air Quality Management

Quarrying operations involves open cast semi mechanized method, but there is involvement of labours too. Dust would be generated during the course of over burden removing, drilling, mining, hauling, handling and transportation of the material. Dust is likely to be generated from emissions of diesel vehicles such as SO_2, NOx etc.

10.2.1.2 Emission Source Identification

The emission sources related to mining operation includes, overburden operations, drilling, conveying, washing, drying, hauling, loading and unloading stock piles.

- Emissions of PM and road dust due to HEMM & Mining Tippers.
- Emissions from generators.

10.2.1.3 Measures for dust suppression

Water will be sprinkled for suppression of air dust on mine haulage roads. Drilling of blast holes of 32 mm dia always under wet condition to prevent flying of dust and drillers will use respirators in accordance with mines regulations. In the unloading point of tippers, water will be sprinkled.

10.2.1.4 Emissions from Material Handling

PM emissions occur during the handling and transfer operations of material from one process to another within the facility.Open storage piles of raw material and products are generated at various points throughout the operational area.

The environmental control measures, which are being taken and proposed to control the fugitive dust released during the quarry production are given below:

- The working faces will be regularly wetted before carrying out the drilling and excavation.
- Dust masks will be provided to the workers especially for the drillers and for

the workers working in the loading operations.

- Periodic health check up for the workers shall be done
- Plantation along approach roads and surrounding the quarry lease area.
- Water tankers with spraying arrangement will be used for regular water sprinkling on the haul roads to ensure effective dust suppression.

Haulage

- Haul road will be maintained regularly.
- Speed limits will be prescribed for transport vehicles.
- Water will be sprayed daily on the roads by using water tankers.
- Periodic maintenance of the trucks used for transport shall be done to reduce dust emissions.
- Over loading of trucks is avoided.

10.2.2 Noise Pollution Control

In an operational mine major noise sources are operation of mine machineries, equipment & plying vehicles. Noise generation may be for an instant, intermittent or continuous period, with low to high decibels. General noise levels generated at mines are documented as below:

Equipment	Noise Level (dB (A))
Rotary Drills	72-100
Compressor (85 M^3/min)	50-55
Excavator	75-90

The management plan for controlling noise pollution is as given below.

- Reducing the drilling operations as far as possible
- Provision of earmuffs to workers working in high noise prone areas.
- Proper gradient of haul roads to reduce cumulative noise levels.
- Development of green belt all along the boundary of the mining lease area which will act as effective noise barrier.
- Use of Diamond Wire Saw machine to reduce noise.
- Restriction of blast hole drilling to only day time hours and usage of sharp drilling bits and delivery of compressed air at optimal pressure during drilling.
- Noise emanating machine such as compressors, diesel generator are enclosed in acoustic enclosure so as to reduce the noise level.

10.2.3 Water Pollution Control Measures

10.2.3.1 Surface Water

There are no major streams and rivers, which can get effected by the mining. Hence there will be no major effect on the surface water environment. Surface water ditches or channels will be made to divert all surface drainage for agricultural purposes.

10.2.3.2 Mine Drainage Water

Mine water will be used in mechanized cutting of the blocks and for wetting purpose.The runoff from the dumps will be channelized and care will be taken.

- Mine water will be used in wet drilling process, dust suppression & green belt development
- The runoff from the dumps will be channelized and care will be taken.

10.2.3.3 Land Environment

Landscape will be slightly changed due to open cast quarry. There will be no land subsidence as area is made up of hard rock. Aesthetic environment will not be effected, as the quarry is located in hilly terrain. Soil cover and the weathered material accounts for the Over Burden. Agriculture is seen mainly in the plains far away from the lease area. A few bushes will be cleared to facilitate mining and other related activities and there are no big trees.

- Top soil shall be used in afforestation work, as early as possible.
- A retaining wall and garland drain will be constructed all around to prevent the wash off. Landscape will be changed due to open cast quarry. There will be no land subsidence as area is made up of hard rock. Aesthetic environment will be effected.
- Soil cover and the weathered material accounts for the Over Burden
- Top soil will be removed & stored on the inner boundary of the mining lease area. To improve its quality, soil stabilizers shall be mixed and leguminous plantation will be done over these stacks.

10.2.3.4 Top soil management

Top soil will be removed in advance and stacked separately. To improve its quality, soil stabilizers shall be mixed and leguminous plantation will be done over these stacks. Top soil shall be used in afforestation work, as early as possible. A retaining wall and garland drain will be constructed all around to prevent the wash off.

