

DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT

For

**“Proposed expansion in industrial Adhesives,
Rubber products and Polyurethane (PU) products
and enhancement of manufacturing facility”**

By



M/s. Thejo Engineering Limited

AT

**Survey No. 176/3, 181/5, 181/6A, 169/2B, 169/4D, 170/2B, 170/3B,
170/4, 175/3, 176/1, 176/2, 181/1B, 175/4B and 175/5B**

Jaganathapuram Road, Irullipattu village

Ponneri Taluk

Thiruvallur Dist

Tamil Nadu State 600 067

[Terms of Reference	: F. No. IA-J-11011/120/2024-I-II(I) dated 11.05.2024]
[Baseline Period	: January 2024 to March 2024]
[Baseline Studies done by	: Mats India Pvt Ltd, Chennai
[Submission	: Public Hearing]

CONSULTANT

M/s Enviroshere Consultant and Engineers LLP, Pune

Certificate No. NABET/EIA/23-26/IA 0130; Validity: December 8th, 2026

April 2025

DECLARATION BY PROJECT PROPONENT

I, Mr. Thomas K. Abraham, Authorized person of M/s. Thejo Engineering Limited, 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 expansion in industrial Adhesives, Rubber products and Polyurethane (PU) products and enhancement of manufacturing facility “at at Survey No. 176/3, 181/5, 181/6A, 169/2B, 169/4D, 170/2B, 170/3B, 170/4,175/3, 176/1, 176/2, 181/1B, 175/4B and 175/5B, Jaganathapuram Road, Irullipattu village, Ponneri Taluk, Thiruvallur Dist, Tamil Nadu State 600 067”*** and the information and content provided in the report are factually correct

For M/s. Thejo Engineering Limited



Mr. Thomas K. Abraham
Authorized Signatory

TABLE OF CONTENTS

1 INTRODUCTION.....	17
1.1 PROJECT BACKGROUND	17
1.2 IDENTIFICATION OF THE PROJECT AND PROJECT PROPONENT	20
1.2.1 THEJO ENGINEERING LIMITED, AUSTRALIA	20
1.2.2 THEJO BRASIL COMERCIO E SERVICOS LTDA.....	21
1.2.3 THEJO HATCON INDUSTRIAL SERVICES CO.....	21
1.2.4 OTHER SERVICES OF THEJO ENGINEERING LIMITED.....	21
1.3 CATEGORIZATION OF THE PROJECT	22
1.4 PROJECT SUMMARY.....	23
1.5 PURPOSE AND STATUS OF THE REPORT AND ITS IMPORTANCE	24
1.6 BRIEF DESCRIPTION OF NATURE, SIZE, LOCATION OF THE PROJECT & ITS IMPORTANCE	25
1.6.1.1 NATURE, SIZE & LOCATION OF THE PROJECT	25
1.6.1.2 SIZE & LOCATION OF THE PROJECT.....	25
1.6.1.3 IMPORTANCE TO THE COUNTRY AND REGION	30
1.6.1.4 DEMAND-SUPPLY GAP	30
1.6.1.5 IMPORT POSSIBILITY.....	30
1.7 DOMESTIC/EXPORT MARKETS	30
1.8 EIA STUDY	31
1.9 EIA COST	31
1.10 SCOPE OF THE STUDY	31
1.10.1.1 OBJECTIVES OF THE STUDY.....	32
1.10.1.2 TERMS OF REFERENCE (TOR)-COMPLIANCE	32
1.10.1.3 METHODOLOGY ADOPTED FOR THE STUDY	43
1.10.1.4 THE BASIC STRUCTURE OF EIA REPORT.....	43
1.11 APPLICABLE REGULATORY FRAMEWORK	44
2 PROJECT DESCRIPTION	49
2.1 INTRODUCTION	49
2.2 TYPE PROJECT.....	49
2.3 NEED FOR THE PROJECT	49
2.4 PROJECT LOCATION (MAPS SHOWING GENERAL LOCATION, SPECIFIC LOCATION, PROJECT BOUNDARY & PROJECT SITE LAYOUT.	50
2.4.1 EXISTING ENVIRONMENTAL SETUP	58
2.4.2 PROJECT COST	61
2.5 PROPOSED SCHEDULE FOR APPROVAL AND IMPLEMENTATION	62
2.6 MAGNITUDE OF OPERATION (INCLUDING ASSOCIATED ACTIVITIES REQUIRED FOR THE PROJECT.	65
2.6.1 RESOURCE REQUIREMENTS	65
2.6.1.1 LAND REQUIREMENTS	65
2.6.1.2 WATER REQUIREMENT	66
2.6.1.3 POWER & ENERGY REQUIREMENT.....	69
2.6.1.4 MANPOWER REQUIREMENTS.....	69
2.6.1.5 RAW MATERIAL REQUIREMENTS	70
2.6.2 SIZE OF MAGNITUDE OF OPERATION	73

2.6.3	PROCESS DESCRIPTION	74
2.6.3.1	MANUFACTURING PROCESS FOR ADHESIVES.....	74
2.6.3.1.1	Cold Adhesives:	75
2.6.3.2	MANUFACTURING PROCESS OF RUBBER MOULDED PRODUCTS	77
2.6.3.3	MANUFACTURING PROCESS OF PU PRODUCTS.....	80
2.6.3.4	UTILITIES DETAILS.....	81
2.6.4	RESOURCE OPTIMIZATION AND/ RECYCLING AND REUSE	86
2.7	SCHEMATIC REPRESENTATION OF THE FEASIBILITY DRAWING WHICH GIVE INFORMATION IMPORTANT FOR EIA PURPOSE.....	86
2.8	POLLUTION POTENTIAL AND CONTROL MEASURES & DESCRIPTION OF MITIGATION MEASURES TO MEET THE ENVIRONMENTAL STANDARDS.....	87
2.8.1	LAND ENVIRONMENT	87
2.8.2	AIR ENVIRONMENT.....	88
2.8.3	WATER ENVIRONMENT	90
2.8.4	NOISE ENVIRONMENT	90
2.8.5	SOLID AND HAZARDOUS WASTE GENERATION AND MANAGEMENT	91
2.8.6	BIOLOGICAL ENVIRONMENT	94
2.8.7	GREEN BELT DEVELOPMENT	94
2.8.8	SOCIO ECONOMIC ENVIRONMENT	94
2.9	ASSESSMENT OF NEW AND UNTESTED TECHNOLOGY FOR THE RISK OF TECHNOLOGICAL FAILURE	95
3	DESCRIPTION OF ENVIRONMENT	97
3.1	PREAMBLE	97
3.2	DESCRIPTION OF STUDY AREA.....	97
3.3	ENVIRONMENTALLY/ECOLOGICALLY SENSITIVE AREAS.....	100
3.4	PHYSICAL CONDITIONS OF PIA DISTRICT	104
3.4.1	PIA DISTRICT PROFILE	104
3.4.2	CLIMATIC CONDITIONS	104
3.5	NATURAL RESOURCES OF PIA DISTRICT	104
3.5.1	FOREST RESOURCES OF PIA DISTRICT	104
3.5.2	IRRIGATION OF PIA DISTRICT	104
3.5.3	AGRICULTURAL RESOURCES OF PIA DISTRICT.....	104
3.5.4	MINERAL RESOURCES OF PIA DISTRICT	105
3.5.5	LAND USE & LAND COVER OF PIA DISTRICT	105
3.5.5.1	LAND USE AND LAND COVER OF THE STUDY AREA	106
3.5.6	GEOLOGY OF PIA DISTRICT	109
3.5.6.1	GEOMORPHOLOGY OF THE STUDY AREA.....	111
3.5.7	HYDROGEOLOGY OF PIA DISTRICT	113
3.5.8	DRAINAGE PATTERN OF PIA DISTRICT	113
3.5.9	SEISMICITY	115
3.5.10	SOILS OF PIA DISTRICT	115
3.6	AIR ENVIRONMENT	116
3.6.1	METEOROLOGICAL CONDITIONS	116
3.6.1.1	GENERAL METEOROLOGICAL SCENARIO BASED ON IMD DATA.....	116
3.6.2	METEOROLOGICAL SCENARIO DURING STUDY PERIOD	117
3.6.3	AMBIENT AIR QUALITY	118

3.6.3.1 AMBIENT AIR QUALITY MONITORING STATIONS	118
3.6.3.2 AMBIENT AIR QUALITY MONITORING TECHNIQUES AND FREQUENCY	120
3.6.3.3 INTERPRETATIONS OF RESULTS:.....	123
3.7 NOISE ENVIRONMENT	123
3.7.1.1 RESULTS AND DISCUSSIONS	123
3.7.1.2 INTERPRETATIONS OF RESULTS:.....	124
3.8 WATER ENVIRONMENT	126
3.8.1 SURFACE WATER RESOURCES OF PIA DISTRICT	126
3.8.2 SURFACE WATER QUALITY ASSESSMENT	126
3.8.2.1 INTERPRETATIONS OF RESULTS.....	132
3.8.3 GROUND WATER QUALITY	132
3.8.3.1 INTERPRETATIONS OF RESULTS.....	136
3.9 SOIL QUALITY.....	136
3.9.1 INTERPRETATIONS OF RESULTS.....	140
3.10 BIOLOGICAL ENVIRONMENT	141
3.10.1 INTRODUCTION	141
3.10.1.1 OBJECTIVES OF ECOLOGICAL STUDIES	141
3.10.1.2 METHODOLOGY ADOPTED FOR THE STUDY	142
3.10.1.3 FLORA STUDY	142
3.10.2 SAMPLING LOCATIONS	143
3.10.3 FLORA IN THE STUDY AREA.....	144
3.10.4 FAUNA IN THE STUDY AREA.....	150
3.10.4.1 BIRD SPECIES.....	150
3.10.4.2 MAMMALS	152
3.10.4.3 REPTILES & AMPHIBIANS.....	152
3.10.4.4 BUTTERFLY SPECIES	153
3.10.4.4.1 Conclusion	155
3.11 SOCIO ECONOMIC PROFILE	155
3.11.1.1 DEMOGRAPHIC DETAILS.....	155
3.11.1.2 POPULATION DENSITY.....	156
3.11.1.3 SEX RATIO.....	156
3.11.1.4 SCHEDULED CASTES AND SCHEDULED TRIBES	156
3.11.1.5 SOCIO ECONOMIC ASPECTS	156
3.11.1.6 EDUCATION & LITERACY.....	157
3.11.1.7 SOCIAL ECONOMIC PROFILE OF THE STUDY AREA	157
3.11.1.8 EMPLOYMENT AND LIVELIHOOD.....	160
3.11.1.8.1 Interpretation of Results	164
3.12 SUMMARY:	165
4 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES	168
4.1 GENERAL	168
4.2 CONSTRUCTION PHASE.....	170
4.3 PREDICTION OF ENVIRONMENTAL IMPACTS DURING CONSTRUCTION PHASE.....	171
4.4 DESCRIPTION OF IMPACTS AND MITIGATION MEASURES DURING CONSTRUCTION PHASE	173
4.4.1.1 AIR ENVIRONMENT.....	173
4.4.2 WATER ENVIRONMENT	174

4.4.3	SOIL ENVIRONMENT.....	174
4.4.4	NOISE ENVIRONMENT	175
4.4.5	LAND ENVIRONMENT (LAND USE/LAND COVER)	175
4.4.5.1	HYDROGEOLOGY	176
4.4.5.2	GEOLOGY.....	176
4.4.6	HAZARDOUS/SOLID WASTE MANAGEMENT.....	176
4.4.7	RISK AND HAZARD	177
4.4.8	ECOLOGY AND BIODIVERSITY.....	177
4.4.9	SOCIO ECONOMIC	177
4.5	OPERATION PHASE	180
4.6	DESCRIPTION OF IMPACTS AND MITIGATION MEASURES DURING OPERATIONAL PHASE	183
4.6.1	AIR ENVIRONMENT.....	183
4.6.1.1	AIR QUALITY- PREDICTION MODELLING	183
4.6.1.2	METEOROLOGICAL DATA	183
4.6.1.3	AERMET PROCESS:	184
4.6.1.4	AERMOD PROCESS:	184
4.6.2	INCREMENTAL GROUND LEVEL CONCENTRATION STUDIES OF PROPOSED PROJECT	185
4.6.3	CUMULATIVE IMPACT ASSESSMENT STUDIES.....	189
4.6.3.1	SUMMARY OF MODELLING RESULTS DUE TO PROPOSED PROJECT	196
4.6.3.2	TOTAL MAXIMUM GLCs FROM THE STACK EMISSIONS DUE TO CUMULATIVE SOURCES	197
4.6.4	IMPACTS DUE TO TRAFFIC AND TRANSPORTATION.....	197
4.6.5	WATER ENVIRONMENT	201
4.6.6	SOIL ENVIRONMENT.....	203
4.6.7	NOISE ENVIRONMENT	204
4.6.8	LAND ENVIRONMENT &LU/LC.....	205
4.6.9	HYDROGEOLOGY	206
4.6.10	GEOLOGY.....	206
4.6.11	HAZARDOUS/SOLID WASTE	206
4.6.12	RISK & HAZARD	208
4.6.13	ECOLOGY &BIODIVERSITY	209
4.6.14	SOCIO ECONOMIC ENVIRONMENT.....	209
4.7	SUMMARY.....	213
5	ANALYSIS OF ALTERNATIVES (TECHNOLOGY & SITE).....	215
5.1	INTRODUCTION	215
5.2	ALTERNATIVE STUDY FOR SITE	215
5.2.1.1	SELECTION CRITERIA:	215
5.2.1.2	CONNECTIVITY OF THE PROJECT.....	215
5.3	ALTERNATIVE TECHNOLOGY	216
5.4	ALTERNATIVE POWER.....	216
5.5	SUMMARY.....	216
6	ENVIRONMENTAL MONITORING PROGRAMME	218
6.1	GENERAL	218
6.2	ENVIRONMENTAL MANAGEMENT PLAN DURING CONSTRUCTION PHASE	218
6.3	ENVIRONMENTAL MANAGEMENT PLAN DURING OPERATION PHASE	219
6.4	POST PROJECT ENVIRONMENTAL MONITORING.....	219

6.5	GREENBELT DEVELOPMENT	222
6.6	DATA ANALYSIS AND REPORTING SCHEDULES	226
6.7	PROCUREMENT SCHEDULE	226
6.8	INFRASTRUCTURAL REQUIREMENT.....	226
6.9	UPDATING OF ENVIRONMENTAL MONITORING PLAN	226
6.10	ENVIRONMENT MONITORING PROGRAM BUDGET	226
6.11	PROPOSED BUDGET FOR ENVIRONMENT MONITORING PROGRAMME	227
6.12	SUMMARY.....	227
7	ADDITIONAL STUDIES.....	229
7.1	PUBLIC CONSULTATION	229
7.2	RISK ASSESSMENT	229
7.2.1.1	OBJECTIVE OF RISK ASSESSMENT.....	230
7.2.1.2	HAZARDOUS CHARACTERISTICS & TOXICITY OF RAW MATERIALS/ CHEMICALS.....	230
7.2.1.3	QUANTITATIVE RISK ASSESSMENT	235
7.2.1.3.1	Chemical and Physical Properties of Toluene	235
7.2.1.3.2	Hazard Identification:.....	235
7.2.1.3.3	Key incident scenarios to consider for toluene is included:.....	235
7.2.1.3.4	Risk Mitigation Measures.....	236
7.2.1.4	QUALITATIVE RISK ASSESSMENT.....	236
7.2.1.4.1	Hazard Identification:	237
7.2.1.5	HAZARD IDENTIFICATION	238
7.2.1.6	RISK ASSESSMENT THROUGH HIRA MATRIX	239
7.2.1.7	SUMMARY OF RISK ASSESSMENT.....	242
7.2.1.7.1	Proposed Adequate Handling Measures.....	242
7.2.1.8	PROPOSED PRECAUTIONARY MEASURES FOR HANDLING AND STORAGE OF CHEMICALS/PRODUCTS:	243
7.3	DISASTER MANAGEMENT PLAN	251
7.3.1	OBJECTIVES OF DISASTER MANAGEMENT PLAN (DMP)	251
7.3.2	SPECIFIC EMERGENCY ANTICIPATED	252
7.3.3	EMERGENCY ORGANIZATION	252
7.3.3.2	ON-SITE DISASTER MANAGEMENT PLAN	253
7.3.3.3	ONSITE EMERGENCY PREPAREDNESS AND RESPONSE FOR ACCIDENTS	253
7.3.3.7	OFF-SITE EMERGENCY	257
7.4	R&R ACTION PLANS.....	260
7.5	SUMMARY OF THE CHAPTER:.....	260
8	PROJECT BENEFITS	262
8.1	FINANCIAL BENEFITS:	262
8.2	SOCIAL BENEFITS:.....	262
8.3	ENVIRONMENTAL BENEFITS:.....	262
8.4	OTHER TANGIBLE BENEFITS.....	263
8.5	SUMMARY.....	263
9	ENVIRONMENTAL COST BENEFIT ANALYSIS.....	265
10	ENVIRONMENTAL MANAGEMENT PLAN	267
10.1	INTRODUCTION	267
10.2	OBJECTIVES OF THE EMP	267
10.3	ENVIRONMENTAL MANAGEMENT CELL (EMC).....	268

10.4	ENVIRONMENTAL POLICY	270
10.5	COMPLIANCE AGAINST THE CONSENT CONDITION	270
10.6	EMP FOR CONSTRUCTION PHASE	270
10.7	EMP FOR OPERATIONAL PHASE.....	271
10.7.1	AIR ENVIRONMENT.....	272
10.7.2	WATER ENVIRONMENT	273
10.7.3	NOISE ENVIRONMENT	274
10.7.4	SOLID AND HAZARDOUS WASTE MANAGEMENT	275
10.7.4.1.1	Solid waste management.....	275
10.7.4.1.2	Hazardous Waste Management.....	275
10.7.5	LAND ENVIRONMENT	275
10.7.6	BIOLOGICAL ENVIRONMENT	276
10.7.7	SOCIO-ECONOMIC ENVIRONMENT.....	276
10.7.8	OCCUPATIONAL HEALTH AND SAFETY	277
10.7.8.5.1	Control Measures of Health Hazards as per priority.....	283
10.7.8.13.1	Eye Wash Fountain and Safety Shower	289
10.7.8.13.2	Wind Sack / Wind Direction Indicator.....	289
10.7.8.14.1	First aid Boxes	289
10.7.9	GREENBELT DEVELOPMENT	289
10.7.10	RESOURCE CONSERVATION	291
10.7.10.1	RAINWATER HARVESTING (RWH)	291
10.7.11	CORPORATE ENVIRONMENTAL RESPONSIBILITY (CER)	294
10.7.12	COST ESTIMATE FOR ENVIRONMENT MANAGEMENT PLAN (EMP)	296
10.8	SUMMARY:	296
11	SUMMARY AND CONCLUSION	299
11.1	INTRODUCTION	299
11.2	PROJECT DESCRIPTION	299
11.3	DESCRIPTION OF THE ENVIRONMENT	302
11.4	ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES.....	304
11.5	ANALYSIS OF ALTERNATIVES (TECHNOLOGY AND SITE)	305
11.6	ENVIRONMENTAL MONITORING PROGRAM	305
11.7	ADDITIONAL STUDIES	305
11.8	PROJECT BENEFITS.....	306
11.9	ENVIRONMENTAL COST BENEFIT ANALYSIS.....	306
11.10	ENVIRONMENTAL MANAGEMENT PLAN (EMP).....	306
11.11	CONCLUSION	307
12	DISCLOSURE OF CONSULTANTS ENGAGED	309
12.1	GENERAL	309
12.2	CERTIFICATION OF NABET ACCREDITATION:.....	311

LIST OF TABLES

Table 1-1 Chronology of consent orders.....	18
Table 1-2 Project Summary.....	23
Table 1-3 Salient Features of the Project.....	28
Table 1-4 Applicable Acts and Rules	45
Table 2-1 Boundary Coordinates of the project site.....	52
Table 2-2 List of Industries within 10km radius of the project site	58
Table 2-3 Nearest Human Settlement	61
Table 2-4 Total capital investment for proposed project cost.....	61
Table 2-5 Project Implementation Tentative Schedule	62
Table 2-6 Existing and Proposed Land Ownership details of the project	65
Table 2-7 Land area breakup details	65
Table 2-8 Existing Built up area breakup details.....	66
Table 2-9 Proposed Built up area breakup details.....	66
Table 2-10 Total water requirement	66
Table 2-11 Total Water Requirement and Breakup.....	67
Table 2-12 Power requirement and Backup power facilities.....	69
Table 2-13 Fuel requirement	69
Table 2-14 Total manpower breakup	69
Table 2-15 Raw Material Requirement, Storage Capacity, Source and Mode of Transportation	70
Table 2-16 List of Existing and proposed products	73
Table 2-17 List of Products, Market area and Mode of Transportation	74
Table 2-18 Cold Adhesive	76
Table 2-19 Material Balance of Hot Adhesive	77
Table 2-20 List of Raw materials and Material Balance for Rubber Moulded Products.....	78
Table 2-21 Raw materials & Material Balance for PU products	81
Table 2-22 List of Existing Machineries & Equipment.....	81
Table 2-23 List of proposed Machineries & Equipment additional to the existing	83
Table 2-24 Existing and Proposed APC Measures.....	89
Table 2-25 MSW Generation and Management.....	91
Table 2-26 Hazardous waste generation and Management.....	92
Table 2-27 Non-hazardous & Other waste Generation and Management	93
Table 3-1 Environmentally Sensitive areas within 15km from Project site boundary.....	100
Table 3-2 District land use/land cover statistics (2015-16) for Thiruvallur district	105
Table 3-3 Land Use Pattern of the Study Area.....	106
Table 3-4 Geomorphology of the Study Area	111
Table 3-5 Climatological Summary – Nungambakkam (1971-2000).....	116
Table 3-6 Meteorological Data for the Study Period (January 2024 - March 2024).....	117
Table 3-7 Details of Ambient Air Quality Monitoring Locations	118
Table 3-8 Analytical Methods for Analysis of Ambient Air Quality Parameters.....	120
Table 3-9 Summary of the average baseline concentrations of pollutants.....	121
Table 3-10 Day and Night Equivalent Noise Levels.....	124
Table 3-11 Test methods used for the analysis of water quality parameters.	126
Table 3-12 Details of Surface water sampling locations.....	128
Table 3-13 Surface water Monitoring Results	130

Table 3-14 Details of Groundwater Quality Monitoring Locations.....	132
Table 3-15 Ground Water Monitoring Results.....	134
Table 3-16 Test methods used for the analysis of Soil	137
Table 3-17 Soil & Sediment Quality Monitoring Locations.....	138
Table 3-18 Soil & Sediment Quality Monitoring Results.....	139
Table 3-19 Ecological and Biodiversity Sampling Locations.....	143
Table 3-20 List of flora reported/observed in the study area	145
Table 3-21 Birds from the Study site.....	150
Table 3-22 Mammals recorded from the secondary Survey in the Study area and their Conservation Status	152
Table 3-23 Reptiles & Amphibians recorded from the Primary Survey in the Study area and their Conservation Status	153
Table 3-24 Occurrence of butterfly species in buffer zone	153
Table 3-25 Social Indicators of Thiruvallur District	156
Table 3-26 Education Infrastructures in the Thiruvallur District	157
Table 3-27 Population profile within study area	158
Table 3-28 Summary of Socioeconomic indicators within the study area	160
Table 3-29 Classification of workers within study area	160
Table 3-30 Details of Literacy population in the study area	162
Table 3-31 Summary of Socio-Economic Aspects	164
Table 4-1 Severity Criteria for Magnitude of Impacts	169
Table 4-2 Cumulative Score Range for Beneficial and Adverse Impacts	170
Table 4-3 Impact Identification Matrix during Construction Phase including positive and negative impacts without mitigation measures.	171
Table 4-4 Environmental Impact Assessment Matrix during Construction Phase without mitigation measures.....	172
Table 4-5 Impact Matrix during Construction Phase with mitigation measures	179
Table 4-6 Impact Matrix (Operation Phase) without mitigation measures.....	181
Table 4-7 Environment Impact Matrix (Operation Phase) without mitigation measures	182
Table 4-8 Stack Emission details after Expansion	185
Table 4-9 Predicted Top 10 highest concentrations of PM10 within 10km radius.	186
Table 4-10 Predicted Top 10 highest concentrations of PM2.5 within 10km radius.	187
Table 4-11 Predicted Top 10 highest concentrations of Sulphur Dioxide within the 10km radius.	188
Table 4-12 Predicted Top 10 highest concentrations of Oxides of Nitrogen within 10km radius.....	189
Table 4-13 Existing Air Pollution Sources within 10km for Cumulative Impact Assessment Studies....	190
Table 4-14 List of Industries Considered for Cumulative Studies	191
Table 4-15 Predicted Top 10 highest concentrations of PM10 within 10km radius.	193
Table 4-16 Predicted Top 10 highest concentrations of PM2.5 within 10km radius.	194
Table 4-17 Predicted Top 10 highest concentrations of SO ₂ within 10km radius.	195
Table 4-18 Predicted Top 10 highest concentrations of NO _x within 10km radius.	196
Table 4-19 Total Maximum GLCs from proposed project sources.	197
Table 4-20 Total Maximum GLCs from the Stack Emissions (Cumulative)	197
Table 4-21 Traffic Assessment-Vehicle movement.....	199
Table 4-22 Traffic Volume after Implementation of the Project	199
Table 4-23 Existing and Proposed APC Measures.....	200

Table 4-24 Wastewater management after expansion	202
Table 4-25 Quality logistics	202
Table 4-26 MSW Generation and Management.....	207
Table 4-28 Hazardous waste generation and Management-Operation Phase	207
Table 4-30 Proposed Corporate Environmental Responsibility (2025-26 to 2032-33)	210
Table 4-31 Environment Impact Matrix (Operation Phase) with mitigation measures	212
Table 5-1 Connectivity of the project site.....	216
Table 6-1 Post Project Environmental Monitoring Program	220
Table 6-2 Proposed Green belt Species.	223
Table 7-1 Hazardous & Toxicity Characteristics of Raw Materials/Chemicals.....	232
Table 7-2 Risk Matrix	237
Table 7-3 Risk Acceptability Criteria	237
Table 7-4 HIRA Worksheet.....	239
Table 7-5 Proposed Safety/Control Measures to Reduce the risk of Fire, Explosion and Toxic Release	244
Table 7-6 Storage and Handling of Solid Chemicals.....	247
Table 7-7 Storage and Handling of Toxic Chemicals	247
Table 10-1 EMC Responsibility.....	269
Table 10-2 Compliance against the consent condition.....	270
Table 10-3 Wastewater management	273
Table 10-4 Details of Occupational Health Impacts and Safety Hazards.....	278
Table 10-5 Proposed Occupational Health Surveillance Planning.....	280
Table 10-7 Health Risk Assessment Matrix.....	282
Table 10-7 Hierarchy of Control for Health Risk Assessment as per Matrix.....	283
Table 10-9 Fire & Safety Systems for proposed project	286
Table 10-10 Proposed Fire Hydrant System.....	287
Table 10-11 Suitability of Extinguishing Media for Different Fires	287
Table 10-11 Proposed Fire Extinguishers details.	287
Table 10-12 List of Plants proposed for Greenbelt.	290
Table 10-16 Rainwater Harvesting Estimation	292
Table 10-15 CER Proposal for period of 2025-26 to 2032-33	295
Table 10-17 Cost Estimate for Environmental Management Plan	296

LIST OF FIGURES

Figure 1-1 Administrative Map of Project Study area	26
Figure 1-2 Map showing the Satellite Image of the study area.....	27
Figure 2-1 Location map of the Project site.....	50
Figure 2-2 Boundary geo coordinated google Imagery of the Project Site	51
Figure 2-3 Google Satellite Imagery of 1km radius.....	53
Figure 2-4 Google Satellite Imagery of 5 km radius.....	54
Figure 2-5 Google Satellite Imagery of 10 km radius.....	55
Figure 2-6 Environmental sensitive areas within 15 km radius of the project site	56
Figure 2-7 10km radius Topo map of the project	57
Figure 2-8 Project Site Layout Plan	63
Figure 2-9 Project Site Photographs	64
Figure 2-10 Water Balance Chart for after Expansion	68
Figure 2-11 Adhesives Manufacturing Process flow chart	75
Figure 2-12 Rubber molded Products Process flow chart.	79
Figure 2-13 PU Products Process flow chart.....	80
Figure 2-14 Feasibility & Environmental Assessment Process.....	87
Figure 3-1 Satellite Image of the study area of Project	98
Figure 3-2 Topo Map of Study area	99
Figure 3-3 Environmental sensitive areas within 15km radius from project site boundary	103
Figure 3-4 Land Use pattern of Thiruvallur District	106
Figure 3-5 Land Use Pattern of the Study Area	107
Figure 3-6 Land Use Land Cover map of the study area	108
Figure 3-7 Contour map of study area.....	110
Figure 3-8 Geomorphology Pattern of the Study Area.....	111
Figure 3-9 Geomorphology map of the study area	112
Figure 3-10 Drainage map of the study area	114
Figure 3-11 Seismicity map of India.....	115
Figure 3-12 Wind rose for the study period	117
Figure 3-13 Ambient Air Quality monitoring locations.....	119
Figure 3-14 Noise Monitoring locations.....	125
Figure 3-15 Surface water monitoring locations	129
Figure 3-16 Groundwater monitoring locations	133
Figure 3-17 Soil monitoring locations map.....	138
Figure 3-18 Ecological and Biodiversity Sampling Locations	143
Figure 3-19 Ecological and Biodiversity Sampling Photos	144
Figure 3-20 Trees Species Photos	149
Figure 3-21 Shrubs Photos	150
Figure 3-22 Fauna Species	155
Figure 4-1 Impacts quantification chart.....	169
Figure 4-2 Wind rose of meteorology considered for modelling (Jan 2024 to March 2024)	184
Figure 4-3 Ground level concentrations of PM10 during study period	186
Figure 4-4 Ground level concentrations of PM2.5 during study period	187
Figure 4-5 Ground level concentrations of SO2 during study period	188

Figure 4-6 Ground level concentrations of NOx during study period.....	189
Figure 4-7 Cumulative Ground level concentrations of PM10	193
Figure 4-8 Cumulative Ground level concentrations of PM2.5	194
Figure 4-9 Cumulative Ground level concentrations of SO ₂	195
Figure 4-10 Cumulative Ground level concentrations of NOx.....	196
Figure 4-11 Traffic Assessment Point Details- Jaganathapuram village connectivity at NH-16 Bridge down	198
Figure 6-1 Existing Greenbelt Photos.....	224
Figure 6-2 Greenbelt Layout	225
Figure 10-1 Environmental Management Cell.....	268
Figure 10-2 Proposed 15 KLD ETP Layout/Process Flow Diagram	274
Figure 10-3 Proposed 60 KLD STP Layout/Process Flow Diagram	274
Figure 10-4 Proposed Greenbelt layout.....	291
Figure 10-5 Schematic diagram of Rain water Harvesting.....	292
Figure 10-6 A Model Storage Pond/Tank.....	293
Figure 10-7 Recharge pit/Trench proposed design(left) & (right)	294

ABBREVIATIONS AND ACRONYMS

AAQ	Ambient Air Quality	MOEFCC	Ministry of Environment, Forests and Climate Change
AAQM	Ambient Air Quality Monitoring	NAAQ	National Ambient Air Quality
ADS	Additional Details Sought	NOx	Oxides of Nitrogen
AGL	Above Ground Level	PCU	Passenger Car Unit
ARL	Above Roof Level	PU	Polyurethane
BOD	Biological Oxygen Demand	PM	Particulate Matter
CPCB	Central Pollution Control Board	PPE	Personnel Protective Equipment
CER	Corporate Environmental Responsibility	R & D	Research & Development
CSR	Corporate Social Responsibility	RET	Rare Endangered and Threatened
DMP	Disaster Management Plan	RA	Risk Assessment
EC	Environmental Clearance	STP	Sewage Treatment Plant
EAC	Expert Appraisal Committee	SW	Surface Water
EIA	Environmental Impact Assessment	SEAC	State Expert Appraisal Committee
EMC	Environmental Management Cell	SEIAA	State Environmental Impact Assessment Authority
EMP	Environmental Management Plan	SO ₂	Sulphur Dioxide
ETP	Effluent Treatment Plant	TDS	Total Dissolved Solids
GW	Ground Water	TFH	Thermic Fluid Heater
GLC	Ground Level Concentration	TNPCB	Tamil Nadu Pollution Control Board
IUCN	International Union for Conservation of Nature	TOR	Terms of Reference
ISO	International Organization for Standardization	TSDF	Treatment, Storage and Disposal Facility
kWh	Kilowatt Hour	kVA	kilovolt-ampere
KLD	Kilo Liters per Day	USEPA	United States Environment Protection Agency
MSDS	Material Safety Data Sheet	VOC	Volatile Inorganic Carbon
		ZLD	Zero Liquid Discharge

LIST OF SYMBOLS / UNITS

°C	: Degree Celsius	MTA	: Metric Ton per Anum
CO	: Carbon Monoxide	µg/m ³	: Microgram/Cubic Meter
dB(A)	: Decibels(A-Weighted)	PM ₁₀	: Particulate Matter (Size less than 10 µm)
gm/cc	: Gram per Cubic Centimeter	PM _{2.5}	: Particulate Matter (Size less than 2.5 µm)
Ha	: Hectare	ppm	: Parts per Million
Kcal/Hr:	Kilo Calorie per Hour	Sq.km	: Square kilometer
Kcal/m ³ :	Kilo Calorie per Cubic Meter	Sq. m	: Square Meter
Km	: Kilo Meter	TPA	: Ton Per Anum
kVA	: Kilo Volts Ampere	TPM	: Ton per Month
KW	: Kilo Watt	TOC	: Total Organic Carbon
mg/lit	: Milligram/ Liters	TPD	: Ton per Day
NOX	: Oxides of Nitrogen	TPH	: Ton per Hour
µs	: Micro Siemens	TR	: Tonnage of Refrigeration
m	: meters		
m/s	: Meters per Second		
mg/m ³	: Milligram/cube meter of air		

LIST OF ANNEXURES

Annexure No	Description
1.	Land documents of the project area & Patta documents
2.	Directorate of Town and Country Planning record of project land
3.	Memorandum and Articles of Association
4.	Existing & Latest CTO orders 4.1 The Latest Consent Orders
5.	The manufacturing process flow chart of for individual Rubber molded products
6.	Proposed Water Balance
7.	Fire NoC
8.	Building Plan approval letter
9.	Land Use classification
10.	Latest Environmental monitoring Test Repots
11.	Proposed STP a process flow diagram & specification report
12.	Existing Project site layout for Existing
13.	Project site layout for Proposed and after expansion
14.	Greenbelt Layout for Proposed
15.	Transport Routing & Parking Layout
16.	Rainwater Harvesting layout
17.	Fire Fighting Layout
18.	Fresh Water & Wastewater Line Layout
19.	EHS Policy
20.	Project Chronology from 2001
21.	Project Site Photographs
22.	Risk Assessment Report
23.	Proposed CER Activities and fund allocation with timeline
24.	Land Ownership details
25.	Terms of Reference (TOR)
26.	Raw data of all AAQ measurements
27.	CTO conditions Self compliance report and TNPCB Submitted ack.

Note: Annexure are provided as a separate Book

CHAPTER – 1

PROJECT INTRODUCTION

(The brief outline of the project as details of need of the EIA report, project proponent, nature and size of the project, location of the project, and need of project, scope of EIA study and applicable environmental regulations and standards)

1 INTRODUCTION

1.1 Project Background

M/s. Thejo Engineering Limited is an existing facility located at Survey No. 176/3, 181/5, 181/6A, 169/2B, 169/4D, 170/2B, 170/3B, 170/4, 175/3, 176/1, 176/2, 181/1B, 175/4B and 175/5B, Jaganathapuram Road, Irullipattu village, Ponneri Taluk, Thiruvallur Dist, Tamil Nadu State 600 067.

Project proponent has currently manufactured 199.99 TPM of Rubber Molded products (11 Nos) and 2 Nos of Adhesive (Hot & cold) of 38.5 KL/Month. The existing facility was established in 16916.46 Sq. m of area. The existing project is operating with valid consent orders vide PROCEEDINGS NO.F.0380GMP/RS/DEE/TNPCB/GMP/A&W/2024 valid up to March 31st, 2026.

Now, M/s. Thejo Engineering Limited proposed expansion in production of Rubber molded products (199.99 TPM to 486 TPM) and Adhesives (38.5 KL/Month to 100 KL/Month) & proposed PU Products manufacturing with production capacity of 6.352 TPM due to increase in the demand of the existing and proposed projects along with enhancement of manufacturing facilities with additional area of 11.46 Acres (46364.97 Sq. m) The total area after expansion is 15.63 Acres (63221.43 Sq. m). The project cost for the proposed expansion proposal is 10699.99 Lakhs.

There is no violation by the present project. There are no court cases, or any direction issued against the project by TNPCB. The Project does not fall under Critically Polluted Area (CPA)/ Severally Polluted Area (SPA).

Now, M/s. Thejo Engineering Limited has applied for Environmental Clearance as the proposed project is termed under Schedule 5(f) Synthetic Organic Chemicals., Category A.’ Since the project site is categorized as non-Planned area. The Chronology of consent orders is shown in **Table 1-1.**

Table 1-1 Chronology of consent orders

S. No.	EC Details	Date of EC	Validity	CTE Fresh/Renewal/ Expansion	Permitted Production Capacity	Status of Implementation details	Details of violation if any
1	No EC is obtained, Operating with Consent orders under Red Category	No EC	NA	-	-	The project commenced in April 2001 with valid consent documents.	Nil
2	CTE	-	-	CTE (Expansion) JCEE/TLR/RS490/A/A1/2001-1 dated: 19.04.2001	5 Products 14.14 TPM		
S. No	CTO Details	Date of CTO	Validity	Products (TPM)	Permitted Production Capacity TPM	Actual Production Capacity TPM	Details of violation if any
1	PROCEEDINGS NO.F.0436AMB/RS/DEE/TNPCB/AMB/A/2015 PROCEEDINGS NO.F.0436AMB/RS/DEE/TNPCB/AMB/W/2015	18.09.2015	30.06.2016	Rubber Compound	10	≤10	Nil
				Solid Tyres (Solid rubber block)	0.83	≤0.83	
				Rubber sheet	0.83	≤0.83	
				Rubber Lined Pipes	0.87	≤0.87	
				Rubber Bushes and Accessories	1.66	≤1.66	
				Total 5 No Rubber Products (TPM)	14.19 TPM	≤ 14.19 TPM	
2	PROCEEDINGS NO.F.0445AMB/RS/DEE/TNPCB/AMB/A/2017 NO.F.0445AMB/RS/DEE/TNPCB/AMB/W/2017	19.06.2017	31.03.2019	Compound Rubber	8.5	≤18.5	
				Solid Tyres (Solid rubber block)	2.5	≤12.5	
				Rubber sheet	67.2	≤167.2	
				Rubber Bushes and Accessories	0.61	≤10.61	
				Ideal ring	4.9	≤14.9	
				Screens	0.38	≤10.38	
				Lines	25.4	≤125.4	

				Insulation compound	3.4	≤13.4	
				Flexi seals	0.6	≤10.6	
				Diaphragms	1.2	≤11.2	
				Rubber pads	85.3	≤1 85.3	
				Total 11 rubber Products (TPM)	199.99	≤199.99	
				Adhesive (Cold) (KL/Month)	25	≤25	
				Adhesive(hot) (KL/Month)	13.5	≤13.5	
				Total Adhesives (KL/Month)	38.5	≤38.5	
3	ROCEEDINGS NO.F.0380 GMP/RS/DEE/TNPCB/AMB/A/2019 PROCEEDINGS NO.F.0380GMP/RS/DEE/TNPCB/GMP/W/2019	26.03.2019	31.03.2024	Rubber Moulded Products 11 Nos as above (TPM)	199.99	≤199.99	
				2 Adhesives (KL/Month) As above	38.5	≤38.5	
4	PROCEEDINGS NO.F.0380GMP/RS/DEE/TNPCB/GMP/A/2024 DATED: 24/10/2024 PROCEEDINGS NO.F.0380GMP/RS/DEE/TNPCB/GMP/W/2024	24.10.2024	31.03.2025	Rubber Moulded Products 11 Nos as above (TPM)	199.99	≤199.99	
				2 Adhesives (KL/Month) As above	38.5	≤38.5	
5	PROCEEDINGS NO.F.0380GMP/RS/DEE/TNPCB/GMP/A/2024 DATED: 29/10/2024	29.10.2024 (Revised for an additional 1 Year)	31.03.2026	Rubber Moulded Products 11 Nos as above (TPM)	199.99	≤199.99	
	PROCEEDINGS NO.F.0380GMP/RS/DEE/TNPCB/GMP/W/2024 DATED: 29/10/2024			2 Adhesives (KL/Month) As above	38.5	≤38.5	

1.2 Identification of the Project and Project Proponent

M/s Thejo Engineering Limited was the result of that dream set up by K.J. Joseph and Thomas John in 1974 as a company providing maintenance of belt conveyor systems, Thejo has grown today into India's foremost solution provider in the bulk material handling, conveyor systems, mineral processing, and corrosion protection sectors. 'THEJO', is a Pioneer in the field of Belt Conveyor Maintenance and a leading Engineering Services provider in the Mining and Material Handling Industry.

From raw material handling to final product dispatch, Conveyor systems form the lifeline to any industry where material handling is involved. Belts are the most expensive part of a conveyor system. Regular maintenance and upkeep play a very important role in increasing the service life of a conveyor system. Thejo offers a host of solutions for proper installation, maintenance, and upkeep of belt conveyors, under our Conveyor Care division. Thejo's Conveyor Care Solutions include:

- Belt Conveyor Splicing and Repair Chemicals
- Belt Conveyor vulcanizing equipment.
- Belt Conveyor pulley protection.
- Belt Conveyor handling equipment (Belt Coiler & De-Coiler)
- Belt Conveyor splicing and repair tools.

M/s. Thejo Engineering Limited is an existing facility located at Survey No. 176/3, 181/5, 181/6A, 169/2B, 169/4D, 170/2B, 170/3B, 170/4, 175/3, 176/1, 176/2, 181/1B, 175/4B and 175/5B, Jaganathapuram Road, Irullipattu village, Ponneri Taluk, Thiruvallur Dist, Tamil Nadu State 600 067, proposed for expansion in production capacities and enhancement of manufacturing facilities with additional land.

The total site area after expansion is **15.63** acres. The capital cost for the proposed project is Rs. **10699.99** Lakhs. The detailed Project cost is shown in **Table 2-4**.

'THEJO', is a Pioneer in the field of Belt Conveyor Maintenance and a leading Engineering Services provider in the Mining and Material Handling Industry. Thejo has established globally through its offices in Australia, Saudi Arabia, Brazil and Chile.

Management of Thejo Engineering Limited, Tamil Nadu

S. No	Name	Designation
1	Mr. V.A George	Executive Chairman
2	Mr. Thomas John	Vice Chairman
3	Mr. Manoj Joseph	Managing Director
4	Mr. Rajesh John	Deputy Managing Director
5	Mr. Manesh Joseph	Non-Executive Director

1.2.1 Thejo Engineering Limited, Australia

Thejo Engineering Limited, Australia is a 100% subsidiary of Thejo India and offers Solutions for the Mining, Mineral Processing and Corrosion Protection segments of the industry. With almost 2 decades of supply to various Clients ranging from Mineral Processing, Aggregates, power, metal, cement, ports, Chemical and fertilizers, the company focuses on the growing demands

of specialized and customized solutions for its clients. The company office & warehouse is in Perth, manned with technical and sales experts and carrying a wide variety of inventories. Services include Inspections, installation and Wear Monitoring of wear liners and screens, refurbishment, preassemblies, inspections, and QA before shipment to clients.

1.2.2 Thejo Brasil Comercio E Servicos Ltda

Thejo Brasil Comercio E Servicos Ltda (Thejo Brasil) is a 100% owned subsidiary of Thejo, India. The company is primarily engaged in sales of products required by the core sector industries of Brasil vis a vis Iron Ore, Gold etc. Thejo’s office is located at Vinhedo, Sao Paulo.

THISC, is a subsidiary company of Thejo India, with a 49% stake owned by HATCON, Bahrain. The company has a large industrial set up and warehouse located near Jubail Industrial City, Dammam, and a branch operation in Jeddah. The subsidiary caters to the industries across Saudi Arabia, Kuwait, Bahrain, and Qatar.

1.2.3 Thejo Hatcon Industrial Services Co.

Thejo Hatcon Industrial Services Company (THISC) is engaged primarily in offering solutions to corrosion protection, mining, and belt conveyor installations. Warehouses are stocked with sufficient products & equipment. In-house Technical staff are equipped and ready to take up breakdown jobs 24x7. THISC offers the complete range of products from the Thejo product line and services across belt splicing, pulley lagging, rubber lining, inspection/audit, and recommendation for improving transfer points in belt conveyor installations.

1.2.4 Other Services of Thejo Engineering Limited

The state-of-the-art manufacturing plants offer a wide range of engineered products, equipment and customized solutions to clients. Consistency and quality are the key drivers behind our successful manufacturing operations.

Our facilities are ISO 9001:2015 certified, evident in our operations and practices. Dedicated manpower, long-term supplier relationships and state of the art machineries, equip us to manufacture the widest assortment of materials and reduce lead time to the suppliers.

Our range of machinery, technical competency and human resources enable us to deliver on the promoter’s vision of supplying global markets with top quality products. It is also one of the main reasons why today many international Original Equipment Manufacturers outsource their requirements from THEJO.

Manufacturing Plants in India

- Unit 1 – Rubberized Products
- Unit 2 – Belt Conveyor Accessory Products
- Unit 3 – Belt Conveyor Care Equipment

Belt Splicing and Repair - Fabric Ply, Steel Cord

- Belt Splicing (By Cold & Hot Process)
- Longitudinal Rip Repairs
- Belt Recapping

Pulley Lagging

- Lagging insitu cold process
- Autoclave hot process
- Ceramic Lagging

conveyor Belt Replacement Service

- Replacement of damaged / old belt conveyors
- Unit 4 – Industrial Adhesives
- Unit 5 – Corrosion Protection
- Unit 6 – Polyurethane Products

1.3 Categorization of the Project

M/s. Thejo Engineering Limited is an existing facility located at Survey No. 176/3, 181/5, 181/6A, 169/2B, 169/4D, 170/2B, 170/3B, 170/4, 175/3, 176/1, 176/2, 181/1B, 175/4B and 175/5B, Jaganathapuram Road, Irullipattu village, Ponneri Taluk, Thiruvallur Dist, Tamil Nadu State 600 067.

Project proponent has currently manufactured 199.99 TPM of Rubber Molded products (11 Nos) and 2 Nos of Adhesive (Hot & cold) of 38.5 KL/Month. The existing facility was established in 16916.46 Sq. m of area. The existing project is operating with valid consent orders vide PROCEEDINGS NO.F.0380GMP/RS/DEE/TNPCB/GMP/W/2024 valid up to March 31st, 2026. The Chronology of Consent Orders is shown in **Table 1 1**.

Now, M/s. Thejo Engineering Limited proposed expansion in production of Rubber molded products (199.99 TPM to 486 TPM) and Adhesives (38.5 KL/Month to 100 KL/Month) & proposed PU Products manufacturing with production capacity of 6.352 TPM due to increase in the demand of the existing and proposed projects along with enhancement of manufacturing facilities with additional area of 11.46 Acres (46364.97 Sq. m) The total area after expansion is 15.63 Acres (63221.43 Sq. m). The project cost for the proposed expansion proposal is 10699.99 Lakhs.

There is no violation by the present project. There are no court cases, or any direction issued against the project by TNPCB. The Project does not fall under Critically Polluted Area (CPA)/ Severally Polluted Area (SPA).

Now, M/s. Thejo Engineering Limited is applied for Environmental Clearance as the proposed expansion in production of Rubber molded products, Adhesives & proposed PU Products is termed under Schedule 5(f) Synthetic Organic Chemicals., Category A.’ and Environmental Clearance (EC) to be obtained from EAC Delhi before the commencement of ground activity for the proposed expansion.

Since the project site is categorized as non-Planned area. Hence, the project site is attracting Public Hearing.

- ✓ In line with the said notification, TOR application was filed to MOEF&CC on 6th, May 2024 with ADS, vide proposal No. IA/TN/466248/2024 dated 20.03.2024 for grant of Terms of References (TOR), The standard ToR has granted with Public Hearing. The Base line Studies are carried out during the period of January 2024 to March 2024 as per OM. No. J-11013/41/2006-IA-II (I) (Part) dated; 29th August 2017 & the draft EIA report has been prepared in line with the prescribed ToR vide F. No. IA-J-11011/120/2024-IA-II(I) and TOR Identification No. TO24A2407TN5525112; dated 11.05.2024. The draft EIA report has been prepared as per generic structure described in EIA Notification and will be submitted for Public Hearing. The Public Hearing details will be included in the Final EIA Report and will be submitted to EAC MOEFCC for project appraisal to obtain Environmental Clearance (EC).

1.4 Project Summary

The project site is coming under schedule 5(f) Synthetic Organic Chemicals, category ‘A’ as per EIA Notification 2006 and its Amendments. The company is assigning prime importance for environmental protection. The company has implemented Zero Liquid Discharge concepts and complied with environmental laws. The industry has maintained well developed greenbelt. Project summary is provided in **Table 1-2**.

Table 1-2 Project Summary

S. No	Particulars	Proposed Project details
1	Category of products	
	a. Rubber molded products	486 TPM
	b. Adhesives	100 KLPM
	c. PU Products	6.352 TPM
2	Total Land area	6.33 Ha (63221.43 Sq. m)
3	Total Built up area (sq .m)	22626.24
4	Total Water Requirement (KLD)	116
5	Recycled Water (KLD)	36
6	Fresh water (KLD)	80
7	Source of Water	Private suppliers
8	Effluent Generation (KLD)	13
9	Sewage Generation (KLD)	23
10	Wastewater Treatment System & capacity	15 KLD of ETP (ZLD Concept)
11	Domestic Wastewater treatment system	25 KLD of Proposed STP
12	Power (kVA) Source: TANGEDCO	1200
13	Power Backup-DGs (kVA)	1 x 250 KVA 1 X 500 KVA
14	Air Compressor (m ³ /minute)	141
15	Boilers (Ton/Hr)	2 X 2 Ton/hr 1 x 6 Ton/hr
16	Diesel for DG Sets (Lts/Day/DG)-During power failure only	800
17	Briquettes for Boilers (T/Month)	260

18	Grease (Kg/Month) as a lubricant	25
19	Permanent Manpower (Nos)	600
20	Temporary Manpower (Nos)-Construction Phase only	50
21	Project Cost in crores (INR Lakhs)	10699.99 (106.99 Crore)
22	Environmental Management Plan (EMP) Cost (INR Lakhs)	60.77 (0.6 Crore)
23	CER -1.5 % of project cost (INR Lakhs)	160 (1.60 Crore)

1.5 Purpose and Status of the Report and its importance

Manufacturing of Adhesives (cold & hot), Rubber moulded products and PU products are requiring Environmental Clearance, and the proposed project termed under **Schedule 5 (f), Synthetic Organic Chemicals, Category A** as per the EIA notification dated 14th September 2006 and its subsequent amendments. Hence, the project will be appraised by the EAC Delhi

M/s. Thejo Engineering Limited applied for Environmental Clearance as the proposed expansion in production of Rubber molded products, Adhesives & proposed PU Products is termed under Schedule 5(f) Synthetic Organic Chemicals., Category A.’ and Environmental Clearance (EC) to be obtained from EAC Delhi before the commencement of ground activity for the proposed expansion. Since the project site is categorized as non-Planned area. Hence, the project site is attracting Public Hearing.

In line with the said notification, TOR application was filed to MOEF&CC on 6th, May 2024 with ADS, vide proposal No. IA/TN/466248/2024 dated 20.03.2024 for grant of Terms of References (TOR), The standard ToR has granted with Public Hearing. The Base line Studies are carried out during the period of January 2024 to March 2024 as per OM. No. J-11013/41/2006-IA-II (I) (Part) dated;29th August 2017 & the draft EIA report has been prepared in line with the prescribed ToR vide F. No. IA-J-11011/120/2024-IA-II(I) and TOR Identification No. TO24A2407TN5525112; dated 11.05.2024. The draft EIA report has been as per generic structure described in EIA Notification and will be submitted for Public Hearing. The Public Hearing details will be included in the Final EIA Report and will be submitted to EAC MOEFCC for project appraisal to obtain Environmental Clearance (EC)

The Indian rubber industry is an extremely significant part of the Indian economy. India is the world's third-biggest producer of natural rubber, its fourth-largest consumer of natural rubber, and its fifth-largest consumer of both natural and synthetic rubber combined.

The world production of rubber was very unstable during the last few years. Comparatively, India's production of rubber is consistent at the rate of 6% per annum. The Rubber industry in India is growing with its roots deeper. India is the 3rd largest consumer, while the largest producer of natural rubber in the world. The growth of rubber industry in India plays a significant role in the global economy. These factors along with high growth of automobile production with many large and medium industries has made India one of the fastest growing economies globally.

1.6 Brief Description of Nature, Size, Location of the Project & Its Importance

1.6.1.1 Nature, Size & Location of the project

Nature of the project:

'THEJO', is a Pioneer in the field of Belt Conveyor Maintenance and a leading Engineering Services provider to the Mining and Material Handling Industry and M/s. Thejo Engineering Limited is an existing facility located at Survey No. 176/3, 181/5, 181/6A, 169/2B, 169/4D, 170/2B, 170/3B, 170/4, 175/3, 176/1, 176/2, 181/1B, 175/4B and 175/5B, Jaganathapuram Road, Irullipattu village, Ponneri Taluk, Thiruvallur Dist, Tamil Nadu State 600 067, proposed for expansion in production capacities and enhancement of manufacturing facilities with additional land.

Manufacturing Adhesives (cold & hot), Rubber moulded products and PU products require Environmental Clearance and the proposed project termed under Schedule 5 (f), Synthetic Organic Chemicals, Category A as per the EIA notification dated 14th September 2006 and its subsequent amendments, Hence, project will be appraised by the EAC Delhi.

1.6.1.2 Size & Location of the project

The proposed project area for expansion is 63221.43 Sq. m (15.63 Acres). The site is located at Survey No. 176/3, 181/5, 181/6A, 169/2B, 169/4D, 170/2B, 170/3B, 170/4, 175/3, 176/1, 176/2, 181/1B, 175/4B and 175/5B, Jaganathapuram Road, Irullipattu village, Ponneri Taluk, Thiruvallur Dist, Tamil Nadu State 600 067 at longitude 80°9'42.48"E and latitude 13°16'19.29"N. The layout of the proposed project site is enclosed as **Annexure-13**.

- ❖ The total project area after expansion: **15.63 Acres (63221.43 Sq. m)**
- ❖ Existing area: **4.18 Acres (16916.97 Sq. m)**
- ❖ Proposed area: **11.46 Acres (46364.97 Sq. m)**
- ❖ Greenbelt after expansion (33%): 5.16 Acres (**20866.17 Sq. m**)
- ❖ The layout plan of the existing project site is attached as **Annexure-12**.
- ❖ Project layout after expansion is enclosed as **Annexure-13**

M/s. Thejo Engineering Limited proposed expansion in production of Rubber molded products (**199.99 TPM to 486 TPM**) and Adhesives (**38.5 KL/Month to 100 KL/Month**) & proposed PU Products manufacturing with production capacity of **6.352 TPM** due to increase in the demand of the existing and proposed projects along with enhancement of manufacturing facilities with additional area of **11.46 Acres (46364.97 Sq. m)** The total area after expansion is **15.63 Acres (63221.43 Sq. m)**. The project cost for the proposed expansion proposal is **10699.99 Lakhs**.

There is no violation by the present project. There are no court cases, or any direction issued against the project by TNPCB. The Project does not fall under Critically Polluted Area (CPA)/ Severally Polluted Area (SPA). The project location index map is shown in **Figure 2-1** and Satellite Image of the project location is appeared in **Figure 2-2**. Administrative Map of Project Study area is given in **Figure 1-1**. Google satellite Imagery of 1 km, 5km, 10km and Environmental sensitive areas within 15km radius of the project site given as **Figure 2-3** to **Figure 2-5**. Geographical Coordinates of the project site is given in **Table 2-1**.

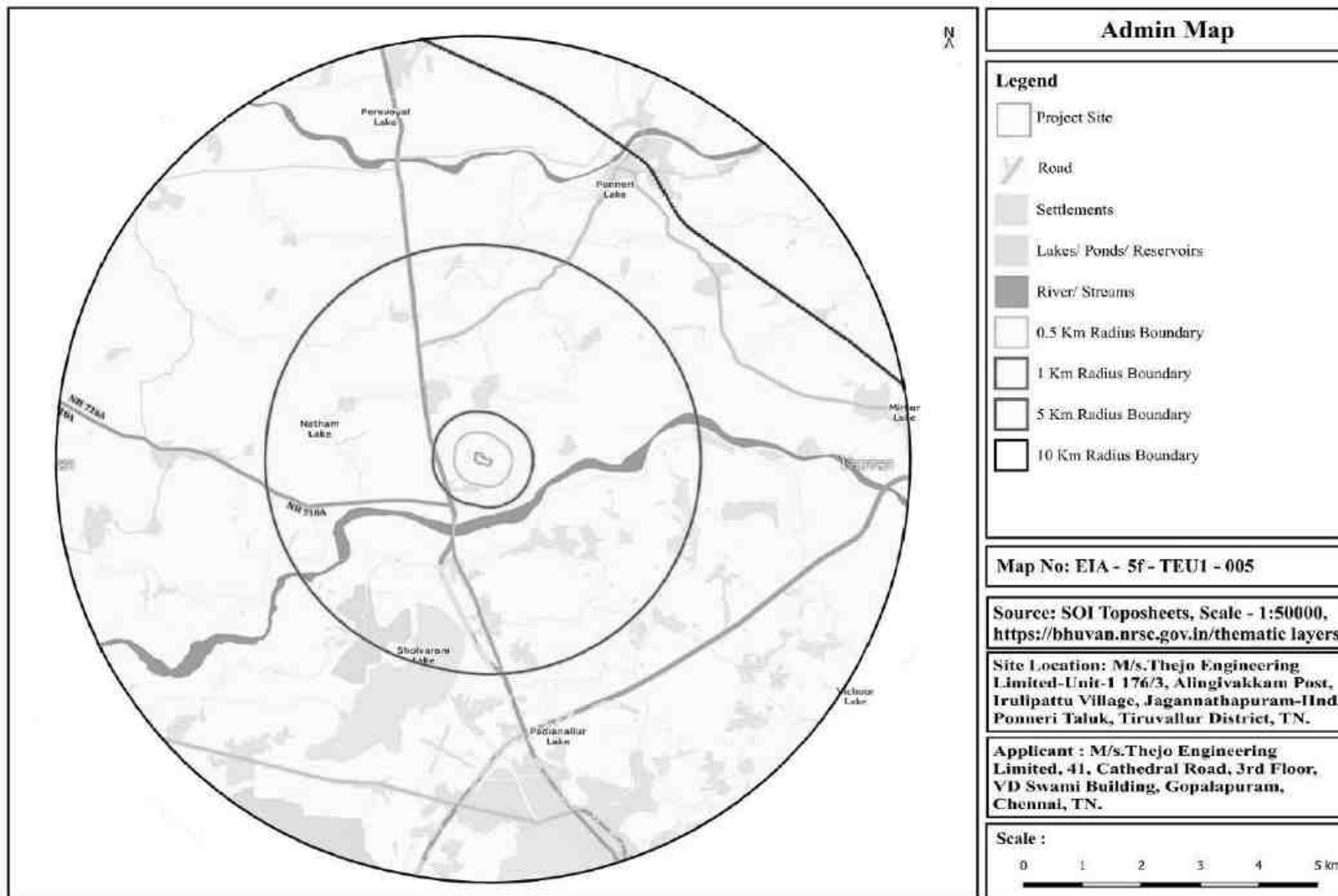


Figure 1-1 Administrative Map of Project Study area

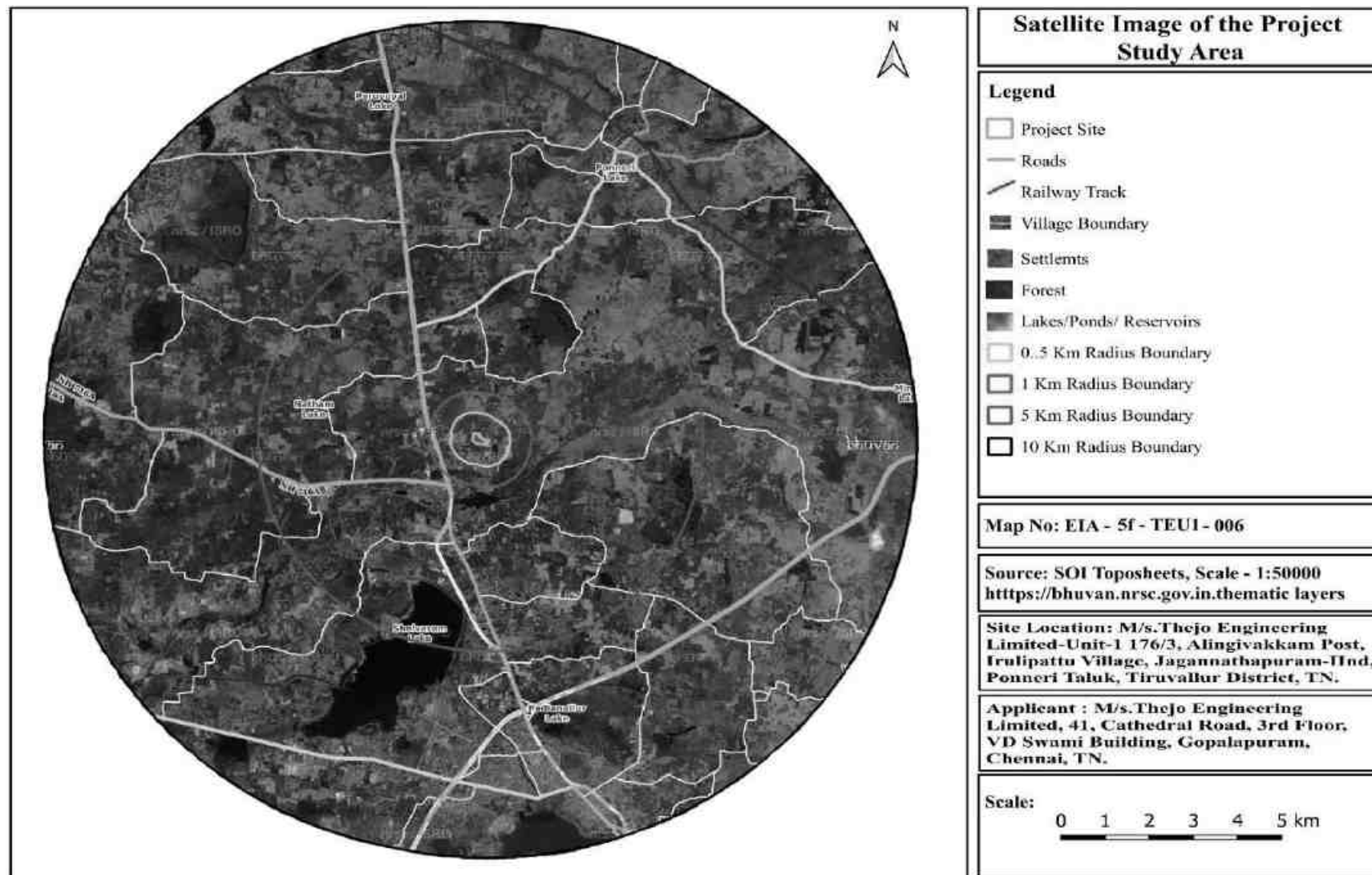


Figure 1-2 Map showing the Satellite Image of the study area

The Salient features of the project site are represented in **Table 1-3**.

Table 1-3 Salient Features of the Project

S. No	Particulars	Details			
1	Plant site latitude	13°16'19.29"N (Centre co-ordinates)			
2	Plant site longitude	80° 9'42.48"E (Centre co-ordinates)			
3	Elevation of Project site	≈ 34-40m AMSL			
4	Nearest Highway	NH - 16 (Chennai - Dankuni – Kolkata) ~0.82 Km (W)			
5	Nearest railway Station	Anuppambattu RS: ~ 8.17 (ENE)			
6	Nearest Airport	Chennai Int. Airport: ~9.40 Km (S)			
7	Nearest Village	Irulapattu (Site is located within the village boundary)			
8	Nearest Town	Cholavaram, ~2.79 (S)			
9	Nearest City	Chennai, ~6.65 (S)			
10	Environmental Sensitivity areas	S. No	Name	Distance (~km)	Direction
		1	Eumaivettipalayam RF	3.73	SSW
		2	Canal	6.66	SSW
		3	Almadi RF	9.13	SSW
		4	Cholavaram Tank	3.55	SSW
		5	Korttalaiyar River	1.02	SSE
		6	Krishna Water Canal	13.24	SSW
		7	Arani River	6.56	NNE
		8	Manali RF	13.55	NW
10	Reserve Forests	S. No	Name	Distance (~km)	Direction
		1	Eumaivettipalayam RF	3.73	SSW
		2	Almadi RF	9.13	SSW
		3	Manali RF	13.55	NW
11	Monuments	S. No	Name	Distance (~km)	Direction
		1	Virgin group containing many barrows	8.07	S
		2	Prehistoric settlement site-megalithic period - Pulal	12.48	SSE
		3	Megalithic cists and cairns -Pottur	12.82	S
		4	Megalithic cists and cairns - Pottur	12.15	S
		5	Megalithic cists and cairns - Pammadukulam	11.94	S

S. No	Name	Distance (~km)	Direction
1	Lake near Kadapakkam	11.92	SE
2	Sembium Manalai Lake	10.67	SE
3	Pulal Lake	8.55	S
4	Lake near Kanalur	12.75	NW
5	Lake near Chinnambedu	6.76	NW
6	Lake near arani	10.04	WNW
7	Gummidipoondi Lake	12.11	NNW
8	Eri near Edapalaiyam	11.3	N
9	Tank near Ramanayakankandigai	11.99	NW
10	Lake near Melmudalambedu	10.2	NNW
11	Lake near Kilmudalambedu	9.4	NNW
12	Panappakkam lake	10.82	NNW
13	Eri near kattavur	9.29	N
14	Lake near Appalapuram	11.57	N
15	Lake near Medur	11.3	NNE
16	Lake near Perumbedu	11.94	NE
17	Lake near Asanbudur	13.39	NE
18	Lake near Akarapakkam	7.18	WNW
19	Lake near Tirunilai	7.83	WNW
20	Cholavaram Tank	3.55	SSW
21	Lake near Alamadi	8.87	SW
22	Lake near Vellanur	12.98	SW
23	Madhavaram Eri	13.79	SSE
24	Lake near Orakkadu	4.87	SE
25	Lake near Attapalaiyam	4	E
26	Lake near Sottupakkam	7.05	SE
27	Lake near Kavaripalayam	8.09	NE
28	Lake near Tulukkupalaiyam	2.38	NE
29	Lake near Ayanallur	14.19	N
30	Lake near Neyveli	7.4	W
31	Lake Near Vadamadurai	13.95	W

12 Water Bodies

1.6.1.3 Importance to the Country and Region

Importance to the Country, Region:

The Indian rubber industry is an extremely significant part of the Indian economy. India is the world's third-biggest producer of natural rubber, its fourth-largest consumer of natural rubber, and its fifth-largest consumer of both natural and synthetic rubber combined.

The world production of rubber was very unstable during the last few years. Comparatively, India's production of rubber is consistent at the rate of 6% per annum. The Rubber industry in India is growing with its roots deeper. India is the 3rd largest consumer, while the largest producer of natural rubber in the world. The growth of rubber industry in India plays a significant role in the global economy. These factors along with high growth of automobile production with many large and medium industries has made India one of the fastest growing economies globally.

1.6.1.4 Demand-Supply Gap

The project is envisaged to meet the demand supply gap in both the domestic market and export market, as the following industrial sector consumes most of the rubber products.

- Automotive tyre sector: 50% consumption of all kinds of rubbers
- Bicycles tyres and tubes: 15%
- Footwear: 12%
- Belts and hoses: 6%
- Camelback and latex products: 7%
- Other products: 10%.

1.6.1.5 Import Possibility

Thejo Brasil Comercio E Servicos Ltda (Thejo Brasil) is a 100% owned subsidiary of Thejo, India. The company is primarily engaged in sales of products required by the core sector industries of Brasil vis a vis Iron Ore, Gold etc. Thejo's office is located at Vinhedo, Sao Paulo.

THISC, is a subsidiary company of Thejo India, with a 49% stake owned by HATCON, Bahrain. The company has a large industrial set up and warehouse located near Jubail Industrial City, Dammam, and a branch operation in Jeddah. The subsidiary caters to the industries across Saudi Arabia, Kuwait, Bahrain, and Qatar.

1.7 Domestic/Export Markets

The products shall cater to both domestic and export markets.

India's production varies between 6 and 7 lakh tons annually which amounts to Rs. 3000 crores. Seventy percent of the total rubber production in India is in the form of Ribbed Smoked Sheets (RSS). This is also imported by India accounting for 45% of the total import of rubber. The Indian rubber industry has a turnover of Rs 12000 crores. Most of the rubber production is consumed by the tyre industry which is almost 52% of the total production of India. Among the states, Kerala is the leading consumer of rubber, followed by Punjab and

Maharashtra. The exports of Indian natural rubber have increased tremendously over the years and have reached 76000 tons in 2003-04. Though, India is one of the leading producers of rubber, but it still imports rubber from other countries. At present, India is importing around 50000 tons of rubber annually.

1.8 EIA Study

M/s. Thejo Engineering Limited, as part of compliance with regulatory requirements for obtaining Environmental Clearance (EC) from the Expert Appraisal Committee (EAC), appointed Environmental Consultants accredited by the National Accreditation Board for Education and Training (NABET) – Quality Council of India (QCI), New Delhi.

The initial assignment for conducting field studies and preparing the Form-1, Pre-Feasibility Report (PFR), Baseline Studies, and EIA/EMP Report (under Category A) was awarded to M/s. AM Enviro Engineers, Bangalore, an organization accredited by NABET-QCI under Certificate No. NABET/EIA/2326/RA 0306_Rev 01, valid up to 30.06.2026. After obtaining the Terms of Reference (ToR), the project proponent decided to change the consultant due to delays in the process, primarily caused by the non-availability of an EIA Coordinator at M/s. AM Enviro Engineers.

Consequently, the project proponent reassigned the work including completion of Baseline Studies, Impact Assessment, preparation of the EIA/EMP Report, Public Hearing consultation, and Environmental Clearance appraisal under Category A (MOEFCC) to M/s. EnviroSphere Consultant and Engineers LLP, Pune, which is accredited by NABET-QCI for the Synthetic Organic Chemicals Industry under Category A, vide Certificate No. NABET/EIA/23-26/IA 0130, valid up to December 8, 2026.

1.9 EIA Cost

The EIA studies were undertaken by EnviroSphere Consultant and Engineers LLP for an amount of Rs.4.0 Lakhs.

1.10 Scope of the Study

The scope of the work mentioned includes an assessment study of the proposed Manufacturing unit and their impact on the region. This study puts forward the most effective ways to protect the environment from increasing pollution caused by the burgeoning industrial development 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 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.

This EIA report presents the existing baseline scenario and the assessment and evaluation of the environmental impacts that may arise during the construction and operational phases of the project. This report also highlights the Environmental Monitoring Program during the

construction and operation phases of the project and the post project monitoring 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 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. Public Consultation
10. Review & finalization of EIA Report based on the TOR requirements.
11. Conducting Public hearing and obtaining minutes.
12. Submission of Final EIA report for implementation of mitigation measures & EMP as well as necessary clearances from relevant Authority.

1.10.1.1 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 which maintain their respective functions.
- ✓ To promote development that is sustainable and optimizes 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., 10km radius from the project site boundary.

1.10.1.2 Terms of Reference (TOR)-Compliance

S. No	Terms of Reference	Compliance
A. Standard TOR		
1	Executive Summary	Brief executive summary is enclosed as Separate Booklet
2	Introduction	
	Details of the EIA Consultant including NABET accreditation	Ms Kalyani Ganvir, Managing Director Envirosphere Consultant and Engineers LLP, Address: Shree Ganesh Ace Arcade, Office No. 506, 5th Floor, Building A, Kokane Chowk, Rahatani, Pune, Maharashtra-411027 Email: ashvin.esce@envirosphere.co.in

S. No	Terms of Reference	Compliance
	Information about the Project Proponent	M/s. Thejo Engineering Limited the “Proposed Expansion in Industrial Adhesives, Rubber products and PU Products and Enhancement of manufacturing facility” at Survey No. 176/3, 181/5, 181/6A, 169/2B, 169/4D, 170/2B, 170/3B, 170/4,175/3, 176/1, 176/2, 181/1B, 175/4B and 175/5B, Jaganathapuram Road, Irullipattu village, Ponneri Taluk, Thiruvallur Dist, Tamil Nadu State 600 067.
	Importance and Benefits of the Project	The Details have been provided in Chapter 8 .
3	Project Description	
	Cost of project and Time of completion	The Project cost after expansion is estimated as INR. 10699.99 Lakhs. The proposed project implementation details are provided in Chapter 2, Section 2.4.2, Table 2-4
	Products with capacities for the proposed project	The Products and their capacities are provided in Chapter 2, Section 2.6.2, and Table 2-16 .
	If expansion project, details of existing products with capacities and whether adequate land is available for expansion, reference of earlier EC if any.	Not applicable, The existing project is operated with valid consent orders. The existing product details are provided in Chapter 2, Section 2.6.2, and Table 2-16 .
	List of Raw materials required and their source along with mode of transportation	List of Raw materials required and their source along with mode of transportation details are given Error! Reference source not found..
	Other chemicals and materials required with quantities and storage capacities	Other materials required with quantities and storage capacities details are given in Table 2-17 . The raw materials are provided in Chapter 2, Section 2.6.1.5 and Table 2-15 .
	Details of emissions, effluents, hazardous waste generation and their management	Details of emission are shown in Section Chapter 2, Section 2.8.2 and Table 2-24 . Effluents and Management details are provided Chapter 2, Section 2.6.1.2 and Table 2-11 . Hazardous waste generation and their management during construction phase and operational phase are provided in Chapter 2, Section 2.8.5 Table 2-25 , Error! Reference source not found., Table 2-26 & Error! Not a valid result for table..
	Requirement of water, power, with source of supply, status of approval, water balance diagram, man-power requirement (regular and contract)	Requirement of water, power, with source of supply, status of approval, water balance diagram, man-power requirement details provided in Chapter 2, Section 2.6.1 .

S. No	Terms of Reference	Compliance
	Process description along with major Equipments and machineries, process flow sheet (quantitative) from raw material to products to be provided	Process description along with major Equipment and machinery, process flow sheet (quantitative) is provided in Chapter 2, Section 2.6.3 & Section 2.6.3.4
	Hazard identification and details of proposed safety systems	Hazard identification and details of proposed safety systems are provided in Chapter 10, Section 10.7.8.
	Expansion/ modernization proposals Copy of all Environmental Clearance(s) including amendments thereto obtaining for the project from MoEFCC/SEIAA shall be attached as an Annexure. A certified copy of the latest monitoring report of the regional office of the Ministry of Environment and Forests as per circular dated 30th May 2012 on the status of compliance of conditions stipulated in all existing environmental clearances including Amendments shall be provided. In addition, status of compliance of Consent to Operate for the ongoing existing operation of the project from SPCB shall be attached with the EIA-EMP report In case the existing project has not obtained environmental clearance, reasons for not obtaining the provisions of the EIA notification 1994 and/or EIA notification 2006 shall be provided. Copies of Consent to Establish / No objection certificate and Consent to Operate (in case of units operating in prior to EIA notification 2006, CTE and CTO of FY 2005-2006) obtained from the SPCB shall be submitted. Further compliance report to the conditions of Consents from the SPCB shall be submitted.	Not Applicable Since the proposed project is applied for the first time for the Environmental Clearance project. The existing unit is operating with a valid consent order. The chronology of the consent orders is provided in Table 1-1.
4	Site Details	
	Location of the project site covering village, Taluka/Tehsil, District and State, justification for selecting the site, whether other sites were considered.	M/s. Thejo Engineering Limited is an existing facility located at Survey No. 176/3, 181/5, 181/6A, 169/2B, 169/4D, 170/2B, 170/3B, 170/4,175/3, 176/1, 176/2, 181/1B, 175/4B and 175/5B, Jaganathapuram Road, Irullipattu village, Ponneri Taluk, Thiruvallur Dist, Tamil Nadu State 600 067. No alternative site study is considered as the proposed expansion will be facilitated within the existing premises, only the details are provided in Chapter 5, Section 5.2.
	A Topo sheet of the study area of radius of 10Km and site location on 1:50,000/ 1:25,000 scale on an A3/A2 sheet (including	Environmental Sensitive areas demarked on Topo sheet of the study area and site location on 1:50,000 is provided in Figure 2-7 10km radius

S. No	Terms of Reference	Compliance
	al eco-sensitive areas and environmentally sensitive places).	Topo map of the project . Environmentally sensitive places demarked google image is shown in Figure 2-6 .
	Details with respect to option analysis for selection of site	No alternative site study is considered as the proposed expansion will be facilitated within the existing premises, only the details are provided in Chapter 5, Section 5.2 .
	Co-ordinates (Lat-long) of all four corners of the site.	Co-ordinates (Lat-long) of all four corners of the site is provided in Table 2-1 .
	Google map Earth downloaded the project site.	Google maps of project site, 1km, 5km & 10km are provided Figure 2-3 to Figure 2-5
	Layout maps include existing units as well as proposed units indicating storage area, plant area, greenbelt area, utilities etc. If located within an industrial area/Estate/Complex, layout of Industrial indicating location of unit within the Industrial area/Estate.	Layout maps including existing units as well as proposed units indicating storage area, plant area, greenbelt area, utilities etc., demarked Site Layout is shown in Figure 2-8 . Proposed project located in a non-notified industrial area.
	Photographs of the proposed and existing (if applicable) plant site, existing, show photographs of plantations/ greenbelt.	Photographs of the proposed project are shown in Figure 2-9 .
	Land use break-up of total land of the project site (indicate and acquired), government/ private- agriculture, forest, wasteland, water bodies, settlements, etc. shall be included (not required for industrial area).	Land use break-up of total land of the project site is shown in Table 2-7 . The proposed project is not having any government/ private-agriculture, forest, wasteland, water bodies, settlements.
	A list of major industries with name and type within the study area (10 km radius) shall be incorporated. Land use details of the study area.	The list of major industries within the study area (10 km radius) is shown in Table 2-2 .
	Geological features and Geo-hydrological status of the study area shall be included.	Geological features and Geo-hydrological status of the study area are provided in Chapter 3, Section 3.5.6 .
	Details of drainage of the project up to 5km radius of the study area. If the site is within 1Km radius of any major river, peak and lean season river discharge as well as flood occurrence frequency based on peak rainfall data of the past 30 years. Details of Flood Level of the project site and maximum of Flood of the river shall also be provided (mega green field projects)	There is no major river within the 5km radius of the project site.
	Status of acquisition of land. If acquisition is not complete, the stage of the acquisition process and expected time of complete procession of the land.	The proposed project area is Patta land, and total project land belongs to the M/s Thejo Engineering Limited. There are no R&R issues envisaged. Since it is partially owned by Thejo Engineering Limited of 4.18 Acres remaining portion of land is under 25 Years lease. lease

S. No	Terms of Reference	Compliance
		documents Land documents are enclosed as Annexure-1.
	R&R details in respect of land in line with state Government policy	Not Applicable
5	Forest and wildlife related issues (if applicable)	
	Permission and approvals for the use of forest land (forestry clearance), if any, and recommendations of the State Forest Department (if applicable)	Not Applicable.
	Land use map based on High resolution satellite imagery (GPS) of the proposed site delineating the forest land (in case of projects involving forest land more than 40 ha)	Not Applicable.
	Status of application submitted for obtaining the stage of Forestry Clearance along with latest status shall be submitted	Not Applicable.
	The projects to be located within 10 Km of the National parks, Sanctuaries, Biosphere Reserves, Migratory Corridors of Wild Animals, the project proponent shall submit the map duly authenticated by Chief Wildlife Warden showing these features vis-à-vis the project location and the recommendations or comments of the Chief Wildlife Warden thereon.	Not Applicable.
	Wildlife Conservation Plan duly authenticated by the Chief Wildlife Warden of the State Government for conservation of schedule I fauna, if any exists in the study area.	Not Applicable.
	Copy of application submitted for clearance under the Wildlife (Protection) Act, 1972 to the Standing Committee of the National Board for Wildlife.	Not Applicable.
6	Environmental Status	
	Determination of atmospheric inversion level at the project site and site-specific micro-meteorological data using temperature, relative humidity, hourly wind speed and direction and rainfall	The details are provided in Chapter 3, Section 3.6.
	AAQ data (except monsoon) at 8 locations for PM ₁₀ , PM _{2.5} , SO ₂ , NO _x , CO, and other parameters relevant to the project shall be collected. The monitoring stations shall be based on CPCB guidelines and take into account the pre-dominant wind direction, population zone and sensitive receptors including reserved forests.	The monitoring stations and Monitoring results are provided in Chapter 3, Section 3.6.3

S. No	Terms of Reference	Compliance
	Raw data of all AAQ measurements for 12 weeks of all stations as per frequency given in the NAAQM notification of Nov. 2009 along with- min-max, average and 98% values for each of the AAQ parameters from data of all AAQ stations should be provided as an annexure to the EIA report	Raw data of all AAQ measurements for 12 weeks of all stations as per frequency given in the NAAQM notification of Nov. 2009 along with- min-max, average and 98% values for each of the AAQ parameters from data of all AAQ stations should be provided as Annexure-26 .
	Surface water quality of nearby River (100m upstream and downstream of discharge point) and other surface drains at eight locations as per CPCB/ MoEFCC guidelines.	A total of 8 Surface water samples were collected and analyzed. The Results of COD and BOD have been found more than expected value which indicates that water has been contaminated with organic matter. It may be due to directly or indirect contamination of sewage and effluent. These waters should not be directly used for drinking purposes, but it can be used in drinking after conventional treatment followed by disinfection. These waters can be used for irrigation and other domestic purposes. The detailed results are provided in Chapter 3, Section 3.8 .
	Whether the site falls near to polluted stretch of river identified by the CPCB/MoEF& CC, if yes give details	No.
	Ground water monitoring at minimum 8 locations shall be included	Ground water monitored at a minimum of 8 locations. The details are provided in Chapter 3, Section 3.8.3 .
	Noise level monitoring at 8 locations within the study area.	Noise level monitored at 8 locations within the study area and the details are provided in Chapter 3, Section 3.7 .
	Soil characteristics as per CPCB guidelines	Soil characteristics are provided in Chapter 3, Section 3.9 .
	Traffic study of the area, type of vehicles, frequency of vehicles for transportation of materials, additional traffic due to proposed project, parking arrangement etc.	Traffic study of the area and Traffic Assessment have been conducted, and details are provided in Chapter 4, Section 4.6.4 .
	Detailed description of flora and fauna (terrestrial and aquatic) existing in the study area shall be given with special reference to rare, endemic, and endangered species. If schedule-I fauna and found within the study area, a Wildlife Conservation plan shall be prepared and furnished	Detailed description of flora and fauna existing in the study area is provided in Chapter 3, Section 3.10 .
	Socio-economic status of the study area	Socio-economic status of the study area is provided in Chapter 3, Section 3.11 .
7	Impact and Environment Management Plan	

S. No	Terms of Reference	Compliance
	i. Assessment of ground level concentration of pollutants from the stack emission based on site-specific meteorological features. In case the project is located on a hilly terrain, the AQIP modeling shall be done using inputs of the specific terrain characteristics for determining the potential impacts of the project on the AAQ. Cumulative impact of all sources of emissions (including transportation) on the AAQ of the area shall be assessed. Details of the model used, and the input data used for modelling shall also be provided. The air quality contours shall be plotted on a location map showing the location of the project site, habitation nearby, sensitive receptors, if any.	AERMOD Software Version 11.0.1 was used for air dispersion modeling. The ground level concentration of pollutants (PM10, PM2.5 SO2, NO2) using AERMOD software was assessed and presented in Chapter 4, Section 4.6.1.1 Summary of Modelling Results due to proposed project is provided in Chapter 4, Section 4.6.3.1 and Summary of Modelling Results due to cumulative studies are provided in Chapter 4, Section 4.6.3.1.
	ii. Water quality modelling- in case of discharge in water body	Not Applicable. Effluent will be treated in the Proposed 15 KLD of ETP. Treated effluent will be used for fire hydrant storage and Greenbelt development. The unit is adopting a Zero Liquid Discharge (ZLD) concept, ensuring that all generated effluent is treated and reused within the plant, with no discharge to external water bodies.
	iii. Impact of the transport of raw material and end products on the surrounding environment shall be assessed and provided. In this regard, options for transport of raw materials and finished products and wastes (large quantities) by rail or rail-cum road transport or conveyor-cum-rail transport shall be examined.	Transport of raw materials and finished products and waste through roadways only.
	iv. A note on treatment of wastewater from different plant operations, extent recycled and reused for different purposes shall be included. Complete scheme of effluent treatment, characteristics of untreated and treated effluent to meet the prescribed standards of discharge under E(P) rules.	The details are provided in Chapter 4, Section 4.6.5. STP Specifications and process flow diagrams are enclosed as Annexure-11.

S. No	Terms of Reference	Compliance
v.	Details of stack emission and action plan for control of emissions to meet standards.	Details of stack emission and action plan for control of emissions details are provided Table 4-23.
vi.	Measures for fugitive emission control	Measures for fugitive emission control are provided in Chapter 4, Section 4.6.4.
vii.	Details of hazardous waste generation and their storage, utilization and management, Copies of MOU regarding utilization of solid and hazardous waste in cement plant also be included. EMP shall include the concept of waste-minimization, recycle/reuse/recover techniques, Energy conservation, and natural resource conservation.	Details of hazardous waste generation and their storage, utilization and management details are provided in Table 2-24, Table 2-25, Error! Reference source not found., Table 2-26, Error! Not a valid result for table. & Table 4-27 &
viii.	Proper utilization of fly ash shall be ensured as per Fly Ash notification, 2009. A detailed plan of action shall be provided.	Not Applicable since there is no Fly ash generation in the proposed project.
ix.	Action plan for the green belt development plan in 33% area i.e., land with not less than 1500 trees per ha. Giving details of Species, width of plantation, planning schedule etc. shall be included. The green belt shall be around the project boundary and a scheme for greening of the roads used for the project shall also be incorporated.	Thejo Engineering Limited is allocated 33% (20866.2 Sq. m) of land for green belt development as per norms. The width of the greenbelt will be maintained as per CBCB guidelines and there shall be 3 rows of plants with a gap of 2m between the plants. Approximately 1,000 trees have already been planted within the existing facility. Existing trees within the project site will be retained to preserve greenery and enhance environmental sustainability. As part of the expansion, an additional 2,000 trees will be planted in a phased manner in and around the project boundary. A capital cost of INR 3.0 Lakhs will be earmarked for this purpose and INR of 0.5 Lakhs will be allocated for recurring expenses towards green belt development and maintenance. Greenbelt layout is enclosed as Annexure-14.
x.	Action plan for rainwater harvesting measures at plant site shall be submitted to harvest rainwater from the roof tops and storm water drains to recharge the ground water and to use for the various activities at the project site to conserve fresh	An action plan for rainwater harvesting measures proposed and details are provided in Chapter 10, Section 10.7.10.1.

S. No	Terms of Reference	Compliance
	water and reduce the water requirement from other sources.	
	xi. Total capital cost and recurring cost /annum for environmental pollution control measures shall be included.	Total capital cost and recurring cost /annum for environmental pollution control measures (EMP) are provided in Chapter 10, Section 10.7.12 and Table 10-15 . Environmental Monitoring Cost details are provided in Error! Reference source not found..
	xii. Action plan for post-project environmental monitoring shall be submitted	Action plan for post-project environmental monitoring is provided in Table 6-1 .
	xiii. Onsite and offsite Disaster (natural and Man-made) preparedness and Emergency Management Plan including Risk Assessment and damage control. Disaster Management Plan should be linked with District Disaster Management Plan.	Onsite and offsite Disaster (natural and Man-made) preparedness and Emergency Management Plan including Risk Assessment and damage control. Disaster Management Plan details are provided in Chapter 7, Section 7.3 . Risk Assessment and Control measures are provided in Chapter 7, Section 7.2 .
8	Occupational Health	
	i. Plan and fund allocation to ensure the occupational health & safety of all contract and casual workers	Post Project Environmental Monitoring Program including OHS details are provided in Chapter 6, Table 6-1 .
	ii. Details of exposure specific health status evaluation of worker. If the worker's health is being evaluated by pre-designed format, chest x-rays, Audiometry, Spirometry, Vision testing (Far and near vision, colour vision and any other ocular defect), ECG, during pre-placement and periodical examinations give the details of the same. Details regarding last month analyzed data of above-mentioned parameters as per age, sex, duration of exposure and department wise.	Thejo Engineering Ltd is proposed pre-placement and periodical examinations schedules and Surveillance Health Monitoring programs suitably planned will be implemented. The details are provided in Chapter 10, Section 10.7
	iii. Details of existing Occupational & Safety Hazards. What are the exposure levels of hazards and whether they are within Permissible Exposure level (PEL) if these are not within PEL, what measures the company has adopted to keep them within PEL. So that health of the workers can be preserved.	Details of Occupational Health Impacts and Safety Hazards are provided in Chapter 10, Section 10.7.8 & Table 10-4 . The Health Risk Assessment Matrix is provided in Table 10-6 . Thejo Engineering Ltd is adopted measures is provided in Chapter 10, Section 10.7
	iv. Annual report of health status of workers with special reference to Occupational Health and Safety	Thejo will be maintained the same after project implementation of the proposed project with

S. No	Terms of Reference	Compliance
		special reference to Occupational Health and Safety.
9	Corporate Environment Policy	
	i. Does the company have a well laid down Environmental Policy approved by its Board of Directors? If so, it may be detailed in the EIA report	M/s Thejo Engineering Ltd has established an Environmental Policy enclosed as Annexure-19 .
	ii. Does the Environment Policy prescribe for standard operating process/ procedures to bring into focus any infringement/ deviation/ violation of the environment or forest norms/ conditions? If so, it may be detailed in the EIA	The proposed Environment Policy recommended standard operating procedures to bring into focus any abnormality or violation of the environment.
	iii. What is the hierarchical system or administrative order of the company to deal with the environmental issues and for ensuring compliance with the environmental clearance conditions? Details of this system may be given.	A hierarchical system is proposed, and details are provided in Figure 10-1 .
	iv. Does the company have a system of reporting non-compliances/ violations of environmental norms to the Board of Directors of the company and/or Shareholders or stakeholders at large? This reporting mechanism shall be detailed in the EIA report	Environmental Management Cell is formed to report non-compliances of environmental norms. Details are provided Chapter 10, Section 10.3 & Figure 10-1 .
10	Details regarding infrastructure facilities such as sanitation, fuel, restroom etc. to be provided to the labour force during construction as well as to the casual workers including truck drivers during operation phase.	Temporary sheds along with sanitation facilities will be provided for construction workers. Quarters will be provided for employees during the operational phase. The site layout is enclosed as Annexure-12
11	Enterprise Social Commitment (ESC)	
	Adequate funds (at least 2.5% of the project cost) shall be earmarked towards the Enterprise Social Commitment based on public Hearing issues and item-wise details along with the bound action plan shall be included. Socio-Economic development activities need to be elaborated upon.	As per the OM F. No. 22-65/2027 -IA.III dated 1st May 2018 and its amendments, the project Proponent is allocated 1.5 % of the total project cost is 1,60, 49,985/- (Say 1,60,50,000) as the Project cost 10699.99 Lakhs. The proposed plan and activities will change according to the issues raised during the Public Hearing as per the above OM revised on 20.09.2020.

S. No	Terms of Reference	Compliance
		Detailed information is provided in Chapter 10, Section 10.7.11.
12.	Any litigation pending against the project and/ or any direction/ order passed by any Court of Law against the project, if so, details thereof shall also be included. Has the unit received any notice under section 5 of the Environment (Protection) Act, 1986 or relevant Sections of Air and Water Acts? If so, details thereof and compliance /ATR to the notice(s) and present status of the case.	Nil as per project proponent information.
13.	A tabular chart with index for points wise compliance of above TOR.	A tabular chart with index for points wise compliance of ToR is provided in Chapter 1, Section 1.10.
Additional Terms of Reference		
i	Please submit certified Compliance report of the existing EC/CTO from the regional office of IRO, MOEFCC/SPCB	The unit operates with a valid Consent to Operate (CTO). The self-compliance report has been submitted to the Tamil Nadu Pollution Control Board (TNPCB), and the report along with the submission acknowledgment is enclosed as Annexure-27.
ii	Copy of valid CTO of the existing unit	The latest consent orders are provided by Annexure-4.1
iii	Public Hearing Report containing details such as (a) Public Hearing Report containing details such as (i) Details of advertisements (ii) Copy of forwarding letter of SPCB to MoEF&CC alongwith public hearing proceedings (iii) Attendance sheets (iv) Action plan to address the issues raised during public hearing along with budget allocation and time line. (v) Copy of written grievances/submissions to SPCB if any, (vi) PI also submit action plan to address the issues raised in such representation.	The details will be provided after the Public Hearing. Currently, the draft Environmental Impact Assessment (EIA) report has been prepared and will be submitted for the Public Hearing.

1.10.1.3 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.

1.10.1.4 The basic structure of EIA report

Chapter No.	Description of Content
Chapter 1	Introduction Give the brief outline of the project as details of need of the EIA report, project proponent, nature and size of the project, location of the project, and need of project, scope of EIA study and applicable environmental regulations and standards
Chapter 2	Project Description The chapter gives details about the type and capacity of the project, need of the project, project location, layout & area break up, details of product, raw materials, manufacturing process and technology description, details of machinery and equipment, resource requirements, details on aspects of the project causing environmental impacts and mitigation measures incorporated to meet the standards.
Chapter 3	Description of the Environment The chapter describes the study area, study period, methodology and components selected for baseline studies, baseline status for ambient air, water, soil, socioeconomic, land use and meteorology of the study area within 10.0 km radius.
Chapter 4	Anticipated Environmental Impacts and Mitigation Measures In this chapter, the anticipated environmental impacts due to proposed project activities are identified, analyzed, and assessed and thereafter the mitigation measures for the adverse impacts are proposed. The significance of impacts is determined. This chapter is prepared based on Chapter 2 & Chapter 3 by correlating the activities under proposed project and their impacts on receiving environmental attributes.
Chapter 5	Analysis of Alternatives (Technology/site) The chapter describes the alternative sites and the proposed factors for locating at the mentioned location. This would also describe the alternative technologies if any for manufacturing proposed products.
Chapter 6	Environmental Monitoring Programme The chapter proposes the post project monitoring plan and the budgetary provisions for the various environmental components.
Chapter 7	Additional Studies This chapter would highlight any additional studies required for the proposed project, i.e Public Consultation. Risk Assessment, Disaster Management Plan, R&R Studies and any additional recommended during the Scope stage/ToR.

Chapter 8	Project Benefits Highlights the direct and indirect benefits on the physical infrastructure and social infrastructure due to proposed projects.
Chapter 9	Environmental Cost Benefit Analysis Highlights environmental value enhancement and benefits thereof if recommend in scoping stage only if recommended during scoping stage.
Chapter 10	Environmental Management Plan The chapter proposes the Environmental Management Plan highlighting the mitigation measures and roles and responsibilities of the management. This would include specific time frames for completion, resources required and specific responsibility.
Chapter 11	Summary and Conclusion Summarize the entire report and conclude the summary of the EIA report.
Chapter 12	Disclosure of Consultants Engaged Provides the brief profile of the EIA consultant organization and EIA project team for the current study.

1.11 Applicable Regulatory Framework

The following Acts and Rules are applicable to the proposed project:

The details of Acts and Rules with applicability to the proposed project are given in **Table 1-4**.

Table 1-4 Applicable Acts and Rules

S. No	Act and Rules applicable	Purpose	Objective	Applicability
1	EIA Notification 2006 and its amendments.	New projects, Expansion modernization, change in product mix of the existing project	Protection and Improvement of the Environment	As the proposal is for new project scheduled under category 5(f), Environmental clearance from Ministry of Environment, Forest & Climate Change is applicable
2	The Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989 and its amendments	Handling of Hazardous Chemicals	Regulate the manufacture, storage and import of Hazardous Chemicals	Preparation/ update of On-site Emergency Preparedness Plan and submission to Factory inspectorate. Preparation/ update of Safety Report and submit to Factory inspectorate. Preparation of Material Safety Data Sheet.
3	The Water (Prevention and Control of Pollution) Act, 1974 and its amendments.	New projects, Expansion modernization, change of product mix of the existing project, Existing plants	Prevention, control and abatement of water pollution	Consent to Establish and Consent to Operate from State Pollution Control Board to be obtained for new product
4	The Air (Prevention and Control of Pollution) Act, 1981 and its amendments.	New projects, Expansion /modernization, change of product mix of the existing project, Existing industries	Prevention, control and abatement of air pollution	Consent to Establish and Consent to Operate from State Pollution Control Board to be obtained for new product
5	The Hazardous and other waste (Management, Handling and Transboundary Movement Rules) 2016 and its amendments.	Management, Handling and Transboundary Movement of Hazardous waste	Prevention, Control and abatement of pollution	Hazardous waste Authorization from State Pollution Control Board to be obtained

S. No	Act and Rules applicable	Purpose	Objective	Applicability
6	The solid Waste Management Rules, 2016	Management of solid (non-hazardous) waste as per the provisions of the Rule	Prevention control and resource conservation	Proper collection, segregation, and disposal as per Rules
7	The Environmental (Protection) Act, 1986 and its Amendments	New projects, Expansion/modernization change of product mix of the existing project, Existing industries	Protection and Improvement of the Environment	Environmental Standards as specified are to be complied with. Submission of Environment Statement on yearly basis to TNPCB
8	The Noise Pollution (Regulation and Control) Rules, 2000	New projects, Expansion/modernization change of product mix of the existing project, Existing industries	To protect the workers and public from noise related problems	Noise control measure. Comply with Noise standards and submission of monthly report to TNPCB
9	The Factories Act 1948 and its amendments.	New projects, Expansion/modernization change of product mix of the existing project, Existing industries	Control of workplace environment, and providing for good health and safety of workers	Factory License from Factory inspectorate.
10	The Explosive Act, 1884	New projects, Expansion/modernization change of product mix of the existing project, Existing industries	Production, Storage and import of explosive substance in and around the project and provides the regulations for safety and environmental measures	Safety measures are compiled for the storage of chemicals in the plant as per PESO guidelines.

S. No	Act and Rules applicable	Purpose	Objective	Applicability
11	The Indian Boiler Act, 1923	New projects, Expansion/modernization change of product mix of the existing project, Existing industries	Boiler act contains the law related to registration and inspection is steam boiler	The Act is applicable to all Boiler (Water tube and fire tube boilers)
12	The Central Motor Vehicle Act, 1988	New projects, Expansion/modernization change of product mix of the existing project, Existing industries	Check the pollution load of vehicles inside the plant	Adequate environmental measures are put in place to check the vehicular emissions.

CHAPTER – 2

PROJECT DISCRPTION

(The chapter has the details about the type and capacity of the project, need of the project, project location, layout & area break up, details of product, raw materials, manufacturing process and technology description, details of machineries and equipment, resource requirements, details on aspects of the project causing environmental impacts and mitigation measures incorporated to meet the standards.)

2 PROJECT DESCRIPTION

2.1 Introduction

This chapter presents the salient features of the project including process description, raw material requirement, utilities and services, infrastructure facilities and likely environmental impacts due to proposed expansion project.

2.2 Type Project

M/s. Thejo Engineering Limited is an existing facility located at Survey No. 176/3, 181/5, 181/6A, 169/2B, 169/4D, 170/2B, 170/3B, 170/4, 175/3, 176/1, 176/2, 181/1B, 175/4B and 175/5B, Jaganathapuram Road, Irullipattu village, Ponneri Taluk, Thiruvallur Dist, Tamil Nadu State 600 067.

Project proponent has currently manufactured 199.99 TPM of Rubber Molded products (11 Nos) and 2 Nos of Adhesive (Hot & cold) of 38.5 KL/Month. The existing facility was established in 16916.46 Sq. m of area. The existing project is operating with valid consent orders vide PROCEEDINGS NO.F.0380GMP/RS/DEE/TNPCB/GMP/W/2024 valid up to March 31st, 2026. The Chronology of consent orders is shown in **Table 1-1**.

Now, M/s. Thejo Engineering Limited proposed expansion in production of Rubber molded products (199.99 TPM to 486 TPM) and Adhesives (38.5 KL/Month to 100 KL/Month) & proposed PU Products manufacturing with production capacity of 6.352 TPM due to increase in the demand of the existing and proposed projects along with enhancement of manufacturing facilities with additional area of 11.46 Acres (46364.97 Sq. m) The total area after expansion is 15.63 Acres (63221.43 Sq. m). The project cost for the proposed expansion proposal is 10699.99 Lakhs.

The proposed project is termed under Schedule 5(f) Synthetic Organic Chemicals., Category A.’ Since the project site is categorized as a non-Planned area, it is attracting Public Consultation.

2.3 Need for the project

The world population is growing at an alarming rate. In the Indian sub-continent population growth is more than that of developed countries. To meet the needs and comforts of ever-growing population industrialization became inevitable.

The Indian rubber industry is an extremely significant part of the Indian economy. India is the world's third-biggest producer of natural rubber, its fourth-largest consumer of natural rubber, and its fifth-largest consumer of both natural and synthetic rubber combined.

The world production of rubber was very unstable during the last few years. Comparatively, India's production of rubber is consistent at the rate of 6% per annum. The Rubber industry in India is growing with its roots deeper. India is the 3rd largest consumer, while the largest producer of natural rubber in the world. The growth of rubber industry in India plays a

significant role in the global economy. These factors along with high growth of automobile production with many large and medium industries has made India one of the fastest growing economies globally.

In view of market scenario of rubber and PU products, particularly assured supply of desired quantity and quality to meet quality production as well as better control over the process and the uninterrupted supply of rubber production, Thejo has proposed expansion in production and facility expansion.

2.4 Project Location (maps showing general location, Specific Location, Project Boundary & Project site Layout.

The proposed project area for expansion is 63221.43 Sq. m (15.63 Acres). The site is located at Survey No. 176/3, 181/5, 181/6A, 169/2B, 169/4D, 170/2B, 170/3B, 170/4, 175/3, 176/1, 176/2, 181/1B, 175/4B and 175/5B, Jaganathapuram Road, Irullipattu village, Ponneri Taluk, Thiruvallur Dist, Tamil Nadu State 600 067 at longitude 80°9'42.48"E and latitude 13°16'19.29"N. The layout of the project site is enclosed as **Annexure-13**. The location map of the Project site is shown in **Figure 2-1** and Google imageries of 1km, 5Km & 10Km radius of the project site is shown in **Figure 2-2** to **Figure 2-5**.

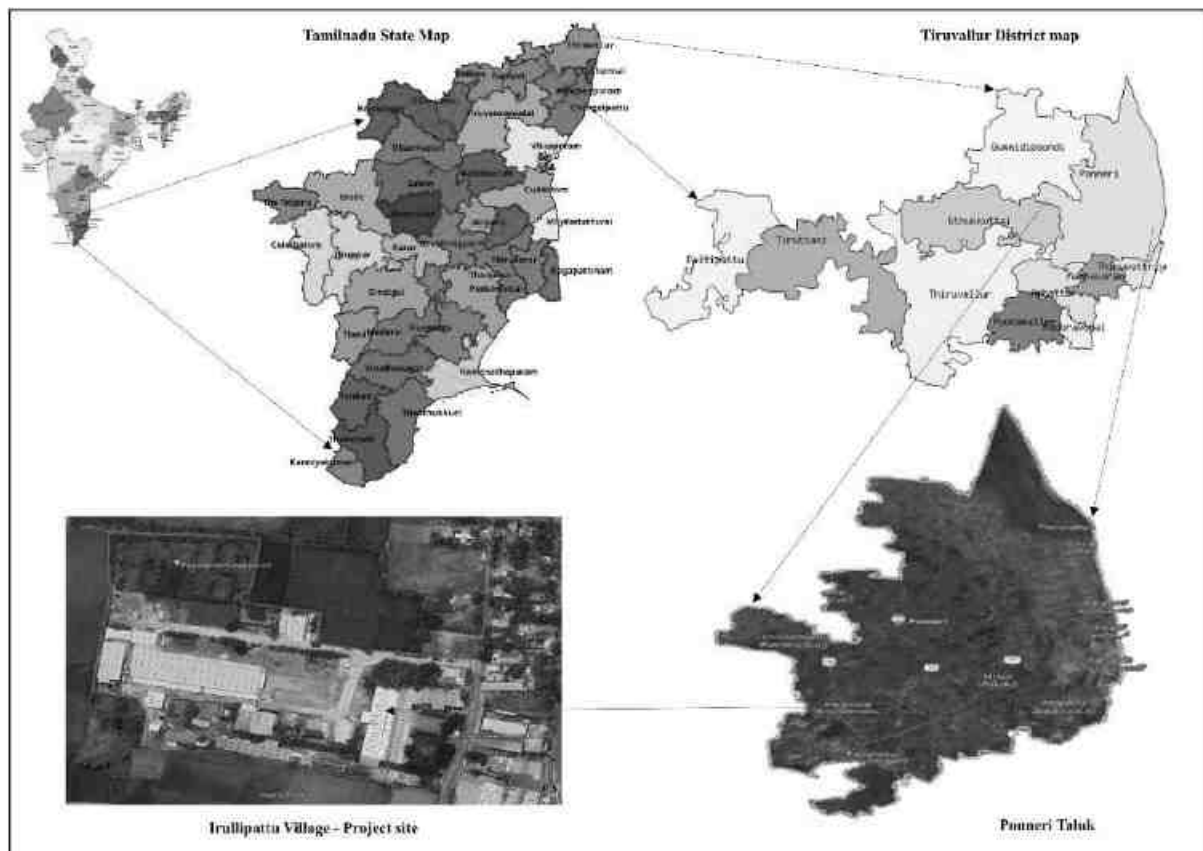


Figure 2-1 Location map of the Project site



Figure 2-2 Boundary geo coordinated google Imagery of the Project Site

Table 2-1 Boundary Coordinates of the project site

Boundary pillar No.	Longitude	Latitude
1	80.16010642	13.27364856
2	80.1614827	13.2734822
3	80.16156952	13.27354586
4	80.16141244	13.2729657
5	80.16148749	13.27303273
6	80.16149029	13.27294542
7	80.16206533	13.27288386
8	80.16213449	13.27249526
9	80.1625685	13.27235313
10	80.16267207	13.27222995
11	80.16267207	13.27222995
12	80.16326729	13.27213576
13	80.16329586	13.27166546
14	80.16295082	13.27109308
15	80.1609661	13.27149013
16	80.16063019	13.27155293
17	80.1605451	13.27162996
18	80.16054759	13.27188067
19	80.16054759	13.27188067
20	80.16006691	13.27216299
21	80.16035614	13.27310635



Figure 2-3 Google Satellite Imagery of 1km radius



Figure 2-4 Google Satellite Imagery of 5 km radius



Figure 2-5 Google Satellite Imagery of 10 km radius



Figure 2-6 Environmental sensitive areas within 15 km radius of the project site

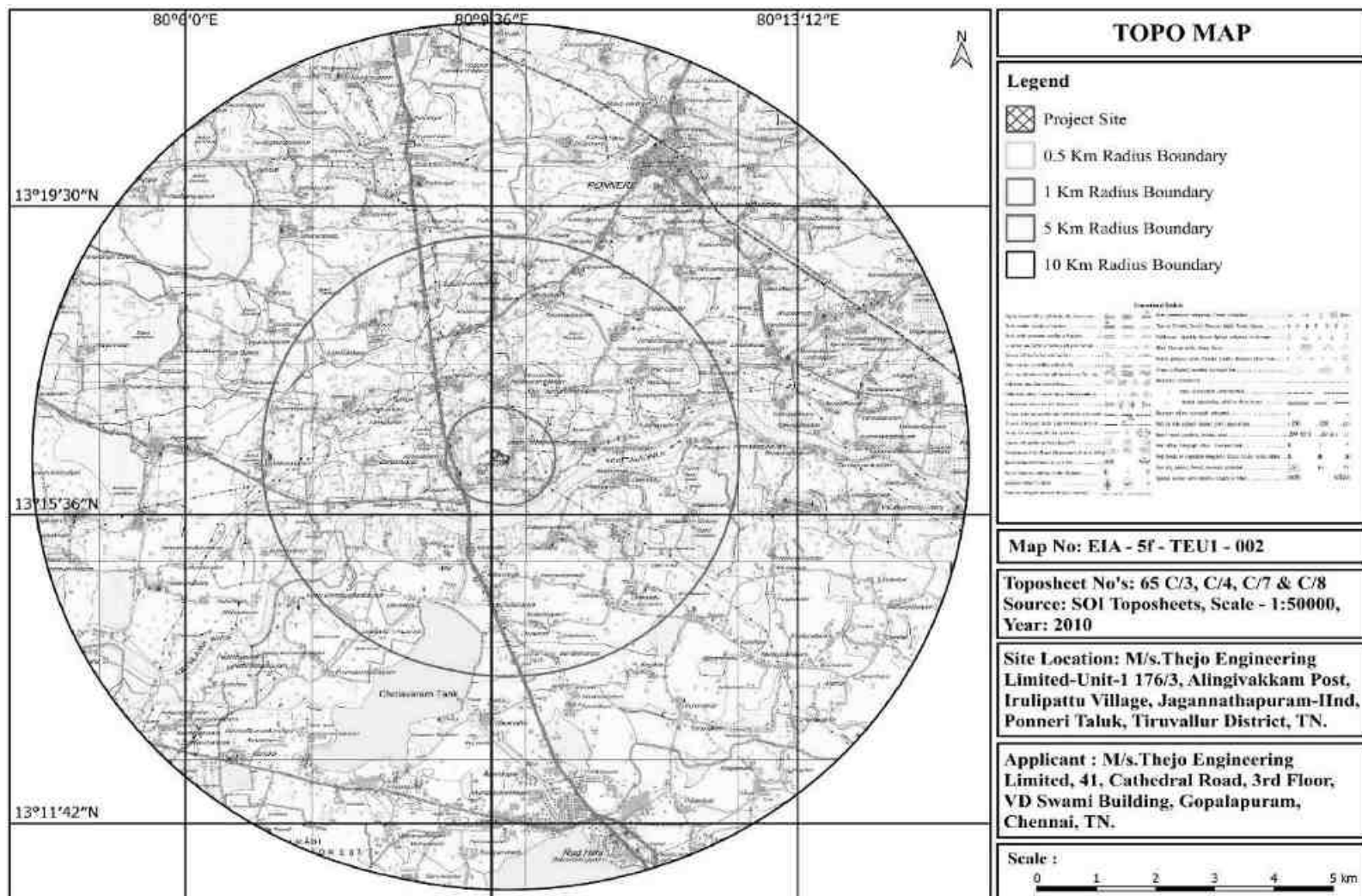


Figure 2-7 10km radius Topo map of the project

2.4.1 Existing Environmental Setup

The major industries within a 10km radius from the project site along with their distance and direction are given in **Table 2-2**. The site does not fall within the CRZ area. The details of the nearest human settlement from the project site are provided below in the

Table 2-3.

Table 2-2 List of Industries within 10km radius of the project site

S. No	Name	Distance (~km)	Direction
1	Heart Steel	2.12	NNW
2	Sriram Industries	2.27	NNW
3	Proconnect Integrated Logistics	13.78	NW
4	Keld Ellentoft India Pvt Ltd	13.87	NW
5	Nordex India Pvt Ltd	13.74	NW
6	Samkit Imaging Systems Pvt Ltd.	13.83	NNW
7	Bridge N Bond Factory	13.66	NNW
8	Super Stahl India GMPD	13.01	NNW
9	Shree Shyama Traders	12.62	NNW
10	Aar Pee Jee Steel Industries	12.44	NNW
11	Performance Products and Services	12.48	NNW
12	Premium fats Pvt Ltd	12.73	NNW
13	Suntex processing mill	11.99	NNW
14	Aachi Masala Foods Pvt Ltd	11.97	NNW
15	Madras Radiators and Pressings Ltd	11.67	NNW
16	Don Construction Chemicals (India) Limited	11.12	NNW
17	Saran Machine Plaza	7.83	N
18	Yanmar Engine Manufacturing India	7.97	N
19	Track Design India	7.86	N
20	Usui susira international pvt ltd	7.79	N
21	Nissei electric India P ltd	7.64	N
22	Varsha Forgings	7.77	N
23	Sri Vijayalakshmi Snuff Products	7.56	N
24	Mod Forge Pvt Ltd	10.37	N
25	Quantum minerals	7.23	N
26	Rmd Kwikform India Pvt Ltd	7.18	N
27	Hari Vishnu Dairy	7.31	N
28	Kannika Aqua Products	7.22	N
29	Adhitya Precast Products	7.94	NNW
30	Astro Aquaculture	7.62	NNW
31	BGR Energy Systems Ltd	6.99	NNW
32	Konkan speciality poly products	7.89	NNW
33	IndoSpace Logistic Park Puduvoyal	6.2	NNW
34	Sheenlac Paints (Unit 5)	7.31	NNW
35	Madras Hardtools Pvt. Ltd.	6.25	NNW
36	DB Schenker	5.17	NNW

37	Agra Casting Pvt Ltd	5.42	NNW
38	Kamachi Foundries Ltd	5.37	NNW
39	Farwood Industries Ltd	5.29	NNW
40	Chopra Lam Products Pvt.Ltd.	5.91	NNW
41	Nice Steel	6.03	NNW
42	Shuchi Friction Additives Pvt Ltd.	6.19	NNW
43	El Kay Ess	3.87	NNW
44	DB Schenker Ind Pvt Ltd.	3.78	NNW
45	MGTuff Toughened Glass Factory	4.33	NNW
46	VAS Agro	4.37	NNW
47	PMP Iron & Steels (India) Limited	3.88	NNW
48	GBR Metals Pvt Ltd	3.9	NNW
49	Rubino Industries Pvt.Ltd	3.52	NNW
50	Thirupathy Bright Industries	13.01	NNW
51	Tamil Nadu Coke and Power pvt ltd	12.7	NNW
52	Redington (India) Limited	12.22	NNW
53	Blendsteel Engineering Private Limited	12.51	NNW
54	Rice Mill	11.93	NNW
55	Nelcast Limited	3.56	NNE
56	Rane Engine Valve Limited (REVL) - Plant 3	3.86	N
57	Chennai Minerals Processers	13.63	NNW
58	Chitrakoot Steels & Power Pvt Ltd.	13.6	NNW
59	Suryadev Alloy and Power P.Ltd.	13.22	NNW
60	Tech Services	7.56	NNW
61	GRT Manufacturing Unit	3.87	NNW
62	Hanuman Steel Industries	3.68	NNW
63	Way Cool	2.99	NNW
64	Shree Kamakshi Steel	3.82	NW
65	ITC Limited	13.67	NW
66	Nippon Express India P.Ltd	5.55	NNW
67	Sri AStro Training center	6.51	N
68	Emcarb Alloy P.Ltd	3.67	NNE
69	Sree Balaji Steel Industries	2.9	N
70	Jumbo Bags Limited	2.64	NNW
71	Trakk Realities LLP	5.21	NNW
72	Vimplex India P.Ltd	10.6	W
73	AGS Alluminium Alloy P.Ltd.	11.92	NNW
74	Nprdex India P.Ltd	13.95	NW
75	Aabon Smoit Alloys P.ltd.	0.35	NNE
76	Zen Overseas Pvt.	0.75	NNE
77	Sri BALaji Casting P.Ltd.	0.01	E
78	Prince Pipes & Fittings Ltd.	0.1	S
79	Venkatachalapathi Paper Mills Pvt Ltd	0.33	ESE
80	Vishnupria Paper Mill Private Limited	0.38	ESE
81	bokaria reinforcing	0.23	S

82	Interpack Industries	0.25	SSE
83	Alpha polymers	0.54	SSE
84	Sree Sreenivasa Paper Mill	0.55	S
85	Superfil Products (P) Ltd-Unit2	0.54	S
86	Superfil Products (P) Ltd	0.52	S
87	Thejo Engineering Limited Unit 3	0.55	SSW
88	Sri Balaji Castingsd P.ltd.	0.6	SW
89	MBM Engineering Technologies	0.91	WSW
90	Ergomax India P.Ltd.	1.21	W
91	Conne Chairs Factory	1.15	WSW
92	MN Horological Industries	1.13	WSW
93	Raj Hair Int.P.Ltd.	0.96	W
94	Hiranandhini Indurtial Parks	1.4	W
95	Aadhithi Industries	1.19	W
96	Indrowud NFC P.Ltd.	0.86	W
97	Sree sumangala metas	0.75	WNW
98	Herrenknecht India Pvt. Ltd	1.06	W
99	Nadi Airtechnics Pvt. Ltd. - Unit - 5	1.1	WNW
100	Grobest Plant	1.31	NW
101	BGR Eneergy	1.43	NW
102	Neminath Wood industry	2.5	W
103	Sri Balaji Warehouse	2.66	W
104	Golden rock granites	2.73	W
105	Vaata Smart Ltd.	3.09	W
106	HIL	5.16	W
107	Pennas indusrties Ltd.	5.76	W
108	St peter paul seafoods exporting	5.84	W
109	Global International	5.96	W
110	Flora Laminate	6.79	W
111	TNS Heavy Engg Ltd.	7.75	W
112	Butterfly Appliances	8.27	W
113	Kumar Agro refinery p.ltd.	10.57	W
114	Patanjali Foodss Ltd.	9.88	W
115	Volvo Auto India Pvt.	3.37	WSW
116	APM Terminals Warehouse	3.43	WSW
117	PA Footwear Ltd.	3.51	WSW
118	Scinntc Supply Chain Solutions Private Limited	3.65	WSW
119	NTC Logistics	3.71	WSW
120	IFDC Chennai	7.02	SW
121	Leap India Ltd.	13.16	WSW
122	Panasonic India P.Ltd.	8.37	SSW
123	Dunamis Machines International Pvt Ltd	8.86	SSW
124	Wilson power & Distribution	3.55	SE
125	Cream line dairy products	3.52	SE
126	Jersey Milk Processing Plant	3.67	SE

127	Roto Polymers	3.65	SE
128	Chandra CFS & Terminal Operator P.Ltd.	7.4	E
129	Raj Petro Specialities	14.17	SE
130	Nacto Pharma LTd	14.24	SE
131	Toshiba JSW Pwer Systems Pvt Ltd.	13.74	SE
132	IWL India Ltd	8.72	WSW
133	Vaigai Agri Tech	3.66	NNW
134	Gnet Impex Pvt Ltd	2.99	NNW
135	Uma snuff co	3.87	NW
136	Ragam Polymoulds pvt ltd	3.96	NW
137	Arvensis Jayaam India Private Limited	13.67	NW
138	D2H PET Bottles	10.83	NW
139	Linfox _ Hindustan Unilever Limited	10.1	WNW
140	Nestle India Pvt.Ltd	10.44	WNW

Table 2-3 Nearest Human Settlement

S. No	Name	Distance (~km)	Direction
1	Cholavaram	2.79	S
2	Ponnerl	6.43	NNE
3	Padinallur	6.65	S

2.4.2 Project Cost

The budget for expansion in production of Rubber molded products (199.99 TPM to 486 TPM) and Adhesives (38.5 KL/Month to 100 KL/Month) & proposed PU Products manufacturing with production capacity of 6.352 TPM due to increase in the demand of the existing and proposed projects along with enhancement of manufacturing facilities with additional area of 11.46 Acres (46364.97 Sq. m) is approximately with total project cost INR 10699.99 Lakhs. Project cost and break up are given in **Table 2-4**.

Table 2-4 Total capital investment for proposed project cost

S. No	Description	Lakhs (INR)		
		Existing	Proposed	After expansion
1	Land (Free hold)	11.35	0.00	11.35
2	Land (Lease)	0.00	3200.65	3200.65
3	Building	882.48	2033.55	2916.03
4	Plant & Machinery	1465.80	1706.46	3172.26
5	Environnment Management Plan (STP, ETP & APC Mesures)	19.77	41.00	60.77
6	Other Assets	1184.94	153.90	1338.84
Total		3564.34	7135.56	10699.99

2.5 Proposed schedule for approval and implementation

Tentative project implementation schedule with respect to various activities after Environmental Clearance is issued from EAC-MOEFC is given in **Table 2-5**.

Table 2-5 Project Implementation Tentative Schedule

S.No	Activity	Nov-24				Dec-24				Jan-25				Feb-25				Mar-25				Apr-25				May-25				Jun-25				Jul-25			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4				
1	Obtaining Environmental Clearance (EC)				⊕																																
2	Obtaining Statutory Permissions (CTE)							⊕																													
3	Site Development & Greenbelt development																																				
4	Construction of Building																																				
5	Procurement of Resources & Utilities																																				
6	Procurement of Equipments & Machineries																																				
7	Installation of Equipments & Machineries																																				
8	Instrumentation Control																																				
9	Piping, Mechanical & Electrical work																																				
10	Supporting infrastructure development																																				
11	Recruiting technical team for operations																																				
12	Obtaining Statutory Permissions (CTO)																																	⊕			
13	Commissioning of the project																																				
	Planning																																				
⊕	May delay due to the Statutory Authorities delays																																				

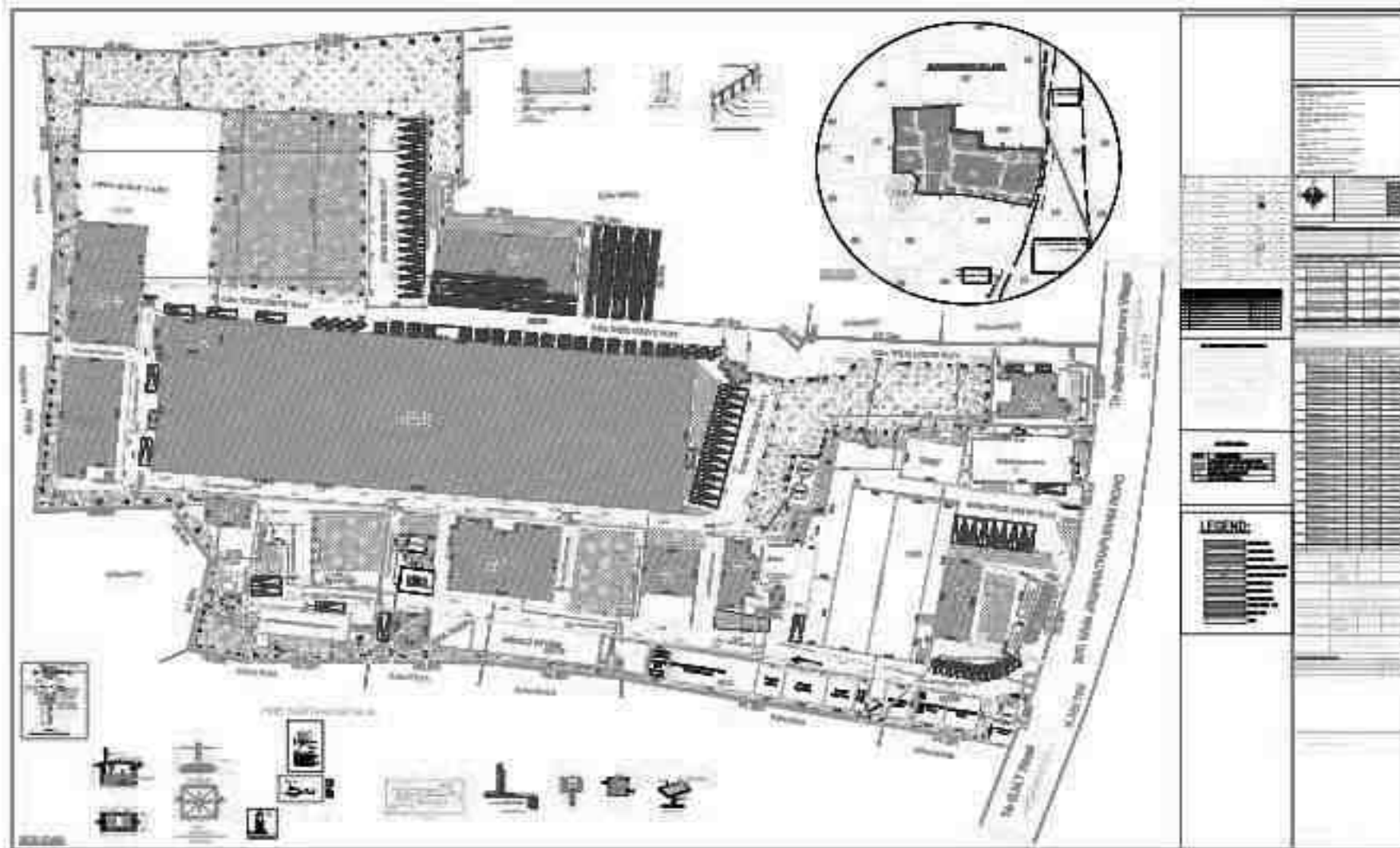


Figure 2-8 Project Site Layout Plan



Figure 2-9 Project Site Photographs

2.6 Magnitude of Operation (Including Associated activities required for the project.

2.6.1 Resource Requirements

2.6.1.1 Land requirements

The total project area after expansion will be 15.63 acres (63,221.43 sq. m), comprising the existing area of 4.18 acres (16,916.97 sq. m) and the proposed expansion area of 11.46 acres (46,364.97 sq. m). After the expansion, the greenbelt will cover 33% of the total area, amounting to 5.16 acres (20,866.17 sq. m). The layout plan of the existing project site is attached as **Annexure-12**. Project layout after expansion is enclosed as **Annexure-13** land existing breakup details is tabulated in **Table 2-8**. The Greenbelt area and Layout plan of the project site are attached as Annexure-16. The proposed built-up area details are given in **Table 2-9**. Project site layout is shown in **Figure 2-8**.

Table 2-6 Existing and Proposed Land Ownership details of the project

S. No	Description	Survey Numbers	Area Acres	Ownership and Lease details
1	THEJO ENNGINEERING OWL LAND	175/5B, 181/1B, 175/4B, 176/3, 181/5, 181/6A	4.18	Thejo Engineering Limited
2	LEASE LAND DETAILS	169/2B	1.30	Dr. S. Aravind (Lessor) who gave lease to M/s. Thejo Engineering Limited on 13-Jan-2022 for the period of 25 years commencing from 01.01.2022 to 01.01.2047
3		169/4D	0.44	
4		170/2B	1.53	
5		175/3	0.23	
6		176/1	2.90	
7		176/2	0.43	
8		170/2B	1.16	Dr. S. Aravind (Lessor) who gave lease to M/s. Thejo Engineering Limited on 1-Jan-2024 for the period of 23 years commencing from 01.01.2024 to 01.01.2047
9		170/4	3.45	
Total Land area			15.63	

Table 2-7 Land area breakup details

S. No	Description	Existing Area			Proposed Area			After Expansion		
		Sq. m	Acres	%	Sq. m	Acres	%	Sq. m	Acres	%
1	Plinth Area	6201.29	1.53	36.66	16424.95	4.06	35.42	22626.24	5.59	35.79
2	Paved /Road area	3157.32	0.78	18.66	6463.00	1.60	13.94	9620.32	2.38	15.22
3	Green Belt Area + OSR	4104.02	1.01	24.26	16762.15	4.14	36.15	20866.17	5.16	33.00
5	Surface Parking Area	1259.74	0.31	7.45	3193.06	0.79	6.89	4452.8	1.10	7.04
7	Open Land	2194.09	0.54	12.97	3522.81	0.87	7.60	5655.9	1.40	8.95
Total		16916.46	4.18	100.0	46365.97	11.46	100	63221.43	15.63	100.00

Table 2-8 Existing Built up area breakup details

S. No	Description	Existing Built-up area (Sq. m)
1	Factory Block, Raw material Storage, Material Store, Store, Boiler Shed Utility Block & Mold Storage	4491.24
2	Adhesive manufacturing Plant, Good Shed, Production Unit, Solvent Storage tank	1710.05
Total		6201.29

Table 2-9 Proposed Built up area breakup details.

S. No	Block Details	Description	Built-up area (Sq. m)
1	Block 1	Ground Floor	10824.73
2	Block-2	Ground Floor	865.57
3	Block-3	Ground Floor	188.7
4	Block-4	Ground Floor	264.73
5	Block-5	Ground Floor	68.67
6	Block-6	Ground Floor	804.02
7	Block-7	Ground Floor	1095.92
8	Block-8	Ground Floor	62.57
9	Block-9	Ground Floor	321.26
10	Block-10	Ground Floor	369.71
11	Block-11	Ground Floor	40.02
12	Block-12	Ground Floor	1007.35
13	Block-13	Ground Floor	146.76
14	Block-14	Ground Floor	324.94
15	Block-15	Ground Floor	40.00
Total			16424.95

2.6.1.2 Water requirement

The water requirement for the proposed project is 116 KLD (Fresh water is 80 KLD and recycled 36 KLD). Water requirements for the proposed project will be sourced from Private tankers. Total water requirement is given in **Table 2-10**. Total Water requirement and Breakup are shown in **Table 2-10**. Water balance charts for the proposed project are given as **Figure 2-10**.