10.2.3.5 Solid Waste Management

The solid waste that is likely to be generated during the quarry activity will be stacked along the lease barrier according to their quality and size.The sub Grade material and waste generated will be stored within the lease boundary over areas where there are no granite deposits. All the care will be taken to minimize the waste generation at the source.

- Top Soil recovered will be used in the green belt areas on the Southern side of the lease area.
- Top soil Stored on the inner boundary of the mining lease area. To improve its quality, soil stabilizers shall be mixed and leguminous plantation will be done over these stacks.
- The solid waste that is likely to be generated during the quarry activity will be stacked along the lease barrier according to the mining plan.
- All the care will be taken to minimize the waste generation at the source.

10.2.3.6 Stabilization of Dumps

The dumps are mainly constituted of quarry waste. It will be afforested properly to stabilize the dumps and preserve soil character.Garland canal also will be dug around the dump.

As the waste generation in the mine includes hard rock fragments of considerable size and irregular shape with varying angularity, the waste dump will be stable on its own even at higher slopes of the sides. However suitable variety of soil will be identified and brought from outside and used for increasing the stability of the sides of the waste dumps and also for planting trees over the dumps in a phased manner.

10.2.3.7 Measures to be adopted for Solid Wastes Management

From the waste generated if any are separated and kept at the dump site. It is supplied to crushing plants and is used as road metal. The left out waste will be used for back filling the quarry which will be covered with soil added with soil conditioners and quarry will be reforested.

10.2.4 Biological Environment

As in any typical Ligneous rocks deposit, there is no tree growth on the area, but grass shrub and bushes grow sparsely. No wildlife is found in quarry Lease area. In order to minimize the impacts and to improve up on the existing eco system afforestation plan will be envisaged.

- As in any typical intrusive igneous rocks deposit, there is no tree growth on the area, but grass shrub and bushes grow sparsely.
- In order to minimize the impacts and to improve up on the existing eco system afforestation plan will be envisaged.
- No wildlife is found in quarry Lease area.

10.2.5 Granite Conservation and Development

The mining plan proposed has fully covered the aspects of granite conservation with a future plan to extend the proposed working of the mine to the full depth of the deposit. Extreme care will be taken to ensure proper supervision of quality control of the granite dimensional stone aimed at the recovery of the maximum saleable quantity / quality of granite dimensional stones suitable for full utilization of the consumers

10.2.6 Afforestation Plan

The main aim of the plantation of the mined out areas is to stabilize the area to protect it from rain, wind erosion, improve the aesthetics and support the re-creation of bio-diversity.

- Afforestation will be taken up along the lease area.
- In the Scheme of Mining 20 plants per year is proposed to be planted for complying Afforestation program with the arrived survival rate of 50% in the North western portion of the lease area in the phased manner.
- Only Shrubs and bushes are seen in the quarry Lease area.

10.2.7 Occupational Health & Safety Measures

Granite stone does not contain any toxic elements. Further this being a semi-mechanized mine, production is by semi-mechanized means and waste material handling partly by mechanized way, there shall be marginal impact on air and noise qualities. Therefore, the possibilities of any health hazards are minimal.

- Awareness and planning are keys to prevention of occupational health hazards.
- Conducting air monitoring to measure worker exposures and to ensure that provided controls are adequate for protection of workers.
- Adequate respiratory protection will be provided to the workers.
- Periodic medical examinations for all workers.
- Provide workers with training that includes information about health effects, work practices, and use of protective equipments.

10.2.8 Socio-Economic Benefits

Granite Quarry project is not going to have any negative impact on the social or cultural life of the villagers in the near vicinity. The quarry activity will provide job opportunities, which will help them to develop economically.

Granite quarry will be done with the vision of leaving a positive impact on socio-economics of people living in the nearby villages. A first-aid centre to meet the basic medical needs of employees will be provided.

10.2.8.1 Employment potential

Around 30 people directly and 20 people indirectly employed including material suppliers, outside workshops, unit supported industries. Local villagers residing in the nearby villages shall be employed as semi-skilled workers.

10.2.8.2 Care and Maintenance during Temporary Discontinuance

All the provisions as per the Mines Act 1952 and Rule17 of GC & DR 1999 shall be strictly adhered during temporary discontinuation.

10.2.8.3 Safety and Security

At the end of quarry operations, the total area excavated will be fenced properly with single opening for workers engaged in closure plan work.