Table 2-10 Total water requirement

S. No	Description	Proposed
1	Total water requirement (KLD)	116
2	Fresh water requirement (KLD)	80
3	Recycled water (KLD)	36
4	Source (Fresh water)	Private tankers

Table 2-11 Total Water Requirement and Breakup

S. No	Water requirement	Total	Input (KLD)		Output (KLD)		Remarks
			Fresh	Recycled	Loss/cons umption	Effluent	
1	Process & Coolant water	2.0	2.0	-	1.0	1.0	1 KLD will be sent to Proposed ETP
2	Cooling Tower	1.0	1.0	-	-	1.0	19 KLD is in circulation of CT, 1KLD of makeup will be added daily
3	Raw water for RO Plant Boiler Consumption.	55.0	55.0	-	44.0	11.0	55 KLD is the daily consumption for Boiler. 10 KLD of RO Rejects & Boiler blowdown 1.0 KLD will be sent to proposed ETP.
4	Fire hydrant water	1.0	-	1.0	1.0	-	Evaporation Loss
5	Domestic	27	9.0	18.0	4.0	23.0	Will be sent to MBBR STP treated water will be used for GB & Flushing
6	Greenbelt	30.0	13.0	17.0	30.0	-	Percolation & Evaporation Loss
Total		116.0	80.0	36.0	80.0	36.0	
Input =Out put			116.0		116.0		

Note: Cooling Tower and Boiler recirculation/condensate water not considered for the daily water requirement.

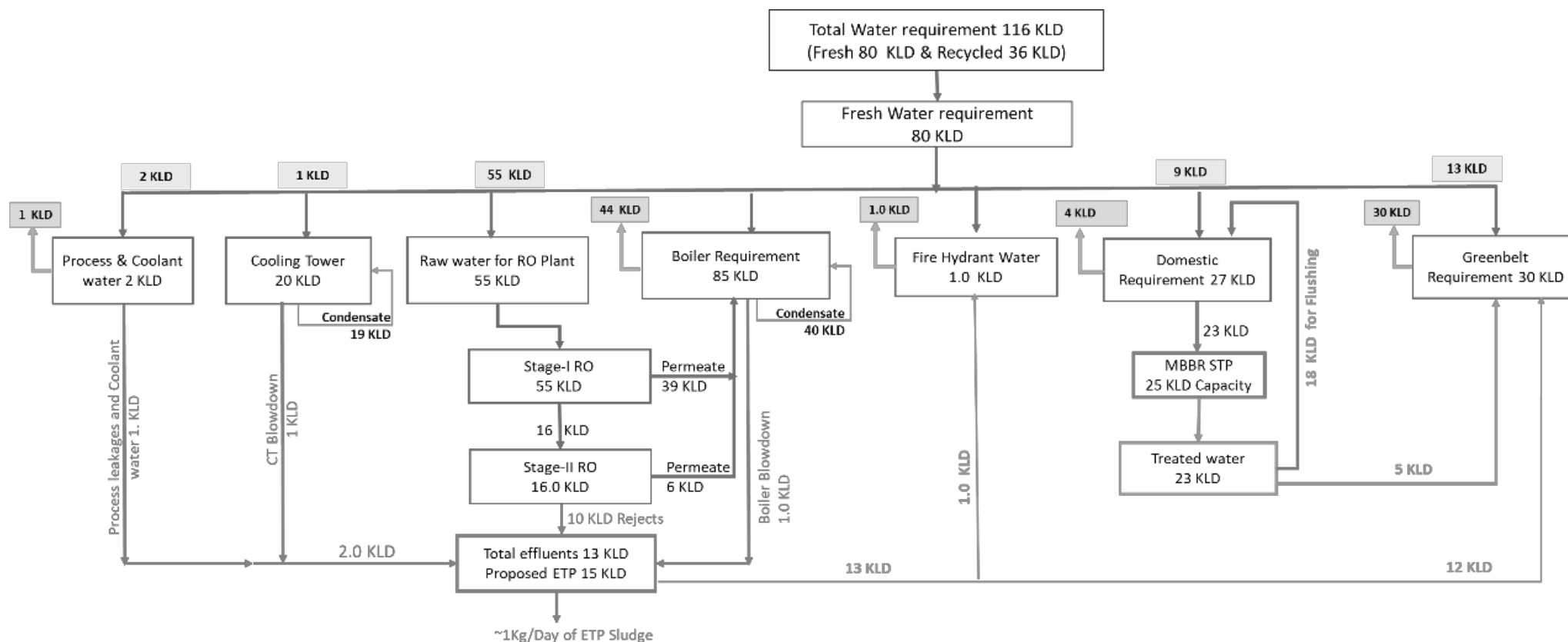


Figure 2-10 Water Balance Chart for after Expansion

2.6.1.3 Power & Energy Requirement

The power requirement is sourced from TANGEDCO. DG sets will act as the standby facilities and will be utilized in case of power failures. The details of power requirement and backup power facilities are given in **Table 2-12** & Fuel requirement is given in **Table 2-13**.

Table 2-12 Power requirement and Backup power facilities

S. No	Description	Existing	Proposed	After Expansion	Source
1	Power requirement (KVA)	950	250	1200	TANGEDCO
2	Backup_ (KVA)	1 x 250 KVA 1 X 500 KVA	No change	1 x 250 KVA 1 X 500 KVA	DG Sets
3	Boilers	2 X 2 Ton	1 x 6 Ton	2 X 2 Ton/hr 1 x 6 Ton/hr	In-House
4	Air Compressor	50 HP x 2 30 HP x 1 1.5 HP-x 1 3HP x 1 2 HP x 1 1.5 HP x 1	No change	50 HP x 2 30 HP x 1 1.5 HP-x 1 3HP x 1 2 HP x 1 1.5 HP x 1	In-House

Table 2-13 Fuel requirement

S. No	Fuel type	Existing	Proposed	After expansion	Source
1	HSD for DG Sets (LPM)	130	670	800	Nearby petrol pumps/ Outlets
2	Boiler (Briquettes) (T/Month)	260	No Change	260	Nearby outlets
3	Grease (Kg/Month)	25	--	25	Nearby outlets

2.6.1.4 Manpower requirements

The total manpower will be 600 nos' during operation phase. During construction phase 50 nos. Plant facilities run on all three shifts with a staggered weekly off. The breakup is given in **Table 2-14**.

Table 2-14 Total manpower breakup

S. No	Description	Construction Phase	Operation Phase		
		Temporary	Existing	Proposed	After Expansion
1	Non-Resident	50	250	350	600
Total		50	250	350	600

2.6.1.5 Raw Material requirements

All the raw materials required in manufacturing are procured either from local markets or imported. The raw materials and finished products will be transported by road. All chemicals used in the process are stored in a designated area with proper labels in the warehouse. Raw Material Requirement, Storage Capacity, Source and Mode of Transportation for Adhesives, Rubber Molded Products and PU Products is given in **Table 2-15**.

Table 2-15 Raw Material Requirement, Storage Capacity, Source and Mode of Transportation

S. No	List of Raw materials for Cold Adhesive	Kg/Month	Source	Mode of Transportation	Storage
1	Chloroprene rubber	11900	Domestic Market	Road	Sealed covered and storage in separate raw material warehouse
2	Resins	1400	Domestic Market	Road	HDPE Drums/Bags storage in separate raw material warehouse
3	Metal oxides	838	Domestic Market	Road	HDPE Bags storage in separate raw material warehouse
4	Antioxidants	306	Domestic Market	Road	HDPE Drums/storage in separate raw material warehouse
5	Wood Rosin	66	Domestic Market	Road	HDPE Drums/storage in separate raw material warehouse
6	Chlorub	537	Domestic Market	Road	HDPE Drums/Bags/storage in separate raw material warehouse
7	Green pigment	3	Domestic Market	Road	HDPE Bags/storage in separate raw material warehouse
9	INVRE	1075	Domestic Market	Road	Sealed covered and storage in separate raw material warehouse
10	Poly isocyanate	300	Domestic Market	Road	HDPE Drums/Bags storage in separate raw material warehouse
11	BPU compound	3069	Domestic Market	Road	HDPE Drums/Bags storage in separate raw material warehouse
12	Chemical SRL	4687	Domestic Market	Road	HDPE Drums/storage in separate raw material warehouse
13	Petroleum Solvents Ethyl acetate	43500	Domestic Market	Road	MS Tanks/storage in separate raw material warehouse

14	Monomeric Carbodiimide	26	Domestic Market	Road	HDPE Drums/storage in separate raw material warehouse
15	Diphenylmethane 4,4' - diisocyanate	1200	Domestic Market	Road	HDPE Drums/storage in separate raw material warehouse
16	Methylene Chloride	4900	Domestic Market	Road	MS Tanks
17	Ethyl acetate	850	Domestic Market	Road	MS Tanks
18	Triphenylmethane-4,4,4-triisocyanate triphenylmethane Tri isocyanate	337	Domestic Market	Road	MS Tanks
19	Chlorobenzene	6	Domestic Market	Road	MS Tanks
Total		75000			
S. No	List of Raw materials for Hot Adhesive	Kg/Month	Source	Mode of Transportation	Storage
1	Rubber compound	3205	Domestic Market	Road	Sealed covered and storage in separate raw material warehouse
2	Toluene	21795	Domestic Market	Road	MS Tanks
Total		25000			
S. No	List of Raw materials for Rubber Moulded Products	Quantity (TPM)	Source	Mode of Transportation	Storage
1	Carbon black	100	Domestic Market	Road	Sealed covered and storage in separate raw material warehouse
2	Zinc Oxide	2	Domestic Market	Road	HDPE Drums/storage in separate raw material warehouse
3	Steric Acid	1	Domestic Market	Road	HDPE Drums/storage in separate raw material warehouse
4	Aromatic oil	7.5	Domestic Market	Road	HDPE Drums/storage in separate raw material warehouse
5	Antioxidants	4	Domestic Market	Road	HDPE Drums/storage in separate raw material warehouse
6	Paraffin wax	6	Domestic Market	Road	HDPE Drums/storage in separate raw material warehouse

7	Reclaim rubber	20	Domestic Market	Road	Sealed covered and storage in separate raw material warehouse
8	Synthetic rubber	70	Domestic Market	Road	Sealed covered and storage in separate raw material warehouse
9	Resin	6	Domestic Market	Road	HDPE Drums/storage in separate storage area
10	Accelerator	7	Domestic Market	Road	Sealed covered and storage in separate raw material warehouse
11	Natural Rubber	179	Domestic Market	Road	Sealed covered and storage in separate raw material warehouse
12	Neoprene rubber	10	Domestic Market	Road	Sealed covered and storage in separate raw material warehouse
13	Solvent (Toluene)	140	Domestic Market	Road	MS Tanks
Total		552.5			
S. No	List of Raw materials for PU products	Quantity (TPM)	Source	Mode of Transportation	Storage
1	NEUTHANE 132	2	Domestic Market	Road	HDPE Drums/Bags storage in separate raw material warehouse
2	NEUTHANE 143S	1.3	Domestic Market	Road	HDPE Drums/Bags storage in separate raw material warehouse
3	NEUTHANE 235S	2	Domestic Market	Road	HDPE Drums/Bags storage in separate raw material warehouse
4	NEUTHANE 122	0.03	Domestic Market	Road	HDPE Drums/Bags storage in separate raw material warehouse
5	NEUTHANE 765HR	0.7	Domestic Market	Road	HDPE Drums/Bags storage in separate raw material warehouse
6	NEUTHANE 14BD CAT	0.045	Domestic Market	Road	HDPE Drums/Bags storage in separate raw material warehouse
7	NEUTHANE 163S	0.08	Domestic Market	Road	HDPE Drums/Bags storage in separate raw material warehouse
8	MOCA	0.7	Domestic Market	Road	HDPE Drums/Bags storage in separate raw material warehouse
9	ERASLIP - L	0.02	Domestic Market	Road	HDPE Drums/Bags storage in separate raw material warehouse

10	DEGASSING AGENT AF 100	0.009	Domestic Market	Road	HDPE Drums/Bags storage in separate raw material warehouse
11	CHEMLOK 218	0.016	Domestic Market	Road	HDPE Drums/Bags storage in separate raw material warehouse
Total		6.9			

2.6.2 Size of Magnitude of Operation

The manufacturing capacity of List of Existing and proposed products are given **Table 2-16**. List of Products, Market area and Mode of Transportation details are given in **Table 2-17**.

Table 2-16 List of Existing and proposed products

S. No	Name of the product	Units	Existing	Proposed	After Expansion
Adhesives:					
1	Adhesive (Cold)	KL/Month	25.0	50.0	75
2	Adhesive (hot)	KL/Month	13.5	11.5	25
Total		KL/Month	38.5	61.5	100
Rubber Molded Products:					
S. No	Name of the product	Units	Existing	Proposed	After Expansion
1	Compound Rubber	TPM	8.5	11.5	20.0
2	Solid Tyres (Solid rubber block)	TPM	2.5	1.5	4.0
3	Rubber bushes and accessories	TPM	0.61	2.39	3.0
4	Ideal ring	TPM	4.9	5.1	10.0
5	Screens	TPM	0.38	2.62	3.0
6	Insulation compound	TPM	3.4	4.6	8.0
7	Flexi seals	TPM	0.6	2.4	3.0
8	Diaphragms	TPM	1.2	3.8	5.0
9	Rubber Sheet	TPM	67.2	82.8	150.0
10	Liners	TPM	25.4	124.6	150.0
11	Rubber pads	TPM	85.3	14.7	100.0
12	Filtration	TPM	Nil	30.0	30.0
Total		TPM	199.99	286.01	486
PU Products:					
S. No	Name of the product	Units	Existing	Proposed	After Expansion
1	PU Products (Scraper Blade, Screen Panel, Liner, Flip Flop Mat, Small Products)	TPM	-	6.352	6.352
Total				6.352	6.352

Table 2-17 List of Products, Market area and Mode of Transportation

S. No	Name of the product	Units	After Expansion	Market area	Mode of Transportation
Adhesives:					
1	Adhesive (Cold)	KL/Month	75	Captive Use	Not applicable
2	Adhesive (hot)	KL/Month	25	Captive Use	Not applicable
Total		KL/Month	100		
Rubber Molded Products					
S. No	Name of the product	Units	After Expansion	Market area	Mode of Transportation
1	Compound Rubber	TPM	20	Domestic/ Export	Road and Sea
2	Solid Tyres (Solid rubber block)	TPM	4	Domestic/ Export	Road and Sea
3	Rubber bushes and accessories	TPM	3	Domestic/ Export	Road and Sea
4	Ideal ring	TPM	10	Domestic/ Export	Road and Sea
5	Screens	TPM	3	Domestic/ Export	Road and Sea
6	Insulation compound	TPM	8	Domestic/ Export	Road and Sea
7	Flexi seals	TPM	3	Domestic/ Export	Road and Sea
8	Diaphragms	TPM	5	Domestic/ Export	Road and Sea
9	Rubber Sheet	TPM	150	Domestic/ Export	Road and Sea
10	Liners	TPM	150	Domestic/ Export	Road and Sea
11	Rubber pads	TPM	100	Domestic/ Export	Road and Sea
12	Filtration	TPM	30	Domestic/ Export	Road and Sea
Total		TPM	486		
PU Products:					
S. No	Name of the product	Units	After Expansion	Market area	Mode of Transportation
1	PU Products (Scraper Blade, Screen Panel, Liner, Flip Flop Mat, Small Products)	TPM	6.352	Domestic	Road
Total			6.352		

2.6.3 Process Description

The manufacturing process for Adhesives, Rubber molded Products and PU Products with material balance is provided in the following sections.

2.6.3.1 Manufacturing process for Adhesives

The process of manufacturing Adhesives involves various stages which are elaborated as below,

2.6.3.1.1 Cold Adhesives:

Adhesives are social substances and can be defined as a mixture in a liquid or semi-liquid state, capable of joining permanently to surfaces, by an adhesive process. Rubber cement is solvent based adhesives. These substances consist of polymers dissolved in a solvent. The solvent dries and evaporates in air, leaving behind the polymer which then solidifies. The adhesive grades of Chloroprene polymer binder crystallize as the film is deposited from solution. The crystallization results from the relatively high percentage of trans configuration chlorine in the range of structural units in the polymer.

Here the chloroprene polymer has a high degree of crystallization. Since crystallization is a physical change rather than a chemical reaction, cohesive strength develops more rapidly than accounting for the rapid development of bond strength or grab. The resin what we incorporated in this cold adhesive is Phenol modified resin which acts as a tackifier. The first reason for the inclusion of resin is what we might call specific adhesion. Chloroprene itself does not adhere well to glass, metal, wood or plastics, and adhesion or wetting of these surfaces is greatly enhanced by combining the resin with chloroprene. Hence it is a chloroprene resin blend which contains chlorine. This tackifier can be combined with activator Magnesium oxide. Chlorine is blended with Zinc oxide forming Zinc chloride which when interacts with Magnesium oxide, forms magnesium chloride and Zinc oxide. This process continues till the Zinc oxide is exhausted. In this adhesive choice of solvent is limited to a few possibilities. Too little solvent in the drying adhesive causes it to lose contact bonding, but too much solvent in the drying adhesive causes it to have too little strength. To speed up the setting, chloroprene adhesive is added with an accelerator at the time of use. Normally this is a polyfunctional isocyanate which serves to increase the degree of cross linking.

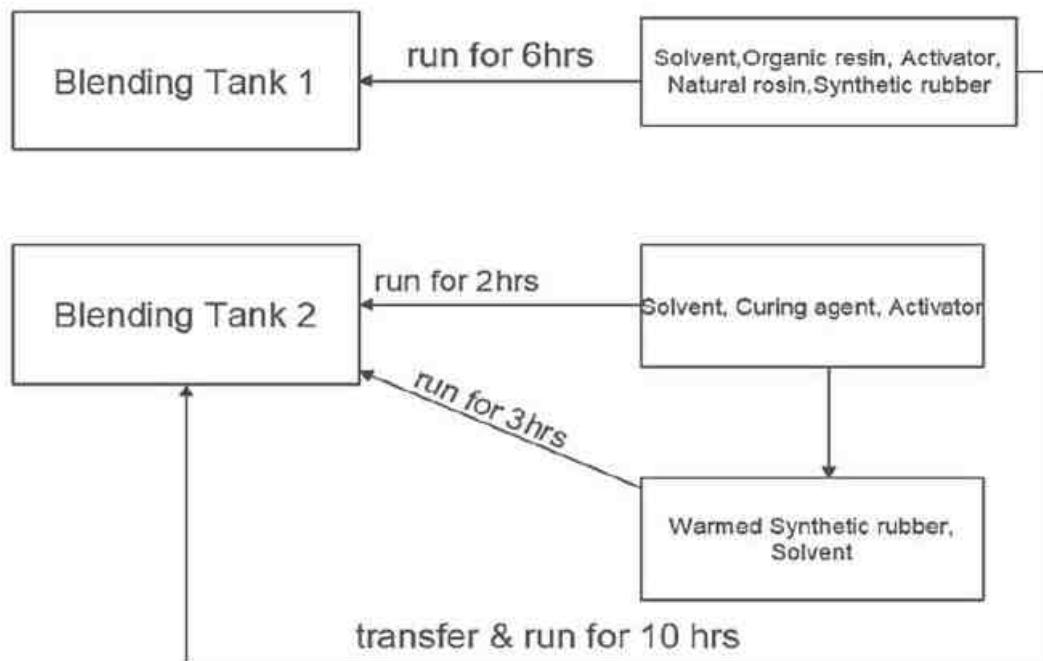


Figure 2-11 Adhesives Manufacturing Process flow chart

A. Raw materials & Material Balance for Adhesive Cold:

Table 2-18 Cold Adhesive

S. No	Name of the Raw materials	Existing (kg/Month)		After expansion (kg/Month)	
		Input (Kg/ Month)	Output Liters/ Month	Input (Kg/Month)	Output Liters/ Month
1	Chloroprene rubber	4250	25000 Ltrs/Month of Cold Solution	11900	75000 Ltrs/Month Cold Solution
2	Resins	500		1400	
3	Metal oxides	299		838	
4	Antioxidants	109		306	
5	Wood Rosin	23		66	
6	Chlo rub	192		537	
7	Green pigment	1.0		3	
9	INVRE	384		1075	
10	Poly isocyanate	108		300	
11	BPU compound	1097		3069	
12	Chemical SRL	1675		4687	
13	Petroleum Solvents Ethyl acetate	13749		43500	
14	Monomeric Carbodiimide	9		26	
15	Diphenylmethane 4,4' - diisocyanate	428		1200	
16	Methylene Chloride	1750		4900	
17	Ethyl acetate	303		850	
18	Triphenylmethane-4,4,4-triisocyanate triphenylmethane Tri isocyanate	121		337	
19	Chlorobenzene	2		6	
	Total	25000	25000	75000	75000

B. High temperature Adhesive Manufacturing Process

In high temperature adhesive, the basic material is the rubber compound which consists of Natural rubber and synthetic rubber and other inorganic ingredients. These materials are first blended in mill as per the given formula.

Here the synthetic rubber is restricted to a maximum of 10% only. This rubber mixture is loaded in a tank along with solvent and continuously blended for 12 hours. Once the time is over it is unloaded from the tank and tested for its property. Then it is filled in 5-liter tins for dispatch. The adhesive becomes functional at the time of actual use and requires temperature during application by which it undergoes vulcanization. The hardener compound, which is Poly Isocyanate with stabilizer, was purchased from Europe. These ingredients are to be put into a mixer and run for 3 hours. Then it is stored in a blending tank itself overnight. The next day it is to be discharged in 65 kg tanks. Then it is passed again in a blending tank with small quantity of mineral oil and Ethyl acetate solvent for 10 to 15 mt. After that it is discharged and filled in small bottles.

Table 2-19 Material Balance of Hot Adhesive

S. No	Name of the Raw materials	Existing (kg/Month)		After expansion (kg/Month)	
		Input (Kg/Month)	Output Liters/Month	Input (Kg/Month)	Output Liters/Month
1	Rubber compound	1731	Hot Adhesive	3205	Hot Adhesive
2	Toluene	11769		21795	
Total		13500	13500	25000	25000

2.6.3.2 Manufacturing process of Rubber Moulded Products

Process Description of Rubber Products:

Manufacturing process of following for Raw materials- Mixing-Ban Bury-Sheeting Mill-Festooning-Batching-quality of checking-Milling-Extruding-Calendaring-Finished Goods stores-packing-dispatched. Manufacturing Steps / Process.

1. Compounded Rubber: By using ban bury / Sheetting mill / Festoonery machines rubber compound need to be mixed. There will be a Mastication/Master batch /Final batch mixing process. Based on technical advice and process parameter set up compounded rubber to be mixed.

2. Solid Tyres (Solid rubber block): Involvement of Rubber compound from mixing and extruded preforms is there in this product. At the time of molding metal parts and preform to be cured in Hydraulic presses. After finishing the process to be offered for inspection.

3.Rubber bushes and accessories: Rubber bushes are being produced by the Molding process. Mixing and Preforming process involved here. Accessories like metal washer / Studs being brought from vendors to full fill the requirements.

4.Ideal ring: Can be produced from Molding line. Mixing / Preforming process involved here.

5. Screens: From the molding line these products can be produced. Mixing /Preforming process involved here. Usage of metal parts and fabrics as special requirement process to be followed. Aperture trimming /finishing is the vital role in this product line.

6.Insulation compound: By using calendared machine rubber compound to be calendared. Involvement of mixing process is there in this production. A very thin layer like min 0.35 mm production is the specialty.

7.Flexi seals: By using molding processes can be produced. Mixing and performing process are also involved. With metal and without metal products are the specialty.

8. Diaphragms: Rubber compound being get from various stages (Mastication/Master/Final batch). After confirming technical acceptance compound shifted to performing for calendaring

process. Preform can be shifted to molding process by using hydraulic press it can be cured and shifted for finishing. After Finishing it can be shifted to QA for Inspection / Acceptance.

9. Rubber Sheet: Involvement of Mixing/ Preform making from calendar machine is there in this product. Here Plain and Patterned like Diamond grooved sheets are being produced. Roto cure machines and Hydraulic press lines can be produced.

10.Liners: Involvement of rubber compound mixing and perform making involved. Molding can be done by Hydraulic presses. Special purpose requirements like metal parts and ceramic usage are there in this production.

11.Rubber Pad: Involvement of Mixing / Preforming process needed in this production. Performs from extrusion to be molded for its dimension. Pads with metal plates/ ceramics are also one of the specialties in this product line.

Table 2-20 List of Raw materials and Material Balance for Rubber Moulded Products

Process Inputs				Process Output		
S. No	Name of the Raw material	Quantity (TPM)		Product Details	Quantity (TPM)	
		Existing	Proposed for Expansion		Existing	Proposed for Expansion
1	Carbon black	44.1	100	Compound Rubber Solid Tyres (Solid rubber block) Rubber bushes and accessories Ideal ring Screens Insulation compound Flexi seals Diaphragms Rubber Sheet Liners Rubber pads Filtration	199.99	486
2	Zinc Oxide	0.83	2.0			
3	Steric Acid	0.35	1.0			
4	Aromatic oil	3.5	7.50			
5	Antioxidants	1.195	4.0			
6	Paraffin wax	2.39	6.0			
7	Reclaim rubber	11.96	20.0			
8	Synthetic rubber	56.48	70.0			
9	Resin	2.58	6.0			
10	Accelerator	2.145	7.0			
11	Natural Rubber	84.98	179.0			
12	Neoprene rubber	3.1	10.0			
13	Solvent (Toluene)	21.98	140.0	Trimming Waste	35.6	66.5
Total		235.59	552.5	Total	235.59	552.5

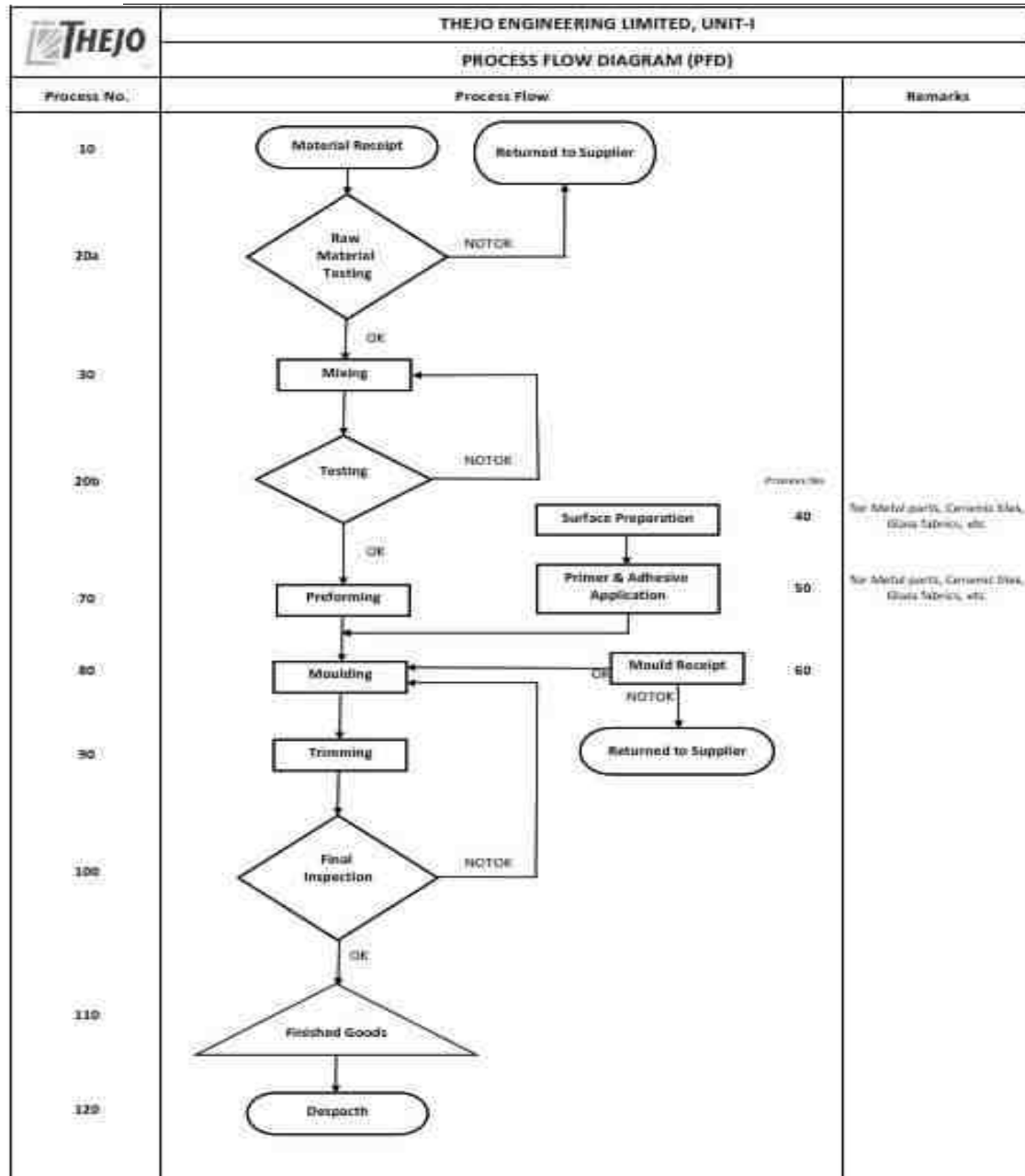


Figure 2-12 Rubber molded Products Process flow chart.

2.6.3.3 Manufacturing process of PU Products

Compression molding also requires the polyurethane to be in liquid form. Once it's poured into a mold, it's placed into a compression press, where the heat will thicken the liquid, and the pressure will finalize the molding process.

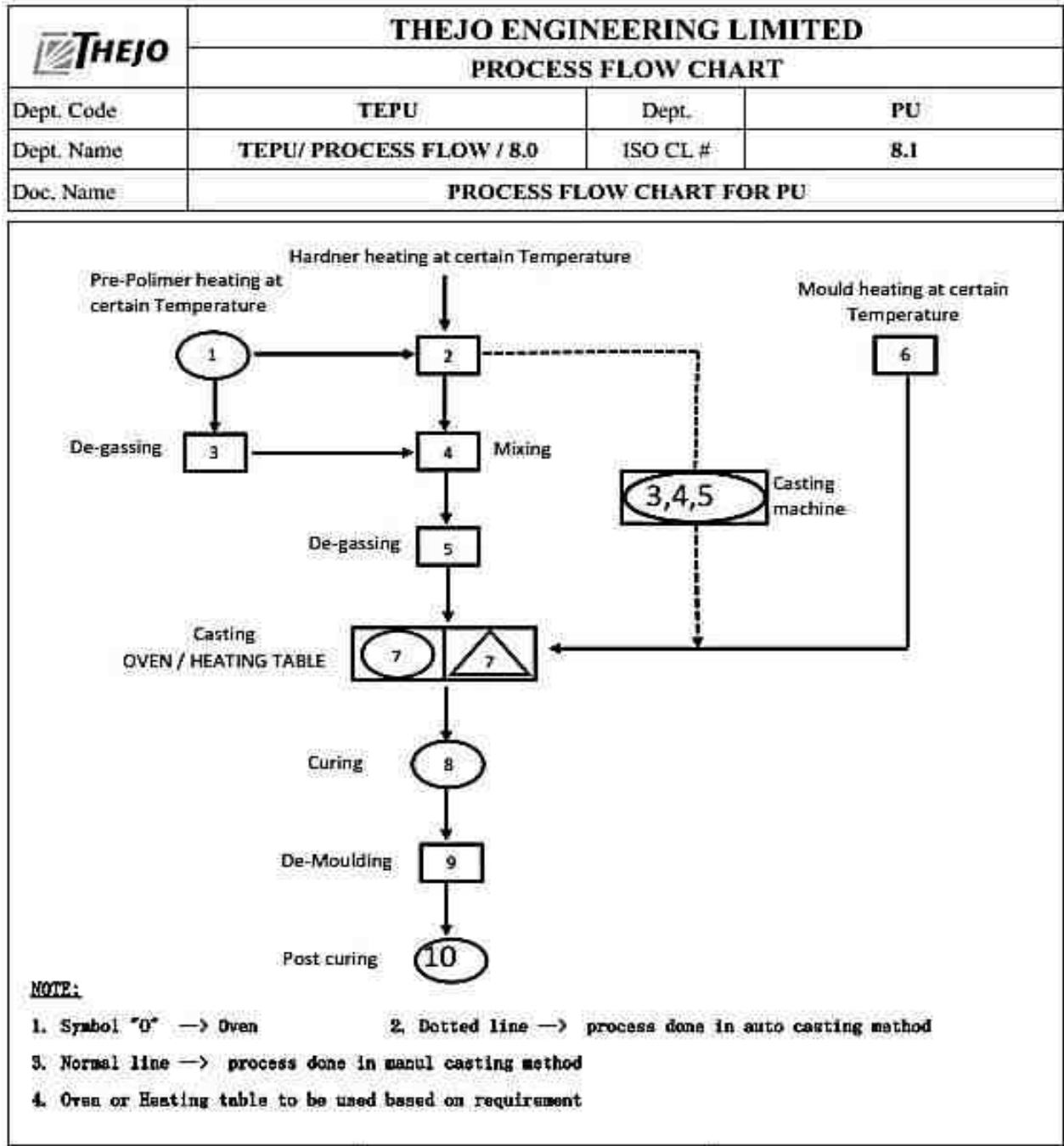


Figure 2-13 PU Products Process flow chart

Table 2-21 Raw materials & Material Balance for PU products

S. No	Process inputs		Process output	
	Raw Material	Quantity (TPM)	Product Details	Quantity (TPM)
1	NEUTHANE 132	2.00	PU Products (Scraper Blade, Screen Panel, Liner, Flip Flop Mat, Small Products)	6.352
2	NEUTHANE 143S	1.30		
3	NEUTHANE 235S	2.00		
4	NEUTHANE 122	0.030		
5	NEUTHANE 765HR	0.700		
6	NEUTHANE 14BD CAT	0.045		
7	NEUTHANE 163S	0.080		
8	MOCA	0.700		
9	ERASLIP - L	0.020		
10	DEGASSING AGENT AF 100	0.009		
11	CHEMLOK 218	0.016	Trimming Waste	0.548
Total		6.900		6.900

2.6.3.4 Utilities Details

List of Existing machineries & equipment's are shown in the **Table 2-22**. List of proposed and after expansion Machineries & Equipment is shown in **Table 2-23**.

Table 2-22 List of Existing Machineries & Equipment

S. No	Description with capacity	Oty
1	Grid Blasting Recovery System	1
2	Fume Extractor - 1	1
3	Fume Extractor - 2	1
4	Fume Extractor - 3	1
5	Blasting Hopper - 1	1
6	Blasting Hopper - 2	1
7	Monorail - 2 TON	1
8	MILL – 1	1
9	MILL – 2	1
10	MILL – 3	1
11	MILL – 4	1
12	Lab Baby Mill	1
13	72 Inch Calendar	1
14	RDE	1
15	Small Calendar	1
16	10 " Big Extruder -- 1	1
17	10 " Big Extruder -- 2	1
18	4.5 " Small Extruder	1
19	Calendar 1 Ton Hoist	1
20	Lathe – 1	1
21	Lathe – 2	1
22	Rotocure – 1	1
23	Rotocure – 3	1

24	Consolidation Table	1
25	SP – 1	1
26	Gantry 3 Ton Hoist – 1	1
27	Gantry 5 Ton Hoist – 2	1
28	A – 1 (Hp – 7)	1
29	A – 2 (Hp – 8)	1
30	A – 3 (Hp – 3)	1
31	A – 4 (Hp – 4)	1
32	A – 5 (Hp - 5)	1
33	B – 1 (Hp – 6)	1
34	B – 2 (Hp – 9)	1
35	B – 3 (Hp – 10)	1
36	B – 4 (Hp - 12)	1
37	C – 1 (Hp – 2b)	1
38	C – 2 (Hp – 2a)	1
39	C – 3 (Hp – 2)	1
40	C – 4 (Hp – 13)	1
41	C – 5 (Hp – 11)	1
42	C – 6 (Bhp – 1)	1
43	D – 1 (Hp – 1)	1
44	D – 2 (Bhp – 2)	1
45	D – 3 (Bhp – 3)	1
46	D – 6 (Bhp – 6)	1
47	C – 7 (Sp – 2)	1
48	Lab Hydraulic Press	1
49	2 Ton EOT (Production)	1
50	5 Ton EOT (Production)	1
51	5 Ton EOT (Production)	1
52	25 Ton EOT (Production)	1
53	5 Ton EOT (Old Plant)	1
54	Banbury	1
55	Dump Mill	1
56	Sheeting Mill	1
57	Festooner	1
58	84 Inch Mill	1
59	Kneader	1
60	42 Inch Mill	1
61	Bale Cutter	1
62	Goods Lift (2 Ton Mixing)	1
63	15 Ton EOT (Mixing)	1
64	Screw Compressor 30hp	1
65	Screw Compressor 50hp – 1	1
66	Screw Compressor 50hp – 2	1
67	Colling Tower = 1 (100 TR)	1
68	Cooling Tower – 2 (200 TR)	1
69	Boiler – 1 (2 Ton)	1
70	Boiler – 2 (2 Ton)	1
71	250KVA DG Set – 1	1
72	500KVA DG Set – 1	1
73	Lift (2 Ton Store)	1
74	BANBURY 1.5 Ltrs	1
75	85 Ton Hy.Press	1
76	Baby Mill	1

77	COMPRESSOR 25 Cfm	1
78	ELC.Drying Oven (600x600x1000)	1
79	ELE.Drying Oven (3500x2500x1500)	1
80	El. Drying Oven (3000x1500x1500)	1
81	Vacume Chamber -1 1000x1100)	1
82	Vacume Chamber -2 (1000x1100)	1
83	Vacume Chamber -3 3rd(1000x1100)	1
84	Heating Table 1	1
85	Casting M/C	1
86	New Heating Table - 2	1
87	Milling Machine	1
88	Shaping Machine	1
89	Bansaw Cutting	1
90	Small Lathe	1
91	Big Lathe	1
92	Radial Drilling Machine	1
93	Plano Milling M/C	1
94	Auto Tapping M/C	1
95	Baby Mill	1
96	HY.Press	1
97	HY.Press	1
98	Agitator No - 1	1
99	Agitator No - 2	1
100	Agitator No - 3	1
101	Agitator No - 4	1
102	Agitator No - 5	1
103	Agitator No - 6	1
104	Agitator No - 7	1
105	Agitator No - 8	1
106	Agitator No - 9	1
107	3 Phase Trial Agitator	1
108	1 Phase Trial Agitator	1
109	Ball Mill Roller - 1	1
110	Ball Mill Roller - 2	1
111	Ball Mill Roller - 3	1
112	42 " Mill	1
113	EOT 1 Ton	1

Table 2-23 List of proposed Machineries & Equipment additional to the existing

S. No	Description With Capacity	Oty
1	Boiler – 1 (6 Ton)	1
2	Arc Welding Machine 3 Nos X 25.00	1
3	AG-7 Grinding Machine (Movable) 3 Nos X 1.34	3
4	Ag-5 Grinding Machine (Movable) 2 Nos X 1.00	2
5	Ag-4 Grinding Machine (Movable) 2 Nos X 1.00	2
6	Magnetic Drilling Machine (Movable) 2 Nos X 1.00	1
7	Cutting Machine (Portable)	1
8	Hand Drilling Machine (Movable) 2 Nos X 1.00	1
9	Ftir (System, Printer, Ir Lamp)	1

10	Lab Banbury	1
11	Lab Mill	1
12	Din Abrader	1
13	Mooney	1
14	Rheometer	1
15	Weighing Scale 3 Nos X 0.94	1
16	Multicell Air Oven	1
17	Hot Air Oven	2
18	Furnace	1
19	Flexio Meter	1
20	Dematis Flexo Tester	1
21	Hydraulic Press	1
22	Tensile Testing	1
23	Zigma Mixture	1
24	Fume Hood	4
25	Blower Duct	1
26	Wet Abrader	1
27	Centrifugate	1
28	Hardness Tester	1
29	FGA	1
30	Soap Oil Tank	1
31	Kneader Machine	1
32	Auto Cleave	1
33	Goods Lift Motor	1
34	Slurry Pump 2 Nos X 5.00	1
35	Hot Air Oven	1
36	Trail Agitator -1	1
37	Solution Mixer	1
38	Trail Agitator -2	1
39	Solution Filling Machine	1
40	Sticking Machine 2 Nos X 0.25	1
41	Printing Machine with Conveyor	1
42	Compressor (Portable)	1
43	Electrical Drying Oven -1	1
44	Vacuum Machine -1	1
45	Heating Table	1
46	Vacuum Machine -2	2
47	Electrical Drying Oven -2	1
48	Casting Machine	1
49	Electrical Drying Oven - 3	1
50	72" Calender Machine with Conveyor	1

51	Jip Crane	1
52	Roller Die Extruder Machine	1
53	Roto Cure Machine -1	1
54	Consolidation Table	1
55	SP-1 Press Machine	1
56	2 Ton Mono Crane	1
57	Gantry Crane 2 Nos X 6.40	1
58	Conveyor Motor 2 Nos X 2.00	1
59	Un Winding Machine	1
60	Small Calendar Machine	1
61	Roto Cure Machine - 2	1
62	Exhaust Blower 2 Nos X 10.00	2
63	Banbery Feeding Conveyor	1
64	Auto Chemical Fetching Machine	1
65	Manual Press Machine	1
66	Kine Matic Visco Meter	1
67	Immersion Tester	1
68	Muffle Furnace	1
69	AGIN Oven	2
70	Tensile Tester	3
71	Mooney Visco Meter	1
72	Rheo Meter	1
73	Melting Point Apparatus	1
74	Densimeter	1
75	Weighing Machine	1
76	Abrasion Tester	1
77	Lab Mill Machine	1
78	Lab Hydraulic Press - 1&2	2
79	Salter Machine	1
80	Air Dryer	1
81	Over Head Conveyor- Dump Mill to Sheeting Mill	1
82	84" Mill	1
83	Soap Solution Tank	1
84	Dust Collector	1
85	Soap Solution Tank 2 Nos	1
86	Small Extruder	1
87	Big Extruder -1	1
88	Conveyor Motor	1
89	Punching Machine (Pneumatic)	1
90	Over Head Conveyor- Mill -3 To Mill-4	1
91	Electrical Oven	1

92	Fume Extractor	1
93	Fume Extractor	1
94	Big Extruder -2	1
95	Over Head Conveyor- Mill - 4 To Big Extruder-1	1
96	ETP (15 KLD)	1
97	STP (25 KLD)	1

2.6.4 Resource optimization and/ recycling and reuse

Installing the latest technology machines was used for effective production and minimization of waste generation. Rubber waste will be used in the process. There is no water requirement in the manufacturing process except the coolant and other washing.

2.7 Schematic representation of the feasibility drawing which give information important for EIA purpose.

A schematic representation of the overall feasibility and environmental assessment process is shown in **Figure 2-14**. The EIA process is composed of the following stages:

- ✓ Study of project information
- ✓ Screening & Scoping
- ✓ Environmental Pre-Feasibility study & application for approval of TOR
- ✓ Collection of detailed project management plan/report
- ✓ Baseline Data collection
- ✓ Impact identification, Prediction & Evaluation
- ✓ Mitigation measures & delineation of EMP
- ✓ Risk Assessment and Safety & Disaster Management plan
- ✓ Review & finalization of EIA Report based on the TOR requirements.
- ✓ Public Hearing/Public Consultation
- ✓ Submission of EIA report for implementation of mitigation measures & EMP as well as necessary clearances from relevant Authority.

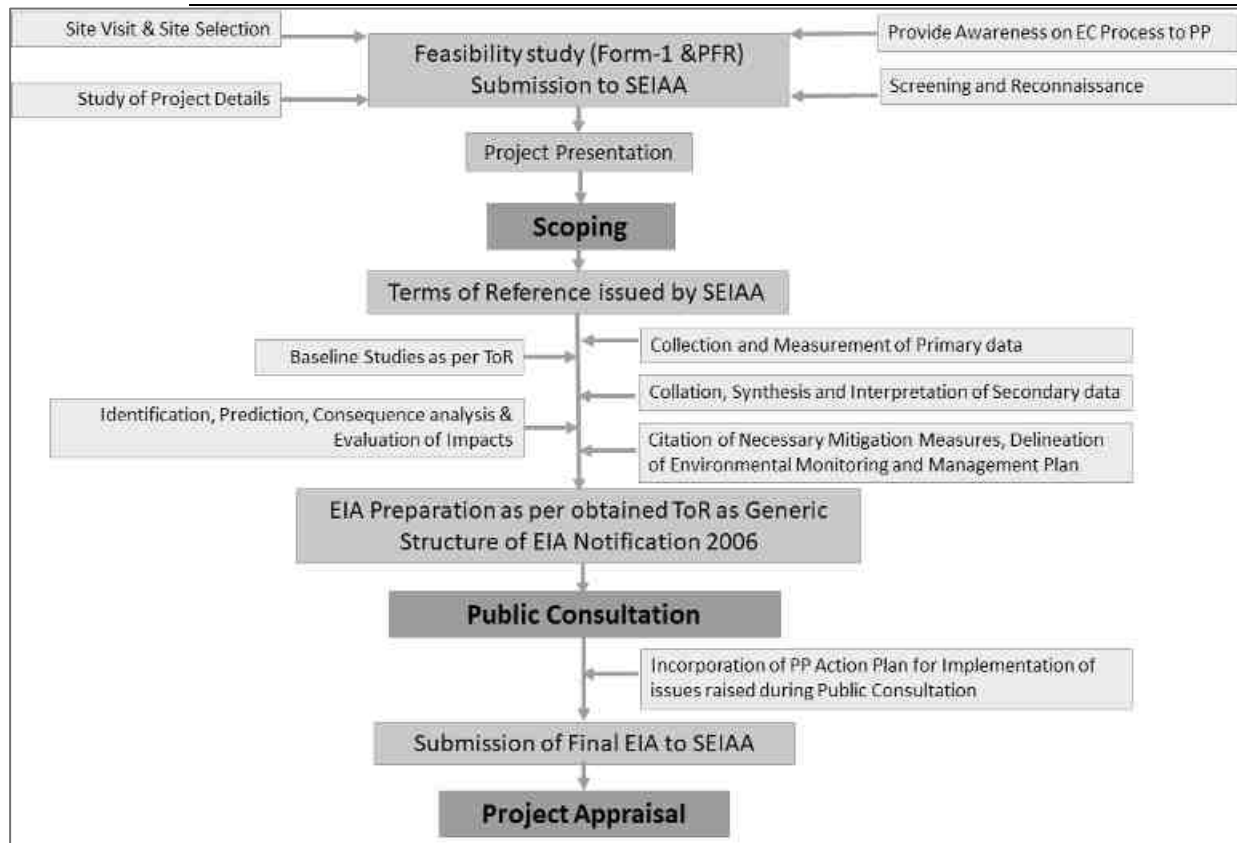


Figure 2-14 Feasibility & Environmental Assessment Process

2.8 Pollution Potential and Control Measures & Description of mitigation measures to meet the environmental standards.

Based on the overall process study/manufacturing details, etc., The following are the details of pollution potential v/s. mitigation measures implemented by the company in areas of wastewater management, air pollution, hazardous waste handling, occupational health etc.,

2.8.1 Land Environment

The existing and proposed project site is Patta land and classified as a non-Planned area as per the Directorate of Town and Country Planning records. The total existing project area is **4.18 Acres (16916.46 Sq. m)** in addition to the existing built-up area is proposed an additional area of **11.46 Acres (46364.97 Sq. m)** The total area after expansion is **15.63 Acres (63221.43 Sq. m)**. The project cost for the proposed expansion proposal is **10699.99 Lakhs**. The project land document is enclosed in **Annexure -1**. Existing and Proposed Land details of the project are shown in **Table 2-7**. Greenbelt area and Layout plan of the project site are attached as **Annexure-14**.

- ✓ *The proposed site is flat terrain.*
- ✓ *No major filling is required. No major change in topography of the site is envisaged due to proposed plant erection.*
- ✓ *No habitation area exists in the Proposed project land.*
- ✓ *Apart from the change in land use pattern within the project site there will not be any adverse impact on the surrounding land use during the construction period.*

- ✓ Most of the impacts of proposed plant on soil are restricted to the construction phase, which will get stabilized during operational phase.
- ✓ There is no source of dust generation during the operation of resin handling plant.
- ✓ The fugitive dust is generated during plant operation, material handling and from the truck movement in the premises of the proposed plant.
- ✓ The proposed greenbelt/green cover will improve the soil quality in the project area.

The following measures are proposed to mitigate impact on Land Environment during operational phase of the project.

- ✓ Excavated earth will be backfilled in the trench after foundation work and topsoil will be restored for gardening purposes.
- ✓ The construction debris as well as debris from demolition work shall be utilized within the site for leveling purpose and base course preparation of internal roads.
- ✓ Municipal solid waste, Non-Hazardous and Hazardous waste will be disposed as per norms.
- ✓ Existing Domestic wastewater is 4.5KLD is being disposed of through Septic Tank. For proposed the domestic Wastewater generation will be 23 KLD will be treated in proposed STP (25 KLD) and treated water (23 KLD) will be used Greenbelt and flushing. Fresh water and wastewater layout are enclosed as **Annexure-18**.
- ✓ Wastewater will be generated from various sources, including cooling tower blowdown (1.0 KLD), process leakages and coolant water (1.0 KLD), boiler blowdown (1.0 KLD), and RO rejects (10 KLD). The wastewater will be treated in the proposed 15 KLD Effluent Treatment Plant (ETP), and the treated water will be reused for greenbelt maintenance, and fire hydrant makeup.
- ✓ No effluent is discharged directly on land without treatment.
- ✓ Hazardous materials are prohibited from being drained or dumped in the premises. Accidental spills will be cleaned, reported, and monitored. HW will be disposed of as per norms.
- ✓ Implementing Soil Conservation methods like 33 % of Greenbelt development with native plants, Windbreaks are composed of shrubs, plants and trees in garden/lawn areas, Regular watering soil along with plants, adding earthworms to soil and Control Storm Water.

2.8.2 Air Environment

The Major sources of Air pollution due to proposed project are Boilers, Shot Blasting, Ban Bury Section, D.G. sets & Construction activities. Sources and Proposed APC Measures are given in Table 2-24.

Table 2-24 Existing and Proposed APC Measures

S. No	Point source of Emission	Pollution control measures	Stack height above ground level (in meters)
Existing			
1	D G set - 250 KVA	Acoustic enclosures with stack	10
2	D G set - 500 KVA	Acoustic enclosures with stack	10
3	2 Tons Boilers 2 Nos	Common Stack	20
4	Shot/Grit blasting section	Dust Collector followed by Stack	5.0
5	Ban Bury Section	Inbuilt Dust collector	2.6
Proposed for expansion as additional to the existing			
1	Boiler 1 x 6 Tons (Proposed)*	Common Stock (existing)	30
2	Metallic-I Fume Exhaust System	With adequate stack height	8.0
3	Metallic-II Fume Exhaust System	With adequate stack height	8.0
4	Ceramic Fume Exhaust System	With adequate stack height	8.0
5	Kneader mixing Section	With adequate stack height	2.6
6	PU Fume Exhaust System (Curatory Melting)	With adequate stack height	2.5

Note: *The proposed Boiler 6TPH will be connected to the existing common stack of 20m, during expansion the common stack height will be maintained 30m. So that after expansion a total of 10 Nos of point sources is facilitated.

Fugitive Emission Control Measures:

- ✓ *The DG set and boiler sources are provided with stacks of adequate height, Boiler having a Common stack to disperse the emanating flue gases containing suspended particulate matter, oxides of sulphur and nitrogen without affecting the ground level concentrations.*
- ✓ *Shot Blasting is facilitated with Dust Collector followed by Stack height of 5m AGL.*
- ✓ *Ban Bury Section having Inbuilt dust collector.*
- ✓ *Water sprinkling systems will be installed to suppress dust emission from loading & unloading activities and roads will be paved to minimize the dust emission during transportation activities.*
- ✓ *All the liquids will be stored in tanks or barrels in a dedicated storage area. The containers will be kept tightly closed to prevent vapor emissions. All liquids will be charged through pumps with suitable seals to prevent any leakages and vapor emissions.*
- ✓ *Raw materials will be transported in closed trucks only.*
- ✓ *Adequate ventilation systems will be provided in the production area.*
- ✓ *Separate inward & outward paved roads for movement of trucks with segregated raw material storage area to minimize dust pollution.*
- ✓ *Greenbelt will be developed around the plant to arrest the fugitive emissions.*

2.8.3 Water Environment

The water requirement for the proposed project is 116 KLD (Fresh water is 80 KLD and recycled 36 KLD). Water requirement for proposed project during construction phase and operation phase will be met through from private tankers. Water requirement and breakup are given in **Table 2-11**. Water Balance is show in **Figure 2-10**.

Construction Phase:

- ✓ Existing Domestic wastewater is 4.5KLD is disposed of through Septic Tank.
- ✓ No Sewage will discharge into any surface water bodies or aquifers /inland surfaces.

Operational Phase:

- ✓ For proposed the domestic Wastewater generation will be 23 KLD will be treated in proposed STP (25 KLD) and treated water (23 KLD) will be used Greenbelt and flushing. Fresh water and wastewater layout are enclosed as **Annexure-18**.
- ✓ STP Sludge/Solid waste will be composed and reused as manure for internal greenbelt.
- ✓ Wastewater will be generated from various sources, including cooling tower blowdown (1.0 KLD), process leakages and coolant water (1.0 KLD), boiler blowdown (1.0 KLD), and RO rejects (10 KLD). The wastewater will be treated in the proposed 15 KLD Effluent Treatment Plant (ETP), and the treated water will be reused for greenbelt maintenance, and fire hydrant makeup.
- ✓ Thejo is constructing separate storm water drains and implementing rainwater harvesting structures.
- ✓ Effluents/Sewage will not be discharged into any water bodies or aquifers under any circumstances.
- ✓ Thejo will implement Rainwater harvesting by adopting following measures:
 - Roof-top Rainwater Harvesting
 - Storage Ponds/Tanks
 - Recharge pits
 - Storm Water Management

Rainwater estimation is summarized in **Table 10-13** and typical structures are given in Chapter **10, Section 10.14.1**.

2.8.4 Noise Environment

Construction Phase:

- ✓ Construction activities, loading and unloading, fabrication and handling of equipment and materials are likely to cause an increase in ambient noise levels. However, will be provided the provision of acoustic enclosures around the equipment and regular maintenance of the equipment & PPE for workers.

Operational Phase:

- ✓ The major sources of noise are Machineries, Generators, Compressors, boiler, and vehicular movements during operation phase for loading/unloading activities, feed

pumps, ID fans, FD fans and other noise generating units like process equipment may increase noise level.

Proposed Control Measures:

- ✓ DG sets and air compressors are provided with integral acoustic enclosures.
- ✓ Calibrator and sanding machines will have inbuilt acoustic panels.
- ✓ The ambient noise levels will be ensured within the ambient standards by inbuilt design of mechanical equipment and buildings.
- ✓ 33% of Greenbelt & Land scaping around the factory building and premises to control the intensity of noise to the surrounding area.
- ✓ Providing personal protective equipment as a safety measure.
- ✓ Training will be imparted to personnel to generate awareness about the effects of noise and importance of using PPEs.
- ✓ Noise monitoring will be carried out to check the efficacy of maintenance schedules undertaken to reduce noise levels and noise protection measures.

2.8.5 Solid and Hazardous Waste Generation and Management

Solid/Hazardous Wastes generated from various plant activities. It is observed that adequate mitigation measures are implemented by proponents to avoid accidental due to spillage or leakage of wastes, during operation phase. Treatment, Storage and Disposal mode for the same is followed as per Hazardous Waste (Storage, Handling and Trans-Boundary Movement) Third Amendment Rules, 2016. MSW Generation and Management is shown in **Table 2-25**. Hazardous waste generation and Management is given in **Table 4-27** and Other Solid Waste generation and Management during operational phase is given Error! Reference source not found..

- ✓ The generated waste will be segregated at sources as Municipal Solid Waste, Hazardous and non-Hazardous.
- ✓ No solid & liquid Hazardous waste will be generated in manufacturing of proposed products.
- ✓ Hazardous non-recyclable waste will be disposed to TSDF & Hazardous recyclable waste will be sent to Authorized recycles.
- ✓ Municipal solid waste generation from domestic activities including canteen & is segregated, into organic, will be composted through OWC and inorganic waste will be disposed to local panchayat bins.

Table 2-25 MSW Generation and Management

S. No	Type	Construction Phase during expansion Kg/day	Operation (Kg/day)			Disposal method
			Existing	Proposed	After Expansion	
1	Bio-degradable	13.5	67.5	94.5	162	Used as Manure after composting within the facility through Organic Waste converter (OWC)
2	Non-Bio-degradable	9.0	45	63	108	TNPCB authorized recyclers

3	STP Sludge	-	-	2.5	2.5	Will be used as a manure
4	Garden Waste (Kg/month)	-	25	7.5	32.5	Used as Manure after composting within the facility through Organic Waste converter (OWC)
Total		22.5	112.5	160	272.5	

Table 2-26 Hazardous waste generation and Management

Stream	Category of Hazardous waste generated	Quantity			Disposal Method
		Existing	Proposed	After Expansion	
Schedule-I/4	4.1 Oil Sludge or emulsion (TPA)	10	4	14	Generation, Collection, Storage, Disposal to TSDF for Incineration
Schedule-I/21	21.1 Process waste, residues and sludges emulsion (TPA)	2	0.8	2.8	Generation, Collection, Storage, Disposal to TSDF for Incineration
Schedule-I/23	23.1 Wastes/ Residues and Sludges (not made with vegetable or animal materials) emulsion (TPA)	3	1.2	4.2	Generation, Collection, Storage, Disposal to TSDF for Incineration
Schedule-I/33	33.1 Empty barrels/containers/liners contaminated with hazardous chemicals /waste (TPA)	3	1.2	4.2	Generation, Collection, Storage, Disposal to TSDF for Incineration
Schedule-I/5	5.2 Wastes or residues containing oil	2	0.8	2.8	Generation, Collection, Storage, Disposal to TSDF for Incineration
-	Used batteries (Nos /annum)	270	108	378	Sold to Recycles/ battery manufactures/ dealers on buy back basis as per E-waste Management rules 2016
	ETP Sludge (Kg/Day)	-	0.5	0.5	Generation, Collection, Storage, Disposal to TSDF for Incineration

Table 2-27 Non-hazardous & Other waste Generation and Management

S. No	Description of waste generated	Physical State	Existing (Qty)	Proposed (Qty)	After expansion (Qty)	Storage Method	Disposal Method
1	Boiler Ash (Kg/ month)	Solid	2600	780	3380	Non-Hazardous Storage area	TNPCB Authorized recyclers
2	Buffing Disk & Grinding wheels (Nos/ month)	Solid	130	39	169	Non-Hazardous Storage area	TNPCB Authorized recyclers
3	Carton Waste (Kg/ month)	Solid	6	1.8	7.8	Non-Hazardous Storage area	TNPCB Authorized recyclers
4	Corrugated Waste (Kg/ month)	Solid	40	12	52	Non-Hazardous Storage area	TNPCB Authorized recyclers
5	Craft paper - Buffer roll (Kg/ month)	Solid	50	15	65	Non-Hazardous Storage area	TNPCB Authorized recyclers
6	Discarded Carton boxes (Box nos/Month)	Solid	42	12.6	54.6	Non-Hazardous Storage area	TNPCB Authorized recyclers
7	Discarded Ceramic Nozzle (Nos/Year)	Solid	30	9	39	Non-Hazardous Storage area	TNPCB Authorized recyclers
8	Discarded Glass Wool (Kg/ month)	Solid	10	3	13	Non-Hazardous Storage area	TNPCB Authorized recyclers
9	Discarded Heating Coils (Nos/Month)	Solid	4	1.2	5.2	Non-Hazardous Storage area	TNPCB Authorized recyclers
10	Discarded Plastic Covers (Kg/ month)	Solid	2.5	0.75	3.25	Non-Hazardous Storage area	TNPCB Authorized recyclers
11	Discarded PPE (Nos/Month)	Solid	265	79.5	344.5	Non-Hazardous Storage area	TNPCB Authorized recyclers
12	Fabric waste (Mts/Month)	Solid	185	55.5	240.5	Non-Hazardous Storage area	TNPCB Authorized recyclers
13	Used Coolant (Lts/Month)	Liquid	10	3	13	Non-Hazardous Storage area	TNPCB Authorized recyclers
14	Discarded Packing tape (Nos/Month)	Solid	20	6	26	Non-Hazardous Storage area	TNPCB Authorized recyclers
15	Metal Scrap (Kg/ month)	Solid	400	120	520	Non-Hazardous Storage area	TNPCB Authorized recyclers
16	Used Oil (Lts/Month)	Liquid	456	136.8	592.8	Non-Hazardous Storage area	TNPCB Authorized recyclers
17	Wood pallets (Nos/Month)	Solid	25	7.5	32.5	Non-Hazardous Storage area	TNPCB Authorized recyclers
18	Wood Wastes including plywood (Kg/ month)	Solid	1000	300	1300	Non-Hazardous Storage area	TNPCB Authorized recyclers
19	Used batteries (Nos /annum)	Solid	1	0.4	1.4	Non-Hazardous Storage area	TNPCB Authorized recyclers
20	Adhesive tapes (Kg/ month)	Solid	45	18	63	Non-Hazardous Storage area	TNPCB Authorized recyclers
21	Blasting Dust (Kg/ month)	Solid	150	45	195	Non-Hazardous Storage area	TNPCB Authorized recyclers
22	Oil & Chemical-soaked cotton waste (Kg/ month)	Solid	30	12	42	Non-Hazardous Storage area	TNPCB Authorized recyclers
23	Discarded masking fabric (mts/ month)	Solid	100	40	140	Non-Hazardous Storage area	TNPCB Authorized recyclers
24	Discarded PU Flash (Kg/ month)	Solid	1	0.4	1.4	Non-Hazardous Storage area	TNPCB Authorized recyclers
25	Gas cutting slag (Kg/ month)	Solid	1	0.4	1.4	Non-Hazardous Storage area	TNPCB Authorized recyclers

2.8.6 Biological Environment

- ✓ *There is no eco- sensitive and there are no wildlife sanctuaries or national parks or biosphere reserves or wetlands, or important bird areas or migratory corridors of wildlife within 15km from the project site.*
- ✓ *The core area is a non-planned land. It is sparsely covered by isolated thorny bushes and invasive weeds. There are no timber trees or any of the threatened taxa of the BSI. There are no forests within 5 km from the core area.*
- ✓ *The existing flora and vegetation of the project site is going to be lost on account of construction activities (fabrication and erection of sheds, workshops, material handling and storage facilities).*
- ✓ *Greenbelt will be developed from the construction phase to improve the aesthetic value in the area and to screen out the fugitive dust generated during construction & will be minimized through paving and water sprinkling.*
- ✓ *Implementing Soil Conservation methods like, Windbreaks are composed of shrubs, plants and trees in garden/lawn areas, Regular watering soil along with plants, adding earthworms to soil for improvement of soil fertility and perennial fodder production.*

2.8.7 Green belt Development

- ✓ *The total area of the site after expansion is 15.63 Acrea & allotted 33 % of 20866.2 Sq. m (5.16 Acres) of land for greenbelt development and Layout plan of the project site is attached as an **Annexure-14**.*
- ✓ *A capital cost of INR 3.0 Lakhs will be earmarked for this purpose and INR of 0.5 Lakhs will be allocated for recurring expenses towards green belt development and maintenance.*

The proposed Greenbelt layout is enclosed as **Annexure-14**.

2.8.8 Socio Economic Environment

The proposed project area is patta land, there are no R&R issues envisaged. The Existing project site is in a non-notified industrial area, which is categorized as dry land. As per the Town and Country Planning/Development authority Classification the project site is classified as dry land, and the land classification letter is enclosed as **Annexure-9** and DTCP approval copy is enclosed as **Annexure-2**.

The proposed expansion project will be implemented within the existing facility and additional land acquired which is located adjacent to the existing plant area.

The total project land belongs to partially owned by Thejo Engineering Limited of 4.18 Acres. The remaining portion of land is under a 25 Year lease. lease documents Land documents are enclosed as **Annexure-1**. The land ownership details are provided in **Table 2-6**.

The following benefits will be envisaged by the proposed project.

- ✓ *As per the OM F. No. 22-65/2027 -IA.III dated 1st May 2018 and its amendments, the project Proponent is allocated 1.5 % of the total project cost is 1,60, 49,985/- (Say 1,60,50,000). As the Project cost 10699.99 Lakhs will be allocated to nearby villages on the issued raised during public Hearing.*
- ✓ *Employment generation for local people directly and indirectly and other businesses and ancillary industry in the state*
- ✓ *Establishment of small and medium scale engineering ancillaries*
- ✓ *Proposed project is of Export oriented unit will generate more foreign exchange, benefiting to the Nation.*
- ✓ *Establishment of small and medium scale engineering ancillaries*
- ✓ *Revenue to Government*

2.9 Assessment of new and untested technology for the risk of technological failure

The industry will be involved in the manufacture of synthetic rubber molded products, adhesives and PU Products. Manufacturing involves blending of raw materials, reactions and heating, cooling, and mixing as physical operations for which industry has adopted the latest and best technology. The manufacturing process for these products will be tried and tested method. Therefore, there is no risk of technological failure. Also, trial experiments will be conducted for proposed products and all safety measures will be taken during the implementation phase itself.

CHAPTER – 3

DISCRIPTION OF ENVIRONMENT

(This chapter describes the study area, study period, methodology and components selected for baseline studies, baseline status for Meteorology, Ambient air, Noise Levels, Water, Soil, Socioeconomic & Land use and of the study area within 10.0 km radius.)

3 DESCRIPTION OF ENVIRONMENT

3.1 Preamble

This chapter depicts the establishment of baseline for environmental components, as identified in and around the “Proposed Expansion in Industrial Adhesives, Rubber products and PU Products and Enhancement of manufacturing facility” in S.F. No’s. 176/3, 181/5, 181/6A, 169/2B, 169/4D, 170/2B, 170/3B, 170/4,175/3, 176/1, 176/2, 181/1B, 175/4B and 175/5B Jaganathapuram Road, Irullipattu village, Ponneri Taluk, Thiruvallur District by M/s. Thejo Engineering Limited. The primary baseline data monitored covered three (3) months i.e., from January 2024 – March 2024, and secondary data was collected from Government and Semi-Government organizations. The primary baseline data has been conducted by Mats India Pvt Ltd, Chennai, NABL approved Environmental Testing Laboratory for following Terrestrial environmental components:

S. No	Description of Section	Section	Parameters
1	Meteorology	Section 3.6.2	Temperature, Relative Humidity, Rainfall, Wind Speed & Direction
2	Ambient Air Quality	Section 3.6.3	As per NAAQS, 2009 and TVOC as per ToR
3	Ambient Noise Levels	Section 3.7	Day equivalent noise levels, Night equivalent noise levels (As per CPCB Standards)
4	Water Quality	Surface water – Section 3.8.2 Ground water – Section 3.8.3	Ground Water – IS 10500:2012 Surface Water – IS 2296 (Class – A)
5	Soil Quality	Section 3.9	ICAR (Indian Council of Agricultural research)
6	Ecology	Section 3.10	Flora and Fauna
7	Social Economic Status	Section 3.11	Socio Economic Profile of Study area (Population Profile, Employment and Livelihood, Education and Literacy, etc.,)

3.2 Description of 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 10Km from the boundary of the project. The PIA covers approximately 47 villages and 2 Town. 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.

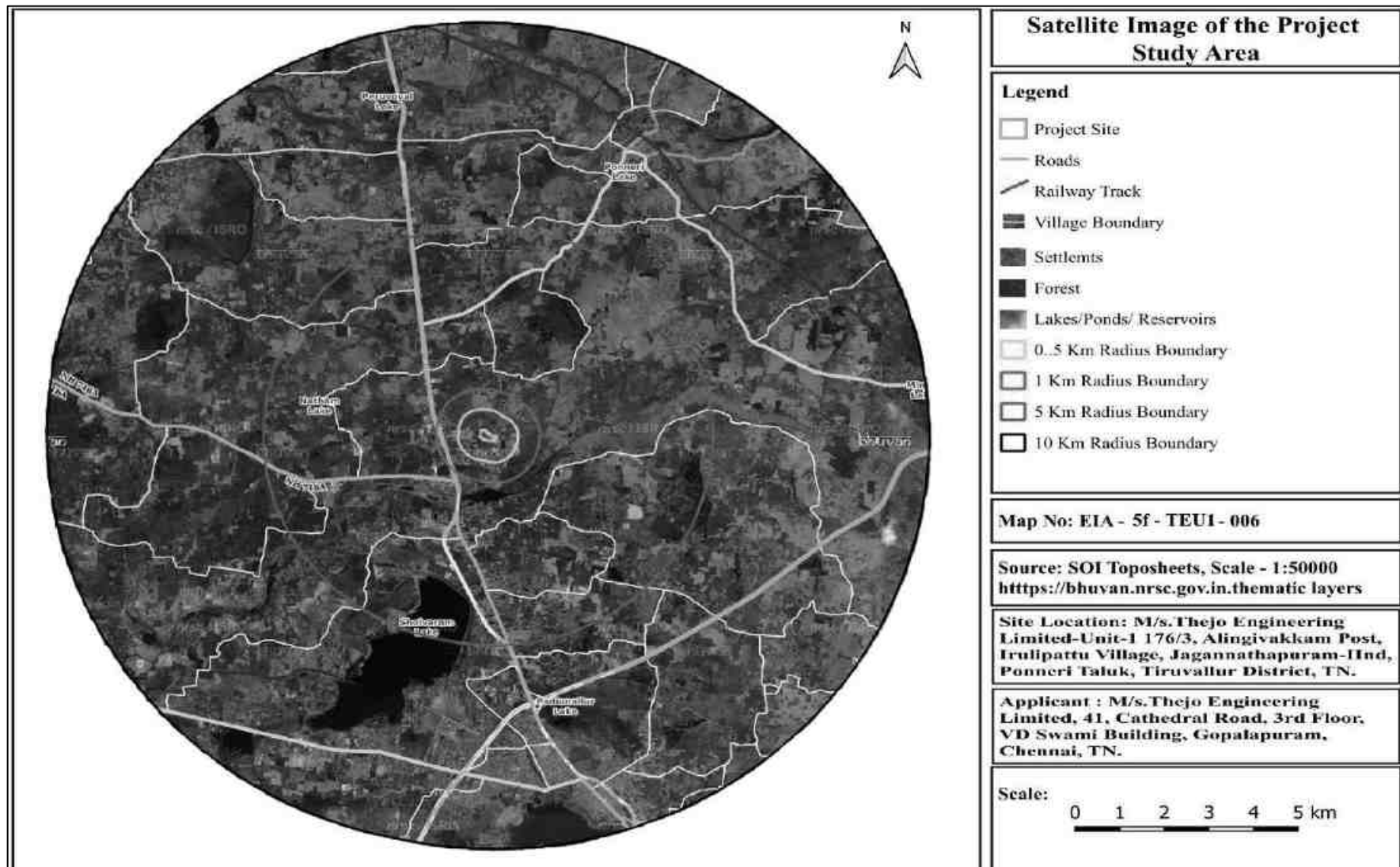


Figure 3-1 Satellite Image of the study area of Project

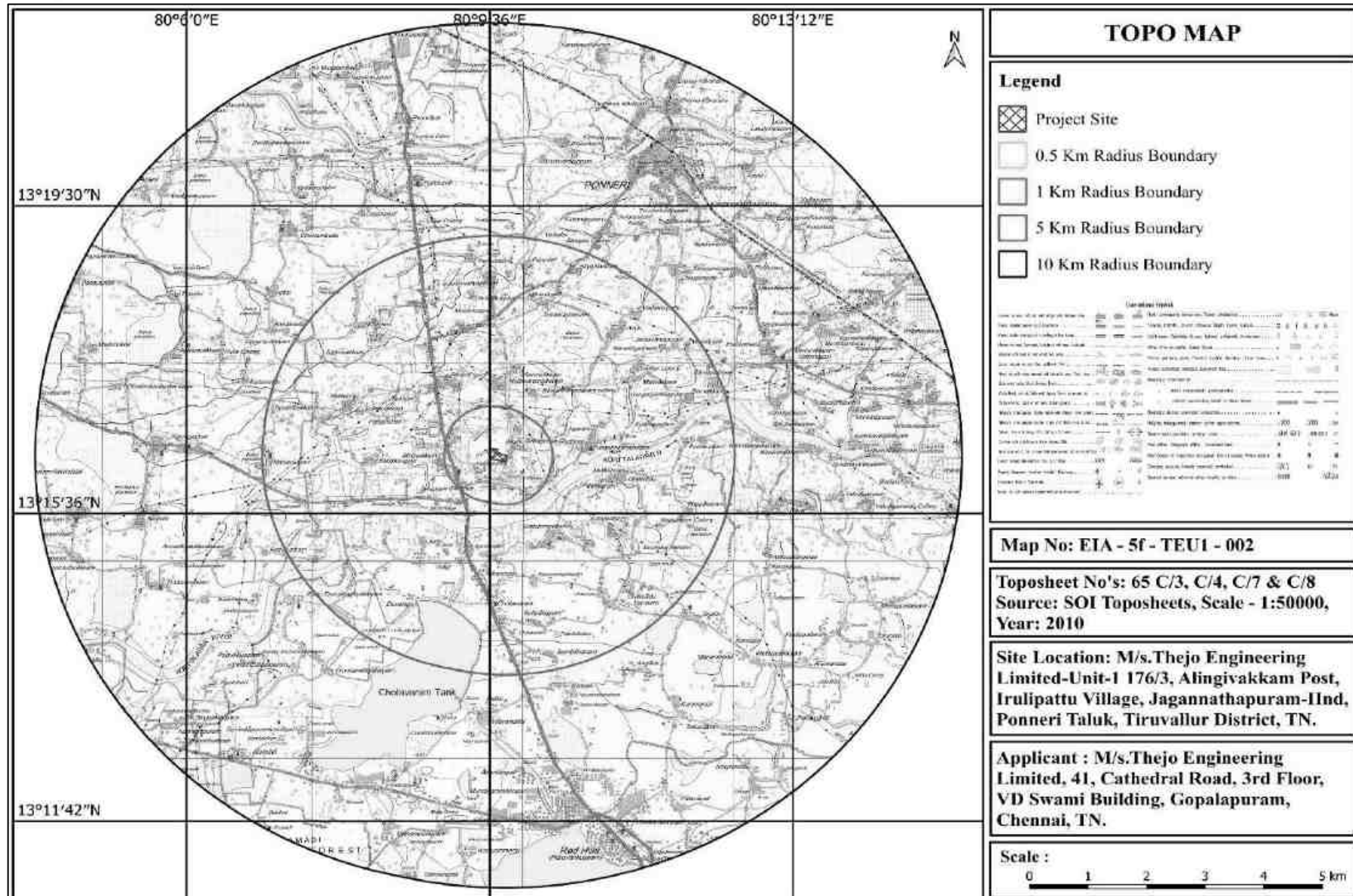


Figure 3-2 Topo Map of Study area

3.3 Environmentally/Ecologically Sensitive areas

The environmental sensitive areas covering an aerial distance of 15km from the project boundary is given in **Table 3-1** and Map showing Environmental sensitive areas within 15km from project boundary is given in **Figure 3-3**.

Table 3-1 Environmentally Sensitive areas within 15km from Project site boundary

S. No.	Areas	Distance & Direction from project boundary			
		S. No	Description	Distance(~km)	Direction
1	List of Monuments and Heritages	1	Virgin group containing many barrows	8.07	S
		2	Prehistoric settlement site-megalithic period - Pulal	12.48	SSE
		3	Megalithic cists and cairns -Pottur	12.82	S
		4	Megalithic cists and cairns - Pottur	12.15	S
		5	Megalithic cists and cairns - Pammadukulam	11.94	S
2	List of Sanctuaries	Nil			
3	List of Water Bodies	S. No	Description	Distance(~km)	Direction
		1	Lake near Kadapakkam	11.92	SE
		2	Sembium Manalai Lake	10.67	SE
		3	Pulal Lake	8.55	S
		4	Lake near Kanalur	12.75	NW
		5	Lake near Chinnambedu	6.76	NW
		6	Lake near arani	10.04	WNW
		7	Gummidipoondi Lake	12.11	NNW
		8	Eri near Edapalaiyam	11.3	N
		9	Tank near Ramanayakankandigai	11.99	NW
		10	Lake near Melmudalambedu	10.2	NNW
		11	Lake near Kilmudalambedu	9.4	NNW
		12	Panappakkam lake	10.82	NNW
		13	Eri near kattavur	9.29	N

		14	Lake near Appalapuram	11.57	N
		15	Lake near Medur	11.3	NNE
		16	Lake near Perumbedu	11.94	NE
		17	Lake near Asanbudur	13.39	NE
		18	Lake near Akarapakkam	7.18	WNW
		19	Lake near Tirunilai	7.83	WNW
		20	Cholavaram Tank	3.55	SSW
		21	Lake near Alamadi	8.87	SW
		22	Lake near Vellanur	12.98	SW
		23	Madhavaram Eri	13.79	SSE
		24	Lake near Orakkadu	4.87	SE
		25	Lake near Attapalaiyam	4	E
		26	Lake near Sottupakkam	7.05	SE
		27	Lake near Kavaripalayam	8.09	NE
		28	Lake near Tulukkupalaiyam	2.38	NE
		29	Lake near Ayanallur	14.19	N
		30	Lake near Neyveli	7.4	W
		31	Lake Near Vadamadurai	13.95	W
3	List of Reserved Forests				
		S. No	Location	Distance(~km)	Direction
		1	Eumaivettipalayam RF	3.73	SSW
		2	Almadi RF	9.13	SSW
3	Manali RF	13.55	NW		
4	Nearby Town, City and Head Quarters	Town: Cholavaram: ~2.79km – (S) City: Chennai: ~6.65 km – (S) District HQ – Tiruvallur, ~27.94 km – (WSW)			
5	Nearby State Boundaries	Nil within the 15km.			
6	Nearby Highways	SH-56: Thiruvottriyur – Ponneri – Panchetty Road~ 2.85km (N). NH-16: Chennai - Dankuni – Kolkata~ 0.82km (W). NH-716 A: Puttur – Janapachatram~ 1.17km (SSW).			
7	Nearest Airport, Port and Railway Stations	Airport: Chennai Int. Airport ~9.40km (S). Railway Station: Anuppambattu RS ~8.17km (ENE)			

8	Nearest Densely Populated Habitations					
		S. No.	Location	Distance (~km)	Direction	Population
		1	Cholavaram	2.79	S	9397
		2	Ponneri	6.43	NNE	31025
		3	Padinallur	6.65	S	23819



Figure 3-3 Environmental sensitive areas within 15km radius from project site 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 are also provided.

3.4.1 PIA District Profile

Thiruvallur district, a newly formed district bifurcated from the erstwhile Chengalpattu district (on 1st January 1997), is located in the Northeast part of Tamil Nadu. North Latitude between 12°15' and 13°15'. East Longitude between 79°15' and 80°20'. The district is surrounded by Kancheepuram district in the South, Vellore district in the West. Bay of Bengal in the East and Andhra Pradesh State in the North. The district is spread over an area of about 3422 Sq. kms.

Source : https://agritech.tnau.ac.in/govt_schemes_services/pdf/govt_schemes_nadp_dap_Tiruvallur.pdf

3.4.2 Climatic Conditions

The average temperature of the district is Maximum 37.9°C Minimum 18.5°C. Like other parts of Tamil Nadu, hot climate prevails during the month of April - May and humid climate during the rest of the year except December - February when it is slightly cold.

Source : https://agritech.tnau.ac.in/govt_schemes_services/pdf/govt_schemes_nadp_dap_Tiruvallur.pdf

3.5 Natural Resources of PIA District

3.5.1 Forest Resources of PIA district

The area under forests, all of 19,736 sq. km., is only 5.8% of the total geographical area of the district. Forest cover in Tiruvallur is quite scanty, in comparison with 17.41% of forest cover in Tamil Nadu or 24% forest cover in India.

Source : <https://cdn.s3waas.gov.in/s39431c87f273e507e6040fcb07dcb4509/uploads/2018/05/2018050816.pdf>

3.5.2 Irrigation of PIA district

Apart from seasonal rivers like Kosasthalaiyar, Araniar, Nandi, Kallar, Coovum and Buckingham canal, there is no perennial river in the district. The agricultural operation in the district depends mainly on tanks and lakes. They get water mainly during two monsoon periods viz., South-West monsoon (June to September) and North-East monsoon (October to December). The North-East monsoon brings more water compared to the others.

Source : [DH 2011 3301 PART A DCHB THIRUVALLUR](#)

3.5.3 Agricultural Resources of PIA district

The major occupation of this district is Agriculture and 16% of the total Workers are engaged in Agriculture. Out of the total geographical area of the district, 29% area was brought under cultivation during the current year. The major crops raised in this district are Paddy, Pulses, Sugarcane and Groundnut. There are no perennial rivers flowing in this district. However, the

existence of a considerable number of tanks in the district are meeting the irrigational needs of the crops cultivated.

Source:

<https://cdn.s3waas.gov.in/s39431c87f273e507e6040fcb07dcb4509/uploads/2024/01/2024012415.pdf>

3.5.4 Mineral Resources of PIA district

The district does not contain any precious minerals. However, it has a few varieties of major (like Minor minerals present in the district are Lime Shell (in Pulicat Lake, Sunnambukulam, and Annamalaicherry), Silica Sand (in Elavoor, Eravanoor, Ennore, Gummidipoondi and Ponneri) and Stoneware Clay (in Adhigathur, Odhapal, and Gudapakkam Kandigai). Major minerals present in the district are River Sand (in Kosasthallyar, Araniar, Kallar, Nandi, and Coovam), Blue Metal (in Pallipattu and Tiruttani Taluks), Gravel (in Ponneri and Gummidipoondi Taluks) and Brick Clay (in Tiruvallur and Ponneri Taluks).

Source : https://dcmsme.gov.in/old/dips/IPS%20%20thiruvallur%202012_t.pdf

3.5.5 Land Use & Land Cover of PIA district

The total geographic area of Tiruvallur district is **3422.93 Sq. km**. Urban Built-up area is 295.16 Sq. Km and Rural Built-up area is 272.76 Sq. Km. Details of land use/land cover statistics for Tiruvallur district were given in **Table 3-2**. Land Use pattern of Tiruvallur district is given in **Figure 3-4**.

Table 3-2 District land use/land cover statistics (2015-16) for Thiruvallur district

S. No	Division of Land Use/Land Cover	Area in Sq.Km.	Area (%)
1	Built up, Urban	295.16	8.62
2	Built up, Rural	272.76	7.97
3	Built up, Mining	7.54	0.22
4	Agriculture, Crop land	1834.25	53.59
5	Agriculture, Plantation	87.77	2.56
6	Agriculture, Fallow	115.92	3.39
7	Forest, Evergreen/ Semi evergreen	18.22	0.53
8	Forest, Deciduous	68.13	1.99
9	Forest, Forest Plantation	10.57	0.31
10	Forest, Scrub Forest	0.03	0.00
11	Forest, Swamp/ Mangroves	3.03	0.09
12	Barren/unculturable/ Wastelands, Salt Affected land	7.42	0.22
13	Barren/unculturable/ Wastelands, Gullied/Ravinous Land	0.11	0.00
14	Barren/unculturable/ Wastelands, Scrub land	190.58	5.57
15	Barren/unculturable/ Wastelands, Sandy area	12.83	0.37
16	Barren/unculturable/ Wastelands, Barren rocky	2.39	0.07
17	Wetlands/Water Bodies, Inland Wetland	0.65	0.02
18	Wetlands/Water Bodies, Coastal Wetland	86.74	2.53
19	Wetlands/Water Bodies, River/Stream/canals	67.33	1.97
20	Wetlands/Water Bodies, Reservoir/Lakes/Ponds	341.5	9.98
	Total	3422.93	100.00

Source : <https://bhuvan-app1.nrsc.gov.in/thematic/thematic/index.php>

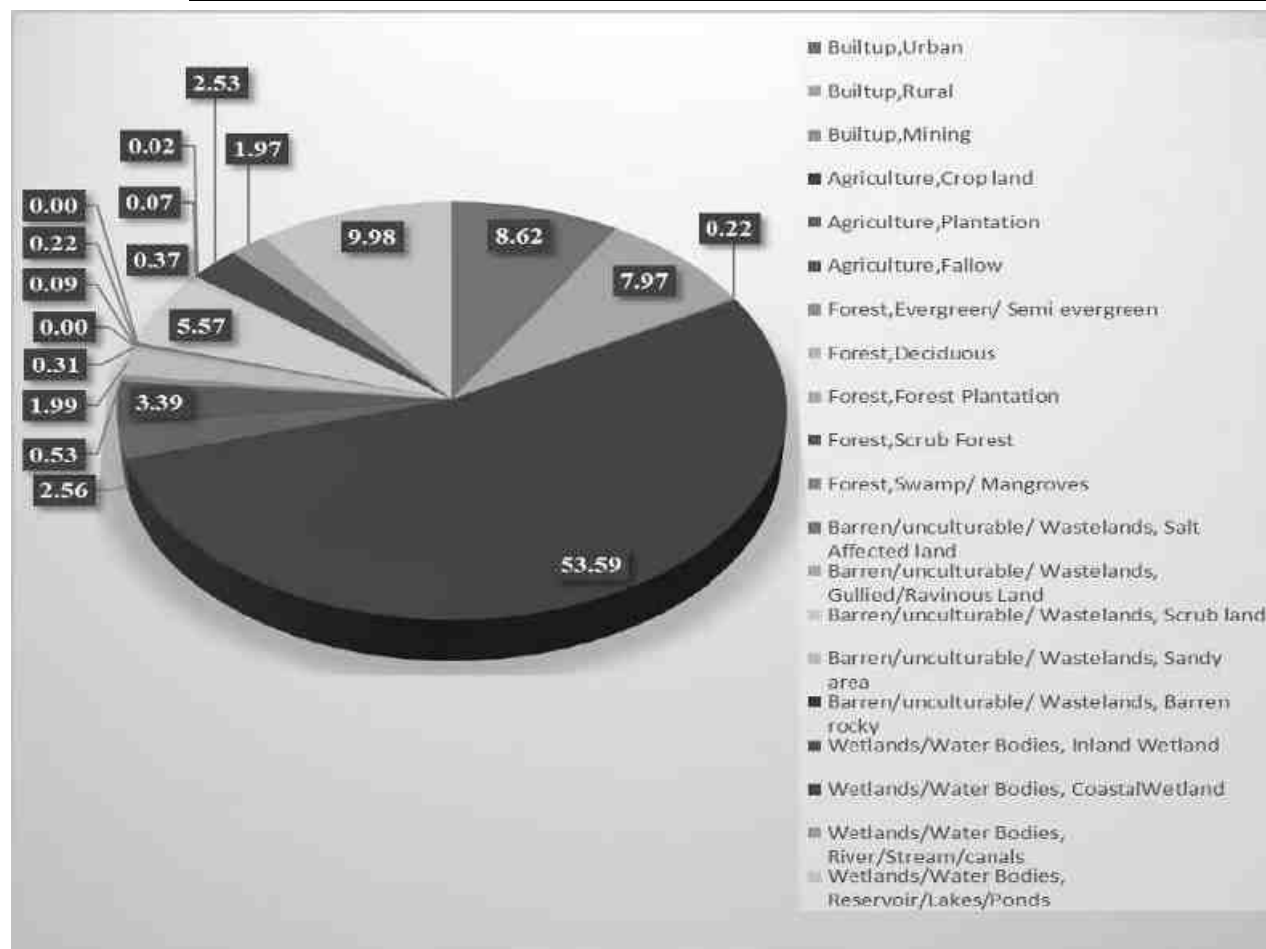


Figure 3-4 Land Use pattern of Thiruvallur District

3.5.5.1 Land Use and Land Cover of the Study Area

The total Project Study area is 345.99 Sq.km. The Land Use Pattern is given in **Table 3-3**. The Land Use Pattern and Land Use Map of the Study area are given in **Figure 3-5** & **Figure 3-6** respectively.

Table 3-3 Land Use Pattern of the Study Area

S. No	Description	Area (Sq. Km)	Area (Acres)	Area (Hectares)	Percentage (%)
1	Crop land	220.99	54607.73	22099	63.87
2	Fallow	4.89	1208.34	489	1.41
3	Forest Plantation	0.1	24.71	10	0.03
4	Mining	1.9	469.50	190	0.55
5	Plantation	2.67	659.77	267	0.77
6	River / Stream / Canals	10.64	2629.20	1064	3.08
7	Rural	45.09	11141.96	4509	13.03
8	Salt affected land	0.16	39.54	16	0.05
9	Scrub land	1.46	360.77	146	0.42
10	Urban	20.53	5073.07	2053	5.93
11	Waterbodies	37.56	9281.26	3756	10.86
Total		345.99	85495.86	34599	100.00

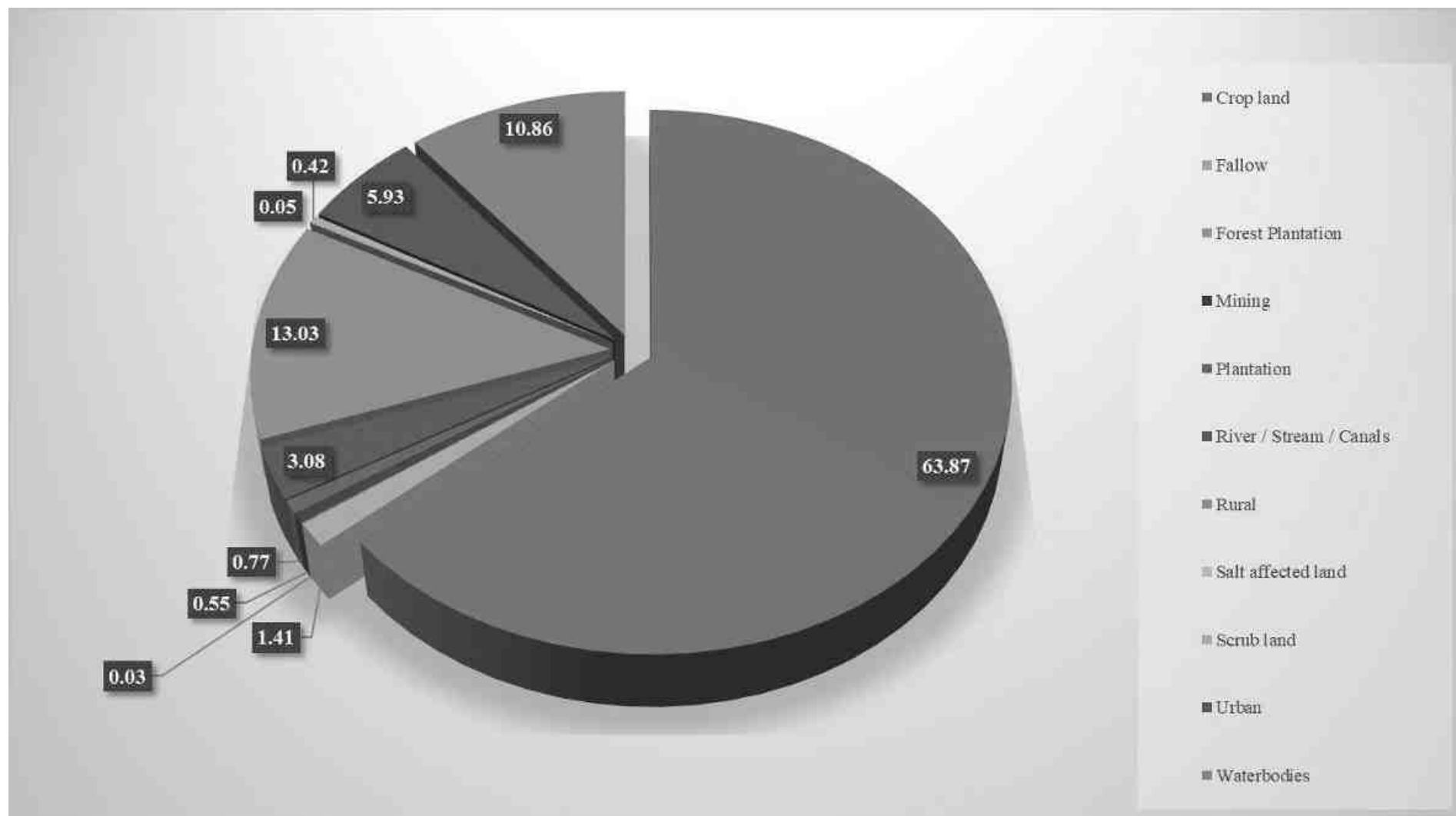


Figure 3-5 Land Use Pattern of the Study Area

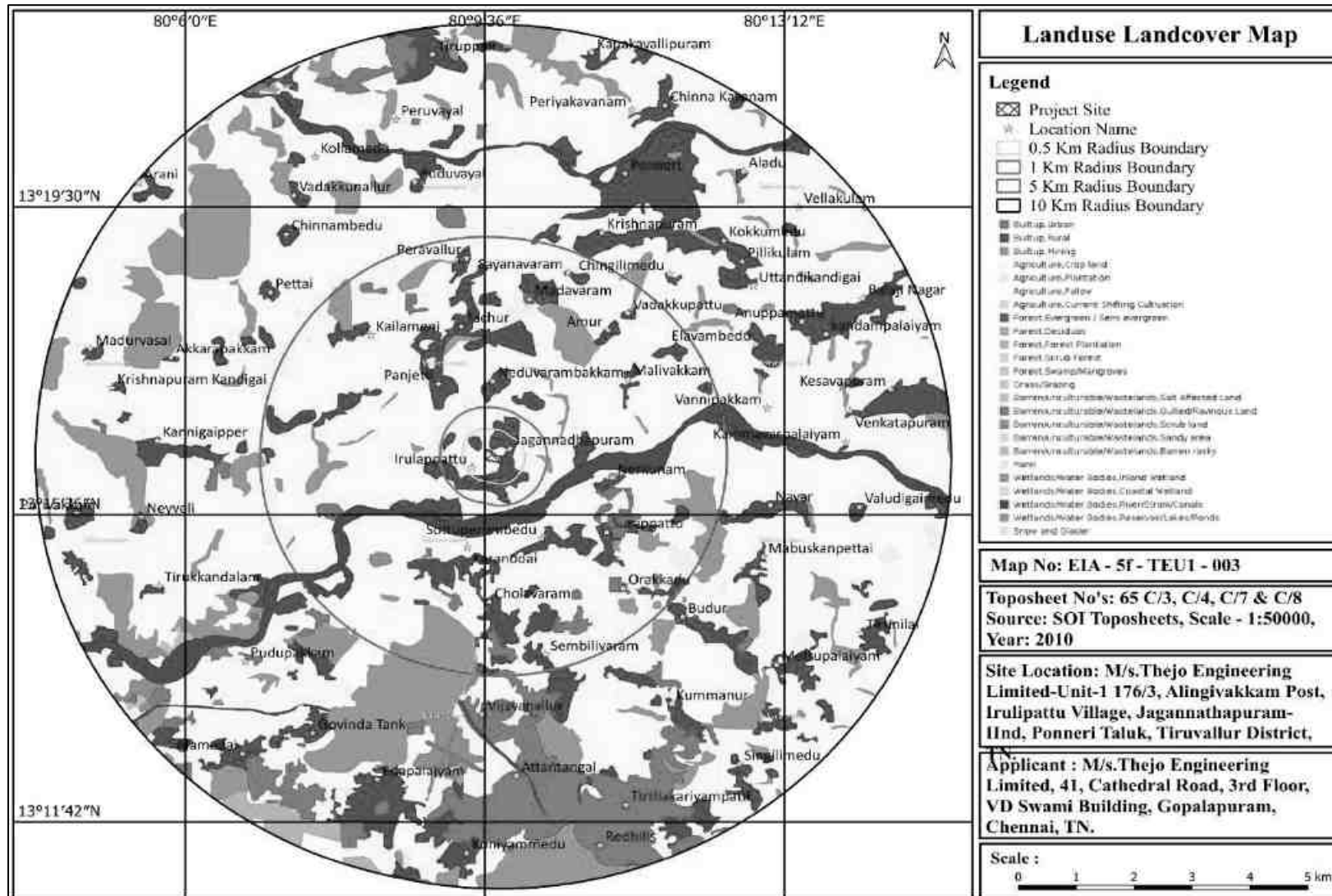


Figure 3-6 Land Use Land Cover map of the study area

3.5.6 Geology of PIA district

The Thiruvallur district can be geologically classified into hard rock and sedimentary (alluvial) formation. This district is principally made up of Archaean, upper Gondwana and the tertiary formations. These are overlaid by laterites and alluvium. The oldest of the crystalline rocks of Archaean age are Biotite and Hornblende Gneiss, Charnockite and granite. These are intruded by Amphibole dykes, and occasionally with veins of quartz and pegmatites. Granites and gneisses of Archaean age are mainly seen in Tiruthani Taluk. A contour map of the study area is given in **Figure 3-7**.

Source : <https://nwm.gov.in/sites/default/files/Notes%20on%20Thiruvallur%20District.pdf>

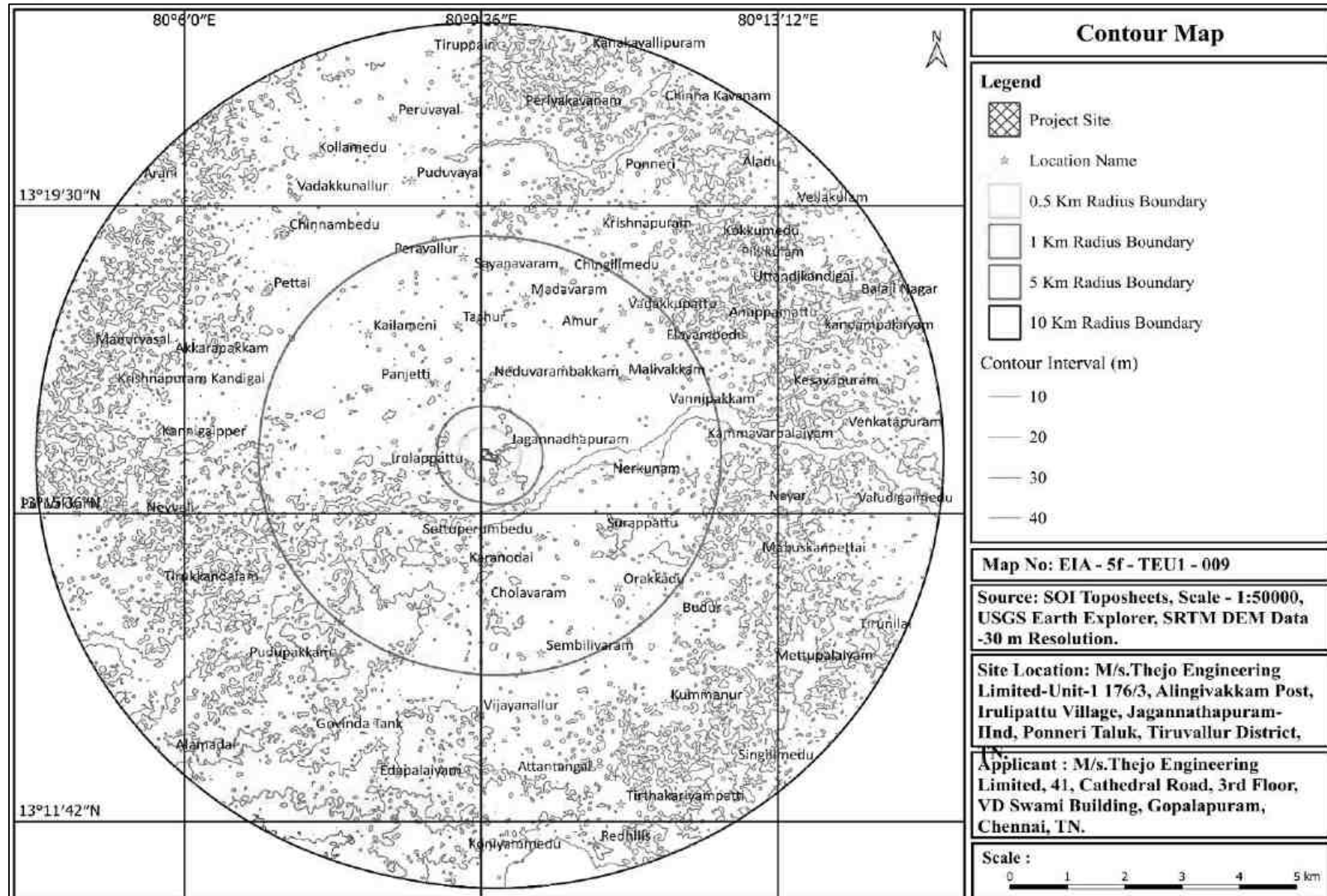


Figure 3-7 Contour map of study area

3.5.6.1 Geomorphology of the Study Area

The total Geographical area of the study area is **345.99** Sq.Km. The Geomorphology of the study area is given in Error! Reference source not found. and Geomorphology pattern and Geomorphology Map of the study area is given in Error! Reference source not found. and Error! Reference source not found. respectively.

Table 3-4 Geomorphology of the Study Area

S. No	Geomorphology	Area (Sq. Km)	Area (Acres)	Area (Ha)	Total Area (%)
1	Denudational Origin - Pediment pediplain Complex	27.57	6812.19064	2756.8	7.97
2	Anthropogenic Terrain	9.19	2270.89495	919	2.66
3	Fluvial Origin - Active Flood Plain	0.21	51.644945	20.9	0.06
4	Waterbodies	48.20	11910.461	4820	13.93
5	Coastal Origin - Older Deltaic Plain	260.82	64449.9261	26082	75.38
	Total	345.99	85495.12	34598.70	100.00

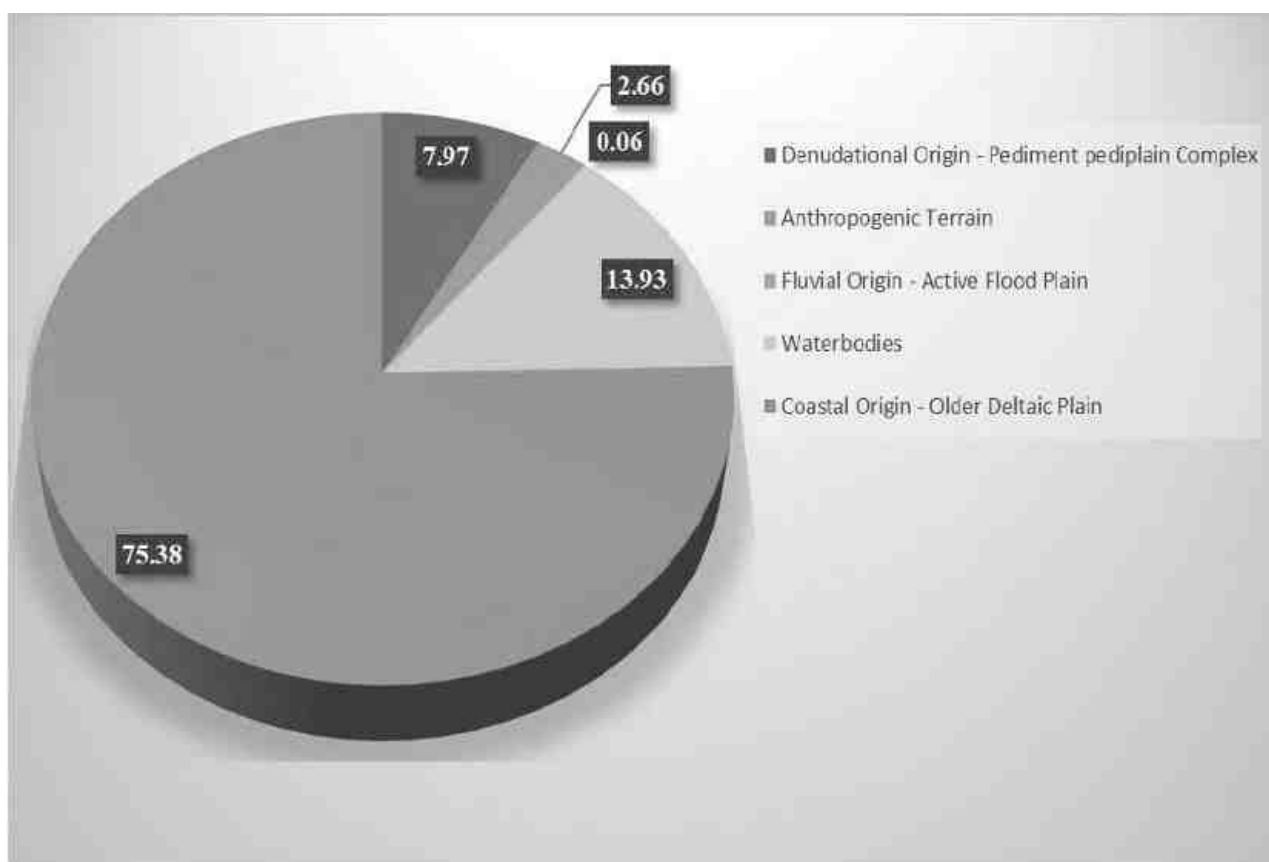


Figure 3-8 Geomorphology Pattern of the Study Area

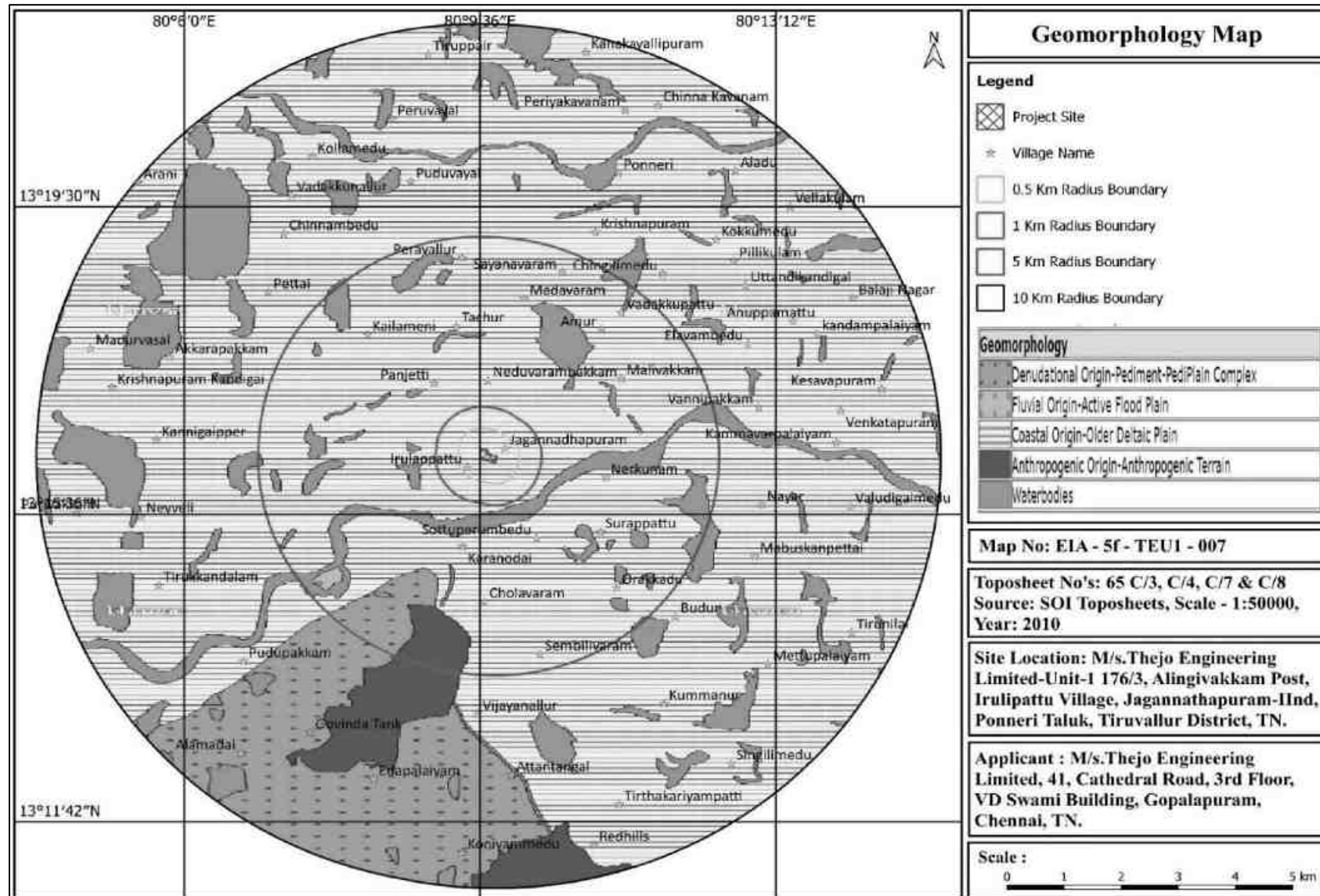


Figure 3-9 Geomorphology map of the study area

3.5.7 Hydrogeology of PIA district

The district is underlain by both porous and fissured formations. The important aquifer systems in the district are constituted by i) unconsolidated & semi-consolidated formations and ii) weathered, fissured, and fractured crystalline rocks.

The porous formations in the district include sandstones and clays of Jurassic age (Upper Gondwana), marine sediments of Cretaceous age, Sandstones of Tertiary age and Recent alluvial formations. As the Gondwana formations are well-compacted and poorly jointed, the movement of ground water in these formations is mostly restricted to shallow levels. Ground water occurs under phreatic to semi-confined conditions in the inter-granular pore spaces in sands and sandstones and the bedding planes and thin fractures in shales. In the area underlain by Cretaceous sediments, ground water development is rather poor due to the rugged nature of the terrain and the poor quality of the formation water. Quaternary formations comprising mainly sands, clays and gravel are confined to major drainage courses in the district. The maximum thickness of alluvium is 30.0 m. whereas the average thickness is about 15.0m. Ground water occurs under phreatic to semi-confined conditions in these formations and is being developed by means of dug wells and filter points.

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

3.5.8 Drainage Pattern of PIA district

Araniyar, Korattalayar, Cooum, Nagari and Nandhi are the important rivers. The drainage pattern, in general, is dendritic. All the rivers are seasonal and carry substantial flows during monsoon period. Korattaliar river water is supplied to Cholavaram and Red Hill tanks by constructing an Anicut at Vellore Tambarambakkam. After filling a few tanks on its further course, the river empties into the Ennore creek a few kilometres north of Chennai. The Cooum River, flowing across the southern part of the district, has its origin in the surplus waters of the Cooum tank in Tiruvallur taluk and receives the surplus waters of a number of tanks. It feeds the Chembarambakkam tank through a channel. It finally drains into the Bay of Bengal. The drainage map of the Study area is given in **Figure 3-10**.

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

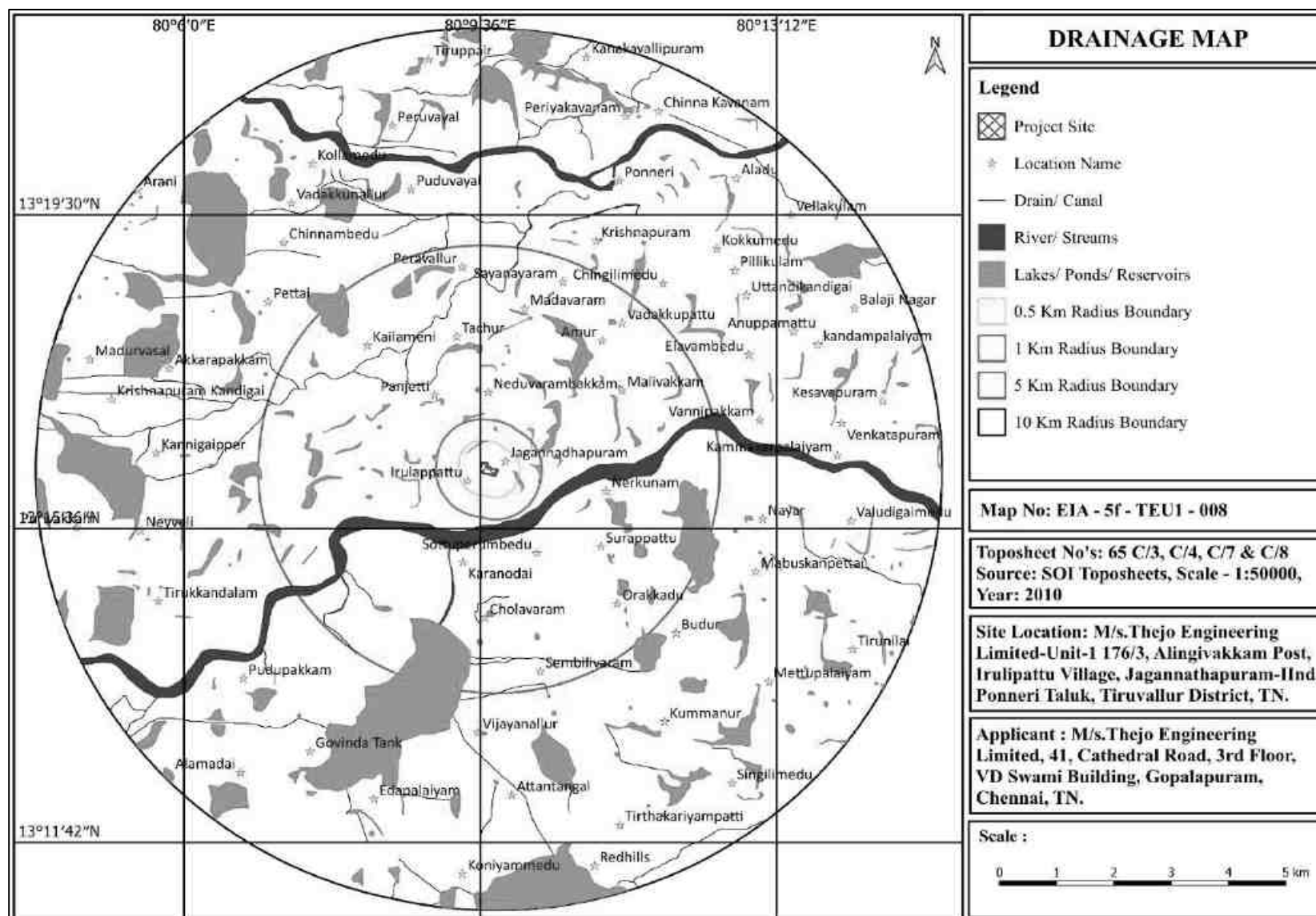


Figure 3-10 Drainage map of the study area

3.5.9 Seismicity

As per Seismicity Map of India, the project location/study area falls in Zone II, which is categorized as a Least Active Zone. The Seismicity Map of India is shown in **Figure 3-11**.



Figure 3-11 Seismicity map of India

3.5.10 Soils of PIA District

The soil in Tiruvallur district is generally sandy mixed with soda or other alkali or stony. Rocks found in and near the surface are in detached masses. Altogether the soil is not so fertile when compared to other districts. The red ferruginous type of soil-less fertile than the alluvial soil is found in the major portion of the district. Araneous soil is seen only in Ponneri taluk.

Source : DH 2011 3301 PART A DCHB THIRUVALLUR

3.6 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. The baseline status of air environment in the study area is assessed through a systematic air quality surveillance programme.

3.6.1 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. 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.

3.6.1.1 General Meteorological Scenario based on IMD Data

The nearest Indian Meteorological Department (IMD) station located to project site is Nungambakkam. The Climatological data of Nungambakkam (13°04 ' and 80°15' E), published by the IMD, based on daily observations at 08:30 and 17:30 hour IST for a 29-year period (1971-2000), 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 3-5**.

Table 3-5 Climatological Summary – Nungambakkam (1971-2000)

Month	Temp (°C)		Rainfall		Mean Wind Speed (Kmph)	Predominant Wind Directions (From)*	
	Daily Max.	Daily Min.	Total (mm)	No. of days		08:30	17:30
Jan	28.8	20.9	22.5	1.3	4.8	N	NE
Feb	30.5	22.0	2.2	0.4	5.1	W	E
Mar	32.5	23.8	4.0	0.3	5.8	SW	SE
Apr	34.3	26.4	7.7	0.6	6.9	SW	SE
May	36.8	27.9	43.9	1.4	7.9	SW	SE
Jun	36.9	27.5	55.9	4.0	8.7	W	SE
Jul	35.0	26.3	100.3	6.9	7.4	W	SE
Aug	34.3	25.7	140.4	8.5	7.0	W	SE
Sep	33.9	25.5	137.3	7.1	6.0	W	SE
Oct	31.8	24.5	278.8	10.6	4.4	W	NE
Nov	29.6	23.0	407.4	11.7	5.3	W	NE
Dec	28.5	21.9	191.1	6.3	6.3	N	NE
Max.	36.9	27.9	407.4	11.7	8.7	Predominant Wind direction is West	
Min.	28.5	20.9	2.2	0.3	4.4		
Annual Avg/Total.	32.8	24.6	1391.5	59.1	6.3		

Source : IMD

3.6.2 Meteorological Scenario during Study Period

The meteorological scenario in and around the project site is an essential requirement during the study period for proper interpretation of baseline air quality status. Meteorological data was collected during the study period (January 2024 - March 2024) and is presented in Table 3-6. The wind rose for the study period is given in Figure 3-12.

Table 3-6 Meteorological Data for the Study Period (January 2024 - March 2024)

S. No	Parameter	Observation
1.	Temperature	Max Temperature: 38 °C Min Temperature: 23 °C Avg Temperature :30.32 °C
2.	Average Relative Humidity	75.73 %
3.	Average Wind Speed	2.93 m/s
4.	Predominant Wind Direction during study period	East

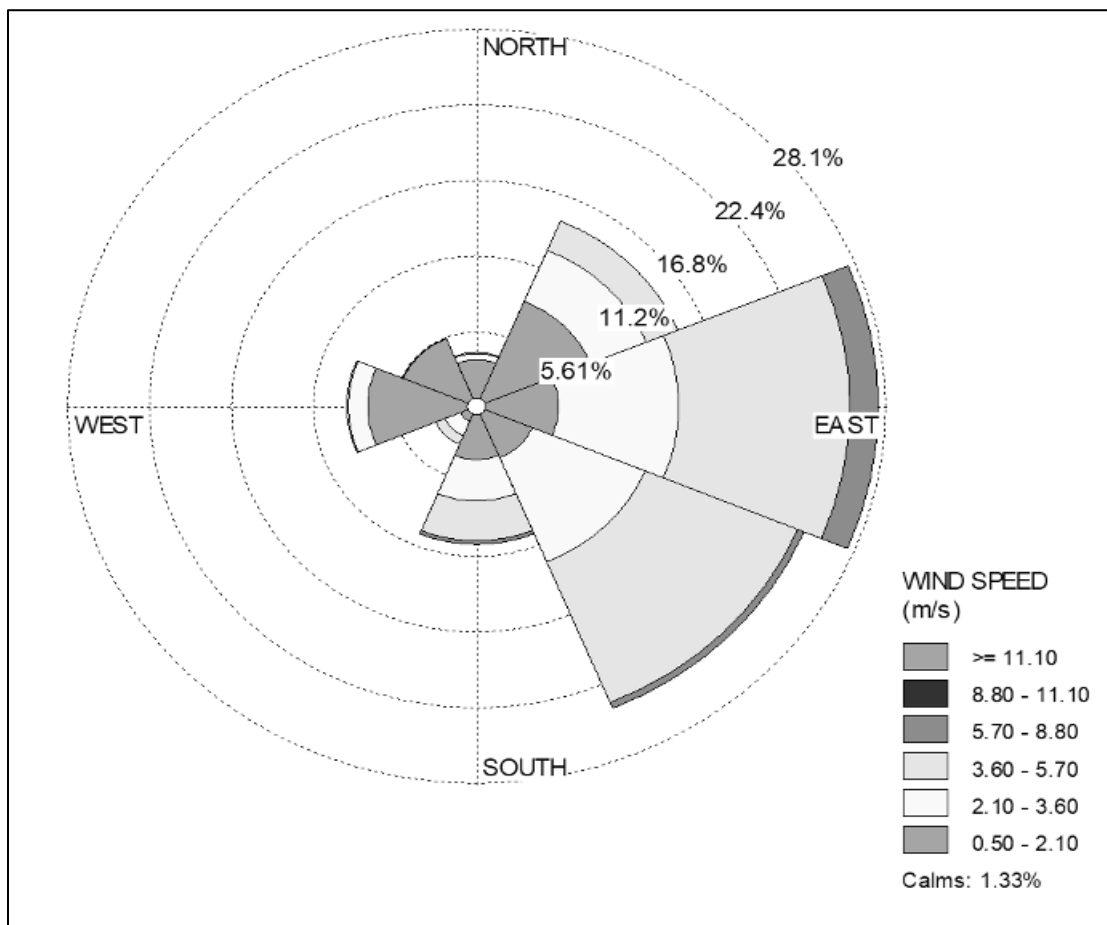


Figure 3-12 Wind rose for the study period

3.6.3 Ambient Air Quality

3.6.3.1 Ambient Air Quality Monitoring Stations

Eight (08) monitoring locations have been identified as per annual wind predominance of Nungambakkam from IMD. AAQ monitoring locations are selected based on Annual wind predominance, map showing the Ambient Air Quality monitoring locations is given in **Figure 3-13** and the details of the locations are given in **Table 3-7**.

Table 3-7 Details of Ambient Air Quality Monitoring Locations

Station Code	Location	Type of Wind	Distance (km) from Project boundary	Azimuth Directions
A1	Project Site	-	Within site	
A2	Tiruvayarpadi	C/W	8.05	NNE
A3	Agaram	D/W	1.93	ENE
A4	Attapalaiyam	D/W	4.05	ESE
A5	Karanpdai	C/W	3.67	SSW
A6	Bandikavanur	U/W	2.84	W
A7	Near Upparapalaiyam	C/W	6.3	WNW
A8	Andalkuppam	C/W	3.51	N

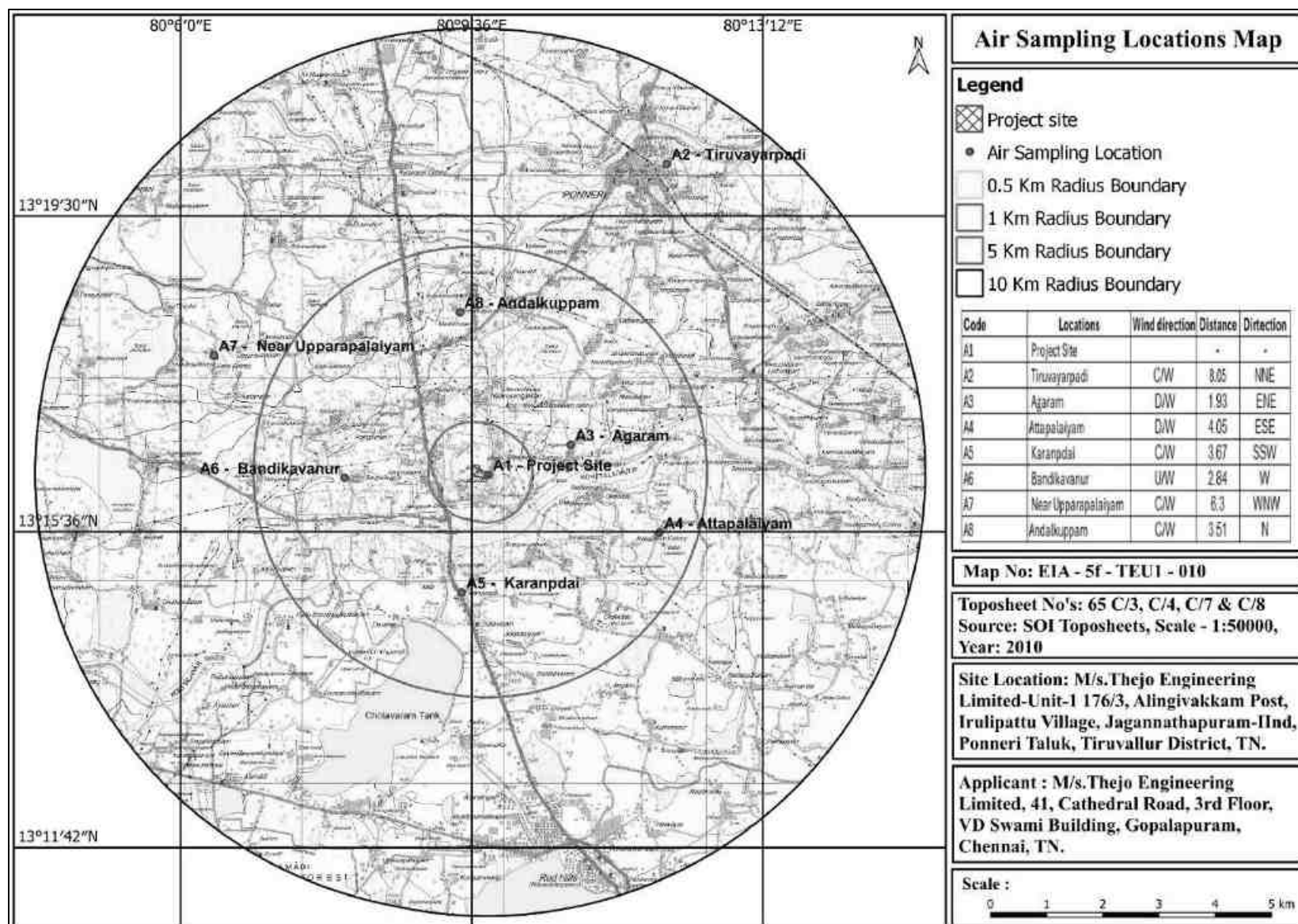


Figure 3-13 Ambient Air Quality monitoring locations

3.6.3.2 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., 3 months (**January 2024 - March 2024**). PM₁₀, PM_{2.5}, SO₂, NO_x, Pb, NH₃, C₆H₆, C₂₀H₁₂, As, Ni and TVOC were monitored. Sampling was carried out as per the Central Pollution Control Board (CPCB), monitoring guidelines at each location. Analytical methods used for analysis of parameters are given in **Table 3-8** and the Summary of the average baseline concentrations of pollutants is given in **Table 3-9**.

Table 3-8 Analytical Methods for Analysis of Ambient Air Quality Parameters

S. No	Parameters	Analytical method
1	Sulphur Dioxide (SO ₂), µg/m ³	IS 5182(Part 2) : 2001 RA
2	Nitrogen Dioxide (NO ₂), µg/m ³	IS 5182(Part 6) : 2006 RA
3	Particulate Matter (PM _{2.5}), µg/m ³	SOP – EA -001- In house validated method / Issue No/Date : 03 / 04.08.2014:
4	Particulate Matter (PM ₁₀), µg/m ³	IS 5182(Part 23) : 2006 RA
5	CO mg/m ³	NIOSH- 6014
6	Pb µg/m ³	IS 5182(Part 22): 2004 RA
7	O ₃ , µg/m ³	IS 5182(Part 9): 1974 RA
8	NH ₃ , µg/m ³	SOP – EA -009 - In house validated method / Issue No/Date: 03/04.08.2014 (Based on CPCB Method)
9	Benzene, µg/m ³	IS 5182(Part 11): 2006 (RA 2012)
10	Benzo (a) pyrene, ng/m ³	IS 5182(Part 12) :2004 RA
11	Arsenic, ng/ m ³	SOP – EA -010 - In house validated method / Issue No/Date :03/04.08.2014 (Based on CPCB Method)
12	Nickel ng/ m ³	SOP – EA -011 - In house validated method / Issue No/Date :03/04.08.2014 (Based on CPCB Guideline)
13	TVOC	USEPA Method

Table 3-9 Summary of the average baseline concentrations of pollutants

Parameters	Conc. $\mu\text{g}/\text{m}^3$	NAAQ Standards	Locations							
			Project Site	Tiruvayarpadi	Agaram	Attapalaiyam	Karanpdai	Bandikavanur	Near Upparapalaiyam	Andalkuppam
			AAQ 1	AAQ 2	AAQ 3	AAQ 4	AAQ 5	AAQ 6	AAQ 7	AAQ 8
PM ₁₀ Conc. ($\mu\text{g}/\text{m}^3$)	Min.	100 (24 Hours)	43.9	43.3	47.4	45.2	42.2	37.2	39.0	41.0
	Max		62.6	61.6	67.6	64.4	60.1	53.1	55.6	58.4
	Avg.		52.7	51.9	56.9	54.2	50.6	44.7	46.8	49.2
	98th 'tile		62.2	61.3	67.2	64.0	59.7	52.8	55.3	58.1
PM _{2.5} Conc. ($\mu\text{g}/\text{m}^3$)	Min.	60(24 Hours)	24.2	23.8	26.1	24.8	23.2	20.5	21.4	22.5
	Max		34.4	33.9	37.2	35.4	33.1	29.2	30.6	32.1
	Avg.		29.0	28.5	31.3	29.8	27.8	24.6	25.7	27.0
	98th 'tile		34.2	33.7	37.0	35.2	32.9	29.0	30.4	31.9
SO ₂ Conc. ($\mu\text{g}/\text{m}^3$)	Min.	80(24 Hours)	8.2	6.8	9.4	9.0	7.0	5.1	5.4	6.0
	Max		11.7	9.6	13.4	12.9	10.0	7.3	7.7	8.6
	Avg.		9.8	8.1	11.3	10.8	8.4	6.1	6.5	7.2
	98th 'tile		11.6	9.6	13.4	12.8	9.9	7.2	7.7	8.5
NO ₂ Conc. ($\mu\text{g}/\text{m}^3$)	Min.	80(24 Hours)	16.4	14.7	18.9	17.5	15.1	13.2	13.5	14.0
	Max		23.3	20.9	26.9	25.0	21.5	18.8	19.3	20.0
	Avg.		19.6	17.6	22.6	21.0	18.1	15.8	16.2	16.8
	98th 'tile		23.2	20.8	26.7	24.8	21.4	18.7	19.2	19.9
CO (mg/m^3)	Avg.	4 (1hour)	0.35	0.39	0.36	0.28	0.26	0.24	0.29	0.30
Pb ($\mu\text{g}/\text{m}^3$)	Avg.	1 (24 hour)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
O ₃ ($\mu\text{g}/\text{m}^3$)	Avg.	180(1hour)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

Parameters	Conc. µg/m ³	NAAQ Standar ds	Locations							
			Project Site	Tiruvay arpadi	Agaram	Attapalaiyam	Karanpdai	Bandika vanur	Near Upparap alaiyam	Andalk upmam
			AAQ 1	AAQ 2	AAQ 3	AAQ 4	AAQ 5	AAQ 6	AAQ 7	AAQ 8
NH ₃ (µg/m ³)	Avg.	400 (24 hours)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Benzene (µg/m ³)	Avg.	5(Annua l)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Benzo (a) pyrene, (ng/m ³)	Avg.	1(Annua l)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Arsenic (ng/ m ³)	Avg.	6(Annua l)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Nickel (ng/m ³)	Avg.	20(Annu al)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
TVOC (µg/m ³)	Avg.	-	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

Note: BDL (Below detectable limit), DL (Detectable limit)

3.6.3.3 Interpretations of Results:

The monitoring results of ambient air quality were compared with the National Ambient Air Quality Standards (NAAQS) Prescribed by MoEFCC; GoI Notification dated 16.11.2009. The baseline levels of PM₁₀ (37.2 – 67.6 µg/m³), PM_{2.5} (20.5 – 37.2 µg/m³), SO₂ (5.1 – 13.4 µg/m³), NO₂ (13.2 – 26.9 µg/m³), While thus it was found that concentration of pollutants was within the limits of NAAQ standards.