10.3 Budget for Environmental Protection

It is necessary to include the environmental cost as a part of the budgetary cost component. Total of Rs.6,45,000/- allocated for environmental protection activities. Environmental Management cost is given in **Table 10-1.**

Table 10-1 Environmental Management Plan Cost

Parameters	Mitigation Measure	Capital cost (INR)	Recurring Cost
Air Environment	Compaction, gradation and drainage on both sides for Haulage Road	23,000	23,000
	Fixed Water Sprinkling Arrangements + Water sprinkling by own water tankers	8,00,000	50,000
	Air Quality will be regularly monitored as per norms within ML area & Ambient Area	-	40,000
	Muffle blasting – To control fly rocks during blasting	-	10,000
	Wet drilling procedure / latest eco-friendly drill machine with separate dust extractor unit	25,000	2500
	No overloading of trucks/tippers/tractors	-	5,000
	Stone carrying trucks will be covered by tarpaulin	-	10,000
	Enforcing speed limits of 20 km/hr within ML area	5,000	1,000
	Regular monitoring of exhaust fumes as per RTO norms	0	5,000
	Regular sweeping and maintenance of approach roads for at least about 200 m from ML Area	-	4,80,000
	Installing wheel wash system near gate of quarry	50,000	20,000

Noise Environment	Source of noise will be during operation of transportation vehicles, HEMM for this proper maintenance will be done at regular intervals.	0	4,80,000
	Oiling & greasing of Transport vehicles and HEMM at regular interval will be done	0	10,000
	Adequate silencers will be provided in all the diesel engines of vehicles.	0	10,000
	It will be ensured that all transportation vehicles carry a fitness certificate.	0	0
	Safety tools and implements that are required will be kept adequately near blasting site at the time of charging.	0	10,000
	Line Drilling all along the boundary to reduce the PPV from blasting activity and implementing controlled blasting.	0	50,000
	Proper warning system before blasting will be adopted and clearance of the area before blasting will be ensured.	0	50,000
	Provision for Portable blaster shed	50,000	5,000
	NONEL Blasting will be practiced to control Ground vibration and fly rocks	0	30
Water Environment	Water management	23,000	11,500
Waste Management	Waste management (Spent Oil, Grease etc.,)	50,000	5,000
	Bio toilets will be made available outside mine lease on the land of owner itself	60,000	0
Implementation of EC, Mining Plan & DGMS Condition	Size 6’ X 5’ with blue background and white letters as mentioned in MoM Appendix II by the SEAC TN	10,000	1,000

	Workers will be provided with Personal Protective Equipment's	1,40,000	35,000
	Health check up for workers will be provisioned	0	35,000
	First aid facility will be provided	4,000	0
	Mine will have safety precaution signages, boards.	5,000	1,000
	Barbed Wire Fencing to quarry area will be provisioned.	4,60,000	23,000
	Construction of Green mesh along with wire fencing around the lease area	1,15,000	46,000
	No parking will be provided on the transport routes. Separate provision on the bottom of the hill will be made for vehicles /HEMMs. Flaggers will be deployed for traffic management	1,00,000	50,000
	Installation of CCTV cameras in the mines and mine entrance	30,000	5,000
	Implementation as per Mining Plan and ensure safe quarry working	7,80,000	7,80,000
Green Belt Development	Green belt development - 400 trees per one hectare	1,00,000	6,000
		1,50,000	6,000
Total		**29,80,000**	**22,66,030**

Table 10-2 Consolidated Environmental Management Plan Cost

S.No	Environment Aspects for Budget Allocation	Capital Cost	Recurring Cost
1.	Air Environment	9,03,000	6,46,500
2.	Noise	50,000	6,15,030
3.	Water Environement	23,000	11,500
4.	Waste Management	1,10,000	5000
5.	Implementation of EC, Mining Plan & DGMS Condition	16,44,000	9,76,000
6.	Greenbelt	2,50,000	12,000
	Total	**29,80,000**	**22,66,030**

11 SUMMARY & CONCLUSION

11.1 Overall justification for the implementation of project

An Environmental Impact Assessment Study has been carried out and assessed for the proposed project, based on the ToR and baseline quality data collected for the study area. Identification and anticipation of the potential environmental impacts due to the proposed project with a delineation of appropriate impact mitigation measures in an Environmental Management plan is provided in the EIA report.

The marginal impacts that might be caused by the proposed activity will be mitigated by the pollution control and environmental management measures. In a true and a larger sense, in view of the considerable benefits from the project with no major impacts, the proposed project is said to be more beneficial to the country. The EMP implemented for the proposed project will include:

- Air Pollution control and management
- Noise Control and Management
- Solid and Hazardous Waste Management
- Water treatment and Management

In order to effectively implement the EMP, an environmental management system will be formulated.