All the results of ambient air quality parameters have been found within the limit as per NAAQS. Based on comparison study of results for tested parameters with NAAQS, it is interpreted that ambient air quality of studied locations is average. This interpretation narrates the results found for corresponding locations and study period.

3.7 Noise Environment

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. Noise levels were recorded on an hourly basis for one complete day at each location using pre-calibrated noise levels. A map showing the noise monitoring locations is given in **Figure 3-14**.

3.7.1.1 Results and Discussions

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

1. 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 comparison of day equivalent noise levels (Ld) and night equivalent noise levels (Ln) with the respective CPCB stipulated noise standards for various land use categories are shown in the **Table 3-10**.

Table 3-10 Day and Night Equivalent Noise Levels

S. No	Location	Location Code	Distance (km) from Project boundary	Azimuth Direction	Noise level in dB(A) Leq		CPCB Standard		Environmental Setting
					Day	Night	Lday (Ld)	LNight (Ln)	
1	Project Site	N1	-		53.4	43.8	75	70	Industrial
2	Tiruvayarpadi	N2	8.05	NNE	52.8	42.6	55	45	Residential
3	Agaram	N3	1.93	ENE	53.6	42.9	55	45	Residential
4	Attapalaiyam	N4	4.05	ESE	51.2	41.2	55	45	Residential
5	Karanpdai	N5	3.67	SSW	54.1	43.5	55	45	Residential
6	Bandikavanur	N6	2.84	W	51.4	43.1	55	45	Residential
7	Near Upparapalaiyam	N7	6.3	WNW	50.9	40.9	55	45	Residential
8	Andalkuppam	N8	3.51	N	52.7	41.6	55	45	Residential

3.7.1.2 Interpretations of Results:

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

- In Industrial areas daytime noise levels are **53.4 dB(A) and 43.8 dB(A)** during nighttime, which is within prescribed limit by CPCB (75 dB(A) Day time & 70 dB(A) Nighttime).
- In residential areas daytime noise levels varied from **50.9 dB(A) to 54.1 dB(A)** and nighttime noise levels varied from 40.9 dB(A) to 43.8 dB(A) across the sampling stations. The field observations during the study period indicate that the ambient noise levels are well within the prescribed limit by CPCB (55 dB(A) Day time & 45 dB(A) Nighttime).

The Noise levels recorded during the daytime (6:00 a. m to 10:00 p. m) and night-time (10:00 p. m to 6:00 a. m) at all stations are within the CPCB limits. The major source of noise in the study area is transportation and vehicular movement since the project site is located near highway.

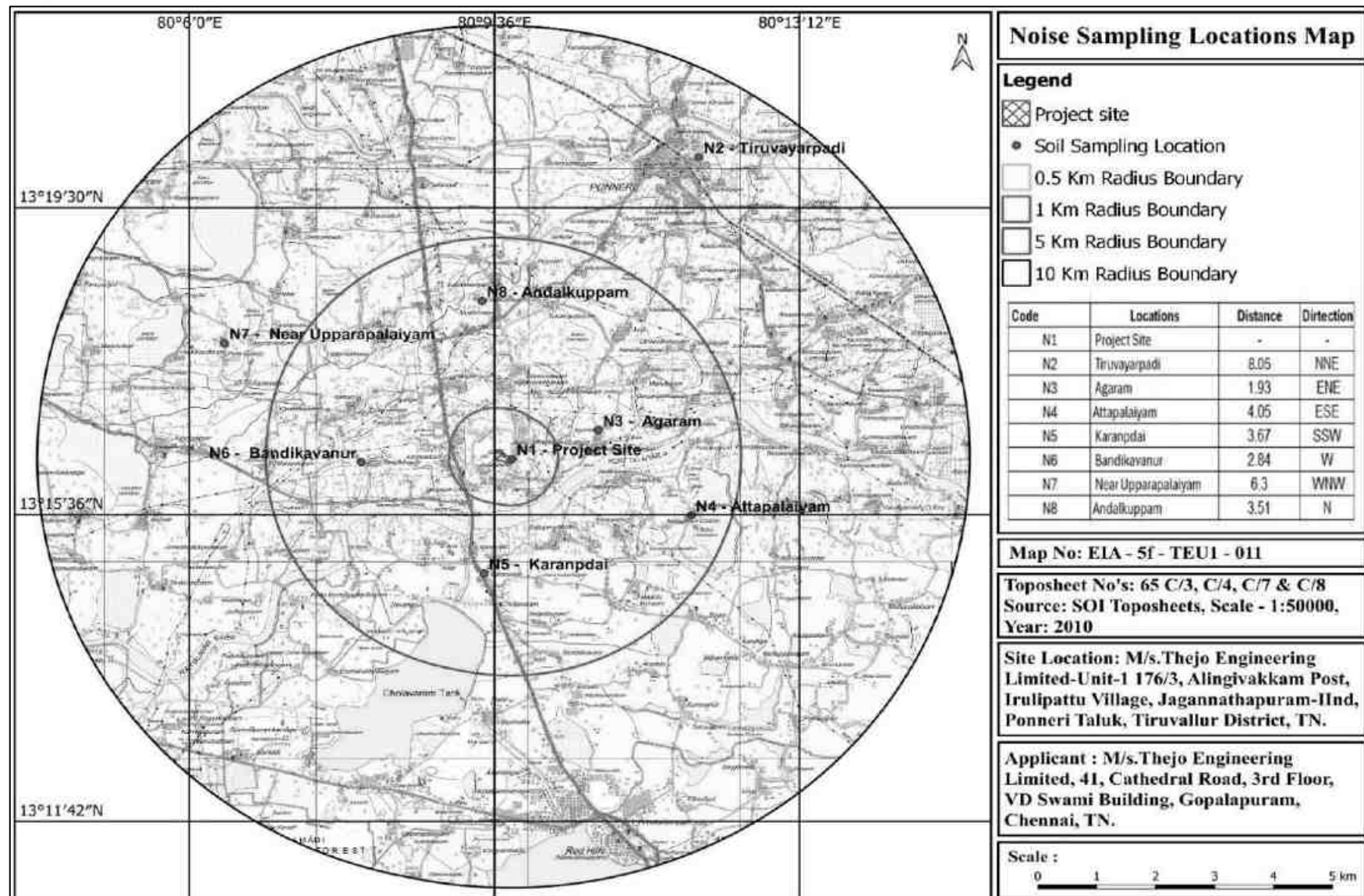


Figure 3-14 Noise Monitoring locations

3.8 Water Environment

3.8.1 Surface Water Resources of PIA district

The district is part of the composite east flowing river basin having Arniar Korattaliar and Cooum sub basins. Araniyar, Korattaliyar, Cooum, Nagari and Nandhi are the important rivers. The drainage pattern, in general, is dendritic. All the rivers are seasonal and carry substantial flows during the monsoon period. Korattaliar river water is supplied to Cholavaram and Red Hill tanks by constructing an Anicut at Vellore Tambarambakkam. After filling a few tanks on its further course, the river empties into the Ennore creek a few kilometers north of Chennai. The Cooum River, flowing across the southern part of the district, has its origin in the surplus waters of the Cooum tank in Tiruvallur taluk and receives the surplus waters of several tanks. It feeds the Chembarambakkam tank through a channel. It finally drains into the Bay of Bengal.

Source: http://cgwb.gov.in/District_Profile/TamilNadu/TIRUVALLUR.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 are given in **Table 3-11**.

Table 3-11 Test methods used for the analysis of water quality parameters.

S. No	Parameter Measured	Test Method
1	Turbidity	APHA 23rd Edition 2017 /2130B/P 2-9 Nephelometric Method/ IS 3025(Part 10): 1984 RA
2	Color	APHA 23rd Edition 2017 2120B /P2-2 Visual Comparison Method / IS 3025(Part 4): 1983 RA
3	pH	APHA 23rd Edition 2017 4500 H+ / P 4-90 Electrometric Method/IS 3025(Part 11): RA
4	Conductivity	APHA 23rd Edition 2017/ 2510 B / P 2 – 47 Electrometric Method/IS3025(Part 14): 2013 RA
5	Total Dissolve Solids	APHA (23rd Edition) 2017/ 2540 C / P 2-58 Gravimetric Method/IS 3025 (part 16) :1984 RA
6	Total Suspended Solids	APHA 23rd Edition 2017/ 2540 D /2 -58 / IS 3025(Part 17) : 1984 (RA 2012) Gravimetric Method
7	Alkalinity as CaCO ₃	APHA 23rd Edition 2017/2320 B / P 2 – 27 Titrimetric Method/IS3025(Part 23) : 1986 RA
8	Total Hardness as CaCO ₃	APHA 23rd Edition 2017 /2340 C / P 2 – 37 EDTA Titrimetric Method/IS 3025(Part 21): 2009 RA
9	Sodium	APHA 23 rd Edition 2017/ 3500 Na B / P 3-98 Flame Emission Photometric Method/IS 3025(Part 45): 1993 RA
10	Potassium	APHA 23 rd Edition 2017/ 3500 K B / P 3-98 Flame Emission Photometric Method/IS 3025(Part 45): 1993 RA
11	Calcium as Ca	APHA 23 rd Edition 2017 3500 Ca B /P 3-65 Calculation Method /IS 3025(Part 40): 1991 RA

S. No	Parameter Measured	Test Method
12	Magnesium as Mg	IS 3025(Part 46): RA /APHA 23rd Edition 2017 2340 C / P 3-84 Calculation Method
13	Chloride	IS 3025(Part 32): 1988 / APHA 23rd Edition 2017 4500 Cl- B / P 4-70 Argemometric Method
14	Sulphate SO ₄	APHA 23 rd Edition 2017 4500 SO ₄ 2- E / P 4-188 Turbidity Method/IS 3025(Part 24): 1986 RA
15	Nitrate as NO ₃	APHA 23 rd Edition 2017 4500 NO ₃ B Ultraviolet Spectro Photometric Screening Method
16	Phosphate	IS 3025 Part 31: 1988 Chapter 12
17	Fluorides as F	APHA23 rd Edition F-D: 2017
18	Cyanide	APHA 23 rd Edition 2017 4500- CN- E/ P 4-42 Calorimetric Method
19	Arsenic	APHA 23 rd Edition 2017 3500- As / P 3-61 Silver Diethyldithiocarbamate Method
20	Boron	APHA 23 rd Edition 2017 :4500 BB/P4-23
21	Cadmium	IS 3025 (Part - 41)1991
22	Chromium,total	IS 3025(Part 52) RA / APHA 23rd Edition 2017/3500 Cr / P 3-67 1,5Diphenylcarbazide Method
23	Copper	APHA 23 rd Edition 2017 3500 Cu B/P 3-72 Atomic Absorption Spectrometric Method / IS 3025(Part 42): 1992 RA
24	Iron	APHA 23 rd Edition 2017 3500 Fe- B/ P 3-77 1,10 Phenanthroline Method /IS 3025(Part 53): 2003 RA
25	Lead	APHA 23 rd Edition 2017 3500 Pb B / P 3 -80 Atomic Absorption Spectrometric Method / IS 3025(Part 47): 1994 RA
26	Manganese	IS 3025(Part 46): RA /APHA 23 rd Edition 2017 2340 C / P 3-84 Calculation Method
27	Mercury	IS 3025 (Part48):1994 RA 1999
28	Nickel	IS 3025:(Part-54):2003(Reaff 2009)
29	Selenium	IS 3025 Part (56)2003
30	Zinc	APHA 22 nd Edition 2017/ 3500 Zn B / P 3 – 106 Atomic Absorption Spectrometric Method/IS 3025(Part 49): 1994 RA
31	Dissolved Oxygen	IS:3025 (Part - 38)1989 (Reaff 2009)
32	BOD at 27Â°C for 3 days	IS:3025 (Part – 58): 2006
33	COD	IS:3025 (Part – 44): 1993

Classification of Surface Standard- IS 2296:

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 wildlife propagation.

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

The prevailing status of surface water quality has been assessed during the study period. Surface water sampling Locations and Its results are given in **Table 3-12** and **Table 3-13** respectively.

Table 3-12 Details of Surface water sampling locations

S. No	Water bodies	Location code	Distance from project boundary (~Km)	Direction from project boundary
1	Lake Near Amur	SW1	3.34	NE
2	Arani River D/S	SW2	9.04	NE
3	Lake Near Pudukuppam	SW3	4.37	E
4	Korttalaiyar River D/S	SW4	1.36	ESE
5	Cholavaram Tank	SW5	5.85	S
6	Korttalaiyar River U/S	SW6	5.94	SW
7	Lake near Savarkandigal	SW7	9.18	E
8	Arani River U/S	SW8	7.14	N

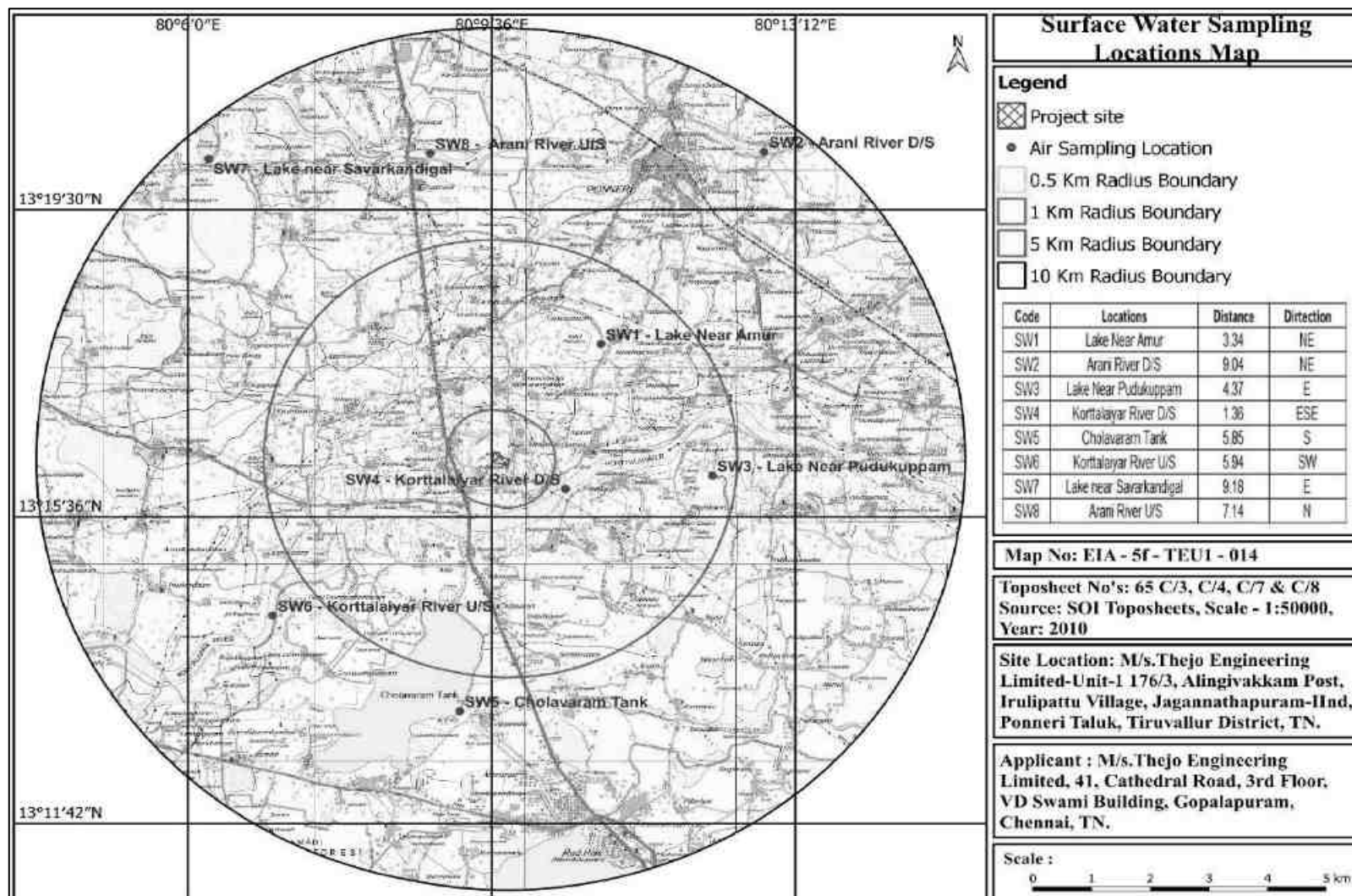


Figure 3-15 Surface water monitoring locations

Table 3-13 Surface water Monitoring Results

S. No	Parameter	Unit	Surface water standards (IS 2296 Class-A)	Lake Near Amur	Arani River D/S	Lake Near Pudukupam	Korttala iyar River D/S	Cholavaram Tank	Korttala iyar River U/S	Lake near Savarkandigal	Arani River U/S
				SW 1	SW 2	SW 3	SW 4	SW 5	SW 6	SW 7	SW 8
1	Turbidity	NTU	1	16.8	11.2	1.2	13.6	28.7	12.7	2.6	17.2
2	pH (at 25°C)	--	6.5-8.5	7.50	7.85	7.26	7.71	7.39	7.66	7.53	7.89
3	Electrical Conductivity	μS/cm	-	500	900	412	790	520	920	250	780
4	Total Dissolved Solids	mg/l	500	318	572	265	502	335	592	158	503
5	Total Suspended Solids	mg/l	-	28.4	18.4	5.5	7.2	15.6	7.6	7.1	20.4
6	Total Alkalinity as CaCO ₃	mg/l	-	247.0	178.0	100.5	323.0	108.0	394.0	36.0	173.0
7	Total Hardness as CaCO ₃	mg/l	300	119.0	158.0	119.0	212.0	247.0	480.0	49.5	183.0
8	Sodium as Na	mg/l	-	15.2	75.3	46.3	66.3	46.0	63.6	30.2	62.4
9	Potassium as K	mg/l	-	3.8	18.8	11.6	16.6	11.5	15.9	7.5	15.6
10	Calcium as Ca	mg/l	-	29.7	47.6	25.7	57.5	55.5	69.4	10.3	39.6
11	Magnesium as Mg	mg/l	-	9.6	4.6	13.6	16.8	26.4	74.6	5.7	20.4
12	Chloride as Cl	mg/l	250	72.3	142	87	125	87	120	58	120
13	Sulphate as SO ₄	mg/l	400	14.5	35.5	21.8	31.3	17.3	30.0	14.5	30.0
14	Nitrate as NO ₃	mg/l	20	6.4	12.5	4.6	19.5	12.5	26.7	1.2	33.6
15	Phosphate as PO ₄	mg/l	-	0.59	0.28	0.07	0.36	0.25	0.11	0.08	0.41
16	Fluorides as F	mg/l	1.5	0.74	0.39	0.38	0.67	0.44	0.85	0.45	0.52
17	Cyanide	mg/l	0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
18	Arsenic	mg/l	0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
19	Boron as B	mg/l	-	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.12
20	Cadmium as Cd	mg/l	0.01	0.01	BDL	BDL	BDL	BDL	BDL	BDL	BDL
21	Chromium, Total	mg/l	0.05	0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL
22	Copper as Cu	mg/l	1.5	1.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL

23	Iron as Fe	mg/l	0.3	0.3	0.85	BDL	BDL	BDL	BDL	BDL	BDL
24	Lead as Pb	mg/l	0.1	0.1	BDL	BDL	BDL	BDL	BDL	BDL	BDL
25	Manganese as Mn	mg/l	0.5	0.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL
26	Mercury	mg/l	0.001	0.001	BDL	BDL	BDL	BDL	BDL	BDL	BDL
27	Nickel as Ni	mg/l	-	-	BDL	BDL	BDL	BDL	BDL	BDL	BDL
28	Selenium as Se	mg/l	0.01	0.01	BDL	BDL	BDL	BDL	BDL	BDL	BDL
29	Zinc	mg/l	15	15	BDL	BDL	BDL	BDL	BDL	BDL	BDL
30	Dissolved Oxygen	mg/l	6	6	5.2	6.2	6	5.8	6.1	5.4	5.3
31	Chemical Oxygen Demand as O ₂	mg/l	-	-	16.3	20.4	20.9	32.7	65.5	20.4	49.2
32	BOD, 3 days @ 27°C as O ₂	mg/l	2	2	4.40	5.66	1.5	8.83	17.7	5.51	3.8

Note: BDL- Below Detectable Limit

3.8.2.1 Interpretations of Results

The surface water results were compared with IS 2296:1992 standard and in respect of CPCB water Quality Criteria for designated best use. Based on comparison study of test results with Surface water Quantity Standards (Is 2296 Class A), it is interpreted that water qualities of studied locations are classified under Class E, which can be used for irrigation industrial cooling, and controlled waste disposal.

- The pH value ranges from 7.26 to 7.89 are within the limits (6.5 – 8.5) of IS 2296:1992.
- The Electrical Conductivity (EC) of the collected surface water ranges from 250 $\mu\text{S}/\text{cm}$ to 920 $\mu\text{S}/\text{cm}$.
- The chloride content in the collected surface water ranges from 58 mg/l to 142 mg/l.
- The sulphate content in the collected surface water sample ranges from 14.5 mg/l to 35.5mg/l.
- The total hardness of the collected surface water sample ranges from 49.5 mg/l to 480.0 mg/l.
- COD of the collected surface water sample ranges from 16.3 mg/l to 65.5 mg/l.
- BOD of the collected surface water sample ranges from 1.5 mg/l to 17.7 mg/l.

3.8.3 Ground Water Quality

Total **Eight (08)** ground water monitoring locations were identified for assessment in different villages around the project site. 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** respectively. A map showing the groundwater monitoring locations is given in **Figure 3-16**.

Table 3-14 Details of Groundwater Quality Monitoring Locations

Station Code	Location	Distance (~km) from Project boundary	Azimuth Directions
GW1	Project site	Within site	
GW2	Tiruvayarpadi	8.05	NNE
GW3	Agaram	1.93	ENE
GW4	Attapalaiyam	4.05	ESE
GW5	Karanpdai	3.67	SSW
GW6	Bandikavanur	2.84	W
GW7	Near Upparapalaiyam	6.3	WNW
GW8	Andalkuppam	3.51	N

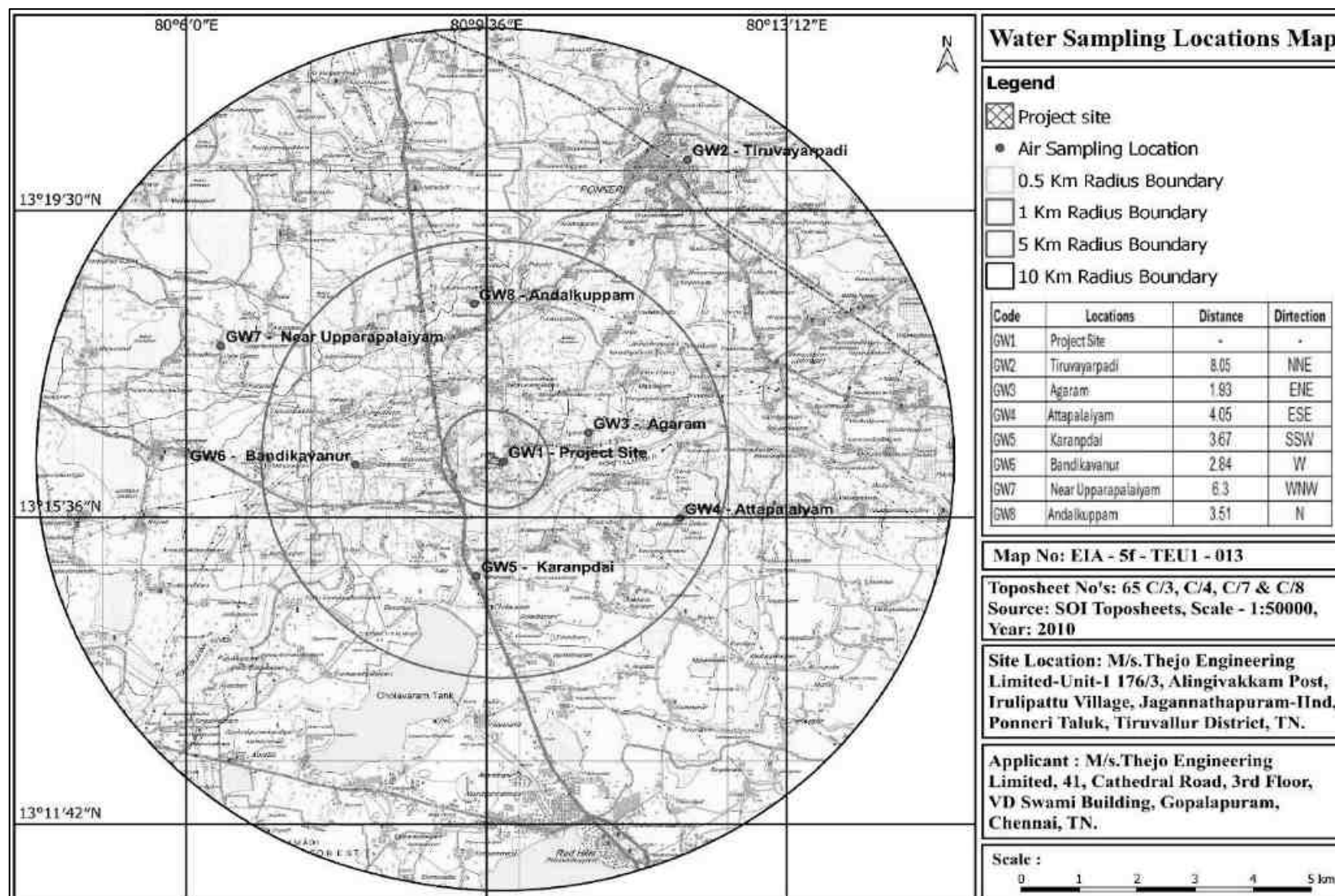


Figure 3-16 Groundwater monitoring locations

Table 3-15 Ground Water Monitoring Results

S. No	Parameters	Unit	Drinking water Standard (IS 10500: 2012) Acceptable Limit	Drinking water Standard (IS 10500: 2012) Permissible Limit	Project Site	Tiruvayarpa di	Agaram	Attapalai yam	Karanpd ai	Bandikavanu r	Near Upparapal aiyam	Andalku ppam
					GW1	GW2	GW3	GW4	GW5	GW6	GW7	GW8
1	Colour	Hazen	5	15	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
2	Turbidity	NTU	1	5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
3	pH	--	6.5-8.5	NR	7.62	7.79	7.6	7.40	7.46	7.49	7.49	7.53
4	Conductivity	μS/cm	-	-	1050	670	720	340	1560	510	810	250
5	Total Dissolve Solids	mg/l	500	2000	665	411	448	218	952	324	528	160
6	Total Suspended Solids		-	-	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
7	Alkalinity as CaCO ₃	mg/l	200	600	193	207	323	171	321	180	181	57
8	Total Hardness as CaCO ₃	mg/l	200	600	316	123	188	59	450	153	163	50
9	Sodium as Na	mg/l	-	-	63.4	33.2	30.1	59.9	116.1	41.3	86.8	20.9
10	Potassium as K	mg/l	-	-	15.9	8.3	7.5	15.0	29.0	10.3	21.7	5.2
11	Calcium as Ca	mg/l	75	200	119.0	33.7	59.5	17.8	81.3	37.6	35.7	10.3
12	Magnesium as Mg	mg/l	30	100	4.8	9.6	9.6	3.6	57.7	14.4	18.0	5.7
13	Chloride as Cl	mg/l	250	1000	151	63	94	171	219	78	164	40
14	Sulphate SO ₄	mg/l	200	400	37.8	15.7	23.5	42.8	54.8	19.5	40.9	9.9
15	Nitrate as NO ₃	mg/l	45	NR	25.4	12.6	24.3	8.5	4.5	1.2	26.2	7.2
16	Phosphate PO ₄	mg/l	-	-	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

S. No	Parameters	Unit	Drinking water Standard (IS 10500: 2012) Acceptable Limit	Drinking water Standard (IS 10500: 2012) Permissible Limit	Project Site	Tiruvayarpa di	Agaram	Attapalai yam	Karanpd ai	Bandikavanu r	Near Upparapal aiyam	Andalku ppam
					GW1	GW2	GW3	GW4	GW5	GW6	GW7	GW8
17	Fluorides as F	mg/l	1	1.5	0.49	0.56	0.34	0.62	0.33	0.41	0.42	0.18
18	Cyanide	mg/l	0.05	NR	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
19	Arsenic as As	mg/l	0.01	0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
20	Boron as B	mg/l	0.5	1.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
21	Cadmium as Cd	mg/l	0.003	NR	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
22	Chromium as Cr	mg/l	0.05	NR	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
23	Copper	mg/l	0.05	1.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
24	Iron	mg/l	0.3	NR	0.14	0.10	0.19	0.09	0.15	0.2	0.26	0.11
25	Lead	mg/l	0.01	NR	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
26	Manganese as Mn	mg/l	0.1	0.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
27	Mercury	mg/l	0.001	NR	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
28	Nickel as Ni	mg/l	0.02	NR	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
29	Selenium as Se	mg/l	0.01	NR	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
30	Zinc as Zn	mg/l	5		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

Note: BDL- Below Detectable Limit; NR-No Relaxation

3.8.3.1 Interpretations of Results

Physio-chemical characteristics of ground water samples collected from the selected villages during Pre-monsoon 2024. The Ground water results were compared with drinking water standards (IS 10500:2012).

- The ground water results of the study area indicate that the pH range varies between 7.40 and 7.79. It is observed that the pH range is within the limit of IS 10500:2012.
- The Total Dissolved Solids range varies between 160 mg/l – 952 mg/l for ground water. All the samples are well within the permissible limit of IS 10500: 2012.
- The acceptable limit of the chloride content is 250 mg/l and permissible limit is 1000 mg/l. The chloride content in the ground water for study area ranges between 40 mg/l – 219 mg/l. It is observed that all are well within the Acceptable Limit and permissible limit of IS 10500: 2012.
- The desirable limit of the sulphate content is 200 mg/l and permissible limit is 400 mg/l. The sulphate content of the ground water of the study area varies between 9.9 mg/l – 54.8 mg/l. It is observed that all the samples are within the Acceptable Limit and permissible limit of IS 10500: 2012.

Based on comparison study of test results with drinking water standard, it is interpreted that water qualities of studied locations meet with the drinking water standards as per IS 10500: 2012. These interpretations relate to the sample tested for location only. To prevent ground water contamination and improving the quality and Quantity, rainwater harvesting, and groundwater recharging may be helpful.

3.9 Soil quality

Eight locations in and around the proposed project were selected for soil sampling. At each location, soil samples were collected from three different depths, viz. 30cm, 60cm, and 90cm below the surface. Soil analysis was carried out as per IS: 2720 methods. The methodology adopted for each parameter is described in **Table 3-16**. Soil quality monitoring locations & results are given in

Table 3-17 and **Table 3-18**. Map showing the soil monitoring locations is given in **Figure 3-17**.

Table 3-16 Test methods used for the analysis of Soil

S. No	Parameter Measured	Test Method
1	pH @ 25°C	IS 2720 (Part 26): 1987
2	Electrical conductivity	IS 14767: 2000
3	Nitrogen as N	IS 14684: 1999 / FAO 2007 RA
4	Phosphorus	IS 14684: 1999 RA
5	Potassium	FAO-UN 2007 RA
6	Bulk Density	IS 2720(Part 3) Sec 2: 1980 / RA
7	Organic Carbon/ Organic Matter	IS 2720 (Part 22): 1972
8	Cation exchange capacity	SOP No. CB/CL/SOP/S- 9 by Calculation Method

Table 3-17 Soil & Sediment Quality Monitoring Locations

Location Code	Location	Distance (Km) With respect to Project site	Direction with respect to project site
S1	Project site	Within site	
S2	Tiruvayarpadi	8.05	NNE
S3	Agaram	1.93	ENE
S4	Attapalaiyam	4.05	ESE
S5	Karanpdai	3.67	SSW
S6	Bandikavanur	2.84	W
S7	Near Upparapalaiyam	6.3	WNW
S8	Andalkuppam	3.51	N

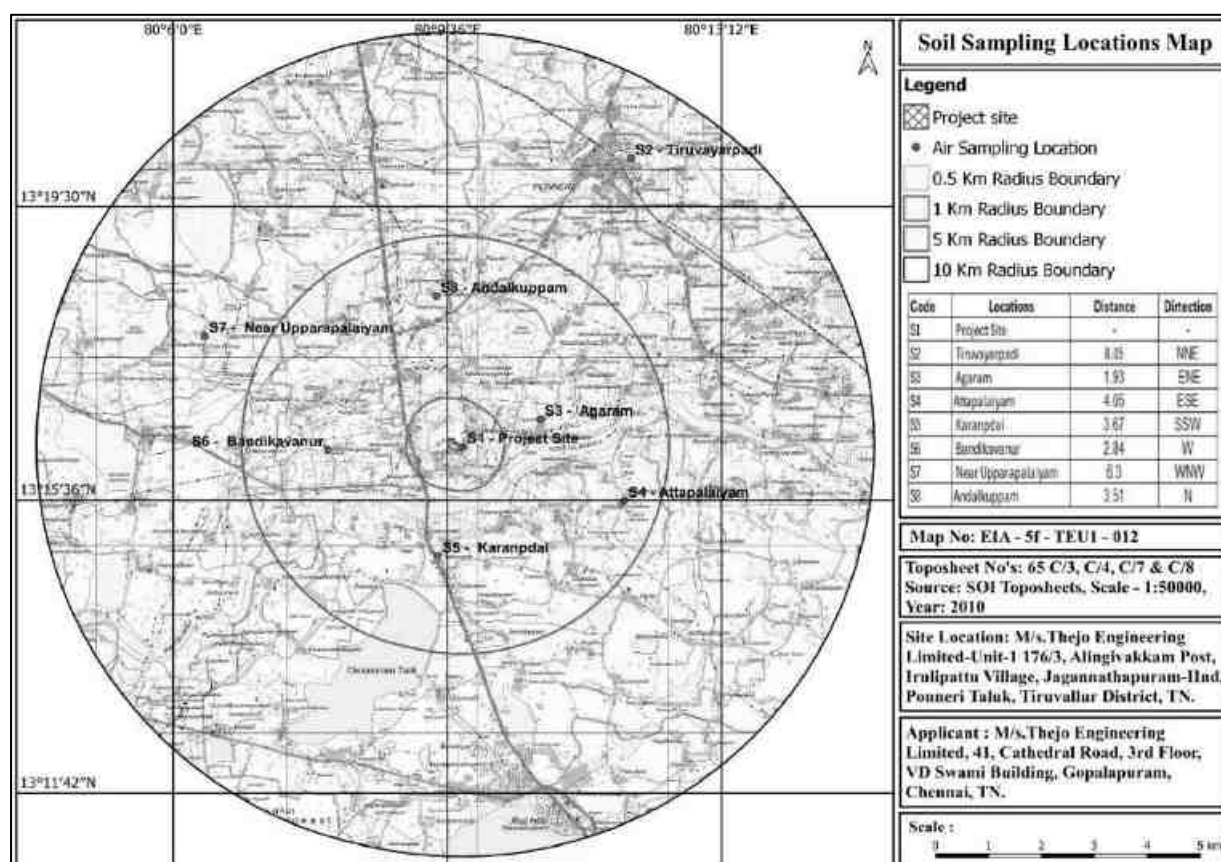


Figure 3-17 Soil monitoring locations map

Table 3-18 Soil & Sediment Quality Monitoring Results

S. No	Parameters	Units	Project Site	Tiruvayarpadi	Agaram	Attapalaiyam	Karanpdai	Bandikavanur	Near Upparapalaiyam	Andalkuppam
			S1	S2	S3	S4	S5	S6	S7	S8
1	Sand	%	36.1	55.6	47.6	38.7	51.6	54.5	44.4	45.2
2	Silt	%	39.6	27.5	31.1	37.1	31.1	27.7	38.2	35.2
3	Clay	%	24.3	16.9	21.3	24.2	17.3	17.8	17.4	19.6
4	pH	-	7.24	6.44	6.93	6.17	7.3	7.5	7.59	7.28
5	Electrical conductivity	mmhos/cm	41	112	180	116	81	82	96	57
6	Nitrogen as N	Kg/ha	305	311	231	252	287	325	281	211
7	Phosphorus	Kg/ha	62	78	92	49	61	53	69	81
8	Potassium	Kg/ha	227	248	185	182	186	258	189	192
9	Cation Exchange Capacity	meq/100 gm	4.2	0.3	2.4	3.8	0.8	0.6	0.5	1.7
10	Organic Carbon	%	0.725	0.680	0.646	0.619	0.748	0.625	0.652	0.685
11	Organic matter	%	1.250	1.172	1.114	1.067	1.290	1.078	1.124	1.181

The soil characteristics are compared with ICAR (Indian Council of Agricultural research):

S. No	Parameters	Units	Project Site	Tiruvayarpadi	Agaram	Attapalaiyam	Karanpdai	Bandikavanur	Near Upparapalaian	Andalkuppam
			S1	S2	S3	S4	S5	S6	S7	S8
1	pH	-	Neutral	Slightly Acidic	Neutral	Slightly Acidic	Neutral	Slightly Alkaline	Slightly Alkaline	Neutral
2	Electrical conductivity	mmhos/cm	Average	Average	Average	Average	Average	Average	Average	Average
3	Nitrogen as N	Kg/ha	Sufficient	Sufficient	Better	Better	Better	Sufficient	Better	Better
4	Phosphorus	Kg/ha	On an Average Sufficient	Sufficient	More Than Sufficient	Medium	On an Average Sufficient	On an Average Sufficient	Sufficient	More Than Sufficient
5	Potassium	Kg/ha	Medium	Average	Medium	Medium	Medium	Average	Medium	Medium

3.9.1 Interpretations of Results

Summary of analytical results

- The pH of the soil samples ranged from 6.17 to 7.59 Indicating that the soils are slightly acidic to slightly alkaline in nature.
- The conductivity of the soil samples ranged from 41 μ mhos/cm to 180 μ mhos/cm.
- Nitrogen content ranged from 211 kg/ha to 325 kg/ha.
- Phosphorous ranged from 49 kg/ha to 92 kg/ha.
- Potassium content ranges from 182 kg/ha to 258 kg/ha.

3.10 Biological Environment

3.10.1 Introduction

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 undertaking appropriate action to mitigate the impact if any. The biological study was undertaken 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 conditions with the help of available data, to predict changes in the biological environment because of present activities and to suggest measures for maintaining its health. Secondary information was collected to study the flora & fauna in the 15 km radius. Some of the information was gathered from the local inhabitants. All the collected data were classified to interpret the impact of pollution on the flora and fauna of that region. A survey of the wild plants as well as cultivated crop plants was conducted, and all the available information was recorded.

The plant and animal populations are in an area from recognizable associations called Natural communities. These are characterized by a few species called dominants. Natural communities have structures based on the life forms (e.g. grass) of the species that make them up. The species composition refers to the kinds of species making up the community. The variety of species and their relative numbers are referred to as diversity. A community composed of few species is called simple or one of low diversity. A community composed of many species is called complex or one of high diversity.

M/s. Thejo Engineering Limited, Proposed Expansion in Industrial Adhesives, Rubber products and PU Products and Enhancement of manufacturing facility located at Survey No. 176/3, 181/5, 181/6A, 169/2B, 169/4D, 170/2B, 170/3B, 170/4, 175/3, 176/1, 176/2, 181/1B, 175/4B and 175/5B, Jaganathapuram Road, Irullipattu village, Ponneri Taluk, Thiruvallur Dist, Tamil Nadu State 600 067. This Baseline studies has been carried out during January 2024 to March 2024 for the purpose of providing an independent and comprehensive baseline assessment of the flora and terrestrial vertebrate fauna and associated habitat values of the site and 10Km Radius of the Thejo Engineering Limited and a subsequent assessment of potential ecological impacts from the proposed project activities.

3.10.1.1 Objectives of Ecological Studies

The objectives of ecological study during the study period of EIA study may be outlined as follows:

- To characterize the environmental components like land, water, flora and fauna.
- To understand their present status.
- To understand the carrying capacity of the ecosystem.
- To assess present biodiversity; and
- To identify susceptible and sensitive areas.

A detailed ecological assessment of the study area has been carried out with the following objectives:

- To establish the present status of ecological conditions surrounding the project location.
- To study the existing anthropogenic stresses on the prevailing ecosystem.
- To identify and predict the likely impacts on the local ecosystem from the proposed activities.
- To list floral species, terrestrial vertebrate and aquatic flora and fauna present within the study area, and significance status under The Wildlife (Protection) Act, 1972.
- To define ecological/conservation status of each species as per IUCN categories Red Data List).
- To formulate migratory measures and a sustainable Environmental Management Plan (EMP) based upon the likely impacts.

During the survey, the following aspects were considered for ecological studies:

- Assessment of the 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

3.10.1.2 Methodology Adopted for the Study

A desktop review (published documents etc.) was conducted to determine the forest area through Satellite imagery, vegetation type (Champion and Seth, 1962), floral and faunal assemblage in the study area. Terrestrial investigations for flora and fauna records were collected by random field survey and a checklist was prepared. During field survey, discussions with the local people were carried out to collect information related to local biodiversity in and around the villages. The ecological status of the study area has been assessed based on the following methodology:

- Primary field surveys to establish the primary baseline of the study area.
- Compilation of secondary information available in published literature/working plans was referred from TN State Forest Department.
- Site Verification and finalization in consultation with local inhabitants.

3.10.1.3 Flora Study

The assessment of the flora of the study area is done by an extensive field survey of the area.

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

- Qualitative analysis of vegetation is made by two different methods such as floristics (by simply studying various genera and species of various plant groups i.e. herbs, shrubs, trees etc.)

3.10.2 Sampling Locations

Ecological and Biodiversity Sampling Locations are provided in the **Table 3-19**. The Ecological and Biodiversity Sampling Locations Map is provided in the **Figure 3-18**. Ecological and Biodiversity Sampling Photos is provided in the **Figure 3-19**.

Table 3-19 Ecological and Biodiversity Sampling Locations

S. No	Name of the Locations	Plot No	Latitude	Longitude	Distance from Project site	Direction from Project site
1.	Project Site	EB 1	13°16'19.94"N	80° 9'41.71"E	-	-
2.	Kosasthalai River	EB 2	13°16'23.95"N	80°11'6.13"E	2.53	E
3.	Near Thatchoor	EB 3	13°17'26.10"N	80° 9'14.38"E	2.35	NNW
4.	Forest Near Cholavaram Tank	EB 4	13°14'5.17"N	80° 8'9.25"E	472	SW
5.	Near Poovalambedu	EB 5	13°13'16.73"N	80° 9'16.42"E	5.54	S
6.	Puzhal Lake	EB 6	13°11'35.37"N	80°10'21.42"E	8.65	S

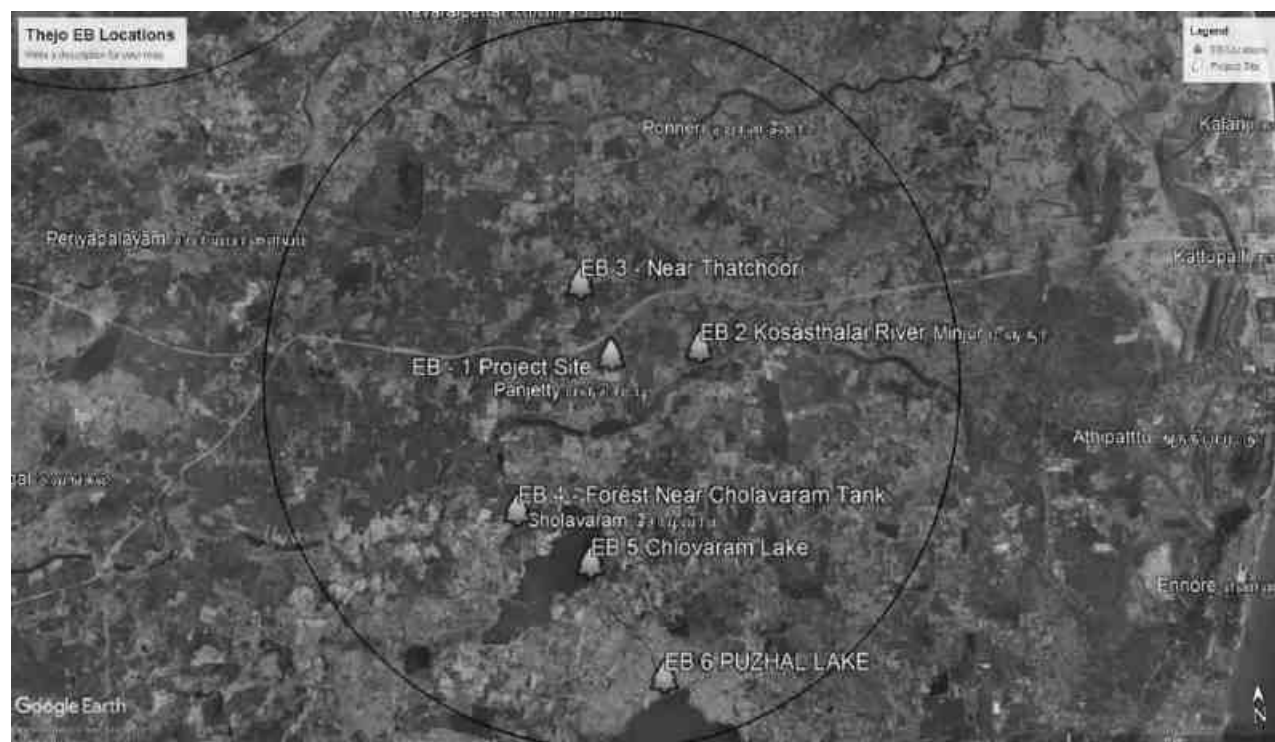


Figure 3-18 Ecological and Biodiversity Sampling Locations

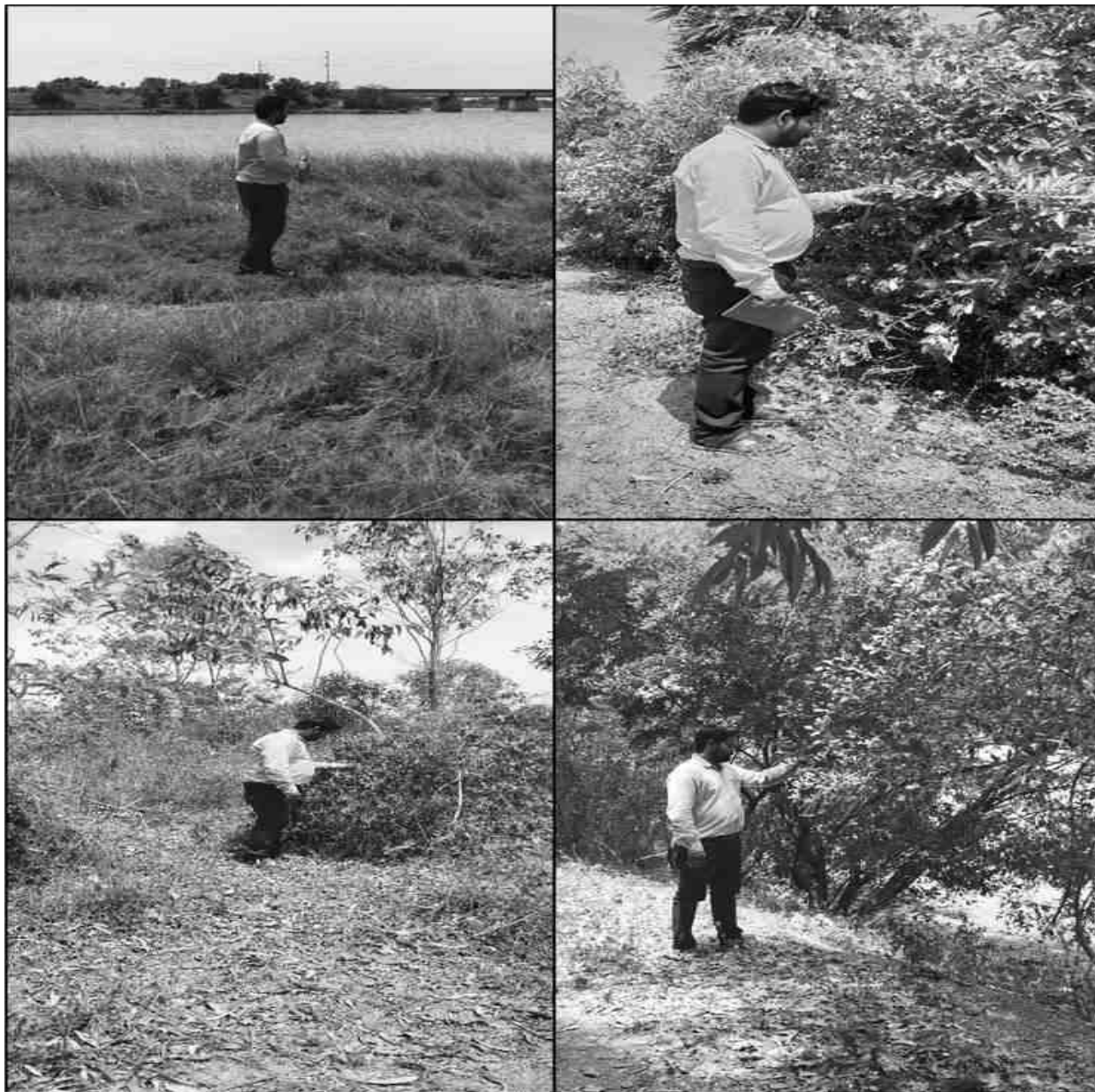


Figure 3-19 Ecological and Biodiversity Sampling Photoes

3.10.3 Flora in the Study Area

During the primary survey, about 105 floral species were observed. The most dominant tree species in the entire study area dominated *Eucalyptus globulus*, *Mangifera indica*, *Anacardium occidentale*, *Tectona grandis*, *Acacia auriculiformis*, *Azadirachta indica*, *Delonix regia*, *Borassus flabellifer*, *Carica papaya*, etc. Most dominant shrubs in the study area were, *Calotropis procera*, *Datura metel*, *Euphorbia hirta*, *Lantana Camara*, etc. Among the herb species observed are *Cynodon dactylon*, *Chrysopogon aciculatus*, *Tridax procumbens*, *Achyranthes aspera*, *Catharanthus roseus*, etc. The list of flora observed in the entire study area is given in **Table 3-20**. Trees Species Photos are shown in **Figure 3-20**. Shrubs Photos are given in **Figure 3-21**.

Table 3-20 List of flora reported/observed in the study area

S. No	Scientific Name	Common Name	Vernacular Name	Occurrence	IUCN Status
1.	<i>Acacia Nilotica</i>	Kavuvelam	Mulmaram	Native	LC
2.	<i>Anacardium occidentale</i>	Cashew-nut tree	Mundiri	Native	LC
3.	<i>Annona squamosa</i>	Seetha Maram	Sitapazhamaram	Native	LC
4.	<i>Azadirachta indica</i>	Neem	Veppai	Native	LC
5.	<i>Barringtonia acutangula</i>	Indian Putat	Samuthra Maram	Native	LC
6.	<i>Borassus flabellifer</i>	Palm tree	Panaimaram	Native	LC
7.	<i>Carica papaya</i>	Papaya tree	Pappali	Native	LC
8.	<i>Cassia auriculata</i>	Matura tea tree	Avaram	Native	LC
9.	<i>Cassia fistula</i>	Golden shower	Kondrai Maram	Native	LC
10.	<i>Citrus limon</i>	Lemon	elumichai	Native	LC
11.	<i>Cocos nucifera</i>	Coconut tree	Tennai	Native	LC
12.	<i>Eucalyptus globulus</i>	Southern blue gum	Karpuramaram	Native	LC
13.	<i>Ficus benghalensis</i>	Indian Banyan	Alamaram	Native	LC
14.	<i>Ficus benjamina</i>	Indian fig	nintamaravakai	Native	LC
15.	<i>Ficus racemosa</i>	Cluster fig	Athi	Native	LC
16.	<i>Leucaena leucocephala</i>	Whitelead tree	Periya-takarai	Native	LC
17.	<i>Madhuca longifolia</i>	Butter tree	Iluppai	Native	LC
18.	<i>Mangifera indica</i>	Mango	Maamaram	Native	LC
19.	<i>Manilkara zapota</i>	Sapota	chimaiyiluppai	Native	LC
20.	<i>Melia azedarach</i>	Indian lilac	Kattu vembhu	Native	LC
21.	<i>Mimusops elengi</i>	Medlar tree	Magizhamboo	Native	LC
22.	<i>Morinda pubescens</i>	Indian Mulberry	Mannanunai	Native	LC
23.	<i>Moringa oleifera</i>	Drumstick tree	Murungai	Native	LC
24.	<i>Peltophorum pterocarpum</i>	Copper pod	Perungkonrai	Native	LC
25.	<i>Phoenix sylvestris</i>	Sugar date palm	icham	Native	LC
26.	<i>Pithecellobium dulce</i>	Manila tamarind	Kodukkappuli	Native	LC
27.	<i>Millettia pinnata</i>	Indian beech	Pongai Maram	Native	LC
28.	<i>Saraca asoca</i>	Ashoka tree	Ashogamaram	Native	LC
29.	<i>Syzygium cumini</i>	Java plum	Naval Maram	Native	LC
30.	<i>Terminalia cattappa</i>	Badam tree	Nattuvadumai	Native	LC
31.	<i>Thespesia populnea</i>	Portia tree	Poovarasu	Native	LC
32.	<i>Tamarindus indica</i>	Tamarind	Puliya Maram	Native	LC

S. No	Scientific Name	Common Name	Vernacular Name	Occurrence	IUCN Status
33.	<i>Tectona Grandis</i>	Teak	Thekku Maram	Native	EN
34.	<i>Tephrosia purpurea</i>	Fish poison	Kolinchi	Native	EN
35.	<i>Vitex negundo</i>	Five Leaved Chaste	Nocchi	Native	LC
36.	<i>Wrightia Tinctoria</i>	Jaundice curative tree	Veppalai	Native	LC
37.	<i>Ziziphus mauritiana Lam</i>	Indian jujube	Ilanthai Maram	Native	LC
38.	<i>Ficus religiosa</i>	Sacred fig	Arasamaram	Native	LC
39.	<i>Terminalia arjuna</i>	Arjun Tree	-	Native	NA
Shrubs					
40.	<i>Bougainvillea spectabilis</i>	Great bougainvillea	Kaakitha poo	Native	LC
41.	<i>Caesalpinia pulcherrima</i>	Peacock flower	Mayilkonrai	Native	LC
42.	<i>Calotropis gigantea</i>	Calotrope	Erukku	Native	LC
43.	<i>Datura metel</i>	Devil's trumpet	Karu oomathai	Invasive	LC
44.	<i>Hibiscus Rosa sinensis</i>	Indian Hibiscus	Cembarutti	Native	LC
45.	<i>Jasminum arborescens</i>	Navamallika	Kattumalligai	Native	LC
46.	<i>Jasminum auriculatum</i>	Juhi	Uccimalligai	Native	LC
47.	<i>Nerium oleander</i>	Nerium	Arali	Native	LC
48.	<i>Punica granatum</i>	Pomegranate	Madulai	Native	LC
49.	<i>Argemone Mexicana</i>	Mexican Prickly Poppy	Pramma Thandu	Invasive	LC
50.	<i>Aristida purpurea</i>	purple three-awn	Thudaippam Pul	Native	LC
51.	<i>Cereus jamacaru</i>	Mandacaru	Kallichedi	Native	LC
52.	<i>Euphorbia Candelabrum</i>	Candelabra tree	Kallichedi	Native	LC
53.	<i>Lantana Camara</i>	Common Lantana	Unni Mulu	Invasive alien	LC
54.	<i>Opuntia stricta</i>	Prickly pear	Sappathikalli	Invasive	LC
55.	<i>Parthenium Hysterophorus</i>	Parthenium weed	Congress Kalai	Invasive	LC
56.	<i>Pavetta indica</i>	Indian Pavetta	Kattukkarantai	Native	LC
57.	<i>Solanum torvum</i>	Sundai	Sundaikkai	Native	LC
58.	<i>Stachytarpheta jamaicensis</i>	Blue Porterweed	Seemainaayuruvi	Native	LC
59.	<i>Tridax Procumbens</i>	Kenathuppoondu	Vettukkaaya-thalai	Invasive	LC
60.	<i>Typha Orientalis</i>	Bulrush	Sambu	Invasive	LC

S. No	Scientific Name	Common Name	Vernacular Name	Occurrence	IUCN Status
61.	<i>Ixora coccinea</i>	Jungle Geranium	Vedchi	Native	
Herbs					
62.	<i>Abutilon Indicum</i>	India Abutilon	Thuthi Keerai	Native	LC
63.	<i>Achyranthes Aspera</i>	Chaff-flower	Naayuruvi	Native	LC
64.	<i>Croton bonplandianum</i>	Ban Tulsi	Rayil Poondu	Native	LC
65.	<i>Ocimum tenuiflorum</i>	Tulsi	Karuntulasi	Native	LC
66.	<i>Datura metel</i>	Devil's Trumpet	Oomathai		
67.	<i>Acalypha indica</i>	Indian Acalypha	Kolippuntu	Native	LC
68.	<i>Acalypha wilkesiana</i>	Copper leaf	Kuppaimeni	Native	LC
69.	<i>Allmania nodiflora</i>	Node flower	Kumattikkirai	Native	LC
70.	<i>Aloe vera</i>	Indian aloe	Kattralai	Native	LC
71.	<i>Alternanthera sessilis</i>	Sessile joyweed	Ponnankanni	Native	LC
72.	<i>Amaranthus viridis</i>	Green amaranth	Kuppaikeerai	Native	LC
73.	<i>Andrographis paniculata</i>	Green chiretta	Nilavempu	Native	LC
74.	<i>Apluda mutica</i>	Mauritian grass	Moongil pillu	Native	LC
75.	<i>Aristida setacea</i>	Broom grass	Thudappam pillu	Native	LC
76.	<i>Bambusa bamboo</i>	Bamboo	Moongil	Native	LC
77.	<i>Catharanthus roseus</i>	Pink periwinkle	Nithyakalyani	Native	LC
78.	<i>Centella asiatica</i>	Indian pennywort	Matanti	Native	LC
79.	<i>Chloris barbata</i>	Swollen finger grass	Cevvarakumpul	Native	LC
80.	<i>Cleome viscosa</i>	Tick weed	Naikaduku	Invasive	LC
81.	<i>Cyanodon dactylon</i>	Bermuda grass	Arugam pillu	Native	LC
82.	<i>Dactyloctenium aegyptium</i>	Egyptian grass	Kavarapillu	Native	LC
83.	<i>Euphorbia heterophylla</i>	Japanese poinsettia	Paal perukki	Invasive	LC
84.	<i>Gardenia jasminoides</i>	Cape Jasmine	Parijatham	Native	LC
85.	<i>Hemigraphis colorata</i>	Red Ivy	Vadaikutti	Native	LC
86.	<i>Heteropogon contortus</i>	Spear grass	Oosi pillu	Native	LC
87.	<i>Leucas aspera</i>	Common leucas	Thumbai	Native	LC
88.	<i>Mimosa pudica</i>	Touch me not plant	Thottar sinungi	Invasive	LC
89.	<i>Musa paradisiaca</i>	Banana	Vaazhai	Native	LC

S. No	Scientific Name	Common Name	Vernacular Name	Occurrence	IUCN Status
90.	<i>Ocimum gratissimum</i>	Clove basil	Vanatulasi	Native	LC
91.	<i>Phyllanthus amarus</i>	Gale of the wind	Kilhkainelli	Native	LC
92.	<i>Phyllanthus virgatus</i>	Seed under leaf	Patar nelli	Native	LC
93.	<i>Portulaca grandiflora</i>	Moss rose	Pattu rose	Native	LC
94.	<i>Solanum nigrum</i>	Black nightshade	Manathakkali	Native	LC
95.	<i>Solanum trilobatum</i>	Pea Eggplant	Thuthuvalai	Native	LC
96.	<i>Datura metel</i>	Devil's Trumpet	Oomathai	Native	NA
Climbers/Creepers					
97.	<i>Cardiospermum halicacabum</i>	Balloon plant	Mudakithan	Native	LC
98.	<i>Cayratia pedata</i>	Birdfoot Grape vine	Panni kodi	Native	LC
99.	<i>Cissus quadrangularis</i>	Veld grape	Pirandai	Native	LC
100.	<i>Cissus vitiginea</i>	South indian treebine	Mutainari	Native	LC
101.	<i>Coccinia grandis</i>	Ivy gourd	Kovai	Native	LC
102.	<i>Hemidesmus indicus</i>	Indian sarsaparilla	Nannari	Native	LC
103.	<i>Potamogeton distinctus</i>	Pondweed	-	Native	LC
104.	<i>Asplenium flabellifolium</i>	Necklace fern	-	Invasive	NA
105.	<i>Panicum Repens</i>	Creeping panic		Native	LC

(Note: LC- Least Concern, NA Not assessed as per wildlife Protection Act - 1972).

Source Validation:

http://www.bsienvs.nic.in/database/invasive_alien_species_15896.aspx#LIST_OF_INVASIVE_ALIEN_PLANT_SPECIES_IN_INDIA

Additional References:

- Henry, A.N., Chithra, V.N. and Balakrishnan, P. (1989) Flora of Tamil Nadu India. Series 1: Analysis. Vol. III. Botanical Survey of India, Coimbatore.
- India Biodiversity Portal - <https://indiabiodiversity.org/>
- Flowers of India - <https://flowersofindia.net/>



Eucalyptus globulus



Borassus flabellifer



Phoenix sylvestris



Saraca asoca



Azadirachta indica



Terminalia cattappa

Figure 3-20 Trees Species Photos



Solanum Torvum



***Stachytarpheta
jamaicensis***



Panicum Repens

Figure 3-21 Shrubs Photos

3.10.4 Fauna in the Study Area

To prepare a detailed report on the status of faunal diversity within the study area, field studies were conducted. Both direct (sighting) and indirect (evidence) observations methods were used to survey the faunal species around the study area. Additionally, references of relevant literatures (published/unpublished) and dialogues with local villagers were also carried out to consolidate the presence of faunal distribution in the area.

3.10.4.1 Bird Species

A total of 57 species belonging to different families have been identified from Agricultural and nearby forest areas. A comparative chart of the total number of bird species belonging to different families along with their feeding preference and abundance are provided in **Table 3-21**.

Table 3-21 Birds from the Study site

S. No	Scientific Name	Common Name	IUCN Status	Nativity	WPA 1972
1.	<i>Acridotheres tristis</i>	Common myna	LC	Native	-
2.	<i>Aerodramus unicolor</i>	Indian Swiftlet	LC	Native	-
3.	<i>Alcedo atthis</i>	Common Kingfisher	LC	Native	-
4.	<i>Amaurornis phoenicurus</i>	White-breasted waterhen	LC	Native	-
5.	<i>Anastomus oscitans</i>	Asian openbill stork	LC	Native	-
6.	<i>Ardeola grayii</i>	Pond Heron	LC	Native	-
7.	<i>Athene brama</i>	Spotted owl	LC	Native	-
8.	<i>Bubo bengalensis</i>	Indian eagle-owl	LC	Native	-
9.	<i>Bubulcus ibis</i>	Cattle Egret	LC	Native	-
10.	<i>Caprimulgus indicus</i>	Jungle Nightjar	LC	Native	-
11.	<i>Centropus sinensis</i>	Greater coucal	LC	Native	-

12.	<i>Ceryle rudis</i>	Pied kingfisher	LC	Native	-
13.	<i>Charadrius hiaticula</i>	Common ringed plover	LC	Native	-
14.	<i>Chrysomma sinense</i>	Yellow-Eyed Babbler	LC	Native	-
15.	<i>Cinnyris asiaticus</i>	Purple sunbird	LC	Native	-
16.	<i>Clamator coromandus</i>	Red-Winged	LC	Native	-
17.	<i>Clamator jacobinus</i>	Pied Cuckoo	LC	Native	-
18.	<i>Columba livia</i>	Blue rock pigeon	LC	Native	Sch - IV
19.	<i>Copsychus saularis</i>	Magpie-robin	LC	Native	-
20.	<i>Corvus splendens</i>	Hose crow	LC	Native	-
21.	<i>Cuculus canorus</i>	Common cuckoo	LC	Native	-
22.	<i>Cuculus micropterus</i>	Indian Cuckoo	LC	Native	-
23.	<i>Dendrocitta vagabunda</i>	Rufous treepie	LC	Native	-
24.	<i>Dicrurus macrocercus</i>	Black drongo	LC	Native	-
25.	<i>Ducula aenea</i>	Green Imperial Pigeon	NT	Native	-
26.	<i>Egretta garzetta</i>	Little Egret	LC	Native	-
27.	<i>Eudynamis scolopaceus</i>	Koel	LC	Native	-
28.	<i>Falco tinnunculus</i>	Common Kestral	LC	Native	-
29.	<i>Francolinus pondicerianus</i>	Grey francolin	LC	Native	-
30.	<i>Fulica arta</i>	Common coot	LC	Native	-
31.	<i>Gallicrex cinerea</i>	Watercock	LC	Native	-
32.	<i>Glareola pratincola</i>	Collared Pratincole	LC	Native	-
33.	<i>Haliastur indus</i>	Brahminy kite	LC	Native	-
34.	<i>Leptocoma zeylonica</i>	Sunbird	LC	Native	-
35.	<i>Lonchura Malacca</i>	Black headed munia	LC	Native	-
36.	<i>Lonchura punctulata</i>	Scaly breasted munia	LC	Native	-
37.	<i>Lonchura striata</i>	White rumped munia	LC	Native	-
38.	<i>Megalaima haemacephala</i>	Copper smith barbet	LC	Native	-
39.	<i>Megalaima zeylanica</i>	Brown headed barbet	LC	Native	-
40.	<i>Merops orientalis</i>	Green bee eater	LC	Native	-
41.	<i>Merops philippinus</i>	Blue-tailed bee-eater	LC	Native	-
42.	<i>Microcarbo niger</i>	Little Cormorant	NA	Native	-
43.	<i>Milvus migrans</i>	Black kite	LC	Native	-
44.	<i>Orthotomus sutorius</i>	Common tailorbird	LC	Native	-
45.	<i>Phaethon lepturus</i>	White-Tailed Tropicbird	LC	Native	-

46.	<i>Phalacrocorax carbo</i>	Great Cormorant	NA	Native	-
47.	<i>Phalacrocorax fuscicollis</i>	Indian Cormorant	LC	Native	-
48.	<i>Phalacrocorax niger</i>	Little cormorant	LC	Native	
49.	<i>Podiceps nigricollis</i>	Eared grebe	LC	Native	
50.	<i>Porphyrio poliocephalus</i>	Grey-Headed Swamphen	LC	Native	-
51.	<i>Psittacula krameri</i>	Rose ringed parakeet	LC	Native	-
52.	<i>Rallina eurizonoides</i>	Slaty-Legged Crane	NA	Native	-
53.	<i>Sturnia pagodarum</i>	Brahminy starling	LC	Native	-
54.	<i>Tachybaptus ruficollis</i>	Dabchick	LC	Native	-
55.	<i>Turdoides affinis</i>	Yellow-billed Babbler	LC	Native	
56.	<i>Turnix tanki</i>	Yellow-Legged Buttonquail	LC	Native	-
57.	<i>Vanellus indicus</i>	Red wattled lapwing	LC	Native	-

(**Note** LC- Least Concern, NT- Near Threatened, EN- Endangered, NE-Not Evaluated, DD -Data Deficient, VU- Vulnerable, IUCN- International Union Conservation of Nature, WPA-1972 (wildlife Protection Act - 1972).

3.10.4.2 Mammals

The presence of mammals in the project influence area are documented based on secondary information given in the **Table 3-22**.

Table 3-22 Mammals recorded from the secondary Survey in the Study area and their Conservation Status

S. No	Species Name	Family	Common Name	IUCN Conservation Status	Schedule WPA1972
1.	<i>Canis aureus</i>	Canidae	Naree	LC	-
2.	<i>Felis chaus</i>	Felidae	Kaattu poonai	LC	-
3.	<i>Funambulus pennanti</i>	Sciuridae	Anil	LC	-
4.	<i>Bandicota benghalensis</i>	Muridae	Varappu Eli	LC	-
5.	<i>Cynopterus sphinx</i>	Pteropodidae	Nari mooku Vavval	LC	-
6.	<i>Macaca radiata</i>	Cercopithecidae	Kurangu	LC	-
7.	<i>Herpetes edwardsi</i>	Herpestidae	Keeri Pillai	LC	-
8.	<i>Sus scrofa cristatus</i>	Suidae	Kattu Pandri	LC	-

Note: LC- Least Concern as per WPA-1972 (wildlife Protection Act -1972).

3.10.4.3 Reptiles & Amphibians

Reptiles and amphibian species were prepared with the secondary information sourced from publications given in the **Table 3-23**.

Table 3-23 Reptiles & Amphibians recorded from the Primary Survey in the Study area and their Conservation Status

S. No	Scientific name	Common name	IUCN Status	WPA 1972
Reptiles				
1.	<i>Hemidactylus sp.</i>	House lizard	LC	-
2.	<i>Eutropis macularia</i>	Common skink	LC	-
3.	<i>Ophisops leschenault</i>	Snake-eyed lizard	LC	-
4.	<i>Calotes versicolor</i>	Garden lizard	LC	-
5.	<i>Naja naja</i>	Nalla Pambu	LC	Sch II (Part II)
6.	<i>Ptyas mucosa</i>	Saara Pambu	LC	-
7.	<i>Ophiophagus hannah</i>	King Cobra	VU	Sch II (Part II)
8.	<i>Varanus bengalensis</i>	Common Indian Monitor	LC	-
9.	<i>Probergrothius sanguinolens</i>	Indian Red Bug	NA	-
10.	<i>Amphiesma stolatum</i>	Buff striped keelback Snake	LC	-
Amphibians				
1.	<i>Rana tigrina</i>	Common yellow frog	LC	-
2.	<i>Rana hexadactyla</i>	Indian Green frog	LC	-
3.	<i>Ozotophusa ravi</i>	Field Crab	LC	-
4.	<i>Nerodia sipedon</i>	Thanni Pambu	LC	-
5.	<i>Lissemys punctata</i>	Indian Flapshell Turtle	LC	-

3.10.4.4 Butterfly Species

Butterflies 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. They participate in most of the ecological processes that sustain ecosystems. A total of 35 species belonging to five families of butterflies were recorded. Butterfly species recorded in the buffer zone is given in the **Table 3-24**.

Table 3-24 Occurrence of butterfly species in buffer zone

S. No	Scientific Name	Family	Common Name
1.	<i>Ariadne merione</i>	Nymphalidae	Common Caster
2.	<i>Atrophaneura aristolochiae</i>	Papilionidae	Common Rose
3.	<i>Acraea terpsicore</i>	Nymphalidae	Tawny coster
4.	<i>Anthene lycaenina</i>	Polyommatainae	Pointed Ciliate Blue
5.	<i>Athyma perius</i>	Nymphalidae	Common Sergeant
6.	<i>Belenois aurota</i>	Pieridae	Pioneer
7.	<i>Eurema andersonii</i>	Pieridae	One-spotgrass yellow
8.	<i>Cepora nerissa dapha</i>	Pieridae	Common gull
9.	<i>Catopsilia pomona</i>	Pieridae	Common Emigrant
10.	<i>Catopsilia pyranthe</i>	Pieridae	Mottled Emigrant

11.	<i>Cupitha purreea</i>	Hesperiidae	Wax Dart
12.	<i>Colotis etrida</i>	Pieridae	Small Orange Tip
13.	<i>Curetis spp</i>	Curetinae	Indian Sunbeam
14.	<i>Danaus chrysippus</i>	Nymphalidae	Plain Tiger
15.	<i>Danaus genutia</i>	Nymphalidae	Striped Tiger
16.	<i>Eurema hecabe</i>	Pieridae	Common Grass Yellow
17.	<i>Dione vanilla</i>	Nymphalidae	Gulf Fritillary
18.	<i>Graphium tereon</i>	Papilionidae	Southern Bluebottle
19.	<i>Graphium doson</i>	Papilionidae	Narrow-banded Bluebottle
20.	<i>Hypolimnas bolina</i>	Nymphalidae	Great Egg Fly
21.	<i>Hypolimnas misippus</i>	Nymphalidae	Danaid Egg Fly
22.	<i>Junonia almana</i>	Nymphalidae	Peacock Pansy
23.	<i>Junonia hierta</i>	Nymphalidae	Yellow Pansy
24.	<i>Junonia lemonias</i>	Nymphalidae	Lemon Pansy
25.	<i>Junonia orithya</i>	Nymphalidae	Blue Pansy
26.	<i>Leptosia nina</i>	Pieridae	Psyche
27.	<i>Mycalesis perseus</i>	Nymphalidae	Common Bush Brown
28.	<i>Neptis hylas</i>	Nymphalidae	Common Sailer
29.	<i>Neptis nata hampsoni</i>	Nymphalidae	Sullied Sailer
30.	<i>Phalanta phalantha</i>	Nymphalidae	Common Leopard
31.	<i>Pachliopta aristolochiae</i>	Papilionidae	Common Rose
32.	<i>Pachliopta pandiyana</i>	Papilionidae	Malabar Rose
33.	<i>Sarangesa purendra Moore</i>	Pyrginae	Spotted Small Flat
34.	<i>Troides minos</i>	Papilionidae	Southern Birdwing
35.	<i>Ypthima asterope</i>	Nymphalidae	Common Three-ring

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.
- Evans WH. Identification of Indian butterflies. The Bombay Natural History Society, Bombay, 1927, 32.
- 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).

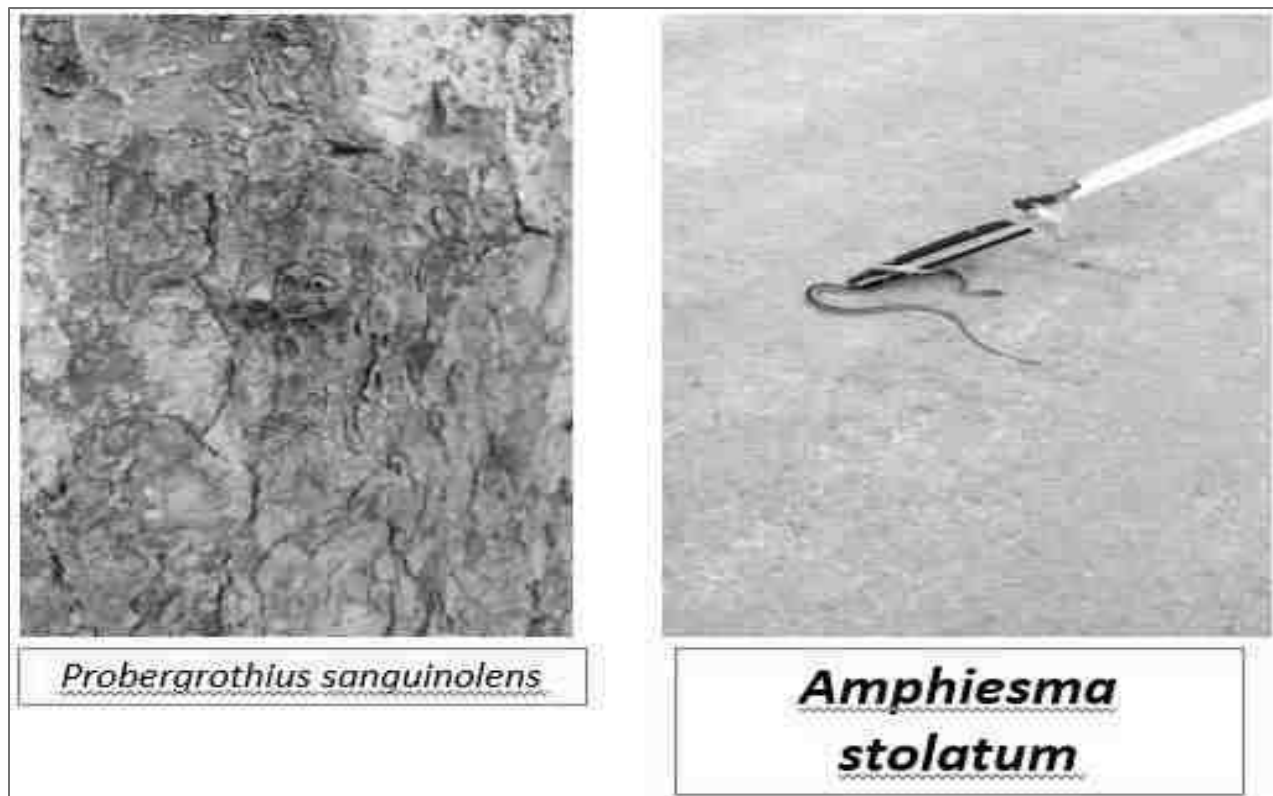


Figure 3-22 Fauna Species

3.10.4.4.1 Conclusion

During the primary survey of Ecological and Biodiversity, there are 11 Floral Invasive Alien species identified in the project study area. Apart from agriculture, locals of all the villages were involved in livestock keeping and each of the individuals had a substantial number of cattle. Livestock like cattle, goat, poultry, duck are reared for dairy products, meat, egg and for agriculture purposes. Most cattle are of local variety. None of the sighted animal species can be assigned endemic species category of the study area.

3.11 Socio Economic Profile

3.11.1.1 Demographic details

In 2011, Thiruvallur had population of 3728104 of which male and female were 1876062 and 1852042 respectively. In 2001 census, Thiruvallur had a population of 2754756 of which males were 1397407 and remaining 1357349 were females.

Source : <https://www.census2011.co.in/census/district/20-thiruvallur.html>

3.11.1.2 Population Density

The initial provisional data released by census India 2011, shows that density of Thiruvallur district for 2011 is 1,098 people per sq. km. In 2001, Thiruvallur district density was 776 people per sq. km. Thiruvallur district administers 3,394 square kilometers of area.

Source: <https://www.census2011.co.in/census/district/20-thiruvallur.html>

3.11.1.3 Sex Ratio

With regards to Sex Ratio in Thiruvallur, it stood at 987 per 1000 male compared to 2001 census figure of 971. The average national sex ratio in India is 940 as per latest reports of Census 2011 Directorate. In 2011 census, child sex ratio is 946 girls per 1000 boys compared to figure of 957 girls per 1000 boys of 2001 census data.

Source : <https://www.census2011.co.in/census/district/20-thiruvallur.html>

3.11.1.4 Scheduled Castes and Scheduled Tribes

The Scheduled Castes (SCs) population in Thiruvallur district was 22.04 per cent (8,21,646) in 2011 census. The Scheduled Tribes population in the district was 1.27 per cent (47,243) in the 2011 census.

Source : [DH 2011 3301 PART B DCHB THIRUVALLUR](#)

3.11.1.5 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 characteristics helps in identification, prediction and evaluation of impacts on socio-economic and parameters of human interest due to proposed project developments. Socio economic Indicators of Thiruvallur District is given in **Table 3-25**.

Table 3-25 Social Indicators of Thiruvallur District

S. No	Social Indicators	Thiruvallur District
1	Decadal variation %	35.33
2	Urban population %	65.14
3	Population density (Persons per square Km)	1098
4	Scheduled caste population %	22.04
5	Scheduled tribe population %	1.27
6	Literacy rate %	84.03
7	Work Participation rate %	41.26

Source : [DH 2011 3301 PART B DCHB THIRUVALLUR](#)

3.11.1.6 Education & Literacy

The average literacy rate of Thiruvallur in 2011 was 84.03 compared to 84.03 of 2001. If things are looked out at gender wise, male and female literacy were 89.69 and 78.32 respectively. For the 2001 census, the same figures stood at 85.26 and 68.39 in Thiruvallur District. Total literate in Thiruvallur District were 2,791,721 of which male and female were 1,495,711 and 1,296,010 respectively. In 2001, Thiruvallur District had 1,865,707 in its district. Education Infrastructures in the Tiruvannamalai District is provided in **Table 3-26**.

Source : <https://www.census2011.co.in/census/district/20-thiruvallur.html>

Table 3-26 Education Infrastructures in the Thiruvallur District

Type of school	Total schools		Rural Schools	
	Government	Private	Government	Private
Primary	941	487	815	252
Primary + Upper Primary	289	60	225	35
Primary + Upper Primary + Secondary + Higher Secondary	33	192	12	55
Upper Primary only	2	1	2	0
Upper Primary + Secondary + Higher Secondary	100	36	60	13
Primary + Upper Primary + Secondary	22	126	11	53
Upper Primary + Secondary	147	18	117	7

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

3.11.1.7 Social Economic Profile of the study area

Table 3-27 provides details on population profile within the study area. **Table 3-28** show the socio-economic indicator within the study area.

Table 3-27 Population profile within study area

Name	Household	Population	Male	Female	Children below 6	Scheduled Caste	Scheduled Tribe
0-5 km							
Saram	15239	59790	30550	29240	7845	7462	380
Kilkarana	548	2101	1025	1076	232	819	7
Evalur	205	788	394	394	114	217	23
Sattanur	903	3405	1692	1713	415	615	72
Melpakkam	566	2145	1059	1086	226	918	0
Neykuppi	1885	7261	3658	3603	862	2112	42
Pulaiyur	167	609	300	309	71	0	10
Ural	423	1670	845	825	206	723	0
Pattanam	958	3779	1934	1845	419	850	110
Salavadi	421	1610	835	775	192	735	256
Panchalam	353	1244	614	630	105	250	0
Melpettai	124	374	192	182	33	31	51
Total	21792	84776	43098	41678	10720	14732	951
5-10 km							
Agaram	130	448	228	220	44	96	0
Kolur	649	2382	1188	1194	239	1001	0
Chinnakavanam	782	2923	1430	1493	319	1333	185
Kanagavallipuram	212	813	409	404	77	439	0
Thirupair	194	752	380	372	72	343	0
Elaimbedu	720	2666	1318	1348	312	1477	0
Aladu	1260	4608	2333	2275	442	1535	181
Anuppampattu	2350	8719	4370	4349	984	3227	148
Nalur	1655	6238	3146	3092	684	2794	53
Vannipakkam	245	875	425	450	77	362	7
Vadakkunallur	222	823	385	438	81	276	0
Sevittupanapakkam	77	314	155	159	41	206	0
Malliankuppam	291	1056	513	543	118	0	0
Chinnambedu	1051	4175	2201	1974	420	1885	87
Madiyur	84	313	160	153	24	0	13

Valuthigaimedu	332	1279	633	646	144	1111	8
Nayur	1187	4516	2212	2304	485	1845	99
Budur	462	1784	915	869	184	798	190
Pudupakkam	100	386	191	195	54	118	0
Kodipallam	155	591	287	304	67	478	0
Marambedu	176	668	332	336	69	23	22
Kummamur	444	1807	919	888	232	1687	0
Angadu	195	703	367	336	64	432	2
Perungavoor	633	2277	1096	1181	279	652	9
Kilmudalambedu	2195	8648	4375	4273	935	2196	6
Puduvoyal	1006	3698	1856	1842	402	1792	81
Lakshmivilasapuram	168	678	346	332	79	249	27
Pettaikandigai	980	4217	2110	2107	453	522	148
Krishnapuram	145	494	256	238	39	0	12
Amindanallur	280	1018	531	487	110	637	0
Akkarapakkam	401	1562	750	812	155	1157	15
Maduravasal	266	981	496	485	103	319	0
Kannigaipair	1323	5023	2469	2554	590	2400	2
Kottakuppam	249	941	455	486	84	607	0
Neiveli	451	1710	825	885	179	440	3
Varadarajapuram (OG)	873	3383	1677	1706	429	1410	0
Erumaivettipalayam R.F.	0	0	0	0	0	0	0
Total	21943	83469	41739	41730	9070	33847	1298
Grand Total	43735	168245	84837	83408	19790	48579	2249

(Source: Census 2011)

Table 3-28 Summary of Socioeconomic indicators within the study area

S. No	Particulars	Study Area	Unit
1	Number of villages in the Study Area	47	No.
2	Number of Towns/Municipality in study area	2	No.
3	Total Households	43735	No.
4	Total Population	168245	No.
5	Children Population (<6 Years Old)	19790	No.
6	SC Population	48579	No.
7	ST Population	2249	No.
8	Total Working Population	72171	No.
9	Main Workers	56225	No.
10	Marginal Workers	15946	No.
11	Literates	118643	No.

(Source: Census 2011)

3.11.1.8 Employment and livelihood

Table 3-29 shows the classification of workers within the study area. Details of Literacy population in the study area is given in **Table 3-30**.

Table 3-29 Classification of workers within study area

Name	Total Workers	Main Workers	Marginal Workers	Agriculture Workers				Main		Marginal	
				Main		Marginal					
				Cultivators	Agri.	Cultivators	Agri.	Household	Others	Household	Others
0-5 km											
Saram	22985	20511	2474	259	125	62	43	249	19878	173	2196
Kilkaranaï	1051	885	166	73	343	3	46	16	453	0	117
Evalur	331	305	26	20	59	0	1	0	226	0	25
Sattanur	1944	1551	393	138	943	13	154	22	448	97	129
Melpakkam	844	685	159	53	315	6	106	15	302	8	39
Neykuppi	3251	2550	701	204	663	31	275	69	1614	22	373
Pulaiyur	247	243	4	9	177	0	0	10	47	0	4
Ural	741	629	112	81	270	0	61	8	270	4	47

Pattanam	1587	1170	417	32	46	24	107	91	1001	84	202
Salavadi	774	677	97	297	147	9	2	6	227	7	79
Panchalam	601	329	272	12	253	15	65	14	50	20	172
Melpettai	195	32	163	2	0	0	152	3	27	0	11
Total	34551	29567	4984	1180	3341	163	1012	503	24543	415	3394
5-10 km											
Agaram	239	107	132	3	67	0	73	2	35	1	58
Kolur	1028	762	266	84	478	4	226	7	193	5	31
Chinnakavanam	1248	747	501	28	321	8	357	19	379	14	122
Kanagavallipuram	367	181	186	30	39	3	129	2	110	2	52
Thirupair	321	314	7	5	182	1	4	1	126	0	2
Elaimbedu	1147	717	430	301	211	38	254	10	195	2	136
Aladu	2186	1180	1006	178	439	22	732	22	541	24	228
Anuppampattu	4119	3568	551	200	1184	18	265	105	2079	16	252
Nalur	2704	2028	676	356	205	69	173	70	1397	65	369
Vannipakkam	369	211	158	24	76	3	128	6	105	4	23
Vadakkunallur	385	345	40	51	182	0	32	18	94	0	8
Sevittupanapakkam	139	131	8	9	60	0	3	1	61	0	5
Malliankuppam	479	475	4	223	169	3	0	4	79	0	1
Chinnambedu	1908	1839	69	288	852	3	21	83	616	6	39
Madiyur	116	110	6	50	19	1	4	4	37	0	1
Valuthigaimedu	580	243	337	24	135	11	234	2	82	11	81
Nayur	2145	1221	924	106	539	30	671	9	567	12	211
Budur	859	761	98	17	448	7	69	13	283	7	15
Pudupakkam	208	145	63	22	71	8	46	6	46	0	9
Kodipallam	265	154	111	0	36	0	99	6	112	0	12
Marambedu	363	97	266	3	2	5	189	0	92	1	71
Kummamur	825	623	202	13	103	3	81	23	484	1	117
Angadu	330	47	283	7	2	0	49	2	36	7	227
Perungavoor	946	474	472	37	281	14	324	24	132	2	132
Kilmudalambedu	3410	2321	1089	151	334	24	690	61	1775	21	354
Puduvoyal	1724	769	955	108	245	11	654	2	414	9	281

Lakshmivilasapuram	263	159	104	26	0	4	69	1	132	4	27
Pettaikandigai	2003	1114	889	284	380	25	683	22	428	72	109
Krishnapuram	298	92	206	9	42	8	167	5	36	7	24
Amindanallur	500	488	12	78	234	0	1	5	171	1	10
Akkarapakkam	990	594	396	37	472	8	28	1	84	0	360
Maduravasal	515	351	164	60	159	1	55	4	128	4	104
Kannigaipair	2193	2029	164	57	1087	0	85	21	864	14	65
Kottakuppam	367	366	1	30	85	0	0	9	242	0	1
Neiveli	839	800	39	42	508	10	9	22	228	2	18
Varadarajapuram (OG)	1242	1095	147	2	25	0	14	40	1028	7	126
Erumaivettipalayam R.F.	0	0	0	0	0	0	0	0	0	0	0
Total	37620	26658	10962	2943	9672	342	6618	632	13411	321	3681
Grand Total	72171	56225	15946	4123	13013	505	7630	1135	37954	736	7075

(Source: Census 2011)

Table 3-30 Details of Literacy population in the study area

Name	Literates Population	Male Literates	Female Literates	Literates %
0-5 km				
Nerkunram (CT)	45381	24333	21048	38.25
Peravallur	1478	802	676	1.25
Madhavaram	560	295	265	0.47
Amoor	2047	1131	916	1.73
Panjetty	1483	804	679	1.25
Jaganathapuram	5102	2806	2296	4.30
Soorapattu	351	202	149	0.30
Sothuperumbedu	1181	635	546	1.00
Karanodai	2938	1573	1365	2.48
Orakkadu	1105	609	496	0.93
Sembilivaram	796	426	370	0.67
Sennavaram	205	126	79	0.17
Total	62627	33742	28885	52.79

5-10 km				
Agaram	223	135	88	0.19
Kolur	1599	869	730	1.35
Chinnakavanam	1817	990	827	1.53
Kanagavallipuram	579	328	251	0.49
Thirupair	490	284	206	0.41
Elaimbedu	1642	879	763	1.38
Aladu	2908	1638	1270	2.45
Anuppampattu	6009	3291	2718	5.06
Nalur	4531	2452	2079	3.82
Vannipakkam	701	356	345	0.59
Vadakkunallur	515	279	236	0.43
Sevittupanapakkam	191	108	83	0.16
Malliankuppam	623	356	267	0.53
Chinnambedu	2841	1608	1233	2.39
Madiyur	235	137	98	0.20
Valuthigaimedu	699	414	285	0.59
Nayur	2814	1550	1264	2.37
Budur	1182	665	517	1.00
Pudupakkam	207	116	91	0.17
Kodipallam	381	209	172	0.32
Marambedu	449	259	190	0.38
Kummamur	1214	666	548	1.02
Angadu	479	271	208	0.40
Perungavoor	1565	843	722	1.32
Kilmudalambedu	6305	3450	2855	5.31
Puduvoyal	2352	1334	1018	1.98
Lakshmivilasapuram	450	254	196	0.38
Pettaikandigai	2698	1557	1141	2.27

Krishnapuram	318	196	122	0.27
Amindanallur	717	412	305	0.60
Akkarapakkam	1119	589	530	0.94
Maduravasal	605	350	255	0.51
Kannigaipair	3412	1848	1564	2.88
Kottakuppam	595	326	269	0.50
Neiveli	1087	583	504	0.92
Varadarajapuram (OG)	2464	1308	1156	2.08
Erumaivettipalayam R.F.	0	0	0	0.00
Total	56016	30910	25106	47.21
Grand Total	118643	64652	53991	100.00

(Source: Census 2011)

3.11.1.8.1 Interpretation of Results

73.87% of Literacy and 59.24% of Non-Workers in 0-5 km zone and 67.11% of Literacy and 54.93% of Non-Workers in 5-10 km zone. The literacy rate of the study region is 70.52%. The study area has more than 55% non-workers. There is a need to establish more industries so that the maximum number of employments can be generated. Summary of Socio-Economic Aspects is presented in the **Table 3-31**.

Table 3-31 Summary of Socio-Economic Aspects

S. No	Impact Zone	Number of villages	Total Population	Male%	Female%	SC population%	ST population%	Total Workers%	Main Workers%	Marginal Workers%	Literacy%	Non-Workers%
1	0-5km	12	84776	50.84	49.16	17.38	1.12	40.76	34.88	5.88	73.87	59.24
2	5-10km	37	83469	50.01	49.99	40.55	1.56	45.07	31.94	13.13	67.11	54.93
Total	49	168245	50.42	49.58	28.87	1.34	42.90	33.42	9.48	70.52	57.10	

3.12 Summary:

Ambient Air Quality Monitoring						
S. No	Criteria Pollutants	Unit	Maximum value	Minimum Value	98 th Percentile Value	Prescribed Standard
1	PM ₁₀	µg/m ³	67.6	37.2	66.0	100
2	PM _{2.5}	µg/m ³	37.2	20.5	36.3	60
3	SO ₂	µg/m ³	13.4	5.1	13.1	80
4	NO _x	µg/m ³	26.9	13.2	26.3	80

All the results of ambient air quality parameters have been found within the limit as per NAAQS. Based on comparison study of results for tested parameters with NAAQS, it is interpreted that ambient air quality of studied locations is good. This interpretation relates to the results found for corresponding locations and study period.

Noise Monitoring					
S. No	Parameters	Unit	Maximum Value	Minimum value	Prescribed standard (residential areas)
1	Leq (day)-residential areas)	dB(A)	54.1	50.9	55
2	Leq(Night) residential areas)	dB(A)	43.8	40.9	45

In Industrial area daytime noise levels were about 54.1 dB(A) and 50.9 dB(A) during nighttime, which is within prescribed limit by CPCB (75 dB(A) Day time & 70 dB(A) Nighttime). The field observations during the study period indicate that the ambient noise levels are well within the prescribed limit by CPCB (55 dB(A) Day time & 45 dB(A) Nighttime).

Surface Water					
S. No	Parameters	Unit	Maximum Value	Minimum Value	IS 2296 Class A
1	pH	-	7.89	7.26	6.5-8.5
2	TDS	mg/l	592	158	500
3	DO	mg/l	6.2	4.8	6
4	COD	mg/l	65.5	16.3	-
5	BOD	mg/l	17.7	1.5	2

The surface water results were compared with IS 2296:1192 standard and in respect of CPCB water Quality Criteria for designated best use. Based on a comparison study of test results with Surface water Quantity Standards (Is 2296 Class A), it is interpreted that water qualities of studied locations are classified under Class E, which can be used for irrigation industrial cooling, and controlled waste disposal

Ground Water						
S. No	Parameters	Unit	Maximum Value	Minimum Value	Acceptable Limit	Permissible Limit
1	pH	-	7.79	7.40	6.5-8.5	-
2	Total Hardness	mg/l	450	50	200	600
3	Chloride	mg/l	219	40	250	1000
4	Fluoride	mg/l	0.62	0.18	1.0	1.5
5	Sulphate	mg/l	54.8	9.9	400	200

Based on comparison study of test results with drinking water standard, it is interpreted that water qualities of studied locations meet with the drinking water standards as per IS 10500: 2012. These interpretations relate to the sample tested for location only. To prevent ground water contamination and improving the quality and Quantity, rainwater harvesting, and groundwater recharging may be helpful.

Soil Quality

S. No	Parameters	Unit	Maximum Value	Minimum Value
1	pH	-	7.59	6.17
2	EC	µmhos/cm	180	41
3	Nitrogen	kg/ha	325	211
4	Phosphorus	kg/ha	92	49
5	Potassium	kg/ha	258	182

As per the Indian Council of Agricultural research characterization all locations soils are having pH Slightly Acidic to Slightly Alkaline range, Electrical conductivity is Average, Nitrogen as N is Better to Sufficient range, Phosphorus range is Medium to More than sufficient range and Potassium ranges from Medium to Average.

Ecology and Biodiversity

During the primary survey of Ecological and Biodiversity, there are 11 Floral Invasive Alien species identified in the project study area. Apart from agriculture, locals of all the villages were involved in livestock keeping and each of the individuals had a substantial number of cattle. Livestock like cattle, goat, poultry, duck are reared for dairy products, meat, egg and for agriculture purposes. Most cattle are of local variety. None of the sighted animal species can be assigned to the endemic species category of the study area.

Socio-Economic

The literacy rate of the study region is 70.52%. The study area has more than 55% non-workers. There is a need to establish more industries so that the maximum number of employments can be generated.

CHAPTER – 4

ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

(This Chapter having, anticipated environmental impacts due to proposed project activities are identified, analyzed, and assessed and thereafter the mitigation measures for the adverse impacts are proposed. The significance of impacts is determined. This chapter is prepared based on Chapter 2 & Chapter 3 by correlating the activities under proposed project and their impacts on receiving environmental attributes.)

4 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.1 General

This chapter presents identification and appraisal of various impacts from the proposed plant. The environmental impacts are categorized as either primary or secondary impacts. Primary impacts are those which are attributed directly to the project and secondary impacts are those, which are indirectly induced and typically include the associated investment and changed pattern of social and economic activities by the proposed action. The construction and operational phase of the proposed project comprises various activities, each of which may have an impact on some or all environmental parameters. Various impacts during the construction and operation phase on the environment have been studied listed along with mitigating measures in the subsequent sections.

The construction and operational phase of the proposed project comprises various activities, each of which will have an impact on some or other environmental parameters. Various impacts during the construction and operation phase on the environmental parameters have been studied and mitigation measures for the same are discussed briefly below and elaborated in the subsequent sections.

Prediction of impacts involves determination of nature and extent of impacts due to the various activities to be involved in the proposed project.

Generally, impacts are classified as follows.

- a. *Direct or indirect*
- b. *Positive or Negative*
- c. *Short term or long term*
- d. *Significant or insignificant or moderate*
- e. *Reversible or irreversible*

Observing the project site, magnitude of project and pollution potential have been predicted for the following three classifications.

- a. *Positive or Negative*
- b. *Short term or long term*
- c. *Significant or insignificant or moderate*

Environmental Impacts are identified and assessed qualitatively through the matrix method. Prediction of impacts during both construction & operation phase with mitigation measures and without mitigation measures are given in **Table 4-3, Table 4-4 ,Table 4-5,Table 4-6 & Table 4-7**. The Severity Criteria for Magnitude of Impacts is shown in **Table 4-1**.

Table 4-1 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

Probability			Impact						
					Very Low	Low	Medium	High	Very High
					1	2	3	4	5
			Very High	5	5	10	15	20	25
High	4	4	8	12	16	20			
Medium	3	3	6	9	12	15			
Low	2	2	4	6	8	10			
Very Low	1	1	2	3	4	5			

Figure 4-1 Impacts quantification chart.

Table 4-2 Cumulative Score Range for Beneficial and Adverse Impacts

S. No	Cumulative Score	Details
1	+ve/-ve	Beneficial Impact / Adverse Impact
2	0-150	No appreciable Beneficial Impact / Adverse Impact
3	151-300	Appreciable but reversible adverse impact-mitigation measures are needed
4	301-450	Significant adverse impacts: most of the impacts are reversible. Mitigation measures are crucial
5	451-600	Major adverse impacts: most of the impacts are reversible. Alternative site selection to be considered.
6	>600	Permanent irreversible impact: alternatives to the project need to be explored

The proposed project would generate impact on the environment in two distinct phases:

- I. *During the construction phase which may be stated as temporary or short term.*
- II. *During the operation phase which would have long term effects.*

4.2 Construction Phase

All the impacts due to following activities during construction phase will be short term and restricted up to project site.

- ✓ *Site cleaning*
- ✓ *Levelling and road laying*
- ✓ *Earthwork comprising of excavation, grading, trenching.*
- ✓ *Transportation of construction materials*
- ✓ *Civil work*
- ✓ *Mechanical erection*
- ✓ *Employment*
- ✓ *Domestic activities by workers*
- ✓ *Greenbelt development*

4.3 Prediction of Environmental Impacts during Construction Phase

Table 4-3 Impact Identification Matrix during Construction Phase including positive and negative impacts without mitigation measures.

S. No	Activities	Environmental Traits										
		Air & AQ	Water	Soil	Noise	Land	HG	Geology	SHW	RH & OHS	EB	SE
1	Site Preparation	✓	-	✓	✓	✓	-	-	-	-	✓	✓
2	Transportation of construction materials & operation of machineries	✓		✓	✓					✓	✓	✓
3	Storage and Handling of construction material	✓	-	✓	✓	-	-	-	-	✓	-	-
4	Construction of facilities (Civil works)	✓	✓	✓	✓	-	-	-	✓	✓	✓	✓
5	Mechanical erection of equipment	✓	✓	✓	✓	-	-	-	-	✓	-	-
6	Sewage / Garbage Disposal	-	✓	✓	-	-	-	-	✓	✓	-	✓
7	Employment Generation	-	✓	-	-	-	-	-	✓	-	-	✓
8	Greenbelt Development	✓	-	✓	-	✓	-	-	-	-	✓	✓

Table 4-4 Environmental Impact Assessment Matrix during Construction Phase without mitigation measures

S. No	Parameter Activities	Environmental Traits											
		Air & AQ	Water	Soil	Noise	LULC	HG	Geology	SHW	RH (Health & Safety)	EB	SE	Total
1	Site Preparation	-9	-	-6	-1	-6	-	-	-	-	-4	+16	-10
2	Transportation of construction material & operation of machineries	-6	-	-4	-4	-	-	-	-	-6	-4	+9	-15
3	Storage and Handling of construction material	-9	-	-2	-6	-	-	-	-	-4	-	-	-21
4	Construction of facilities (Civil works)	-9	-12	-6	-12	-	-	-	-9	-12	-4	+9	-55
5	Mechanical erection of equipment	-2	-2	-2	-3	-	-	-	-	-2	-	-	-11
6	Sewage / Garbage Disposal	-	-6	-3	-	-	-	-	-9	-3	-	+3	-18
7	Employment Generation	-	-6	-	-	-	-	-	-2	-	-	+9	+1
8	Greenbelt Development	+16	-	+9	+9	-	-	-	-	-	+9	+4	+47
	Total												-82
Total Cumulative Score for various Environmental Parameters without mitigation measures is – 82 which is not appreciable adverse impact during construction phase. No appreciable Beneficial Impact / Adverse Impact during construction phase													

4.4 Description of Impacts and Mitigation Measures during Construction Phase

4.4.1.1 Air Environment

Environmental Impacts on Air Environment are identified and assessed quantitatively and qualitatively due to the following activities during construction phase.

☒ **Activities considered for impact assessment:**

- ✓ *Site Preparation*
- ✓ *Transportation and Storage of Construction Material*
- ✓ *Construction of facilities*
- ✓ *Mechanical erection of equipment*
- ✓ *Sewage / Garbage Disposal*
- ✓ *Recruitment/Employment*
- ✓ *Greenbelt Development*

☒ **Impacts:**

- ✓ *Increase in the level of PM due to generation of airborne dust from the construction activities, constructions, internal road development, storage, and handling of construction materials.*
- ✓ *Increase in the level of CO₂, CO, NO_x, and PM from the transportation of the vehicles, D. G. set and construction machineries.*
- ✓ *PM would be the predominant pollutant affecting the air quality.*
- ✓ *Crop yield will be reduced due to deposition of dust and reduce stomatal index.*

☒ **Mitigation Measures**

- ✓ *Construction materials will be covered with tarpaulin sheets throughout the construction phase to avoid dust generation.*
- ✓ *Barricading will be done wherever required during construction activities.*
- ✓ *Excavated soil and construction debris will be sprinkled with water and kept moist & Reuse of construction wastes such as sand, brick, gravel, cement for developing internal road and project structures.*
- ✓ *Regular water sprinkling will be done to avoid dust generation from transportation and stored material.*
- ✓ *In the proposed project, 6m wide road shall be provided for smooth movement of the goods vehicles. Also, unit will be provided separate entry and exit for the smooth traffic movement.*
- ✓ *Regular maintenance/ inspection of vehicles used at site will be done.*
- ✓ *Personnel Protective Equipment's (PPEs) will be provided to the construction workers. Hence there will be no significant impacts on their health due to the dust particle.*
- ✓ *Greenbelt development in and around the plant shall greatly serve as an efficient barrier for prevention of air outside the plant premises.*
- ✓ *For control of emission from D.G. set which will be used in case of power failure and/or emergency, adequate stack height of is being provided to minimize the impacts.*

4.4.2 Water Environment

Environmental Impacts on Air Environment are identified and assessed quantitatively and qualitatively due to the following activities during construction phase.

☒ **Activities considered for impact assessment:**

- ✓ Construction of facilities
- ✓ Mechanical erection of equipment
- ✓ Sewage / Garbage Disposal
- ✓ Recruitment
- ✓ Greenbelt Development

☒ **Impacts**

- ✓ 10 KLD of water will be used for construction stage for the proposed project, will be sourced from private suppliers.
- ✓ Potential impacts on Water environment may be due to contamination of water by dumping/ fall/ spill of construction materials & debris, fuel, and other wastes like garbage etc & Oil and suspended solids in run-off from vehicles and access roads.
- ✓ Water pollution due to disposal of untreated sewage.
- ✓ Increase the consumption of water for construction activities and domestic usage.

☒ **Mitigation Measures**

- ✓ An appropriate water management system will be implemented like aware the construction workers with the help of banners to save water during different activity.
- ✓ Good construction practices to avoid water logging on site.
- ✓ The existing domestic sewage will generate 4.5 KLD and will be disposed through a septic tank followed by soak pit, Septic tank will be cleaned periodically.
- ✓ Proper management of rainwater runs off during monsoon and creating bunds to utilize the rainwater for construction purposes.

4.4.3 Soil Environment

☒ **Activities considered for impact assessment:**

- ✓ Site Preparation
- ✓ Construction of Buildings and other facilities
- ✓ Greenbelt development
- ✓ Development of internal road
- ✓ Recruitment

☒ **Impacts**

- ✓ The excavated earth material if stacked loosely may result into runoff to the mud flats resulting in loss of topsoil.
- ✓ Compaction of soil due to vehicular movement.
- ✓ Soil contamination due to disposal of construction waste.
- ✓ Soil removal for foundation

☒ **Mitigation Measures**

- ✓ Excavated earth will be stacked covered with plastic/tarpaulin sheets and will be maintained separately.

- ✓ *Excavated topsoil shall be used for backfilling/greenbelt development and plantation.*
- ✓ *The construction wastes shall be utilized for road construction and another filling requirement etc.*

4.4.4 Noise Environment

During the construction phase, the noise will mostly be produced because of building activities and machinery used for carrying out construction.

☑ Impacts

- ✓ *Construction activities mainly involve diesel generators, laying of foundation, erection of superstructure, clearing of obstruction and trees if any from the proposed area.*
- ✓ *Activities such as construction of labor camps, onsite office, pneumatic hammers, compressors, concrete mixers, construction material plants however do not cause significant noise pollution but if the work continuous for longer duration, it can affect the health of local people and workers involved in the project work.*

☑ Mitigation Measures

- ✓ *The green belt will help to reducing the noise nuisance.*
- ✓ *Selection of equipment of high quality.*
- ✓ *Proper planning and organizing of construction activities which will help in avoiding loud verbal exchanges between the intervening parties.*
- ✓ *Transportation activities will be carried out only during the day and only in case of emergency, the transportation activities will be permitted in night-time.*
- ✓ *The vehicles used for construction activities and transportation of materials will be provided with the horn of low noise level as recommended concerned authorities.*
- ✓ *Minimization of operation time of noisy equipment and operation of machineries/equipment that generate high levels of noise only during daytime.*
- ✓ *Inadequate use of plant and equipment, namely, running on full power when the work does not necessitate it will be avoided.*
- ✓ *Personal protective equipments, education and public awareness and exposure control through rotation of work will be provided to the workers engaged in construction activities in the area generating high levels of noise.*

4.4.5 Land Environment (Land Use/Land Cover)

☑ Activities considered for impact assessment:

- ✓ *Site Preparation*
- ✓ *Construction of Buildings and other facilities*
- ✓ *Compaction of soil and a change in the soil structure due to the use of heavy construction vehicles and machineries.*
- ✓ *Removal of soil from the site.*
- ✓ *Mixing of the topsoil and subsoil.*
- ✓ *Dispersion of dust*
- ✓ *Green belt Development*

☒ **Impacts**

- ✓ *Greenbelt area will be developed which will result in beneficial impacts on land cover of the project area.*

☒ **Mitigation Measures**

- ✓ *Employing techniques such as restricting access during wet conditions, using protective boarding and low ground pressure machineries to minimize compaction of soil.*
- ✓ *The removed soil will be properly stored for subsequent reinstatement.*
- ✓ *Reuse of excess excavated material for road development, green belt development and landscaping.*
- ✓ *A well-designed closed depository for storage of construction materials to prevent land/soil pollution.*
- ✓ *Effective stabilization of altered landforms to minimize soil erosion and the potential for water pollution (e.g., Vegetation).*
- ✓ *Reuse of construction wastes such as sand, brick, gravel, cement for developing internal road and project structures.*

4.4.5.1 Hydrogeology

- ✓ *There is no significant impact on Hydrogeology due to project activity during construction phase as no ground water consumption will be done.*

4.4.5.2 Geology

- ✓ *There are no underground construction works proposed by the project.*

4.4.6 Hazardous/Solid Waste Management

The sources of waste are metal pieces, cardboard, wooden scrap, Process units etc., generation of chemical waste by general site practices (e.g., vehicle and plant maintenance/servicing), municipal waste generated by site workers.

☒ **Activities considered for impact assessment:**

- ✓ *Site Preparation*
- ✓ *Construction of Buildings and other facilities*
- ✓ *Sewage /Garbage disposal*
- ✓ *Development of internal road*
- ✓ *Recruitment*

☒ **Mitigation Measures**

- ✓ *Recycling/reusing/recovering materials where possible and thereby neglecting or reducing the disposal requirements.*
- ✓ *Separation of construction material for reuses either to be used on onsite filling or can be used as public fill.*
- ✓ *Training the staff in waste minimizing practices.*
- ✓ *Chemical waste should be stored in a locked area to avoid leaching of harmful chemicals in the soil or nearby water bodies.*

4.4.7 Risk and Hazard

☒ **Activities considered for impact assessment:**

- ✓ *Transportation*
- ✓ *Storage of construction material and movement of machinery*
- ✓ *Construction of Buildings and other facilities*
- ✓ *Recruitment*

☒ **Impacts:**

- ✓ *Chances of accident may increase due to proposed construction activity.*

☒ **Mitigation Measures:**

- ✓ *All the activities will be carried out under the supervision and control of the management.*
- ✓ *The Vehicles must be maintained in good repairs and checked thoroughly at least once a week by the competent person authorized by the Management.*
- ✓ *Safety equipment such as helmet, goggles, ear plug, etc., shall be provided.*

4.4.8 Ecology and biodiversity

☒ **Activities considered for impact assessment:**

- ✓ *Site preparation*
- ✓ *Transportation*
- ✓ *Construction of building and other facilities*
- ✓ *Green belt Development*
- ✓ *Development of internal road*

☒ **Impacts:**

- ✓ *The existing flora and vegetation of the project site is going to be lost on account of construction activities (fabrication and erection of sheds, workshops, material handling and storage facilities).*
- ✓ *Loss of Negative species & removal of weeds.*
- ✓ *There is no eco- sensitive and there are no wildlife sanctuaries or national parks or biosphere reserves or wetlands, or important bird areas or migratory corridors of wildlife within 15km from the project site.*

☒ **Mitigation Measures**

- ✓ *The core area is a non-planned land. It is sparsely covered by isolated thorny bushes and invasive weeds. There are no timber trees or any of the threatened taxa of the BSI. There are no forests within 5km from the core area.*
- ✓ *Greenbelt will be developed from the construction phase to improve the aesthetic value in the area and to screen out the fugitive dust generated during construction & will be minimized through paving and water sprinkling.*
- ✓ *Implementing Soil Conservation methods like, Windbreaks are composed of shrubs, plants and trees in garden/lawn areas, Regular watering soil along with plants, adding earthworms to soil for improvement of soil fertility and perennial fodder production.*

4.4.9 Socio Economic

Predicting socio-economic impacts can be effectively achieved through a well-planned survey accompanied by a structured questionnaire targeting the local public. Such a survey will

provide valuable insights into community perceptions, concerns, and expectations regarding the proposed project. The proposed project has a positive impact by providing employment to about 50 nos people in the area, improving the standard of living and quality of life during construction phase.

☑ Activities considered for impact assessment:

- ✓ Site preparation
- ✓ Transportation
- ✓ Construction of building and other facilities
- ✓ Green belt Development
- ✓ Development of internal road

☑ Impacts:

- ✓ The construction phase will generate employment opportunity of 50 Nos. in the skilled as well as unskilled categories. Although the workforce requirement will be temporary in nature, it will be met from the local populace as far as possible hence there will be positive impact in terms of local resource utilization.
- ✓ Construction workers will require essential basic infrastructure facilities viz. safe drinking water, adequate sanitation, etc. will have temporary impact on the existing facilities in the study area.

☑ Mitigation Measures

- ✓ The contractor will provide all required facilities to the workers to reduce the impact on the existing facilities in the study area.
- ✓ Local businessmen will get opportunity to supply construction materials.
- ✓ Demands generated from the employees working at site for basic facilities will increase the local business activity of the area.
- ✓ Any development, either temporary or permanent will support the family of many villagers. Thus, positive impacts are envisaged on socio-economic environment.

Table 4-5 Impact Matrix during Construction Phase with mitigation measures

S. No	Parameter Activities	Environmental Traits											
		Air & AQ	Water	Soil	Noise	LULC	HG	Geology	SHW	RH (Health & Safety)	EB	SE	Total
1	Site Preparation	-2	-	-2	-2	-2	-	-	-	-	-2	+9	+1
2	Transportation of construction material & operation of machineries	-2	-	-2	-2	-	-	-	-	-2	-2	-2	-12
3	Storage and Handling of construction material	-2	-	-2	-2	-	-	-	-	-2	-	-	-8
4	Construction of facilities (Civil works)	-4	-6	-2	-2	-	-	-	-2	-4	-2	-2	-24
5	Mechanical erection of equipment	-2	-2	-2	-2	-	-	-	-	-2	-	-	-10
6	Sewage / Garbage Disposal	-	-2	-2	-	-	-	-	-2	-1	-	-	-7
7	Employment Generation	-	-4	-	-	-	-	-	-2	-	-	+9	+3
8	Greenbelt Development	+16	-	+9	+9	-	-	-	-	-	+9	+4	+47
Total													-10
Total Cumulative Score for various Environmental Parameters with mitigation measures is -10 during construction phase which is not appreciable adverse impact are during construction phase.													

4.5 Operation Phase

The proposed project operations may cause environmental pollution and if adequate control measures are not taken to prevent/mitigate the environmental impacts, these operations may cause damage to the Environmental attributes.

Each individual activity listed has its specific impact on each environmental parameter. After commissioning the proposed project, operation phase will have permanent (long term) which are can irreversible in nature with proper mitigation measures. The following activities are considered for the operational phase.

- ✓ *Raw material & product storage, handling, and transportation.*
- ✓ *Manufacturing process & utility operations (consumption of resources & emission of liquid effluent, flue & process gas, generation of solid/hazardous waste and Noise)*
- ✓ *Employment*
- ✓ *Green Belt Development*
- ✓ *Infrastructure development*
- ✓ *CER & CSR activities*

Table 4-6 Impact Matrix (Operation Phase) without mitigation measures

Parameter Activities	Environmental Traits										
	Air & AQ	Water	Soil	Noise	LU\LC	HG	Geology	SHW	RH (Health & Safety)	EB	SE
Road transportation (Materials supply & Product)	✓	-	✓	✓	-	-	-	-	✓	✓	✓
Raw Material storage product Handling and Storage	✓	-	✓	-	-	-	-	✓	✓	-	✓
Product Manufacturing process	✓	✓	-	✓	-	-	-	✓	✓	-	✓
Gaseous Emissions	✓	-	-	-	-	-	-	-	✓	✓	✓
Effluent/Sewage Discharge	✓	✓	✓	-	-	-	-	-	✓	✓	-
Solid / Hazardous waste generation	✓	-	✓	-	-	-	-	✓	✓	✓	-
Employment generation	-	✓	-	-	-	-	-	✓	-	-	✓
Greenbelt development	✓	✓	✓	✓	✓	✓	✓	✓	-	✓	✓

Table 4-7 Environment Impact Matrix (Operation Phase) without mitigation measures

Parameter Activities	Environmental Traits											
	Air & AQ	Water	Soil	Noise	LU\LC	HG	Geology	SHW	RH & OHS	EB	SE	Total
Road transportation (Materials supply & Product)	-4	-	-4	-9	-	-	-	-	-4	-4	+4	-21
Raw Material storage product Handling and Storage	-9	-	-6	-	-	-	-	-6	-6	-	+2	-25
Product Manufacturing process	-9	-9	-	-12	-	-	-	-16	-16	-	-9	-71
Gaseous Emissions	-6	-	-	-	-	-	-	-	-9	-6	-6	-27
Effluent/Sewage Discharge	-9	-9	-4	-	-	-	-	-	-4	-6	-	-32
Solid / Hazardous waste generation	-9	-	-6	-	-	-	-	-9	-4	-4	-	-32
Employment generation	-	-4	-	-	-	-	-	-2	-	-	+16	+10
Greenbelt development	+9	-2	+9	+9	-	-	-	-	-	+9	+9	+43
Total as Individual attributes	-37	-24	-11	-12	-	-	-	-33	-43	-11	+16	-155

“Total Cumulative Score for various Environmental Parameters without mitigation measures is –155 which is appreciable but reversible adverse impact-mitigation measures are needed.”

4.6 Description of Impacts and Mitigation Measures during Operational Phase

4.6.1 Air Environment

The major air pollution sources from the DG sets, Boilers, shot blasting & Ban Bury Section. The major air pollution sources from the industry are Boilers, DG sets and Shot blasting. The DG set and boiler sources are provided with stacks of adequate height, Boiler having a Common stack to disperse the emanating flue gases containing suspended particulate matter, oxides of sulphur and nitrogen without affecting the ground level concentrations. Shot Blasting is facilitated with Dust Collector followed by Stack height of 5m AGL. Ban Bury Section having Inbuilt dust collector.

4.6.1.1 Air Quality- Prediction Modelling

The stacks are considered as point sources to predict impact on ambient air quality during operational phase. The prediction has been done by using AERMOD View model prescribed by CPCB/MoEF&CC.

Base line data reveals that ambient air quality in the study area for the Parameters PM₁₀, PM_{2.5}, SO₂, NO₂, are well within the permissible Limits as prescribed by the National Ambient Air Quality Standards (NAAQS) for Industrial Area, Residential, Rural & Other areas.

The major air pollution sources from the industry are DG sets, Boilers, shot blasting & Ban Bury Section are the sources provided with stacks of adequate height to disperse the emanating flue gases containing suspended particulate matters, oxides of sulfur and nitrogen without affecting the ground level concentrations.

4.6.1.2 Meteorological Data

The site-specific meteorological data for three months from **Jan 2024 to March 2024** was obtained from secondary sources and Wind rose was plotted and shown in **Figure 4-2**. Other data included for AERMET were daily wind speed, wind direction, temperature, relative humidity, air pressure, precipitation, and solar radiation recorded during the period. AERMET reformat meteorological data so that it can be used as input for AERMOD model.

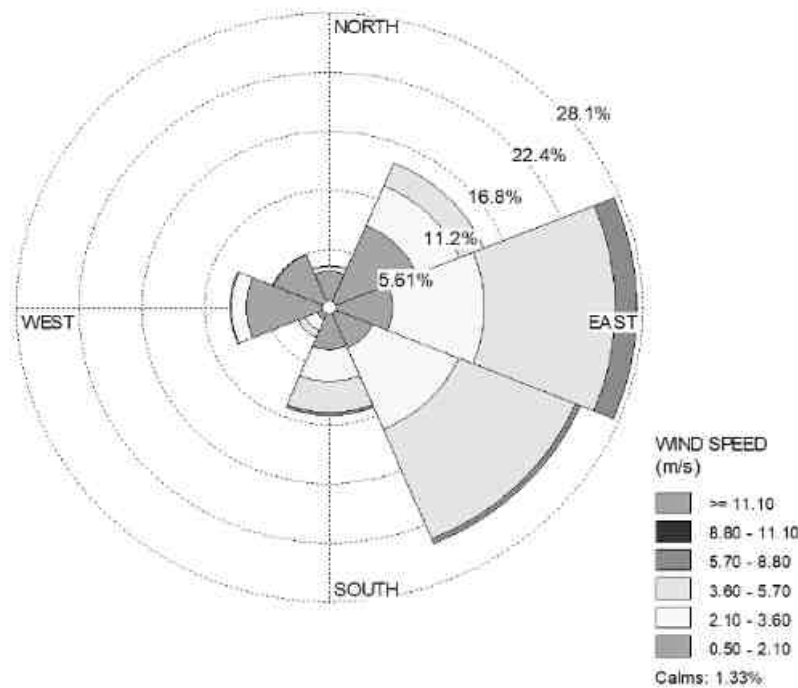


Figure 4-2 Wind rose of meteorology considered for modelling (Jan 2024 to March 2024)

4.6.1.3 AERMET Process:

For the 3 phase AERMET processing of meteorological data, specifications of the land use in the area are required to determine the terrain roughness for modelling. The land use was characterized in and around the site. The surface characteristics for the site and surroundings were selected and used to calculate the Albedo, Bowen ratio and surface roughness parameter.

The meteorological data were processed in the AERMET software to generate wind flow pattern & to generate surface meteorological data and profile meteorological data in a prescribed format that can be fed to AERMOD for modelling.

4.6.1.4 AERMOD Process:

AERMOD Software Version 11.0.1 was used for air dispersion modelling. AERMOD MPI is Lakes Environmental parallel version of the AERMOD model 22112. AERMOD MPI Version 11.0.1 and AERMOD Model 22112 are the parallel version for the US EPA AERMOD model released by the US EPA on June 27, 2022, and is applicable to a wide range of buoyant or neutrally buoyant emissions up to a range of 50 km. In addition to more straightforward 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 behaviour 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 the elevated stable layer and then allows it to re-enter the boundary layer when and if appropriate. For sources, both the CBL and the SBL AERMOD treat the enhancement of lateral dispersion resulting from plume meander.

4.6.2 Incremental Ground Level Concentration studies of Proposed Project

The emissions from proposed stacks are estimated and these stack emissions are used for the air dispersion modelling as shown in **Table 4-8**.

Maximum concentration value for PM₁₀, PM_{2.5}, SO₂, NO_x obtained through modelling without control measures are shown **Figure 4-3, Figure 4-4, Figure 4-5 & Figure 4-6** respectively and first ten highest values of Ground Level Concentration (GLC) as uncontrolled for proposed stacks is given in **Table 4-9** Error! Reference source not found., **Table 4-10, Table 4-11 & Table 4-12** respectively. Existing Air Pollution Sources within 10km for Cumulative Impact Assessment Studies is given in the

Table 4-13 and List of industries and sources considered for cumulative studies is given in the **Table 4-14**. Cumulative Ground level concentrations of PM₁₀, PM_{2.5}, SO₂ & NO_x obtained through modelling is shown in **Figure 4-7, Figure 4-8, Figure 4-9 & Figure 4-10** respectively. First ten highest values of Ground Level Concentration (GLC) for the cumulative condition is provided in the **Table 4-15, Table 4-16, Table 4-17 & Table 4-18** respectively.

Table 4-8 Stack Emission details after Expansion

Source	Fuel used	Stack Details					Emission (g/s)			
		No of Stack s	Height (m)	Dia (m)	Temp (°C)	Exit Velocity (m/s)	PM ₁₀	PM2.5	SO ₂	NOx
250 KVA.	HSD	1	20	0.3	200	11.3	0.006111	0.003055	0.005694	0.087037
500 KVA.	HSD	1	20	0.3	230	11.5	0.003055	0.001527	0.002847	0.043518
2T /Boiler	HSD	1	30	0.3	260	12.0	0.000341	0.000170	0.002470	0.004873
6T/ Boiler	HSD									
Total Emission (g/s)							0.009508	0.004754	0.01101	0.13543

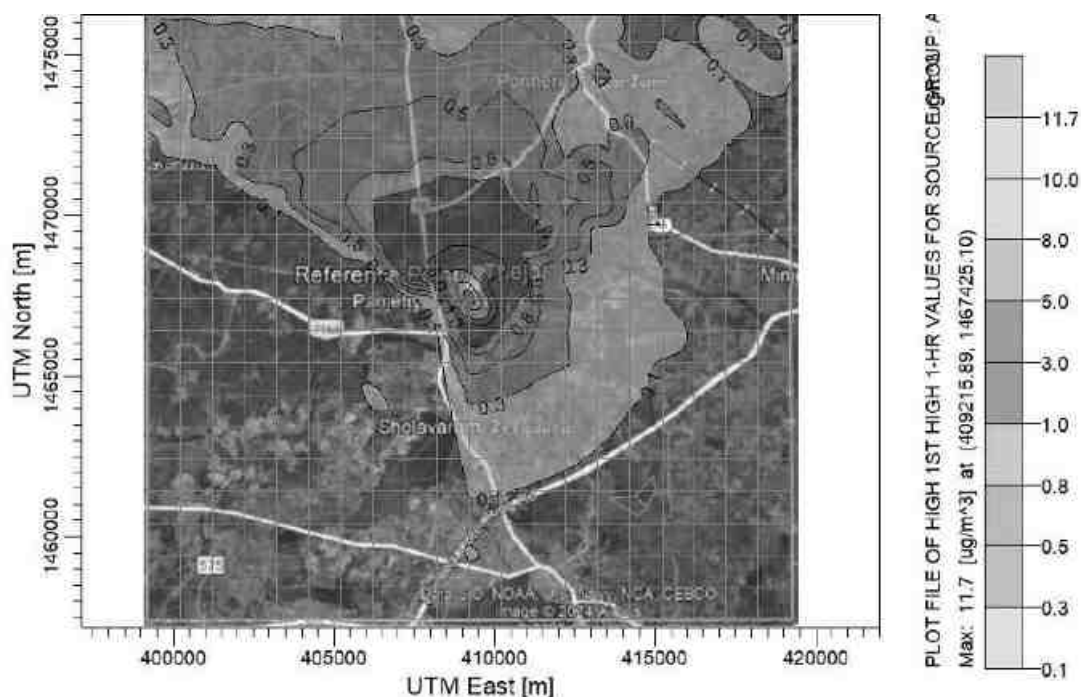


Figure 4-3 Ground level concentrations of PM10 during study period

Table 4-9 Predicted Top 10 highest concentrations of PM10 within 10km radius.