11.2 Explanation of how adverse effects will be mitigated

The baseline study carried out for the study area indicates that all the physical, chemical and biological characteristics of the environmental attributes in the surrounding area are well within the permissible limits.

Based on this environmental assessment, the possible impacts during both pre-project and post-project phase are anticipated and the necessary adequate control measures are formulated to meet the statutory compliances. Follwing mitigation measures are proposed for the project:

Air environment

- Regular water sprinkling on haul and access roads.
- Usage of wire saw machine to reduce blasting and drilling.
- Use of dust aprons on drilling equipment and adopting wet drilling methods
- Use of controlled blasting technique
- Covering of the trucks/dumpers to avoid spillage
- Greenbelt development along the haul roads, dumps and along the boundaries of the lease area.

Water environment

Fresh water will be sourced from private water tankers.

- Construction of garland drains of suitable size around mine area and dumps to prevent rain water descent into active mine areas.
- The water channels/drains carrying the rain water from the mine will be provided with baffles and settling pits to arrest the suspended solids, if any, present in this water
- Construct barriers at suitable intervals along the path of the drains.

Noise environment

- Controlled blasting techniques to be utilised.
- MSDD Millisecond Delayed Detonator and Muffle Blasting technologies are going to be used for this proposed project to avoid noise pollution and also Rock Breaking Powder ($Ca(OH)_2$) is going to be used for rock splitting to avoid blasting. Hence the adverse impact of blasting will be reduced.
- Greenbelt development will help to arrest propagation of noise and help to lessen dust pollution due to dust arresting action.

Occupational Health

- Planned excavation, avoid haphazard mining
- The operators and other workers should be provided with masks, helmets, gloves and earplugs.
- Health survey programmes for workers and local community.
- Regular training and awareness of employees to be conducted to meet health and safety objectives.

11.3 Baseline Study

Ambient Air Quality

The ambient air quality has been monitored at 8 locations for 13 parameters as per CPCB guidelines within the study area. The average baseline levels of PM_{10} is 44.93 to 53.65 µg/m³, $PM_{2.5}$ is 24.27 to 33.27 µg/m³, SO_2 is 8.43 to 10.86 µg/m³, NO_2 is 16.86 to 21.71 µg/m³, all the parameters are well within the National Ambient Air Quality Standards.

Noise Environment

Ambient noise levels were monitored using precision noise level meter in and around the project site at 10 km radius at 8 locations during study period.

- In Industrial areas day time noise levels was about 63.8 dB (A) and 42.6 dB (A) during night time, which is within prescribed limit by CPCB (75 dB (A) Day time & 70 dB (A) Night time).
- In residential areas day time noise levels varied from 50.6 dB (A) to 54.1 dB (A) and night time noise levels varied from 40.2 dB (A) to 43.7 dB (A) across the sampling stations. The field observations during the study period indicate that the ambient noise level is within the prescribed limit by CPCB (55 dB (A) Day time & 45 dB (A) Night time).

Surface water quality

- pH in the collected surface water samples varies between 7.26 to 8.10 where all the samples are within the limit of IS 2296:1992.
- The Total Dissolved Solids (TDS) value of collected surface water sample ranges from 391 mg/l to 477 mg/l.
- The Total hardness value of the collected surface water sample ranges between 142 mg/l to 185 mg/l.
- BOD value of the collected surface water sample ranges from 2.0 mg/l to 4.0 mg/l.
- COD value of collected surface water varies from 16 to 24 mg/l.
- The concentration of heavy metals like As, Cd, Cr, Pb, Mn, Hg, Ni and Se are within the limits of IS 2296:1992.

Ground Water Quality

- The average pH ranges from 6.89 to 7.25.
- TDS value varied from varied from 883 mg/l – 1266 mg/l.
- Total Hardness varied from 253 mg/l – 341 mg/l
- The chloride concentration ranged from 341 mg/l – 514 mg/l
- Sulphate range from 135 mg/l – 203 mg/l
- It is observed that all the collected ground water samples meets the drinking water standards (IS 10500:2012) and can be used for drinking.

Soil Environment

- The pH of the soil samples ranged from 4.51 to 5.54.
- Conductivity of the soil samples ranged from 101 to 197 µmhos/cm.
- Nitrogen content in the collected soil samples ranged from 103.58 mg/kg to 134.57 mg/kg.
- Phosphorous content ranged from 6.94 mg/kg to 9.01 mg/kg.
- Potassium content ranges from 107.28 mg/kg to 139.38 mg/kg.