S.NO	UTM coordinates (m)		Conc. ($\mu\text{g}/\text{m}^3$)	Distance from Centre of Sources (Km)	Direction from Source Centre
	E	N			
1	409215.9	1467425	11.73519	-	Project Site
2	409215.9	1468425	4.58331	1.0	N
3	410215.9	1468425	3.50764	1.4	NE
4	408215.9	1468425	3.47378	1.0	NW
5	409215.9	1469425	2.19559	2.0	N
6	408215.9	1469425	2.08174	2.2	NW
7	407215.9	1469425	1.64729	2.8	NW
8	407215.9	1468425	1.64618	2.1	NW
9	409215.9	1466425	1.50254	1.0	S
10	411215.9	1469425	1.48625	2.8	NE

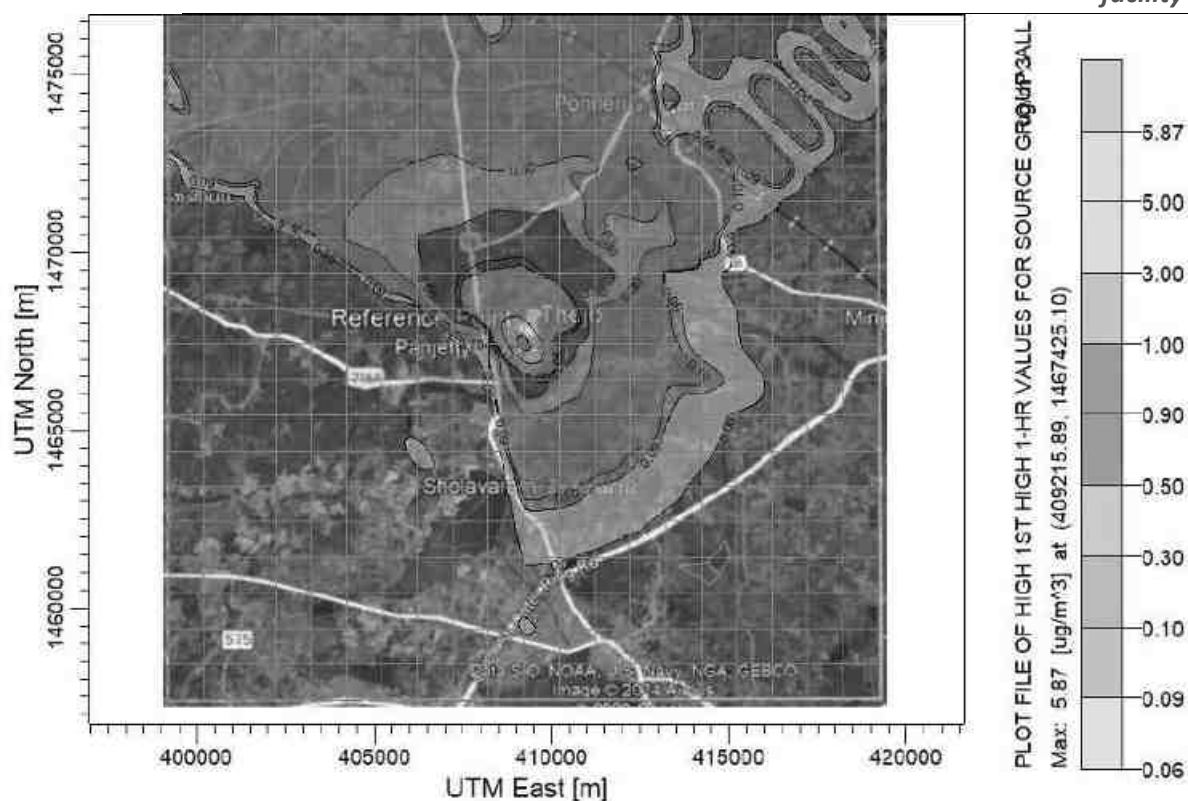


Figure 4-4 Ground level concentrations of PM2.5 during study period

Table 4-10 Predicted Top 10 highest concentrations of PM2.5 within 10km radius.

S. No	UTM coordinates (m)		Conc. (µg/m³)	Distance from Centre of Sources (Km)	Direction from Source Centre
	E	N			
1	409215.9	1467425	5.8676	-	Project Site
2	409215.9	1468425	2.29165	1.0	N
3	410215.9	1468425	1.75382	1.4	NE
4	408215.9	1468425	1.73689	1.0	NW
5	409215.9	1469425	1.0978	2.0	N
6	408215.9	1469425	1.04087	2.2	NW
7	407215.9	1469425	0.82364	2.8	NW
8	407215.9	1468425	0.82309	2.1	NW
9	409215.9	1466425	0.75127	1.0	S
10	411215.9	1469425	0.74313	2.8	NE

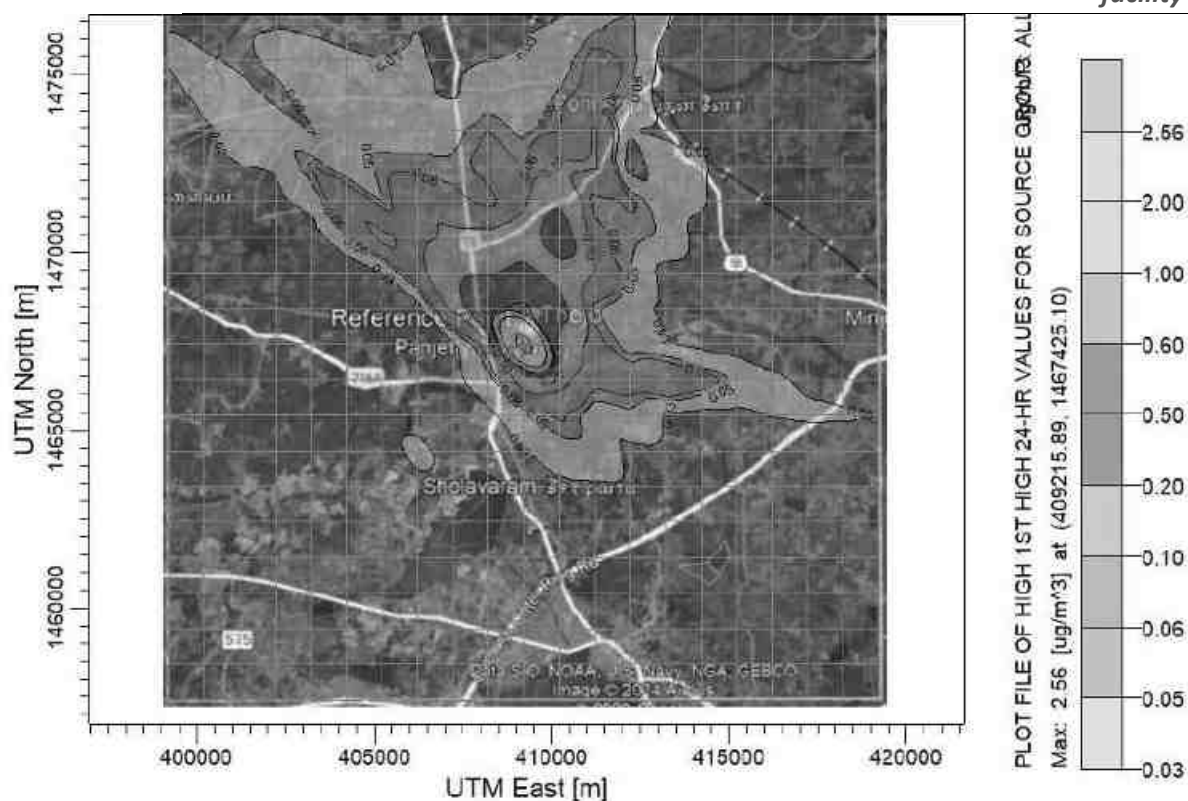


Figure 4-5 Ground level concentrations of SO₂ during study period

Table 4-11 Predicted Top 10 highest concentrations of Sulphur Dioxide within the 10km radius.

S. No	UTM coordinates (m)		Conc. (µg/m ³)	Distance from Centre of Sources (Km)	Direction from Source Centre
	E	N			
1	409215.9	1467425	2.55643	-	Project Site
2	409215.9	1468425	0.55836	1.0	N
3	408215.9	1468425	0.4427	1.4	NE
4	410215.9	1470425	0.29947	1.0	NW
5	410215.9	1468425	0.24933	2.0	N
6	409215.9	1469425	0.23273	2.2	NW
7	410215.9	1471425	0.19875	2.8	NW
8	408215.9	1469425	0.18632	2.1	NW
9	407215.9	1469425	0.1667	1.0	S
10	410215.9	1467425	0.16401	2.8	NE

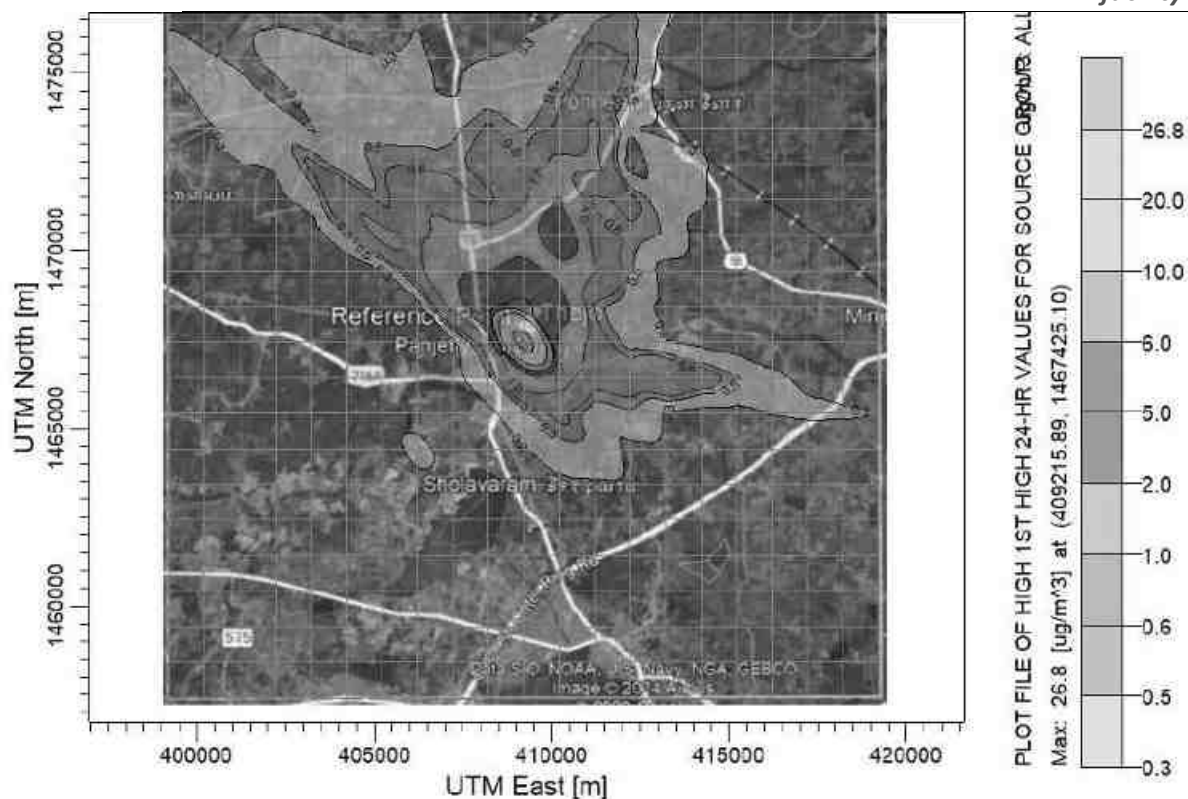


Figure 4-6 Ground level concentrations of NOx during study period

Table 4-12 Predicted Top 10 highest concentrations of Oxides of Nitrogen within 10km radius.

S. No	UTM coordinates (m)		Conc. ($\mu\text{g}/\text{m}^3$)	Distance from Centre of Sources (Km)	Direction from Source Centre
	E	N			
1	409215.9	1467425	26.79579	-	Project Site
2	409215.9	1468425	5.85254	1.0	N
3	408215.9	1468425	4.64028	1.4	NE
4	410215.9	1470425	3.13894	1.0	NW
5	410215.9	1468425	2.61345	2.0	N
6	409215.9	1469425	2.43944	2.2	NW
7	410215.9	1471425	2.08324	2.8	NW
8	408215.9	1469425	1.95298	2.1	NW
9	407215.9	1469425	1.74735	1.0	S
10	410215.9	1467425	1.71909	2.8	NE

4.6.3 Cumulative Impact Assessment Studies

The total 15 Industries are available within a 10km radius from the project site. However, cumulative studies were conducted for red and orange category industries only. The list of Industries considered for cumulative studies is shown in the **Table 4-14**.

Table 4-13 Existing Air Pollution Sources within 10km for Cumulative Impact Assessment Studies

S. No	Name of the Industries	Distance (Km)	Direction	Air pollution sources and APC Measures
1.	Sriram industries	2.27	NNW	DG Set 50 KVA, &180KVA stack height - 4 m, Air pollution Control Measures-Acoustic enclosures with stack
2.	YANMAR ENGINE MANUFACTURING INDIA	7.97	N	D G Set 500 KVA, Boiler-2T stack height - 4 m, Air pollution Control Measures-Acoustic enclosures with stack
3.	Track Design India	7.86	N	DG Set 400 KVA, stack height - 3 m, Air pollution Control measures- Acoustic enclosures with stack
4.	Sri Vijayalakshmi Snuff Products	7.56	N	DG Set 62.5 KVA, stack height - 3 m, Air pollution Control measures- Acoustic enclosures with stack
5.	Quantum minerals	7.23	N	D G Set 25 KVA, stack height - 4 m, Air pollution Control Measures-Acoustic enclosures with stack
6.	BGR Energy Systems Ltd	6.99	NNW	D G Set 125 KVA, stack height - 4 m, Air pollution Control Measures-Acoustic enclosures with stack
7.	GBR Metals Pvt Ltd	3.9	NNW	DG Set 160 KVA, stack height - 4 m, Air pollution Control Measures-Acoustic enclosures with stack
8.	NELCAST LIMITED	3.56	NNE	DG Set-50 KVA, 03KVA, 80KVA & 320 stack height - 6 m, Air pollution Control Measures-Acoustic enclosures with stack
9.	Tech Services	7.56	NNW	DG SET 15KVA, stack height - 4 m, Air pollution Control Measures-Acoustic enclosures with stack
10.	Venkatachalapathi Paper Mills Pvt Ltd	0.33	ESE	DG SET 350KVA, Boiler-11/Tstack height - 4 m, Air pollution Control Measures-Acoustic enclosures with stack
11.	Vishnupria Paper Mill Private Limited	0.38	ESE	D.G Set 320 KVA (2) -stack height -6 m, Control Measures-Acoustic enclosures with stack
12.	Golden rock granites	2.73	W	DG SET 180KVA, stack height - 4 m, Air pollution Control Measures-Acoustic enclosures with stack
13.	Flora Laminate	6.79	W	DG SET 320KVA, stack height -3.5m, Air pollution Control Measures-Acoustic enclosures with stack
14.	Roto Polymers	3.65	SE	DG SET 40KVA, stack height -3.5m, Air pollution Control Measures-Acoustic enclosures with stack
15.	IWL India Ltd	8.72	WSW	D.G.SET 110 KVA, stack height -5m, Air pollution Control Measures-Acoustic enclosures with stack

Source: Primary survey and <https://dpccocmms.nic.in/>

Table 4-14 List of Industries Considered for Cumulative Studies

Source	Fuel used	Stack Details					Emission (g/s)			
		No of Stacks	Height (m)	Dia (m)	Temp (°C)	Exit Velocity (m/s)	PM ₁₀	PM _{2.5}	SO ₂	NO _x
Sriram industries - DG Set 50 KVA,	HSD	1	4	0.3	200	13	0.003055556	0.001527778	0.002847222	0.043518519
YANMAR ENGINE MANUFACTURING INDIA- D G Set 500 KVA, Boiler-2T,	HSD	2	4	0.3	210	13	0.0022	0.0011	0.00205	0.031333333
Track Design India- DG Set 400 KVA,	HSD	1	3	0.3	230	14	0.006111111	0.003055556	0.005694444	0.087037037
Sri Vijayalakshmi Snuff Products- DG Set 62.5 KVA,	HSD	1	6	0.3	180	14	0.001527778	0.000763889	0.001423611	0.021759259
Quantum minerals- D G Set 25 KVA	HSD	1	4	0.3	150	10	0.001955556	0.000977778	0.001822222	0.027851852
GBR Metals Pvt Ltd- DG Set 160 KVA,	HSD	1	4	0.2	150	9.0	0.004888889	0.002444444	0.004555556	0.06962963
NELCAST LIMITED- DG Set-50 KVA, 03KVA, 80KVA & 320,	HSD	4	5	0.3	200	11	0.000763889	0.000381944	0.000711806	0.01087963
LIMITED- Tech Services- DG SET 15KVA,	HSD	1	3	0.3	180	13	0.000305556	0.000152778	0.000284722	0.004351852
Venkatachalapathi Paper Mills Pvt Ltd- D.G Set 320 KVA (2),	HSD	2	6	0.3	200	12	0.004277778	0.002138889	0.003986111	0.060925926
Vishnupria Paper Mill Private Limited- D.G Set 320 KVA (2),	HSD	2	4	0.3	200	13	0.000488889	0.000244444	0.000455556	0.006962963
Golden rock granites- DG SET 180KVA,	HSD	1	6	0.3	180	12	0.001466667	0.000733333	0.001366667	0.020888889

Flora Laminate- DG SET 320KVA,	HSD	1	4	0.3	200	13	0.000183333	9.16667E-05	0.000170833	0.002611111
180KVARoto Polymers- DG SET 40KVA,	HSD	2	6	0.2	150	11	0.007638889	0.003819444	0.007118056	0.108796296
IWL India Ltd- D.G.SET 110 KVA	HSD	1	4	0.2	130	12	0.003055556	0.001527778	0.002847222	0.043518519
Thejo - 250 KVA 500 KVA 2T /Boiler 6T/Boiler	HSD	4	20	0.3	260	11.5	0.009508	0.004754	0.01101	0.13543
Total Emission (g/s)							0.044372545	0.022186272	0.043499328	0.631976296

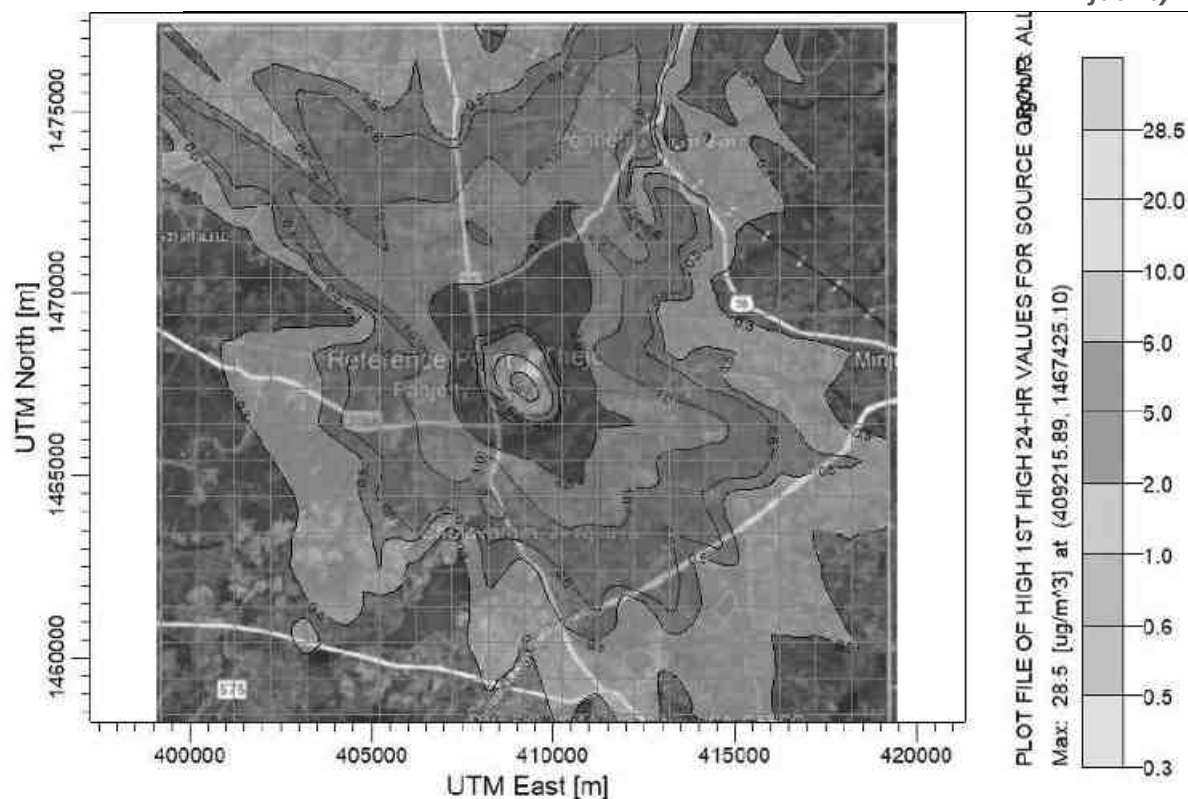


Figure 4-7 Cumulative Ground level concentrations of PM10

Table 4-15 Predicted Top 10 highest concentrations of PM10 within 10km radius.

S. No	UTM Coordinates (m)		Conc. ($\mu\text{g}/\text{m}^3$)	Distance from Centre of Sources (Km)	Direction from Source Centre
	E	N			
1.	409215.9	1467425	28.50686	-	-
2.	409215.9	1468425	8.77106	1.0	N
3.	408215.9	1468425	6.65574	1.3	NW
4.	408215.9	1467425	6.26252	1.0	W
5.	409215.9	1466425	5.3106	1.0	S
6.	410215.9	1467425	5.18214	1.0	E
7.	410215.9	1470425	4.99496	3.2	NE
8.	410215.9	1466425	4.18424	1.6	SE
9.	408215.9	1466425	4.0113	1.0	SW
10.	409215.9	1469425	3.89103	7.4	W

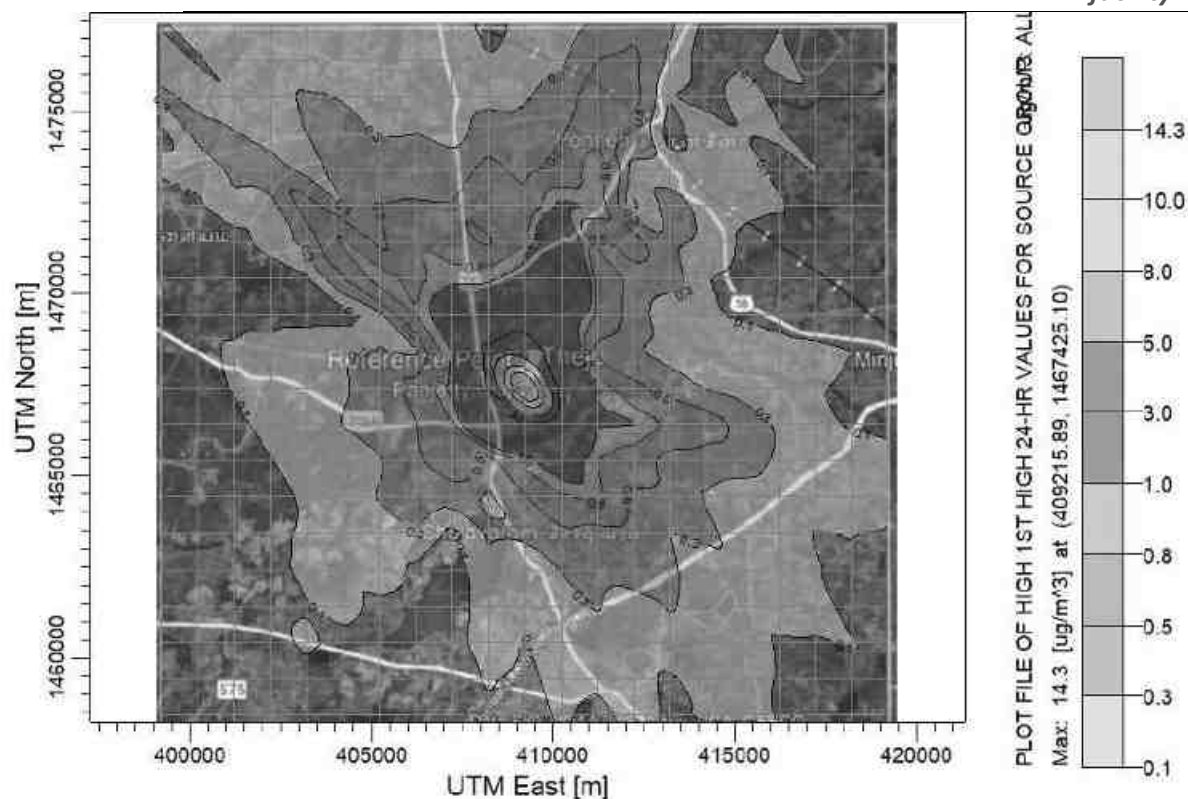


Figure 4-8 Cumulative Ground level concentrations of PM2.5

Table 4-16 Predicted Top 10 highest concentrations of PM2.5 within 10km radius.

S. No	UTM Coordinates (m)		Conc. (µg/m³)	Distance from Centre of Sources (Km)	Direction from Source Centre
	E	N			
1.	409215.9	1467425	14.25343	-	-
2.	409215.9	1468425	4.38553	1.0	N
3.	408215.9	1468425	3.32787	1.3	NW
4.	408215.9	1467425	3.13126	1.0	W
5.	409215.9	1466425	2.6553	1.0	S
6.	410215.9	1467425	2.59107	1.0	E
7.	410215.9	1470425	2.49748	3.2	NE
8.	410215.9	1466425	2.09212	1.6	SE
9.	408215.9	1466425	2.00565	1.0	SW
10.	409215.9	1469425	1.94551	7.4	W

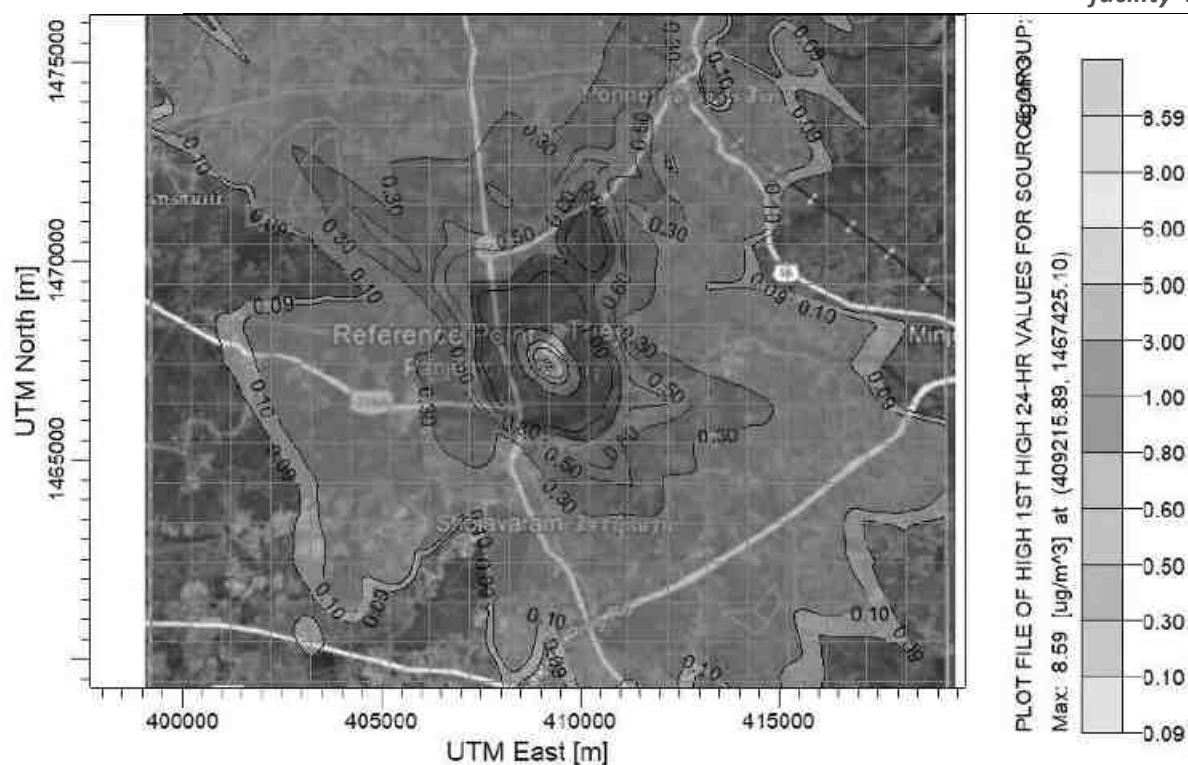


Figure 4-9 Cumulative Ground level concentrations of SO₂

Table 4-17 Predicted Top 10 highest concentrations of SO₂ within 10km radius.

S. No	UTM Coordinates (m)		Conc. (µg/m ³)	Distance from Centre of Sources (Km)	Direction from Source Centre
	E	N			
1.	409215.9	1467425	8.59344	-	-
2.	409215.9	1468425	2.64405	1.0	N
3.	408215.9	1468425	2.00638	1.3	NW
4.	408215.9	1467425	1.88784	1.0	W
5.	409215.9	1466425	1.60089	1.0	S
6.	410215.9	1467425	1.56216	1.0	E
7.	410215.9	1470425	1.50574	3.2	NE
8.	410215.9	1466425	1.26134	1.6	SE
9.	408215.9	1466425	1.20921	1.0	SW
10.	409215.9	1469425	1.17296	7.4	W

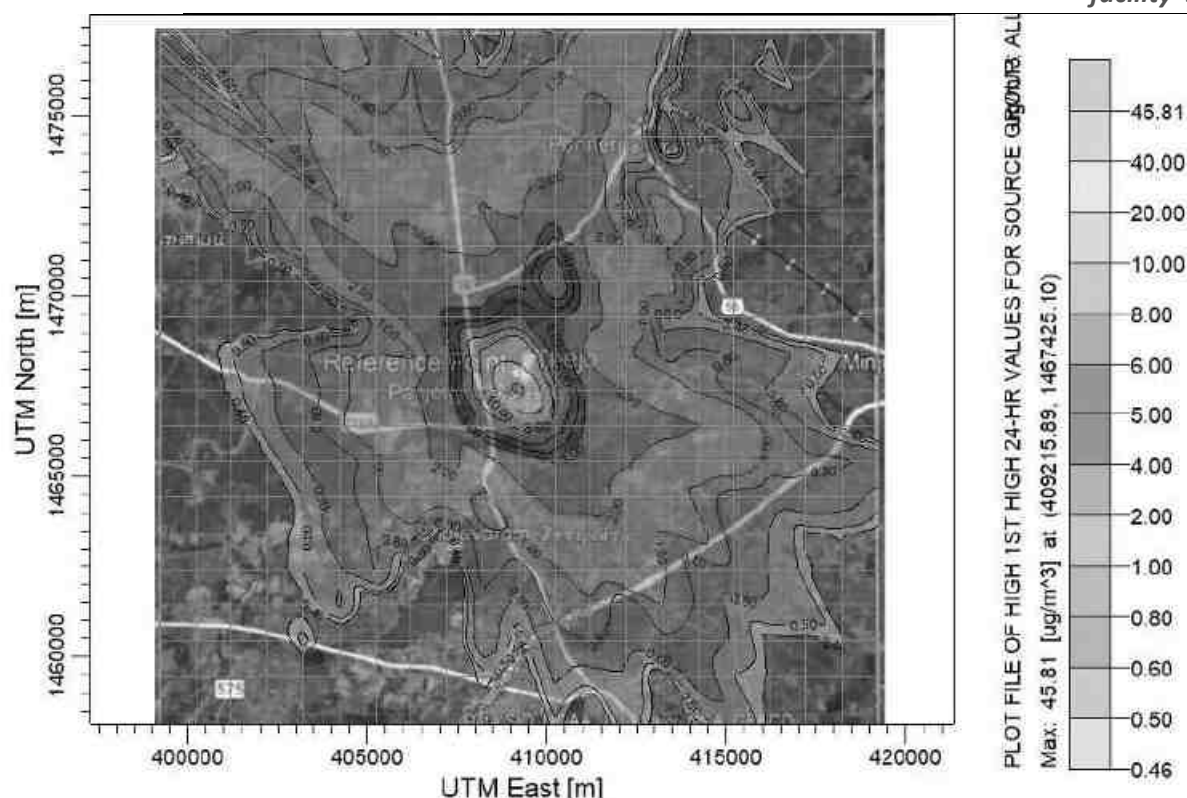


Figure 4-10 Cumulative Ground level concentrations of NOx

Table 4-18 Predicted Top 10 highest concentrations of NOx within 10km radius.

S. No	UTM Coordinates (m)		Conc. (µg/m³)	Distance from Centre of Sources (Km)	Direction from Source Centre
	E	N			
1.	409215.9	1467425	45.81298	-	-
2.	409215.9	1468425	14.09584	1.0	N
3.	408215.9	1468425	10.69634	1.3	NW
4.	408215.9	1467425	10.0644	1.0	W
5.	409215.9	1466425	8.53459	1.0	S
6.	410215.9	1467425	8.32815	1.0	E
7.	410215.9	1470425	8.02733	3.2	NE
8.	410215.9	1466425	6.72443	1.6	SE
9.	408215.9	1466425	6.44651	1.0	SW
10.	409215.9	1469425	6.25322	7.4	W

4.6.3.1 Summary of Modelling Results due to proposed project

It was observed that the maximum concentration of PM₁₀, PM_{2.5}, SO₂ and NOx observed due to proposed and existing stacks are 11.7 µg/m³, 5.87 µg/m³, 2.56µg/m³ and 26.8µg/m³. So, it can be concluded that the impact envisaged is minimum and well within the CPCB standard due to proposed project activities. The total increase in concentrations above baseline status to estimate the percentage increase and summarized in **Table 4-19**.

Table 4-19 Total Maximum GLCs from proposed project sources.

Pollutant	Max. Base line Conc. ($\mu\text{g}/\text{m}^3$)	Estimated Incremental Conc. at source obtained through modelling ($\mu\text{g}/\text{m}^3$)	Total Conc. ($\mu\text{g}/\text{m}^3$)	NAAQ standard	%Increase
PM ₁₀	67.1	11.7	78.8	100	17.0
PM _{2.5}	37.2	5.87	43.0	60	15.5
SO ₂	13.4	2.56	15.9	80	19.1
NO _x	26.9	26.8	53.7	80	99

4.6.3.2 Total Maximum GLCs from the Stack Emissions due to Cumulative sources

It was observed that the maximum concentration of PM₁₀, PM_{2.5}, SO₂ and NO_x observed due to proposed and existing stacks are 28.5 $\mu\text{g}/\text{m}^3$, 14.3 $\mu\text{g}/\text{m}^3$, 8.5 $\mu\text{g}/\text{m}^3$ and 45.8 $\mu\text{g}/\text{m}^3$. So, it can be concluded that the impact envisaged is well within the CPCB standard. The total increase in concentrations above baseline status to estimate the percentage increase and summarized in **Table 4-20**.

Table 4-20 Total Maximum GLCs from the Stack Emissions (Cumulative)

Pollutant	Max. Base line Conc. ($\mu\text{g}/\text{m}^3$)	Estimated Incremental Conc. at source obtained through modelling ($\mu\text{g}/\text{m}^3$)	Total Conc. ($\mu\text{g}/\text{m}^3$)	NAAQ standard	% increase
PM ₁₀	67.1	28.5	95.6	100	42.4
PM _{2.5}	37.2	14.3	51.5	60	38.4
SO ₂	13.4	8.5	21.9	80	63.4
NO _x	26.9	45.8	72.7	80	170

4.6.4 Impacts due to Traffic and Transportation

Traffic data collected continuously for 24 hours by visual observation and counting of vehicles under three categories, viz., heavy motor vehicles, light motor vehicles and two/three wheelers. As traffic densities on the roads are medium, two persons were deployed simultaneously at one station during each shift- one person on each of the two directions for counting the traffic. At the end of each hour, fresh counting and recording was undertaken. Total numbers of vehicles per hour under the three categories were determined.

Since, the National highways make up only 2.7% of the total road network in India but they handle 40% of the total road traffic. Among them, NH 16 Highway (NH 16) plays a crucial role in connecting East and South India It extends through 12 states, aligning with the NH 16 route.

The last of the states that relate to the NH 16 is Tamil Nadu. Compared to the other three states, the highway stretches for a small distance in Tamil Nadu. With just 42 km covered in this state, NH 16 still covers pretty good grounds for commuters who enjoy nature and

greenery. The main cities/towns covered by NH 16 in Tamil Nadu are Gummidipoondi and Chennai. Chennai is the destination of National Highway-16. We observed that the highest peak was 3055 PCU/hr from 10 to 11 AM.

The traffic survey was carried out on the Major connectivity point of NH-16 at Jaganathapuram village road it is near the project site. It was observed that the existing level of service is Stable flow and acceptable delays during peak time and nonpeak time. From the results, it is envisaged that there will not be a significant change in transportation and traffic scenario during the construction and operation stage of the proposed expansion project.

The Traffic Assessment and vehicle for the proposed project is given in **Table 4-21**.



Figure 4-11 Traffic Assessment Point Details- Jaganathapuram village connectivity at NH-16 Bridge down

Table 4-21 Traffic Assessment-Vehicle movement

S. N o.	Type of Vehicle	Vehicles trips/ hr. at present at NH-45	Before project PCU	Proposed vehicles trips/ hr. due to proposed project	Proposed PCU	Total Vehicles after project implementation	PCU Factors IRC (SP 41)	Total PCU after project implementation
1	Cars	10	10	5	5	15	1	15
2	Buses	15	45	2	6	17	3.0	51
3	Truck / Lorry	30	105	5	17.5	35	3.5	122.5
4	2 wheeler s	30	15	10	5	40	0.5	20
5	3- Wheeler	40	32	5	4	45	0.8	36
Total		125	207	27	37.5	152	5.8	244.5

Based on the traffic for the proposed project, the expected LOS due to the project is given in Table 4-22.

Table 4-22 Traffic Volume after Implementation of the Project

NH-45 Traffic level	Volume of Traffic	Total PCU/hr	LOS Category*	V/C	Traffic Classification
Present scenario	125	207	C	0.60	Stable flow and acceptable delays
After project implementation	152	244.5	C	0.62	Stable flow and acceptable delays

*LOS 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.

☒ **Major Activities considered for impact assessment:**

- ✓ Unloading of raw materials, Storage of raw materials, Products & Loading of products
- ✓ Deterioration of ambient air quality due to fugitive emissions during handling and storage of chemicals & fuel
- ✓ Fugitive emission & Gaseous Emission from process plant and raw material storage & handling area.
- ✓ Solid/Hazardous Waste generation from activities

☒ **Impacts:**

- ✓ Generation of fugitive dust due to vehicle movement for transportation of raw material and finished goods.
- ✓ Flue gas emission from boiler and transport vehicles.
- ✓ Odour from Effluent Treatment Plant and Solid Waste Handling Area
- ✓ Positive impact as Greenbelt acts as dust barrier.

☑ Mitigation Measures

- ✓ Raw material will be transported in closed/covered truck/tanker.
- ✓ Transfer, handling and charging of raw materials through with minimal manual handling.
- ✓ Use of welded pipes, suitable gasket material, suitable glad packing for valves, extensions, and plugs.
- ✓ The Proposed APC Measures are given in **Table 4-23**.

Table 4-23 Existing and Proposed APC Measures

S. No	Point source of Emission	Pollution control measures	Stack height above ground level (in meters)
Existing			
1	D G set - 250 KVA	Acoustic enclosures with stack	10
2	D G set - 500 KVA	Acoustic enclosures with stack	10
3	2 Tons Boilers 2 Nos	Common Stack	20
4	Shot/Grit blasting section	Dust Collector followed by Stack	5.0
5	Ban Bury Section	Inbuilt Dust collector	2.6
Proposed for expansion as additional to the existing			
1	Boiler 1 x 6 Tons (Proposed)*	Common Stock (existing)	30
2	Metallic-I Fume Exhaust System	With adequate stack height	8.0
3	Metallic-II Fume Exhaust System	With adequate stack height	8.0
4	Ceramic Fume Exhaust System	With adequate stack height	8.0
5	Kneader mixing Section	With adequate stack height	2.6
6	PU Fume Exhaust System (Curatory Melting)	With adequate stack height	2.5

Note: *The proposed Boiler 6TPH will be connected to the existing common stack of 20m, during expansion the common stack height will be maintained 30m. So that after expansion a total of 10 Nos of point sources is facilitated.

☑ Fugitive Emission Control Measures

- ✓ Water sprinkling system will be installed to suppress dust emission from mixing areas loading & unloading activities and roads will be paved for minimize the dust emission during transportation activities.
- ✓ All the liquids will be stored in tanks or barrels in dedicated storage area. The containers will be kept tightly closed to prevent vapour emissions. All liquids will be

charged through pumps with suitable seals to prevent any leakages and vapour emissions.

- ✓ *Raw materials for will be transported in closed trucks only.*
- ✓ *Adequate ventilation system will be provided in production area.*
- ✓ *Separate inward & outward paved roads for movement of trucks with segregated raw material storage area to minimize dust pollution.*
- ✓ *Greenbelt will be developed around the plant to arrest the fugitive emissions.*

4.6.5 Water Environment

The water requirement for the proposed project is 116 KLD (Fresh water is 80 KLD and recycled 36 KLD). Water requirements for the proposed project will be sourced from Private tankers. The total water requirement & breakup is shown in

Table 2-11. The water balance for proposed expansion is shown in **Figure 2-10**.

Table 4-24 Wastewater management after expansion

S. No	Description	Effluent generation (KLD)	Method of Treatment
1	Proposed effluent & Domestic Wastewater quantity and treatment details	Domestic- 23 KLD	Domestic Wastewater generation will be 23 KLD, will be treated in proposed 25 KLD MBBR STP and treated water (23 KLD) will be used for flushing and Greenbelt.
		Effluents- 13 KLD	Effluent from Process, Coolant water, Colling Tower blowdown, RO Rejects from RO Plant and Boiler blowdown will be treated in Proposed ETP (15 KLD). Treated effluent (13 KLD) will be used within the plant for Fire hydrant storage and greenbelt ETP sludge will be sent to TSDF or Authorized recycler.

Table 4-25 Quality logistics

S. No	Description	Unit	ETP I/L	ETP O/L
1	pH	-	7.0 – 8.5	7.0 – 8.5
2	TSS	mg/l	200 - 300	< 30
3	BOD	mg/l	800 - 1000	< 20
4	COD	mg/l	1800 - 2500	< 100
5	TDS	mg/l	1000 - 1500	1000 - 1500

☒ **Activities considered for impact assessment:**

- ✓ *Product Manufacturing*
- ✓ *Effluent/Sewage Discharge*
- ✓ *Solid/Hazardous Waste Generation*
- ✓ *Maintenance of Greenbelt*
- ✓ *Recruitment*

☒ **Impacts:**

- ✓ Load on water resources due to water consumption for various industrial and domestic usage.
- ✓ Wastewater generation from manufacturing and other domestic/industrial activities.
- ✓ Improper disposal of solid/hazardous waste into the water body may adversely impact on it.
- ✓ Water pollution may increase if untreated wastewater/sewage will be disposed of without treatment.

☒ **Mitigation Measures**

- ✓ The total Water requirement will be sourced from private water supplier. However, rainwater harvesting system will be implemented and Water conservation measures will be followed. Hence no major impact will be envisaged on the surface or ground water resources.
- ✓ After expansion the domestic wastewater generation will be 23 KLD, will be treated in proposed 25 KLD STP and treated water (23 KLD) will be used for Greenbelt.
- ✓ STP Sludge/Other Solid waste will be composed and reused as manure for internal greenbelt.
- ✓ The total effluent generation of 13 KLD from process, coolant water, cooling tower blowdown, boiler blowdown, and RO rejects will be treated in the proposed 15 KLD Effluent Treatment Plant (ETP). The treated effluent will be reused within the plant for fire hydrant storage and greenbelt development. The unit is adopting a Zero Liquid Discharge (ZLD) concept, ensuring that all generated effluent is treated and reused within the plant, with no discharge to external water bodies.
- ✓ The sludge will be stored in a designated Hazardous waste room and sent to TSDF or Authorized recycler.
- ✓ Thejo will construct separate storm water drains and provide rainwater harvesting structures.
- ✓ The unit is adopting a Zero Liquid Discharge (ZLD) concept, ensuring that all generated effluent is treated and reused within the plant, with no discharge to external water bodies.

The proposed STP Specification and process flow charts are enclosed as **Annexure-11**

4.6.6 Soil Environment

☒ **Activities considered for impact assessment**

- ✓ Transportation (Materials, Product, Fuel Supply)
- ✓ Raw Material Product Handling & Storage
- ✓ Effluent/Sewage Discharge
- ✓ Solid/Hazardous Waste generation

☒ **Impacts:**

- ✓ Soil contamination is due to leakage/ spillage of raw material/untreated water/hazardous waste.

- ✓ Leachate from the process wastewater and waste handling area may contaminate the soil.
- ✓ Soil compaction due to the movement of heavy vehicles.
- ✓ Accidental spillage during manufacturing activity will contaminate the soil

☑ Mitigation Measures

- ✓ A wastewater management facility with proper disposal facility is being/will be provided.
- ✓ Solid/hazardous waste generated from the process will be properly handled as per Solid and Hazardous Waste Handling Rule.
- ✓ Domestic effluent will be treated in proposed STP with MBBR technology.
- ✓ The greenbelt is being/will significantly helping to protect the soil from erosion and contamination by preventing the airborne dust from traveling longer distances from the source.

4.6.7 Noise Environment

The major source of noise pollution in the industry are DG sets, Air compressors, feed water pumps and other machinery. DG sets and air compressors are provided with integral acoustic enclosures. The plant will be specifically designed with due consideration on minimizing noise pollution. Higher noise levels will be felt only near the active working areas and therefore the workers are provided with personal protective equipment as a safety measure.

☑ Activities considered for impact assessment

- ✓ Transportation (Materials, Product, Fuel Supply)
- ✓ Raw material & product Handling & Storage
- ✓ Product Manufacturing
- ✓ Maintenance of Greenbelt

☑ Impacts

- ✓ Noise generation is due to vehicular movement and the operation of construction machinery.
- ✓ Continuous noise may have a negative impact on workers.
- ✓ Decreases the efficiency of workers.
- ✓ Positive impact on the reduction of noise due to green belt

☑ Mitigation Measures

- ✓ DG sets and air compressors are provided with integral acoustic enclosures.
- ✓ The ambient noise levels will be ensured within the ambient standards by inbuilt design of mechanical equipment and buildings.
- ✓ 33% of Greenbelt & Land scaping around the factory building and premises to control the intensity of noise to the surrounding area. Development (plantation of dense trees

across the boundary) will help in reducing noise levels in the plant as a result of attenuation of noise generated due to plant operations, and transportation.

- ✓ Training will be imparted to personnel to generate awareness about effects of noise and importance of using PPEs. Provision of PPEs like earmuffs/earplugs to avoid effects of noise on occupational health of workers as well as planning of working hours and shift of workers.
- ✓ Noise monitoring will be carried out to check the efficacy of maintenance schedules undertaken to reduce noise levels and noise protection measures.
- ✓ Periodical noise monitoring will be carried out to ensure that ambient noise levels are restricted to permissible limits.
- ✓ All the equipment/machineries operated on the project will be designed/operated in such a way that the noise level in the workplace will be minimal.

4.6.8 Land Environment &LU/LC

- ✓ The total area of the existing project site is 4.18 Acres (16916.46 Sq. m),
- ✓ Proposed additional area of 11.46 areas (46364.97 Sq. m). The total area after expansion is 15.63 Acres (63221.43 Sq. m). Land use breakup of the proposed project site is provided in **Table 2-7**.
- ✓ As per the Town and Country Planning/Development authority Classification the project site is classified as dry land, and the land classification letter is enclosed as **Annexure-9** and DTCP approval copy is enclosed as **Annexure-2**.
- ✓ The proposed site is flat terrain. No major filling is required. No major change in the topography of the site is envisaged.
- ✓ No habitations exist in the proposed project site.

☒ Activities considered for impact assessment

- ✓ Development and maintenance of green belt
- ✓ Leakage / spillage due to material handling
- ✓ Storage, handling and disposal of liquid effluent and hazardous waste
- ✓ Development and maintenance of green belt

☒ Impacts:

- ✓ Soil contamination is due to leakage/ spillage of material or contaminated water or hazardous waste.
- ✓ Sludge disposal or leachate from the ETP/STP may create unhygienic conditions and create odor nuisance.
- ✓ Surface runoff and Spillages
- ✓ Apart from the change in land use patterns within the project site there will not be any adverse impact on the surrounding land use during the construction period.
- ✓ Most of the impacts of proposed plants on soil are restricted to the construction phase, which will get stabilized during operational phase.

☑ Mitigation Measures

- ✓ *Excavated earth will be backfilled in the trench after foundation work and topsoil will be restored for gardening purposes.*
- ✓ *The construction debris as well as debris from demolition work shall be utilized within the site for leveling purpose and base course preparation of internal roads.*
- ✓ *Municipal solid waste, Non-Hazardous and Hazardous waste will be disposed as per norms.*
- ✓ *ETP and STP will be installed to treat industrial effluent and domestic wastewater, respectively. No untreated effluent will be discharged directly onto the land or into the environment.*
- ✓ *Hazardous materials are prohibited from being drained or dumped on the premises. Accidental spills will be cleaned, reported, and monitored. HW will be disposed of as per norms.*
- ✓ *The fugitive dust is generated during plant operation, material handling and from the truck movement in the premises of the proposed plant.*
- ✓ *Implementing Soil Conservation methods like 33 % of Greenbelt development with native plants, Windbreaks are composed of shrubs, plants and trees in garden/lawn areas, Regular watering soil along with plants, adding earthworms to soil and Control Storm Water.*
- ✓ *Thus, no impact on land is envisaged due to discharge of gaseous emission, solid waste or liquid effluent from the proposed production capacity.*
- ✓ *Regular monitoring will be done as per the monitoring plan mentioned in **chapter 6**.*

4.6.9 Hydrogeology

- ✓ *Water will be sourced from private water supplier so there will be no Impact on Hydrogeology.*

4.6.10 Geology

- ✓ *There is no significant impact on Geology due to project activity during construction as well as operation phase.*

4.6.11 Hazardous/Solid Waste

Solid waste management:

The source of Municipal solid waste in the industry is from domestic use. Solid waste generated is stored and disposed of municipal authority.

Hazardous Waste Management:

The various hazardous waste generated from the industries activities used or spent oil, Empty barrels/containers/liners contaminated with hazardous chemicals /wastes (Nos), Wastes or residues containing oil & Used batteries, ETP sludge from the effluent treatment plant and discarded bags from the raw materials section. The hazardous waste will be stored separately in hazardous waste storage area and disposed to TNPCB authorized vendors within a stipulated period. Hazardous waste materials will be properly disposed of as per the

Hazardous and Other Wastes (Management and Transboundary Movement) Rules in 1989 and subsequent amendment in 2016.

Table 4-26 MSW Generation and Management

S. No	Type	Construction Phase during expansion Kg/day	Operation (Kg/day)			Disposal method
			Existing	Proposed	After Expansion	
1	Bio-degradable	13.5	67.5	94.5	162	Used as Manure after composting within the facility through Organic Waste converter (OWC)
2	Non-Bio-degradable	9.0	45	63	108	TNPCB authorized recyclers
3	STP Sludge	-	-	2.5	2.5	Will be used as a manure
Total		22.5	112.5	160	272.5	

Manpower: 50 Nos during construction phase, (As per CPHEEO Guidelines -0.45kg/capita/day)

Table 4-27 Hazardous waste generation and Management-Operation Phase

Stream	Category of Hazardous waste generated	Quantity			Disposal Method
		Existing	Proposed	After Expansion	
Schedule -I/4	4.1 Oil Sludge or emulsion (TPA)	10	4	14	Generation, Collection, Storage, Disposal to TSDF for Incineration
Schedule -I/21	21.1 Process waste, residues and sludges emulsion (TPA)	2	0.8	2.8	Generation, Collection, Storage, Disposal to TSDF for Incineration
Schedule -I/23	23.1 Wastes/ Residues and Sludges (not made with vegetable or animal materials) emulsion (TPA)	3	1.2	4.2	Generation, Collection, Storage, Disposal to TSDF for Incineration
Schedule -I/33	33.1 Empty barrels/containers/liners contaminated with hazardous chemicals /waste (TPA)	3	1.2	4.2	Generation, Collection, Storage, Disposal to TSDF for Incineration
Schedule -I/5	5.2 Wastes or residues containing oil	2	0.8	2.8	Generation, Collection, Storage, Disposal to TSDF for Incineration
-	Used batteries (Nos /annum)	270	108	378	Sold to Recycles/ battery manufactures/ dealers on buy back basis as per E-waste Management rules 2016

	ETP Sludge (Kg/Day)	-	0.5	0.5	Generation, Collection, Storage, Disposal to TSDF for Incineration

Non-hazardous & Other waste Generation and Management during operational is provided in **Table 2-27**.

☒ **Activities considered for impact assessment:**

- ✓ *Transportation (Materials, Product, Fuel Supply)*
- ✓ *Raw material & Product Handling & Storage*
- ✓ *Product Manufacturing*
- ✓ *Effluent/Sewage Discharge*
- ✓ *Solid/Hazardous Waste Generation*
- ✓ *Recruitment*

☒ **Impacts:**

- ✓ *Storage and handling of hazardous/ solid waste will cause an adverse impact on the health of the workers.*
- ✓ *Odor generation from waste storage area.*

☒ **Mitigation Measures**

- ✓ *The generated waste will be segregated at sources as Municipal Solid Waste, Hazardous and non-Hazardous.*
- ✓ *No liquid waste will be generated in existing and proposed project activities.*
- ✓ *Hazardous non-recyclable waste will be disposed to TSDF & Hazardous recyclable waste will be sent to Authorized recyclers.*
- ✓ *Municipal solid waste generation from domestic activities including canteen & is segregated, into organic, will be composted through OWC and inorganic waste will be disposed to authorized recyclers.*

4.6.12 Risk & Hazard

☒ **Activities considered for impact assessment:**

- ✓ *Odor generation from waste storage area.*
- ✓ *Raw material & product Handling & Storage*
- ✓ *Product Manufacturing*
- ✓ *Effluent Discharge*
- ✓ *Solid/Hazardous Waste Generation*

☒ **Impacts:**

- ✓ *The chances of accident may increase due to transportation activity.*
- ✓ *Spillages/ leakages, discharge of chemicals*
- ✓ *Occupational health hazards due to handling of wastewater, gaseous leakage, and solid waste, as well as process operations.*

☒ **Mitigation Measures**

- ✓ *Loading and unloading equipment will be inspected and maintained regularly.*

- ✓ External and internal visual inspections, leakage and pressure tests are conducted.
- ✓ Material Safety Data Sheet (MSDS) of all raw materials and products will be readily available in the department.
- ✓ Adequate ventilation will be provided in the process area.
- ✓ Fire extinguishers will be provided at designated places.
- ✓ PPEs will be provided for the workers.
- ✓ Risk assessment and DMP will be prepared.

4.6.13 Ecology & Biodiversity

☒ **Activities considered for impact assessment:**

- ✓ Transportation (Materials, Product, Fuel Supply)
- ✓ Gaseous Emission
- ✓ Effluent Discharge
- ✓ Solid/Hazardous Waste Generation
- ✓ Maintenance of Greenbelt

☒ **Impacts:**

- ✓ Impact on Flora and Fauna
- ✓ Habitat Fragmentation

☒ **Mitigation Measures**

- ✓ There are no eco- sensitive and there are no wildlife sanctuaries or national parks or biosphere reserves or wetlands, or important bird areas or migratory corridors of wildlife within 15km from the project site.
- ✓ As per the Town and Country Planning/Development authority Classification the project site is classified as dry land. The proposed project area is sparsely covered by isolated thorny bushes and invasive weeds. There are no timber trees or any of the threatened taxa of the BSI. There are no forests within 1km from the core area.
- ✓ The existing flora and vegetation of the project site is going to be lost on account of construction activities (fabrication and erection of sheds, workshops, material handling and storage facilities).
- ✓ Greenbelt will be developed from the construction phase to improve the aesthetic value in the area and to screen out the fugitive dust generated during construction & will be minimized through paving and water sprinkling.
- ✓ Implementing Soil Conservation methods like, Windbreaks are composed of shrubs, plants and trees in garden/lawn areas, Regular watering soil along with plants, adding earthworms to soil for improvement of soil fertility and perennial fodder production.

4.6.14 Socio Economic Environment

The proposed project area is patta land, total project land belongs to the M/s Thejo Engineering Limited. There are no R&R issues envisaged. Since it is partially owned by Thejo Engineering Limited of 4.18 Acres remaining portion of land is under 25 Years lease. lease documents Land documents are enclosed as **Annexure-1**.

The Land classified as dry land as per the Directorate of Town and Country Planning records and no displacement of habitation as it is located away from the habitation area.

☑ Activities considered for impact assessment:

- ✓ Maintenance of Greenbelt
- ✓ Recruitment

☑ Impacts:

- ✓ Beneficial to local transporters
- ✓ Job opportunity for local villagers
- ✓ Positive impact is due to Greenbelt.

☑ Mitigation Measures

- ✓ Due to proposed project the socio-economic scenario of the area will be changed & Development of surrounding region.
- ✓ Socio-economic benefit to the locals as it would provide both direct employment 600 Nos) and indirect beneficiary (1000-1500 Nos) during operational phase and during construction phase (50 Nos).
- ✓ Employment generation for local people, farmers, transporters, labourers and other businesses and ancillary industry in the state
- ✓ Establishment of small and medium scale engineering ancillaries
- ✓ CER and CSR benefits to the local region people/Environment & Revenue to Government
- ✓ As per the OM F. No. 22-65/2027 -IA.III dated 1st May 2018 and its amendments thereafter, the project Proponent is allocated 1.5 % of the total project cost is 1,60,49,985/- (Say 1,60,50,000). As the Project cost 10699.99 Lakhs.

Table 4-28 Proposed Corporate Environmental Responsibility (2025-26 to 2032-33)

S. No	Proposed Activity	Cost break-up	Name of the Beneficiary village Name	Cost allocated in INR Rs	Period
1	Community hall cum marriage hall (25,00,000*2)	2 Hall*25,00,000/-	Irullipattu village Jaganadhapuram	50,00,000	2025-26
2	Greenbelt development as Avenue plantation at Govt. Schools	each village 500 Plants 500* 4=2000 Nos each plant cost including maintenance 200/-	Irullipattu village, Jaganadhapuram Alinjivakkam Janappan Chattram	4,00,000	2026-27
3	Smart Classroom with all relevant facilities for Govt School	for each village 2,00,000*4=8,00,000/-	Irullipattu village, Jaganadhapuram Alinjivakkam Janappan Chattram	8,00,000	2027-28
4	Skill Development programs with repudiated universities with certificate	Yearly once in each village 1,50,000*4=6,00,000/-	Irullipattu village, Jaganadhapuram Alinjivakkam Janappan Chattram	6,00,000	2028-29
5	Renovation and Desalting of existing water bodies	in the 4 villages (2,00,000*4=8,00,000/-)	Irullipattu village, Jaganadhapuram Alinjivakkam Janappan Chattram	8,00,000	2029-30

6	Rainwater Harvesting-	Ground water recharge pits in each village 10 Nos 4*10= 40 Nos pits Each pit cost = 25000*40 No pit	Irullipattu village, Jaganadhapuram Alinjivakkam Janappan Chattram	10,00,000	2030-31
7	Solar Street Lights at villages streets	Each village 20 light Each light 30,000*80	Irullipattu village, Jaganadhapuram Alinjivakkam Janappan Chattram	24,00,000	2031-32
8	Drinking water plant	Each village one Plant with maintenance 2.50,000*4	Irullipattu village, Jaganadhapuram Alinjivakkam Janappan Chattram	10,00,000	2032-33
Total				120,00,000	
Remaining: 40, 50,000/- Will be allocated under Public Hearing issues apart from the proposed activities.					

Table 4-29 Environment Impact Matrix (Operation Phase) with mitigation measures

Parameter Activities	Environmental Traits											
	Air & AQ	Water	Soil	Noise	LU\LC	HG	Geology	SHW	RH&OHS	EB	SE	Total
Road transportation (Materials supply & Product)	-2	-	-1	-2	-	-	-	-	-2	-1	-1	-9
Raw Material storage product Handling and Storage	-2	-	-1	-	-	-	-	-2	-2	-	-	-7
Product Manufacturing process	-4	-4	-	-4	-	-	-	-2	-4	-	-2	-20
Gaseous Emissions	-2	-	-	-	-	-	-	-	-2	-2	-4	-10
Effluent/Sewage Discharge	-2	-2	-2	-	-	-	-	-	-2	-2	-	-10
Solid / Hazardous waste generation	-4	-	-2	-	-	-	-	-2	-2	-2	-	-12
Employment generation	-	-2	-	-	-	-	-	-2	-	-	+16	+14
Greenbelt development	+9	-1	+9	+9	-	-	-	-	-	+9	+9	+44
Total for individual attributes	-7	-9	+3	+3	0	0	0	-8	-14	+2	+18	-10
The highest total score (+44) was received for Greenbelt development as it supports directly and indirectly mitigating various pollution. Total cumulative score for various environmental parameters with mitigation measure is -10 which are not appreciable adverse impacts are during operation phase.												

4.7 Summary

Impacts on land environment, air environment, water environment, noise environment, biological environment, socioeconomic environment, and risk & hazard has been identified and mitigation measures for the same for both construction and operation phase are incorporated. Impact identification matrix with quantitative impact matrix with and without mitigation measures has also been carried out and briefed in the chapter. Total Cumulative score for various environmental parameters without mitigation measures is -82 which is not appreciable adverse impact and with mitigation measures is -10 which no appreciable beneficial impacts are during construction phase. For “Total Cumulative Score for various Environmental Parameters without mitigation measures is -155 which is appreciable but reversible adverse impact-mitigation measures are needed. The highest total score (+44) received for Greenbelt development as it supports directly and indirectly for mitigating various pollution during operation phase total cumulative score for various environmental parameters with mitigation measure is -10 which are not appreciable adverse impacts are during operation phase. AAQ modelling study It was observed that the maximum concentration of PM₁₀, PM_{2.5}, SO₂ and NO_x observed due to proposed and existing stacks are 11.7 µg/m³, 5.87 µg/m³, 2.56µg/m³ and 26.8µg/m³. So, it can be concluded that the impact envisaged is minimum and well within the CPCB standard due to proposed project activities.

Due to Cumulative sources the maximum concentration of PM₁₀, PM_{2.5}, SO₂ and NO_x observed due to proposed and existing stacks are 28.5 µg/m³, 14.3 µg/m³, 8.5 µg/m³ and 45.8 µg/m³. So, it can be concluded that the impact envisaged is well within the CPCB standard from the overall study and evaluation of impacts, it can be concluded that the overall negative impacts from various activities on different environmental parameters is negligible with proper EMP in place.

CHAPTER – 5

ANALYSIS OF ALTERNATIVES (TECHNOLOGY/SITE)

(The chapter describes the alternative sites and the proposed factors for locating at the mentioned location. This would also describe the alternative technologies, if any for manufacturing proposed products.)

5 ANALYSIS OF ALTERNATIVES (TECHNOLOGY & SITE)

5.1 Introduction

Analysis of alternative site study has been carried out for the following requirements.

1. Project site
2. Technology
3. Power

5.2 Alternative Study for Site

M/s. Thejo Engineering Limited proposed expansion in production of Rubber molded products (199.99 TPM to 486 TPM) and Adhesives (38.5 KL/Month to 100 KL/Month) & proposed PU Products manufacturing with production capacity of 6.352 TPM due to increase in the demand of the existing and proposed projects along with enhancement of manufacturing facilities with additional area of 11.46 Acres (46364.97 Sq. m) The total area after expansion is 15.63 Acres (63221.43 Sq. m). The capital cost for the proposed project is Rs. 10699.99 Lakhs.

As per the Town and Country Planning/Development authority Classification the project site is classified as dry land, and the land classification letter is enclosed as Annexure-9 and DTCP approval copy is enclosed as **Annexure-2**. Site connectivity is shown in Table 5-1.

5.2.1.1 Selection Criteria:

- ✓ Site selection was guided by many factors like availability of infrastructures, land, water sources, fuel, transportation, power etc.
- ✓ As the unit is in Non- Notified Area, no prime agricultural land / forest land needed to be converted for industrial use.
- ✓ Majority of the raw materials are available from the nearby vendors.
- ✓ The proposed project is located adjacent to the NH-16.
- ✓ Easy availability of manpower
- ✓ Renewal energy system proposed for reduce the non-renewable source consumption.

Hence no alternate sites were considered for the project.

5.2.1.2 Connectivity of the project

The project site is well connected with National Highway NH - 16 (Chennai - Dankuni – Kolkata) ~0.82 Km (W) and the Project connectivity shown in Table 5-1

.

Table 5-1 Connectivity of the project site

S. No	Features	Details
1	Project Site Location	Survey No. 176/3, 181/5, 181/6A, 169/2B, 169/4D, 170/2B, 170/3B, 170/4, 175/3, 176/1, 176/2, 181/1B, 175/4B and 175/5B, Jaganathapuram Road, Irullipattu village
2	Topography	Plain terrain
3	Nearest Town	Cholavaram, ~2.79 (S)
4	Nearest Highway	NH - 16 (Chennai - Dankuni – Kolkata) ~0.82 Km (W)
5	Nearest Railway station	Anuppambattu RS: ~ 8.17 (ENE)
6	Nearest Airport	Chennai Int. Airport: ~9.40 Km (S)

5.3 Alternative Technology

The technology for manufacturing is simple and proven. Thejo adopting the most modern and state-of-the-art technology available for the manufacturing process. So, there is no requirement for alternative technology consideration for this project. Hence, no alternatives for technologies are considered.

The mitigative measures for impacts are addressed. The effluent treatment with Zero Liquid Discharge concept and reuse and green belt is proposed. There are no major air pollution issues as the sources are minimal and air pollution can be controlled to the regulatory norms with the technology available and proposed.

5.4 Alternative Power

The proponent will explore phase wise installation of solar panel as Renewal energy source through main building shed will be designed suitably to take the load of solar panel.