12 DISCLOSURE OF CONSULTANTS

In order to assess the potential environmental impacts due to the proposed project at Survey No. 12/1A, 12/1B, 12/1C, 12/1D, 12/1E, 12/2A, 12/2B, 12/2C, 12/3A, 12/3B, 12/3C, 12/3D, 12/3E, 12/4A, 12/4B and 12/5A, Veeriyapalayam Village, Krishnarayapuram Taluk, Karur District, Tamil Nadu State to undertake EIA study. The nature of consultancy service rendered covers terrestrial environmental assessment.

12.1 Brief Profile of Hubert Enviro Care Systems (P) Limited (HECS)

Hubert Enviro Care Systems (P) Limited is a leading Environmental Management Company and service provider serving as a catalyst for environmental protection in the industrial & service sectors.

Enviro care Systems was started in 1997 as a proprietor company. In the year 2004, Enviro Care Systems became a Private Limited Company and registered as Hubert Enviro Care Systems (P) Limited.

Across two decades of operation we have developed into a matured corporate house to meet client's requirements to provide products and services of Global standards at the most competitive price within committed schedule of time.

We have full-fledged office and laboratory at Chennai, Mangalore, Trivandrum & Hyderabad.

12.2 Strength of HECS

Number of Employees as on till date

Consultancy	42
Laboratory	100
Projects	29
Operation & Maintenance	999
Total No of Employees	**1170**

12.3 QCI-NABET - EIA Accreditation

Consultancy	Hubert Enviro Care Systems Pvt. Ltd., Chennai
NABET Certificate No	NABET/EIA/2224/SA0190 Valid up to 27/07/2024
MoEF Reg. Lab	F.No. Q-15018/13/2016-CPW

12.4 Copy of QCI NABET Accreditation

QUALITY COUNCIL® OF INDIA
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NABET

National Accreditation Board for Education and Training

NABET

Certificate of Accreditation

Hubert Enviro Care Systems Pvt. Ltd.,

A-21, (Behind Lions Club School) III Phase, Thiru Vi Ka Industrial Estate, Guindy, Chennai - 600 032.

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

S. No	Sector Description	Sector (as per)		Cat.
		NABET	MoEFCC	
1	Mining of minerals including open cast/ underground mining	1	1 (a) (i)	A
2	Offshore and onshore oil and gas exploration, development & production	2	1 (b)	A
3	River Valley projects	3	1 (c)	A
4	Thermal power plants	4	1 (d)	A
5	Mineral beneficiation	7	2 (b)	A
6	Metallurgical industries (ferrous & nonferrous)- both primary & secondary	8	3 (a)	B
7	Cement plant	9	3 (b)	A
8	Petroleum refining industry	10	4 (a)	A
9	Pesticides industry and pesticide specific intermediates(excluding formulations)	17	5 (b)	A
10	Petro-chemical complexes (industries based on processing of petroleum fractions & natural gas and/or reforming to aromatics)	18	5 (c)	A
11	Petrochemical based processing (processes other than cracking & reformation and not covered under the complexes	20	5 (e)	A
12	Isolated storage & handling of hazardous chemicals (As per threshold planning quantity indicated in column 3 of Schedule 2 & 3 of MSIHC Rules 1989 amended 2000)	28	-	B
13	Synthetic organic chemicals industry	21	5 (f)	A
14	Industrial estates/ parks/ complexes/ Areas, export processing zones(EPZs), Special economic zones (SEZs), Biotech parks, Leather complexes	31	7 (c)	A
15	Ports, harbours, break waters and dredging	33	7 (e)	A
16	Highways	34	7 (f)	B
17	Common Effluent Treatment Plants (CETPs)	36	7 (h)	B
18	Common municipal solid waste management facility (CMSWMF)	37	7 (i)	B
19	Building and construction projects	38	8 (a)	B
20	Townships and Area development projects	39	8 (b)	B

Note: Names of approved EIA Coordinators and Functional Area Experts are mentioned in SAAC minutes dated Feb 3, 2023 posted on QCI-NABET website.

The Accreditation shall remain in force subject to continued compliance to the terms and conditions mentioned in QCI-NABET's letter of accreditation bearing no. QCI/NABET/ENV/23/2696 dated March 6, 2023. The accreditation needs to be renewed before the expiry date by Hubert Enviro Care Systems Pvt. Ltd, following due process of assessment

Sr. Director, NABET	Certificate No.	Valid up to
Dated: March 6, 2023	NABET/EIA/2224/SA 0190	July 27, 2024

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

Further details may be seen on the following URL: www.hecs.in.