5.5 Summary

No Alternative Site was considered for the proposed project since the existing premises (is the best option for the proposed project since available space is adequate for the proposed project. Apart from this, not Ecologically Sensitive, no National Park, no Wildlife Sanctuary, no Biosphere Reserve, and no Protected Forests are present within the study area. Also, some alternatives for technology were considered for the proposed project which will be adopted tested technology. The main building area is designed to establish the solar panel, and the project proponent explores the phase wise installation of solar panels to meet the 50% required energy from renewal energy source.

CHAPTER – 6

ENVIRONMENTAL MONITORING PROGRAMME

(The chapter Describes the post project monitoring plan and the budgetary provisions for the various environmental components.)

6 ENVIRONMENTAL MONITORING PROGRAMME

6.1 General

Environmental monitoring is the measurement of environmental parameters at regular intervals over an extended period. Monitoring allows the assessment of environmental and biological changes in an ecosystem. All the project activities shall be monitored to ensure that appropriate environmental mitigation activities are being implemented and to identify areas where Environmental Management Plan compliance is not satisfactory. Hence, Environmental quality monitoring of critical parameter is very essential in the routine activity schedule of project operation.

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. An Environmental Monitoring Programme shall be scheduled for the following major objectives:

- ✓ *To verify the result of the impact assessment study with regards to new developments.*
- ✓ *To follow the trend of parameters which have been identified as critical to implement water quality, air quality and noise impact monitoring program.*
- ✓ *To check or assess the efficiency of controlling measures to provide an early indication and suggest appropriate additional or remedial measures should any of the environmental mitigation measures or controls fail to achieve acceptable standards.*
- ✓ *To determine project compliance with regulatory requirements, standards, and Government policies.*
- ✓ *To ensure that the areas of environmental concern identified during EIA process are carried through to and appropriately considered and incorporated into the detailed design and tender stage of project.*
- ✓ *To take remedial action if unexpected problems or unacceptable impacts arise.*
- ✓ *To conduct regular reviews of monitored data as the basis for assessing compliance with defined criteria.*

6.2 Environmental Management Plan during Construction Phase

Environmental impacts during the construction phase can be attributed to the site preparation activity and the mobilization of workforce. The impacts of the construction phase on the environment would be basically of transient nature and are expected to wear out gradually on completion of the construction program. However, once the construction of the project is completed and its operations started, these operation stage impacts would overlap the impacts due to the construction activities.

- ✓ *All the construction activities will be confined to the plant area only.*
- ✓ *The proposed site is already used for industrial land-use hence no change in land use is envisaged due to the project.*

- ✓ *The green belt will also be strengthened to carry dust and noise due to various activities. Hence no noticeable impact on ecology is expected.*
- ✓ *Water sprinkling in the vulnerable areas to suppress the dust generated during excavation, levelling, and other operations.*
- ✓ *Implementation of suitable disposal methods of sediment/construction debris at designated places to avoid water logging at construction site.*
- ✓ *Provision of protective gears such as ear mufflers etc. for construction personnel exposed to high noise levels and locating the temporary labour sheds for housing the construction labourers away from the construction site.*

6.3 Environmental Management Plan during Operation Phase

The control measures which will be imposed to mitigate the impacts caused during the operational phase of the project are as follows:

- ✓ *Adequate protective measures will be provided in the form of earmuff/ear plugs to the. All the necessary noise protective equipment will be provided to the workers working in high noise areas workers exposed to high noise.*
- ✓ *DG sets will be maintained regularly to ensure stack emission quality within the desirable limit.*
- ✓ *Used spent oil from DG sets would be carefully stored in HDPE in isolated covered facility and disposed of according to the guidelines of hazardous waste (management, handling & Transboundary movement) rule 2016.*
- ✓ *Processed water will be re-circulated within the process where possible.*
- ✓ *No waste or waste material will be discharged to the ground.*
- ✓ *Adequacy greenbelt will be provided.*

6.4 Post Project Environmental Monitoring

The goal of having a post project monitoring (PPM) is to ensure that an action has been implemented in accordance with the conditions specified, that appropriate measures corresponding with those required and the conditions imposed on the action have been adequately met. In the process, Post Project Monitoring is supposed to provide essential feedback about the actual environmental impacts of the project and check if the implementation of the environment management plan is having the desired mitigative effects.

After commissioning the project, post project monitoring of environmental parameters will be carried out at regular intervals. The monitoring programme in different areas of the environment has been based on the findings of the impact assessment studies. The post project monitoring program is summarized 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	2 Stations (In downwind)	Twice a week 24 hourly period	PM ₁₀ , PM _{2.5} , SO ₂ , VOC and NO ₂
3.	Noise	4 (two within plant premises and two outside plant premises)	Once every season	Ambient Equivalent Continuous Sound Pressure Levels (Leq) at day and Nighttime.
4.	Liquid Effluents	Main Plant Effluents & Sewage	Weekly	pH, Temp, Conductivity, TSS, TDS, BOD.
5.	Exhaust from DG set	Stack of DG set	Quarterly	PM ₁₀ , PM _{2.5} , SO ₂ & CO
6.	Vehicular Emissions	Parking area	Periodic monitoring of vehicles	Air emission and noise, PCU
7.	Solid waste / Hazardous waste	Check conformance to HWM rules	Quantity and Quality monitoring	Periodically
8.	Soil	Two Locations within the Project Site	Yearly Once	Physico chemical properties, Nutrients, Heavy metals
9.	Terrestrial Ecology	Within 10km, around the project	Once in three years	Symptoms of injuries on plants
10.	Occupational Health	Employment checkup	Entry level & yearly once	Pre-employment Checkup – Audiometric, Vision, Color Blindness, Chest, Urine, RBS, T.B., Cancer, AIDS, Liver Function Tests (LFT), Eye Test, CBC Urine, Chest X-Ray Glutamic Pyruvic Transaminase (SGPT) and Stool D/R etc.
			1 time/1Year for <30 yr. 1time/ 4 years for 31- 40 yr. 1 time/2 years for 41- 50 yr. 1 time/year for >50 yr.	Periodical Checkup – Audiometric Test, Liver Function Tests (LFT), Color Blindness, Eye Test, Urine, RBS, complete blood count, dental X ray, Anemia, X Ray, Serum Glutamic Pyruvic Transaminase (SGPT) and Stool D/R, Medical fit test for use of Breathing Apparatus, vision etc

11.	Renewal of Consents and Authorization	As per orders	3 months before expiry of validity	Renewing consent to operate under applicable acts
12.	Compliance of EC condition	As per orders	Once in 6 months	Submission of 6 monthly compliance reports
13.	Socio Economic	As per Commitments give during public Consultation	Yearly	Workers, employment pattern, CSR/CER activities, Budget, expenses etc.

6.5 Greenbelt development

Green belts are an effective mode of control of air pollution, where green plants act as absorbent for pollutants and act as a sink for pollution. Plants grown to function as pollution sink are collectively referred to as greenbelts. An important aspect of a greenbelt is that the plants are living organisms with their varied tolerance limit towards air pollutants. A green belt is effective as a pollutant sinks only within the tolerance limit of constituent plants. Apart from functioning as a pollution sink, greenbelt would provide other benefits like aesthetic improvement of the area and providing suitable habitats for birds and animals. As per the rules and regulations laid by Ministry of Environment and Forest, Central Pollution Control Board (CPCB) and State Pollution Control Board (SPCB), it is legally mandatory to earmark 33% of the project area for greenbelt development to promote integration of environmental issues with industrial development projects.

Selection of plants for Greenbelt: The main limitations for plants to function as scavenger of pollutants are, plant’s interaction to air pollutants, sensitivity to pollutants, climatic conditions, and soil characteristics.

The purpose of developing the greenbelt in and around the industrial site is for:

- ✓ Preventing land degradation and erosion of topsoil.
- ✓ Containment and Abatement of pollution in the industrial environment, capturing of fugitive emissions if any and thereby improving the quality of the surrounding environment.
- ✓ Substantially reducing the adverse environmental impacts due to the proposed industrial activity.
- ✓ Serving as a barrier for attenuating the intensity of noise generated.
- ✓ Enhancing the biodiversity index of the region.
- ✓ Adding aesthetic value to the project area.
- ✓ Maintaining the ecological equilibrium of the area.

The following general guidelines and measures will be adopted:

- ✓ The plantation of trees is initiated with start of the construction stage now, substantial growth is achieved. The greenbelt development programme is drawn to conform to natural climatic conditions and adaptability of the species.
- ✓ Species involved in afforestation should be indigenous, fast growing, and eco-friendly.
- ✓ Proper drainage system and proper plantation techniques is adopted.
- ✓ Plantation is being properly maintained and protected by fencing from grazing and felling. The plantations would consist of a mixture of carefully chosen locally available species of trees, shrubs, and herbs, preferably evergreen and resistant to pollution.

The project proponent proposed the total area of the site after expansion is 15.63 Acrea & allotted 33 % of 20866.2 Sq. m (5.16 Acres) of land for greenbelt development in and around the project site to capture the fugitive emissions, attenuate the noise generated and improve the aesthetics of land for greenbelt development and Layout plan of the project site is attached as an **Annexure -14**.

The width of the greenbelt will be maintained as per CBCB guidelines and there shall be 3 rows of plants with a gap of 2 m between the plants.

M/s Thejo Engineering Limited is planted ~ 1000 in the existing facility. During expansion, 2000 trees under Greenbelt Development will be planted in a phased manner in and around the project boundary. Trees which are already within the project site same will be retained.

A capital cost of INR 3.0 Lakhs will be earmarked for this purpose and INR of 0.5 Lakhs will be allocated for recurring expenses towards green belt development and maintenance. Recommended species for greenbelt development is shown in **Table 6-2**. Greenbelt Layout is shown in **Figure 6-2**. The existing Greenbelt photos are shown in **Figure 6-1**.

Table 6-2 Proposed Green belt Species.

S. No	Common Name	No. of trees proposed
1	Ashoka Tree	300
2	Narra Tree	300
4	Neem Tree	500
5	Vagai Tree	250
6	Pungam Tree	200
7	Babhool Tree	150
8	Serakondrai Tree	300
Total		2000



Figure 6-1 Existing Greenbelt Photos

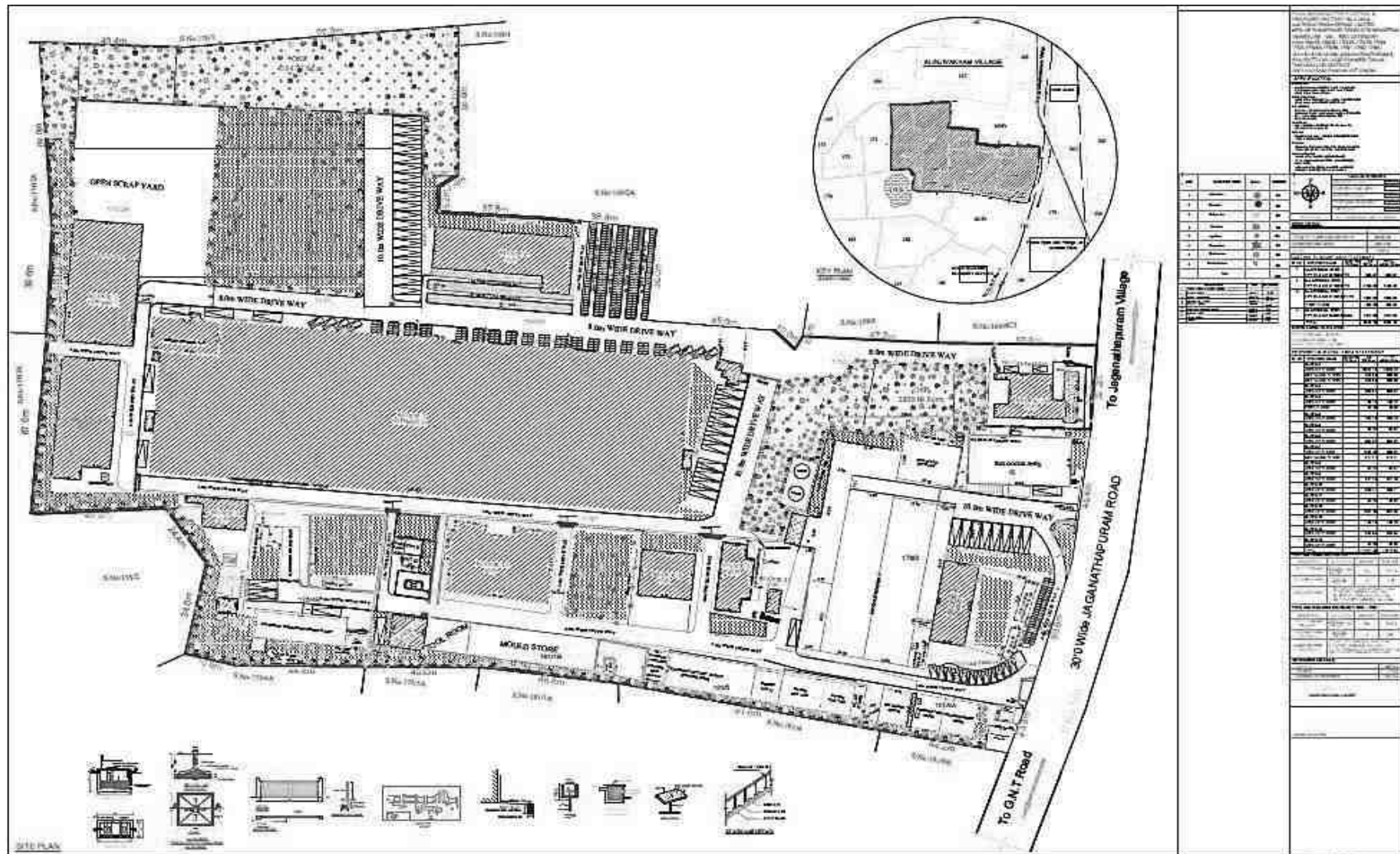


Figure 6-2 Greenbelt Layout

6.6 Data analysis and Reporting Schedules

The Environmental Management Cell in respect of the operation of pollution control facility will maintain the following records:

- ✓ *Monthly and annual progress reports: Immediately upon the completion of monitoring as per the planned schedule, report shall be prepared & necessary documents shall be forwarded to the concerned person.*
- ✓ *Instruction manual for operation and maintenance of pollution control equipment.*
- ✓ *Instruction manual for monitoring of water & gaseous parameter and hazardous waste management.*
- ✓ *Records of medical check-up of employees.*
- ✓ *Regularly all documents & records shall be reviewed for necessary improvement of the monitoring plan/mitigation measures/environmental technologies as well as for necessary actions of Environmental Management Cell.*
- ✓ *Stationary records as per the Environmental Acts.*

6.7 Procurement Schedule

The procurement of different equipment for plant operation shall be planned to be procured in a phase wise manner.

6.8 Infrastructural Requirement

Laboratory is existing with manpower and basic facilities for self-monitoring of pollutants generated in proposed plant. The laboratory will be equipped with preliminary instruments and chemicals required for monitoring general parameters of RO Water, Boiler Water and wastewater to fulfill the reuse criteria within plant premises.

6.9 Updating of Environmental Monitoring Plan

The directives from MoEF&CC and the regulations in force at any time shall govern the periodicity of monitoring. However, it is suggested that the implementation of various measures recommended in the EMP & be taken in the system to effectively implement the measures for continual improvement in environmental performance.

6.10 Environment Monitoring Program Budget

The Environment Management Cell shall inspect the necessity & availability of the materials, technologies, services, maintenance works and make appropriate budget for the purpose. Regular record review for change in financial requirement of environment management shall be done and appropriate budgetary provisions shall be made. The budget shall include provisions of:

- ✓ *Environmental Monitoring Program*
- ✓ *Operation & Maintenance of Environmental Technologies/Equipment*
- ✓ *Laboratory works for Environmental management activities.*
- ✓ *Emergency Purchase of necessary material, equipment, tools, services, etc.*
- ✓ *Greenbelt development.*

6.11 Proposed Budget for Environment Monitoring Programme

Environment management cell shall inspect the necessity & availability of the materials, technologies, services, maintenance works and make appropriate budget for the purpose. Regular record review for change in financial requirement of environment management shall be done and appropriate budgetary provisions shall be made. Budget for environment management shall be prepared and revised regularly up on requirement. The budget shall include provisions of:

- ✓ Environmental Monitoring Program
- ✓ Operation & Maintenance of Environmental Technologies/Equipment
- ✓ Laboratory works for Environmental management activities.
- ✓ Emergency Purchase of necessary material, equipment, tools, services, etc.
- ✓ Environmental monitoring cost is estimated INR.2.50,000 /annum.

6.12 Summary

The environmental monitoring plan enables environmental management system with early sign of need for additional action and modification of ongoing actions for environment management, improvement, and conservation. The environmental monitoring locations will be decided considering the environmental impacts likely to occur due to the operation of proposed project as the main aim of the monitoring program is to track, timely and regularly, the change in environmental conditions and to take timely action for protection of surrounding environment. Environmental sampling and monitoring will be done as per the guidelines provided by MoEF&CC & CPCB. Budget for environmental management will be prepared and revised regularly as per requirement. Total project cost is Rs. 10699.99 Lakhs. Environmental Management Plan Capital cost of the proposed project is Rs. 41 Lakhs and recurring for proposed is estimated as 7.2 Lakhs. Cost of the Environment Monitoring will be Rs. 2,30,000 /Annum. After Proposed Implementation the total Capital EMP cost is 60.77 Lakhs under recurring 11.8 Lakhs.

CHAPTER – 7

ADDITIONAL STUDIES

(This chapter would highlight any additional studies required for the proposed project i.e Public Consultation, Risk Assessment, Disaster Management Plan, R&R Studies and any additional recommended during the Scope stage/ToR.)

7 ADDITIONAL STUDIES

This chapter describes the public consultation for the proposed project, risk assessment, approach to study, hazards identification, hazards assessment and evaluation, disaster management plan, occupational health, and safety measures.

AS per EIA structure the required additional studies for the project are.

1. Public Consultation / Hearing
2. Qualitative Risk Assessment
3. Onsite & offsite Disaster Management Plan.
4. SIA and R& R Studies

7.1 Public Consultation

Manufacturing of “Adhesives, Moulded rubber products and PU Products” is termed under Schedule 5(f), Synthetic Organic Chemicals, Category A as per the EIA notification dated 14th September 2006 and its subsequent amendments however and as the project is located at **non notified industrial area** hence, the project will be appraised by the EAC, MOEF&CC. As a part of obtaining Environmental Clearance the Draft EIA report has been prepared as per the obtained ToR the draft report will be submitted to TNPCB for Public Consultation.

M/s. Thejo Engineering Limited proposed expansion in production of Rubber molded products (199.99 TPM to 486 TPM) and Adhesives (38.5 KL/Month to 100 KL/Month) & proposed PU Products manufacturing with production capacity of 6.352 TPM due to increase in the demand of the existing and proposed projects along with enhancement of manufacturing facilities with additional area of 11.46 Acres (46364.97 Sq. m) The total area after expansion is 15.63 Acres (63221.43 Sq. m). The project cost for the proposed expansion proposal is 10699.99 Lakhs.

The EC application (Form-1& PFR) was filed to MOEF&CC on 6th, May 2024 with ADS, vide proposal No. IA/TN/466248/2024 for grant of Terms of References (TOR), The standard ToR has granted with Public Hearing. The Base line Studies are carried out during the period of January 2024 - March 2024 as per OM. No. J-11013/41/2006-IA-II (I) (Part) dated; 29th August 2017 & the draft EIA report has been prepared in line with the prescribed ToR vide F. No. IA-J-11011/120/2024-IA-II(I) and TOR Identification No. TO24A2407TN5525112; dated 11.05.2024. The draft EIA report has been prepared as per generic structure described in EIA Notification and will be submitted for Public Hearing. The Public hearings will be conducted as per EIA notification and Its Amendment hereafter. After Public Hearing, the minutes and its compliance with action plan of the issues raised will be incorporated in Final EIA for the project appraisal.

7.2 Risk Assessment

Risk assessment ensures that all the relevant hazards are addressed, with the aim of identifying significant risks in the workplace. The existing and proposed unit shall handle a few chemicals, some of the chemicals which are hazardous in nature by virtue of their intrinsic

chemical properties or their operating temperatures or pressures or a combination of them. Fire, toxic release, or combinations of them are the hazards associated with industrial plants using hazardous chemicals. 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 recommendations on the minimization of the worst accident possibilities. Preparation of broad Disaster Management Plan (DMP), on-site and off-site emergency plan which includes occupational and health safety plan.

7.2.1.1 Objective of Risk Assessment

Risk analysis follows an extensive hazard analysis. It involves the identification and assessment of risks the neighboring populations are exposed to because of hazards present. This requires a thorough knowledge of failure probability, credible accident scenario, vulnerability of population etc. Much of this information is difficult to get or generate. Consequently, risk analysis is often confined to maximum credible accident studies.

7.2.1.2 Hazardous Characteristics & Toxicity of Raw Materials/ Chemicals

Immediate Dangerous to Life and Health (IDLH) limits are used when no public exposure guidelines are defined for a given chemical. An IDLH limit is a workplace exposure limit that is used primarily for making decisions regarding respirator use.

Lower Explosive Limit (LEL): The lowest concentration (percentage) of gas or a vapor in air capable of producing a flash of fire in the presence of an ignition source (arc, flame, heat). The term is considered by many safety professionals to be the same as the lower flammable limit (LFL).

Upper Explosive Limit (UEL): Highest concentration (percentage) of gas or vapor in air capable of producing a flash of fire in presence of an ignition source (arch, flame, heat). Concentrations higher than UEL are 'too rich' to burn. Also called upper flammable limit (UFL).

Flash Point: The flash point of a volatile material is the lowest temperature at which vapors of the material will ignite when given an ignition source. The flash point may sometimes be confused with the auto ignition temperature, which is the temperature at which the vapor ignites spontaneously without an ignition source. The fire point is the lowest temperature at which the vapor will keep burning after being ignited and the ignition source removed.

Threshold Limit Value (TLV/ TWA): The threshold limit value (TLV) of a chemical substance is a level to which it is believed a worker can be exposed day after day for a working lifetime without adverse effects.

Lethal dose levels (LD50, LC50): LD stands for "Lethal Dose". LD50 is the amount of a material, given all at once, which causes the death of 50% (one half) of a group of test animals. The LD50 is one way to measure the short-term poisoning potential (acute toxicity) of a material.

The storage details of raw materials include the hazardous and toxic characteristics of raw materials are given in **Table 7-1**.

Table 7-1 Hazardous & Toxicity Characteristics of Raw Materials/Chemicals

S. No.	Chemical Trade Name	State of Physical	Use of chemical/ Material	Container			NFPA Sign		
				Type	Size	Unit	H	F	R
1	Accicure TMT	Solid	Mixing	Paper	25	Kg	2	1	0
2	Accinox SP	Liquid	Mixing	Can	20	Ltr	1	1	0
3	Accinox TQ	Solid	Mixing	HDPE	25	Kg	1	1	0
4	Accinox ZC	Solid	Mixing	HDPE	25	Kg	1	1	0
5	Accicure ZDC	Solid	Mixing	HDPE	25	Kg	2	1	0
6	Accitard RE	Solid	Mixing	HDPE	25	Kg	2	1	0
7	Accicure ZMBT	Solid	Mixing	HDPE	25	Kg	1	1	0
8	Accinox ODPS	Solid	Mixing	HDPE	25	Kg	1	1	0
9	Accicure MS	Solid	Mixing	HDPE	25	Kg	2	1	0
10	Accicure MBTS	Solid	Mixing	HDPE	25	Kg	1	1	0
11	Accicure MBT	Solid	Mixing	HDPE	25	Kg	1	1	0
12	Accinox MBI	Solid	Mixing	HDPE	25	Kg	1	0	0
13	Accicure HBS	Solid	Mixing	HDPE	25	Kg	1	1	0
14	Accicure F	Solid	Mixing	HDPE	25	Kg	1	1	0
15	Accions 445	Solid	Mixing	HDPE	25	Kg	1	1	0
16	Accicure ZDBC	Solid	Mixing	HDPE	25	Kg	1	1	0
17	Accicure DPG	Solid	Mixing	HDPE	25	Kg	1	1	0
18	Accicure DCS	Solid	Mixing	HDPE	25	Kg	1	1	0
19	Accicure BSB	Solid	Mixing	HDPE	25	Kg	2	1	0
20	Accicure BSM	Solid	Mixing	HDPE	25	Kg	2	1	0
21	Accimel E	Solid	Mixing	HDPE	25	Kg	1	1	0
22	Accimel	Solid	Mixing	HDPE	25	Kg	1	1	0
23	Accinox BI 75 S	Solid	Mixing	Can	25	Kg	1	1	0
24	Aromatic hydrocarbon	Solid	Lab	Can	26	Kg	2	0	0

25	Aromatic Oil	Liquid	Mixing	Tanker	9000	Kg	1	1	0
26	Bromobutyl Rubber	Solid	Mixing	Bale	35	Kg	1	1	0
27	Chemitac 7	Liquid	Coating	Drum	20	Ltr	2	3	0
28	Chemitac 11	Liquid	Coating	Drum	20	Ltr	2	3	0
29	Chemitac 25	Liquid	Coating	Drum	20	Ltr	2	3	0
30	Chloro butyl Rubber	Solid	Mixing	Bale	35	Kg	0	0	0
31	Ethyl Acetate	Liquid	Solution	Drum	210	Ltr	2	2	0
32	Enamel Paints	Liquid	Coating	Drum	185	Kg	1	2	0
33	EPDM Grades	Solid	Mixing	Bale	25	Kg	0	0	0
34	HV Paraffinic Oil	Liquid	Mixing	Drum	210	Ltr	2	1	0
35	Iso Propyl Alcohol	Liquid	Coating	Drum	210	Ltr	1	3	0
36	Methyl ethyl ketone	Liquid	Coating	Drum	185	Kg	2	3	0
37	Methylene chloride	Liquid	Solution	Drum	210	Ltr	2	0	0
38	Methyl isobutyl ketone	Liquid	Lab	Drum	10	Ltr	2	3	0
39	Natural Rubber	Solid	Mixing	Bale	25	Kg	0	1	0
40	Natural Rubber RSS IX	Solid	Mixing	Bale	50	Kg	0	1	0
41	NC Thinner	Liquid	Coating, Mold cleaning	Drum	5	Ltr	2	2	0
42	NBR	Solid	Mixing	Bale	25	Kg	NA	NA	NA
43	Napthenic Oil	Liquid	Mixing	Drum	210	Ltr	NA	NA	NA
44	Paraffinic Oil	Liquid	Mixing	Drum	210	Ltr	NA	NA	NA
45	PBR 1220	Solid	Mixing	Bale	35	Kg	NA	NA	NA
46	Polyprpopylene glycol 2000 (PPG2000)	Solid	Mixing	HDPE	25	Kg	NA	NA	NA
47	Polytetramethylene Ether glycol (PTMEG)	Solid	Mixing	HDPE	25	Kg	2	1	0
48	Sulfur	Solid	Mixing	HDPE	20	MT	2	2	0
49	Soudium hypochlorite solution	Liquid	Lab & STP	Drum	210	Ltr	3	0	0
50	Trichloroethylene	Liquid	Solution	Drum	285	Kg	2	1	0

51	Toluene	Liquid	Solution	Tank (Underground)	20L*3 Nos	KL	2	3	0
52	Toluene di-isocyanate	Liquid	Lab	Drum	210	Ltr	3	1	3
53	Varox dcp-99	Solid	Mixing	HDPE	25	Kg	2	2	2

Source: Thejo Engineering Ltd

7.2.1.3 Quantitative Risk Assessment

Quantitative Risk Assessment (QRA) is carried out for liquid chemicals (Toluene) with an NFPA fire rating of 3 and which are stored in Above Ground Level. However, the Toluene is stored in Below ground Level Tanks of 3 Nos with capacity of 20KL of each.

Quantitative Risk Assessment (QRA) for **toluene** is a volatile, flammable liquid with an **NFPA fire rating of 3**—stored in **below-ground tanks**. Chemical and Physical Properties of Toluene are shown below:

7.2.1.3.1 Chemical and Physical Properties of Toluene

Flammability:

- **NFPA Fire Rating:** 3 (indicating it can ignite under most ambient conditions)
- **Flash Point:** Approximately 4°C (39°F), which makes it highly flammable.

Vapor Characteristics:

- Toluene has relatively high vapor pressure at ambient temperatures, which can lead to the formation of flammable vapor-air mixtures.

Health and Environmental Effects:

- **NFPA Health Rating:** Typically, 2 (moderate hazard upon exposure)
- Potential toxic effects through inhalation, requiring careful control of vapor releases.

7.2.1.3.2 Hazard Identification:

Primary Hazards:

- **Fire/Explosion:** Due to the high flammability and vapor production.
- **Toxic Exposure:** Inhalation risks in case of vapor release.
- **Environmental Contamination:** In the event of a leak, especially considering the confined nature of below-ground storage.

Storage Considerations:

- **Below-Ground Tanks:** While they offer some protection against external ignition sources, they may present challenges like limited ventilation, leading to vapor accumulation.

7.2.1.3.3 Key incident scenarios to consider for toluene is included:

- **Leak and Pool Fire:**
 - A breach in the tank could result in a liquid leak that pools and ignites, leading to a sustained fire.

- **Vapor Cloud Formation and Explosion:**
 - A leak might generate a flammable vapor cloud in the confined space, which could ignite and result in a vapor cloud explosion (VCE).
- **Jet Fire:**
 - If toluene is released under pressure, a high-velocity jet fire could occur, posing risks to nearby equipment and personnel.
- **Secondary Containment Failure:**
 - A failure in the containment systems (e.g., seals or dikes) might exacerbate the consequences of a leak.

The Detailed Risk Assessment report is enclosed as **Annexure-22**.

7.2.1.3.4 Risk Mitigation Measures

- **Leak Detection:** Install continuous monitoring systems (e.g., sensors for toluene vapor).
- **Secondary Containment:** Robust secondary containment systems (such as dikes or double-walled tanks) to capture leaks.
- **Ventilation:** Adequate ventilation in areas where vapor accumulation is possible.
- **Fire Suppression:** Incorporate automatic fire detection and suppression systems designed for hydrocarbon fires.
- **Standard Operating Procedures (SOPs):** For filling, maintenance, and emergency shutdown.
- **Regular Inspections:** Frequent and thorough inspections of tank integrity and associated safety systems.
- **Training:** Regular training for personnel on emergency response and handling of toluene
- **Emergency Response Plans:** Detailed emergency response plans, including evacuation routes and coordination with local fire services.
- **Drills:** Conduct regular emergency drills to ensure preparedness.

The details are provided in **Section no. 7.2.1.5**.

7.2.1.4 Qualitative Risk Assessment

The qualitative risk assessment is carried out for chemicals with an NFPA fire rating of less than 3, stored in small quantities in drums, cans, or HDPE containers, the risk is inherently lower. By implementing the above handling measures including proper storage, routine inspections, effective spill response, and ongoing training—the safety of the facility and its personnel can be maintained at acceptable levels.

Hazardous & Toxicity Characteristics of Raw Materials/Chemicals is given in **Table 7-1**.
Qualitative Risk Assessment:

7.2.1.4.1 Hazard Identification:

- **Lower Flammability Risk:**
 - With an NFPA fire rating of less than 3, these chemicals are less prone to ignition compared to higher-rated substances.
- **Small Quantities & Robust Packaging:**
 - Storage in small quantities minimizes the potential impact in case of an incident.
 - Using drums, cans, or HDPE containers helps contain the chemical and prevents large-scale releases.

The approach is to identify hazards associated in operation of equipment as well as in processes, assessing its impacts, ranking the risk posed by it and finally propose remedial actions/mitigation measures such that the risk is minimized to tolerable level. Qualitative Risk Assessment has been carried out for the following areas:

- Storage and Handling of Acids.
- Storage and Handling of Flammable Chemicals.
- Storage and Handling of Toxic Chemicals.
- Storage and Handling of other Solid Chemicals.

In Qualitative Risk Assessment, risk has been analyzed using methodology called HIRA- Hazards Identification & Risk Assessment. In HIRA, major manual activities carried out by plant personnel as well as contract laborers have been considered.

Table 7-2 Risk Matrix

LIKE HOOD/ PROBABILITY		Catastrophic (Death/ System Loss)	Major/ Critical (Serious injury/ Illness)	Moderate (Less Serious Injury/ Illness)	Minor/ (Minor Injury/ Illness)	Insignificant/N egligible (No injury /illness)
		5	4	3	2	1
Almost Certain	E	H	H	H	M	M
Likely	D	H	H	M	M	L
Possible	C	H	M	M	M	L
Unlikely	B	M	M	M	L	L
Impossible	A	M	M	L	L	L

Table 7-3 Risk Acceptability Criteria

Risk Range	Risk Acceptability Criteria	Remarks
H	Unacceptable/ High	Management ‘s Decision/Action Plan Required. Potential off- site Impact.
M	Medium	Generally Minor Impact. Acceptable with Management ‘s Review. Specific monitoring or SOP to be followed.

L	Low	Acceptable without Review. Manage through Routine Procedure.

7.2.1.5 Hazard Identification

- **Chemical Spill/Leak:**
 - **Cause:** Accidental damage, improper handling, or container degradation.
 - **Consequences:** Potential exposure, environmental contamination, and localized hazards.
- **Fire Incident:**
 - **Cause:** Although the NFPA fire rating is below 3, the presence of ignition sources (e.g., electrical sparks, open flames) can still lead to fire.
 - **Consequences:** Localized fire that may lead to property damage and minor injuries.
- **Chemical Exposure:**
 - **Cause:** Spill, leak, or accidental release during handling.
 - **Consequences:** Skin or respiratory exposure, which could lead to health effects.
- **Container Failure/Degradation:**
 - **Cause:** Aging or damaged containers leading to leaks.
 - **Consequences:** Release of chemicals and possible reactions to the environment.
- **Incompatible Storage:**
 - **Cause:** Incorrect segregation of chemicals.
 - **Consequences:** Chemical reactions that may result in releases or fire.

The HIRA Worksheet of the proposed project is shown in **Table 7-4**

7.2.1.6 Risk Assessment through HIRA Matrix

Table 7-4 HIRA Worksheet

S. No	Process or Activity	Associated Hazards	Health & safety Impact (risk)	Initial risk			Control / Mitigation Measures	Residual Risk		
				Severe	Likelihoods	Risk		Severe	Likelihoods	Risk
A Construction Phase										
1	Site Clearance, excavation and paving of site	Dust generation & increase in SPM/RSPM in air Fall into pit due to caving the side	Health effect on workers and surrounding People Risk of injury to workers	2	C	M	Water sprayed on the ground before excavation. Work permit procedure to be followed. Shoring of the sides while manual digging the ground. Use of dust mask.	1	B	L
2	Vehicular movement for transportation of construction material	Emission of PM10, HC, NOx, & CO Noise generation	Health effect Risk of injury to workers due to accidents	2	E	M	P.U.C. Certified Vehicles Regular Maintenance of Vehicles Speed control of the vehicles.	1	C	L
B	Storage and Handling of Acids									
1	Loading & unloading of acids	Exposure to acid fumes due to leakage /spillage in pipe/container/ valves etc.	Skin/Eye irritation. Toxic Vapor inhalation etc.	2	C	M	Use of right MOC. Periodic Inspection of flanges/ferrule joints is carried out. The loading & Unloading activity will be carried out in well-ventilated area and in closed Loop Pipelines with suitable pumps. Neutralization media is made. available in areas where acid is stored/handled/used suitable.	2	B	L

							Acid proof flooring will be done at the storage and handling area.			
							Use of acid-resistant glove, apron, face shield, eye goggle, nose mask, gumboot & helmet.			
C	Storage and Handling of Flammable/Toxic Chemicals									
1	Unloading and use of Flammable Chemicals	Spillage/ Leakage. Fire Explosion	Fire Burn injury Damage to equipment and facilities.	2	C	M	Spill containment is done. No hot work is carried out nearby. Ignition sources are avoided in such areas. Fire extinguishers are kept available. Appropriate PPEs like Safety Goggles, Butyl or Nitrile rubber gloves, gumboot, plastic apron etc. will be used.	2	B	L
2	Handling of toxic Chemicals	Spillage / Leakage	Skin/Eye irritation Toxic Vapor inhalation	2	C	M	Operators/Workers to be trained in Safe Work Practices. Spillage will be cleaned or neutralized with suitable media. Chemical handling bags to be labeled properly. Chemicals will be stored in an isolated storage room having provision for natural & forced ventilation.	2	B	L

							Certified Dust respirator shall be used. Use of Suitable protective clothing, gloves, boots shall be used.			
E	Storage and Handling of other Solid Chemicals									
1	Handling, Cleaning of Solid Chemicals	Chemical Exposure	Skin/Eye irritation	2	C	M	Loading & Unloading activity shall be carried out in a well-ventilated area under proper supervision. Immediate collection of spilled chemicals. Rubber or neoprene gloves and additional protection including impervious boots, apron shall be used. PPEs like chemical safety goggles, apron, and full-face shield.	2	B	L

7.2.1.7 Summary of Risk Assessment

It can be seen from the above table that: After providing mitigation measure in activity of construction phase. Storage & Handling of Acids, Storage and Handling of Flammable/Toxic Chemicals and for Solid chemicals have the risk probability will change from almost certain to possible as well as its residual risk will change from medium to low. Based on the risk assessment analysis, precautionary mitigation measures are recommended for the project.

However, All Liquid Chemicals will be Stored in HDPE, Drums, Can and Bale Containers. The containers will be placed on Suitable platform with required safety measures. An Empty Tank will be kept standby of similar capacity to meet any Emergency of Leakage and valves failure. The area will be equipped with proper firefighting systems like Fire Extinguishers and Hydrant Points. Proper SOP will be prepared for all safety related audit, storage, and permission.

7.2.1.7.1 Proposed Adequate Handling Measures

- **Designated Storage Areas:**
 - Store chemicals in areas that are cool, well-ventilated, and away from ignition sources.
- **Secondary Containment:**
 - Use spill trays or secondary containment systems to capture any leaks or spills.
- **Segregation:**
 - Keep chemicals away from incompatible materials to avoid adverse reactions.

2. Handling and Transfer Procedures

- **Proper Labeling:**
 - Ensure all containers are clearly labeled with the chemical name, hazard information, and handling instructions.
- **Use of Personal Protective Equipment (PPE):**
 - Provide and enforce the use of appropriate PPE (e.g., gloves, goggles) during handling and transfer.
- **Spill Response Plan:**
 - Develop and maintain a spill response plan that includes immediate actions, cleanup procedures, and proper disposal methods.

3. Monitoring and Maintenance

- **Regular Inspections:**

- Conduct routine inspections of containers and storage areas to detect any signs of damage, leaks, or deterioration.

- **Ventilation Controls:**

- Ensure storage areas have adequate ventilation to prevent the accumulation of any vapors.

- **Fire Safety Equipment:**

- Although the flammability risk is lower, maintain accessible fire extinguishers and other fire suppression systems.

4. Personnel Training and Emergency Preparedness

- **Training Programs:**

- Regularly train staff in safe handling, emergency response, and the specific hazards of chemicals.

- **Emergency Response Drills:**

- Conduct periodic drills to ensure that employees are familiar with evacuation routes, spill control, and first-aid measures.

7.2.1.8 Proposed Precautionary Measures for Handling and storage of Chemicals/Products:

The installation of all the equipment will be as per the guidelines of the provision of Factories Rule 1963. For any case of fire emergency, standard type of Firefighting equipment and fire extinguishers will be provided in the storage area as well as required places in the plant. Proposed Safety/Control Measures to Reduce the risk of Fire, Explosion and Toxic Release are summarized in **Table 7-5**. Storage and Handling of Solid Chemicals is given **Table 7-6**. Storage and Handling of Toxic Chemicals are provided in **Table 7-7**.

Table 7-5 Proposed Safety/Control Measures to Reduce the risk of Fire, Explosion and Toxic Release

S. No	Activity	Safety Precautions
1	Transportation of chemicals by road tanker including leak or spillage	• Training will be provided to driver and cleaner regarding the safe driving, hazards of chemicals, emergency handling. • Fire extinguishers will be kept in necessary places. • Flame arrestor will be provided to exhaust. • Instructions will be given not to stop road tanker in populated area. • Hazard identification symbol and emergency telephone number will be displayed as per HAZCHEM code. • Appropriate PPEs
		• Source of leakage will be checked. • Damaged containers or spilled material shall not be attended without wearing appropriate protective attire. • Leak will be stopped, if possible, to do so without risk. • Water spray shall be used to reduce vapours. • Combustibles (wood, paper, oil, etc.) shall be kept away from spilled material.
2	Unloading of chemicals from tanker	• Priority will be given to tanker to immediately enter the storage premises at site and will not be kept waiting near the gate or the main road. • Security person will check license, fire extinguisher condition, SCBA set condition, antidote kit, required PPEs. • Store officer will take sample as per sampling SOP from sampling point and necessary quality can be done.
3	Chemicals storage tank safety	• All storage areas will be isolated from all sources of open flame and well posted with 'NO SMOKING' signs and will be provided with adequate firefighting/extinguishing system. • Entry of unauthorized persons shall be prohibited. Spark-resistant tools will be used, wherever required. • Water spray shall be used to reduce vapours. • Water spray shall be used to reduce vapours (but do not put water directly on leak, spill area or inside container). Combustibles (wood, paper, oil, etc.) shall be kept away from spilled chemicals. • Storage areas will be inspected on regular basis.

		• For solid storage, adequate ventilation & illumination shall be provided. • At strategic point of the plants, toxic gas detectors (VOC Monitors) shall be provided for detection of such emissions. • Lines of hazardous chemicals will be checked tested periodically, and such checks will be recorded.
4	Chemicals transfer from storage tank to Process plant.	• Double mechanical seal type pump shall be provided, if required. • Double on / off switch shall be provided at tank farm and process area near day tank. Pump auto cut off with day tank elevated level shall be provided. • Flame arrestor will be provided on day tank vent, if required. • Measuring Tank will be provided with overflow line for additional safety, and it shall be connected to main storage tank. • Colour coding will be provided for storage tanks handling pipelines.

Activity-wise Safety measures will be provided as following section.

A. Safety Measures for Transportation, Storage and Handling of Chemicals

i. General safety measures for transportation, storage & handling are listed below.

- ✓ *Layout and location of hazardous chemical storage area shall be based on natural and Mechanical ventilation.*
- ✓ *Spare Tank of sufficient quantity are/will be kept ready for any emergency spillage or leakage.*
- ✓ *Regular inspection of all the drums of hazardous chemicals shall be carried out and damaged drums shall be separated and disposed to avoid the possibility of catastrophic rupture.*
- ✓ *Display Boards shall be provided on all storage drum/Tanks which include the name of the chemicals, Calibration of tanks and date of Painting.*
- ✓ *The level indicators shall be placed on all storage tanks to know the exact liquid level inside the tank and to avoid the accidental spillage or overflow.*
- ✓ *All equipment (tanks, Pumps etc) related to hazardous chemical storage shall be maintained and calibrated regularly.*
- ✓ *Drum trolley is/will be used for the movement of drums of hazardous chemicals to avoid accident due to manual error.*
- ✓ *SOP for handling hazardous chemicals will be displayed in local language for safe operating procedure.*
- ✓ *Proper inventory of hazardous chemicals will be maintained, and buffer stock will be kept as minimum as possible.*
- ✓ *Standard procedure for unloading will be in place and will be implemented for safe unloading of road tanker.*
- ✓ *Static earthing provision is/will be made for tanker unloading.*
 - ✓ *All storage Tanks will be under Sun protection Shed and well-ventilated to maintain the room temperature to avoid vaporization.*
- ✓ *Water showering/Sprinkling system is/will be provided to the flammable liquid storage area, wherever required to avoid the vaporization due to increase in atmosphere temperature.*
- ✓ *On site detectors for fire based on heat or smoke detection with alarm system is/will be provided as required.*
- ✓ *Firefighting system is/will be provided as required along with the fire hydrants.*
- ✓ *First aids boxes is/will be provided at prominent places in the plant.*
- ✓ *Area is/will be declared as —NO SMOKE ZONE*

Table 7-6 Storage and Handling of Solid Chemicals

S. No	Process or activity	Associated Hazards	Health and safety impact	Recommendations
1	Handling chemical bags	Chemical exposure	Skin/eye irritation	- Chemical shall be stored in isolated storage rooms having provision for natural and forced ventilation. - Certified dust respirator shall be used. - Suitable protective clothing and other PPEs shall be used
2	Cleaning of chemical spillage	Fumes inhalation, dust exposure	Severe irritation to eye, skin, inhalation	- Certified dust respirator will be used. - Suitable protective clothing, gloves, boots shall be used. - Spillage shall be cleaned or neutralized with suitable media. - Chemicals shall be stored in isolated storage having provision for natural and forced ventilation. - Care shall be taken, remaining gloves and other PPEs to avoid all possible skin contact

Table 7-7 Storage and Handling of Toxic Chemicals

S. No	Process or activity	Associated Hazards	Health & Safety Impact	Recommendations
1	Chemical handling/loading & unloading	Exposure to fumes (due to leakage from joints, corroded lines failure etc.)	Skin burns, eye irritation and respiratory disorder.	- Dyke will be provided. Shall be stored in well-ventilated area. - Eye wash station or safety Shower shall be installed in nearby location. - Maintenance shall be carried as per schedule. - Employee will be provided with impervious clothes, gloves, face shield dust and splash proof safety goggles, chemically resistant safety shoes, etc
2	Working in storage area	Exposure to fumes due to spillage	Severe irritation to eyes. Skin etc. internal body burns	- Spill kit or suitable absorbent shall be kept available. - PPEs like face mask, gloves, goggles, etc. shall be worn by concerned person. - Eye wash station or safety Shower shall be installed in storage area.
3	Tank overflow	Chemical Exposure	Eyes and skin irritation	- Level indicator shall be installed and the same shall be checked for its proper operation. - Dyke wall shall be available to contain the spill

ii. Process Safety Measures

- ✓ *Safety measures are the most important aspect of selection of process technology to ensure safety in production unit. For the safety in production area some important critical safety measures must be provided within the process technology/equipment itself.*
- ✓ *The details of the general safety measures for process unit are as below.*
- ✓ *Process parameters control should be provided vide Standard Operating Procedures.*
- ✓ *Trained person should be engaged for handling of hazardous materials.*
- ✓ *Proper safety precautions should be taken during handling of hazardous materials.*
- ✓ *Further all the vessels should be examined periodically by a recognized competent person.*
- ✓ *All the equipments should be well earthed and well protected against Static Electricity. Also, for draining in drums, proper earthing facilities should be provided.*
- ✓ *Temperature indicators will be provided near to all production areas.*
- ✓ *Caution notes, safety posters, stickers, periodic training & updating in safety and emergency preparedness plan must be displayed and conducted.*

iii. Safety Measures for Drum Storage and Handling

- ✓ *Drums should be stored at designated location or secured in a safety storage cabinet.*
- ✓ *Approved methods of equipping a drum and dispensing liquids from it should be followed.*
- ✓ *Drums, carboys, and related accessories should be inspected on regular basis for maintenance purpose.*
- ✓ *All the equipments should be earthed properly and protected against static electricity. Also, proper earthing facilities shall be provided for drums.*
- ✓ *Materials should be transferred by pumping through pipeline or by vacuum from drums.*
- ✓ *Drums for flammable liquids should have proper closures that can withstand the expected handling conditions without leaking.*

iv. Spill Emergency Mitigation Procedure

- ✓ *Spill Kit is kept in all emergency cupboards.*
- ✓ *Once the spill is observed, Spill Kit shall be collected from the nearest area/emergency cupboard installed and neutralizing agent (if required) based on the nature of the spill. In case if the spill is not controlled, immediately declare the emergency as per emergency response procedure.*
- ✓ *While handling the spill, use most appropriate PPEs like chemical suit, acid/ alkali proof hand gloves, face shield, safety goggles, gum boots or even respiratory masks with suitable cartridges.*
- ✓ *Once the spill is controlled using Sorbent pad/Boom collect in a double polythene bag and secure with the plastic ties. dispose it as per applicable disposal procedure.*
- ✓ *Report the incident of spill to EHS department through online incident reporting System.*
- ✓ *Once in a month, the items of the Spill Kit shall be inspected and recorded by EHS representatives of the individual area.*

v. Safety Measures for Preventive Maintenance

The safety measures in the form of the general Do's & Don'ts for safety in process & other plant area are as below:

- ✓ *Make sure equipment is empty and fluxed with nitrogen and air.*

- ✓ Use of proper PPE will be ensured by safety officer.
- ✓ Check VOC content for flammable vapours and make sure that no flammable vapours contents.
- ✓ Keep proper and adequate fire extinguisher near work area.
- ✓ Check all motors are disconnected and fuse pulled out before maintenance.
- ✓ Work in any equipment must be conducted in presence of supervisor.
- ✓ Make sure all process lines are disconnected.
- ✓ Do not work on equipments without permission from plant head and maintenance head.
- ✓ Do not allow any employment without premedical check-up or without checking fitness.
- ✓ Additional safety measures in form of the checklist covering Do's & Don'ts of preventive maintenance, strengthening of HSE, manufacturing utility staff for safety related measures is/will be updated timely and will be made available to all concern department & personnel.

B. Fire Fighting System / Fire Control Plan

By looking at the hazardous nature of the process and the chemicals that are handled and processed, the chances of outbreak of fire cannot be totally ignored. Hence to tackle such a situation, the company has developed a proposed, well-resourced, and adequate fire protection system. The management has proposed keeping the following extinguishers at site:

- ✓ Area will be equipped with Fire Hydrant system and suitable Fire Extinguishers as per Fire safety norms.
- ✓ The storage and Process area will be under 24x7 electronic surveillance.
- ✓ Company will be provided Fire Water Tank of adequate capacity to combat the emergency.
- ✓ Working staff is/will be trained to operate Foam, DCP and CO2 extinguishers.
- ✓ Electric driven alarms & sirens are/will be placed at the conspicuous locations. Hand Bell shall be used in case of power failure.
- ✓ Proponent had provided separate entry and exists with adequate margin all around the periphery for unobstructed easy movement of the emergency vehicle / fire tenders without reversing back.

C. Occupational Health and Safety Program

THEJO has been preparing the Occupational Health Surveillance Program which shall be followed right from the project construction & erection phase and the same shall be updated for the upcoming new facility, if required. The details of the same are described in the following sections.

- ✓ **First Aid:** The First Aid kit as per Tamil Nadu Factory Rules.
- ✓ Plan for Periodic Medical Check-up
- ✓ Safety Trainings on Safe Material Handling, First Aid, & all Safety Aspects shall be provided by the Safety Officers.
- ✓ **Mock Drills:** To evaluate the effectiveness of emergency preparedness and to spread the awareness among employee's mock drill will be carried out at the interval of every six months. After completion of the mock drill, summary report shall be made, and corrections will be done if any weakness has been observed.

D. Recommendations to Reduce Fugitive Emissions

- ✓ Regular monitoring of plant area will be conducted, and records will be maintained at strategic point of the plants,
- ✓ Lines of such hazardous chemicals will be checked periodically, and such checks may be recorded.
- ✓ Barrier wall will be provided.
- ✓ PPEs will be given to concerned personnel.
- ✓ Only trained personnel will be allowed to carry out work in this area.

E. To further mitigate risk and enhance safety, the following actions are recommended:

- **Enhanced Training:**
Provide periodic refresher training for all personnel involved in the handling and storage of these chemicals.
- **Improved Ventilation:**
Continue to assess and upgrade ventilation systems in storage areas to ensure rapid dissipation of any accidental vapors.
- **Regular Audits:**
Schedule frequent audits of storage practices and container conditions to promptly identify and correct any issues.
- **Emergency Drills:**
Increase the frequency of emergency response drills focusing on spill containment and fire response.
- **Container Management:**
Develop and adhere to a strict maintenance and replacement schedule for storage containers to prevent degradation-related failures.

F. D. DO"s & DON"Ts

Management has listed some of the Do's & Don'ts activities to strengthen the **SAFETY AT WORK**, which will be followed strictly:

For Preventive Maintenance

Do's:

- ✓ Ensuring that operators/workers etc. follows the SOPs, Safety procedures & standards, work permit system etc.
- ✓ Inspection of Storage Area, Earthing & Bonding system.
- ✓ Inspection of all Fire Fighting Facilities /Check Alarms operation.
- ✓ Checking the availability of Spill Containment Kit.
- ✓ Make sure existing fire extinguishers are fully charged and ready for action.
- ✓ Inspections of plant, machinery, tools, equipment, premises, work practices, processes, procedures, and general environment must be carried out for the health and safety of plant, people and surrounding.
- ✓ On-site and Offsite Emergency Plans shall be reviewed and updated, as per the requirement.

Donts:

- ✓ *Don't allow anyone who hasn't received specific safety and operational training to get indulge in any site activity.*
- ✓ *Don't perform any activity without proper permit.*
- ✓ *Don't perform your own maintenance.*
- ✓ *Don't compromise on Design and Engineering part.*
- ✓ *Don't panic if you are in a risky situation.*
- ✓ *Don't allow spilled chemicals to drain to sewers/gutters etc.*

The detailed Fire protection facilities & Occupational Health and Safety measures are envisaged for the proposed plant, which is given below **Chapter 10, Section 10.8.**

7.3 Disaster Management Plan

The disaster management plan has been prepared in line with the Tiruvallur District Disaster Management Plan, 2016. A disaster is a catastrophic situation in which suddenly, people are plunged into helplessness and suffering, and as a result, need protection, clothing, shelter, medical and social care and other necessities of life.

Disasters can be divided into two main groups. In the first, disasters resulting from natural phenomena like earthquakes, volcanic eruptions, storm surges, cyclones, tropical storms, floods, avalanches, landslides, forest fires etc. The second group includes disastrous events occasioned by man, or man's impact upon the environment.

The Disaster Management Plan (DMP) is a guide, giving detailed organizational responsibilities, actions, reporting requirements and support resources available to ensure effective and timely management of emergencies likely to arise from planned operations. The DMP has been prepared for the production process based on the Risk Assessment and related findings covered in the foregoing topics in this report.

7.3.1 Objectives of Disaster Management Plan (DMP)

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 will be widely circulated and personnel training given through rehearsals/drills.

The objective of the Disaster Management Plan is to make use of the combined resources of the plant 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.*

7.3.2 Specific Emergency anticipated

Fire consequences can be disastrous, since they involve huge quantities of fuel either stored or in dynamic inventory in pipelines or in nearby areas. Toxic releases can affect people working around. Preliminary hazard Analysis has provided a basis for consequence estimation.

7.3.3 Emergency Organization

It is recommended to set up an Emergency Organization. A senior executive who has control over the affairs of the plant would be heading the Emergency Organization. He would be designated as a Site Controller. A Works Manager would be designated as the Incident Controller. In the case of stores, utilities, open areas, which are not under the control of the Production Heads, Senior Executive responsible for maintenance of utilities would be designated as Incident Controller. All the Incident Controllers would be reporting to the Site Controller.

Each Incident Controller, for himself, organizes a team responsible for controlling the incidence with the personnel under his control. Shift In-charge would be the reporting officer, who would bring the incidence to the notice of the Incidence Controller and Site Controller.

Emergency coordinators would be appointed who would undertake the responsibilities like firefighting, rescue, rehabilitation, transport and provide essential and support services. For this purpose, Security In-charge, Personnel Department, Essential services personnel would be engaged. All these personnel would be designated as Key personnel.

In each shift, the electrical supervisor, electricians and other maintenance staff would be drafted for emergency operations. In the event of power or communication system failure, some of the staff members in the office/plant offices would be drafted and their services would be utilized as messengers for quick passing of communications. All these personnel would be declared as essential personnel.

7.3.3.1 Emergency Communication

Whoever notices an emergency such as fire, escalation of fire, leakage etc will inform his immediate superior and Emergency Control Center. A place nearer to the security office shall be identified as Emergency Control Center. The person on duty in the Emergency Control Center would appraise the Site Controller. Site Controller verifies the situation from the Incident Controller of that area or the Shift In-charge and takes a decision about an impending On Site Emergency. This would be communicated to all the Incident Controllers and Emergency Co-coordinators. Simultaneously, the emergency warning system would be activated on the instructions of the Site Controller.

7.3.3.2 On-site Disaster Management Plan.

On-site plan will be the responsibility of the works management to formulate it. Plan must therefore be specific to the site. An onsite emergency plan is attributed to the response plan that contains and minimizes the effects due to emergencies within the installations which have a potential to cause damage to people and facilities within the installation premises.

An On-site emergency plan will be prepared and kept at plant premises to deal with emergencies and prevent disasters.

7.3.3.3 Onsite Emergency Preparedness and Response for Accidents

7.3.3.4 Emergency Responsibilities

Site Controller:

On receiving information about emergencies, he would rush to Emergency Control Center (ECC) and take charge of ECC and the situation and:

- *Assesses the magnitude of the situation on the advice of incident Controller and decides, whether the affected area needs to be evacuated.*
- *Whether personnel who are at assembly points need to be evacuated.*
- *Declare Emergency and order for operation of emergency siren.*
- *Organizes announcement by public address system about location of emergency.*
- *Assesses which areas are likely to be affected or need to be evacuated or need to be alerted.*
- *Maintains a continuous review of possible development and assesses the situation in consultation with Incident Controller and other Key Personnel as to whether shutting down the plant or any section of the plant is required and if evacuation of persons is required.*
- *Directs personnel for rescue, rehabilitation, transport, fire, brigade, medical and other designated mutual support systems locally available, for meeting emergencies.*
- *Controls evacuation of affected areas, if the situation is likely to go out of control or effects are likely to go beyond the premises of the factory, informs the District Emergency Authority, Police, Hospital and seeks their intervention and help.*
- *Informs the Inspector of Factories, Deputy Chief Inspector of Factories, TNPCB and other statutory authorities.*
- *Gives a public statement if necessary*
- *Keeps record of chronological events and prepares an investigation report and preserve evidence; and on completion of onsite Emergency and restoration of normalcy, declares all clear and orders for all clear warning.*

Incident Controller:

- *Assembles the incident control team.*
- *Directs operations within the affected areas with the priorities for safety to personnel minimize damage to the plant, property and environment and minimize the loss of materials.*

- Directs the shutting down and evacuation of plant and areas likely to be adversely affected by the emergency.
- Ensure that key personnel help is sought
- Provides advice and information to the Fire and Security Officer and the Local Fire Services as and when they arrive.
- Ensures that all non-essential workers/staff of the affected areas evacuated to the appropriate assembly points, and the areas are searched for casualties.
- Has regard to the need for preservation of evidence so as to facilitate any inquiry into the causes and circumstances, which caused or escalated the emergency.
- Co-ordinates with emergency services at the site
- Provides tools and safety equipment to the team members.
- Keeps in touch with the team and advise them regarding the method of control to be used and keeps the Site Controller of Emergency informed of the progress being made.

Emergency Coordinator - Rescue, Fire Fighting:

- Helps the incident Controller in containment of the emergency.
- Ensures fire pumps are in operating conditions and instructs pump house operator to be ready for any emergency with standby arrangement.
- des the firefighting crew i.e. firemen, trained plant personnel and security staff.
- Organizes shifting of the firefighting facilities to the emergency site, if required.
- Takes guidance of the Incident Controller for firefighting as well as assesses the requirements of outside help.
- Arranges to control the traffic at the gate and the incident area.
- Directs the security staff to the incident site to take part in the emergency operations under his guidance and supervision.
- Evacuates the people in the plant or in the nearby areas as advised by Site Controller.
- Searches for casualties and arranges proper aid for them.
- Assembles search and evacuation team.
- Arranges for safety equipment for the members of this team.
- Decides which paths the evacuated workers should follow and Maintains law and order in the area, and if necessary, seeks the help of police.

Emergency Coordinator-Medical, Mutual Aid, Rehabilitation, Transport and Communication:

- In the event of failure of electric supply and thereby internal telephone, sets up communication point and establishes contact with the ECC
- Organizes medical treatment to the injured and if necessary, will shift the injured to nearby hospitals.
- Mobilizes extra medical help from outside, if necessary.
- Keeps a list of qualified first aid providers of the factory and seek their assistance.
- Maintains first aid and medical emergency requirements.
- Makes sure that all safety equipment is made available to the emergency team.
- Assists Site Controller with necessary data and to coordinate the emergency activities.

- *Assists Site Controller in updating emergency plan, organizing mock drills verification of inventory of emergency facilities and furnishing report to Site Controller.*
- *Maintains liaison with Civil Administration.*
- *Ensures availability of canteen facilities and maintenance of rehabilitation centre.*
- *He will be in liaison with Site Controller/Incident Controller.*
- *Ensures transportation facility.*
- *Ensures availability of necessary cash for rescue/rehabilitation and emergency expenditure.*
- *Controls rehabilitation of affected areas on discontinuation of emergency; and ensures availability of diesel/petrol for transport vehicles engaged in emergency operation.*

General Responsibilities of Employees during an Emergency:

During an emergency, it becomes more enhanced and pronounced when an emergency warning is raised, the workers if they are in-charge of process equipment should adopt safe, and emergency shut down and attend any prescribed duty as essential employee. If no such responsibility is assigned, he should adopt a safe course to assembly point and await instructions. He should not resort to spread panic. On the other hand, he must assist emergency personnel towards objectives of DMP.

7.3.3.5 Emergency Facilities

Emergency Control Center (ECC):

For the time being, Office Block or a place nearer to the security office is identified as Emergency Control Centre. It would have external Telephone, Fax, and Telex facility. All the Site Controller/ Incident Controller Officers, Senior Personnel would be located here. Also, it would be an elevated place. The following information and equipment are to be provided at the Emergency Control Centre (ECC).

- *Intercom, telephone*
- *P and T telephone*
- *Safe contained breathing apparatus*
- *Fire suit/gas tight goggles/gloves/helmets*
- *Hand tools, wind direction/velocities indications*
- *Public address megaphone, hand bell, telephone directories*
- *(Internal P and T) factory layout, site plan*
- *Emergency lamp/torch light/batteries*
- *Plan indicating locations of hazard inventories, plant control room, sources of safety equipment, work road plan, assembly points, rescue location vulnerable zones, escape routes.*
- *Hazard chart*
- *Emergency shut-down procedures*
- *Nominal roll of employees*
- *List of key personnel, list of essential employees, list of Emergency Co-ordinators*
- *Duties of key personnel*

- *Address with telephone numbers and key personnel, emergency coordinator, essential employees.*
- *Important address and telephone numbers including Government agencies, neighbouring industries and sources of help, outside experts, chemical fact sheets population details around the factory.*

Assembly Point:

Number of assembly points depending upon the plant location would be identified wherein employees who are not directly connected with the disaster management would be assembled for safety and rescue. Emergency breathing apparatus, minimum facilities like water etc. would be organized. In view of the size of plant, different locations are ear marked as assembly points. Depending upon the location of hazard, the assembly points are to be used.

Fire Fighting Facilities:

First Aid Firefighting equipment suitable for emergency should be maintained in each section in the plant. This would be as per statutory requirements. However, fire hydrant line covering major areas. Fire alarms would be in the bulk storage areas. Fire officer will be the commanding officer of firefighting services.

Location of Windsock:

On the top of the Administration block and the top of each production blocks, windsocks shall be installed to indicate direction of wind for emergency escape.

Emergency Medical Facilities

Stretchers, gas masks and general first aid materials for dealing with fire burns would be maintained in the medical centre as well as in the emergency control room. Medical superintendent of the township will be the head of the causality services ward. Private medical practitioners help would also be sought. Government hospital would be approached for emergency help.

Apart from plant first aid facilities, external facilities would be augmented. Names of Medical Personnel, Medical facilities in the area would be prepared and updated. Necessary specific medicines for emergency treatment of Burns for Patients and for those affected by toxicity would be maintained. Breathing apparatus and other emergency medical equipment would be provided and maintained. The help of nearby industrial management in this regard would be taken on mutual support basis.

Ambulance:

An ambulance with driver availability in all the shifts and an emergency shift vehicle would be ensured and maintained to transport injured or affected persons. Number of persons would be trained in first aid so that, in every shift, first aid personnel would be available.

7.3.3.6 Emergency Actions

Emergency Warning:

Communication of emergency would be made familiar to the personnel inside the plant and people outside. An emergency warning system shall be established.

Emergency Shutdown:

There are number of facilities which can be provided to help deal with hazardous **conditions**, when a tank is on fire. The suggested arrangements are:

1. Stop the production.
2. Dilute contents.
3. Remove heat.
4. Deluge with water; and
5. Transfer contents.

Whether a given method is appropriate depends on the case. Cessation of agitation may be the best action in some instances but not in others. Stopping of the feed may require the provision of bypass arrangements.

Methods of removing additional heat include removal through the normal cooling arrangements or use of an emergency cooling system. Cooling facilities, which use vaporizing liquid, may be particularly effective, since a large increase in vaporization can be obtained by dropping pressure.

Evacuation of Personnel:

There could be a greater number of persons in the storage area and other areas in the vicinity. The area would have adequate number of exits and staircases. In the event of an emergency, unconnected personnel must escape to assembly point. Operators must take emergency shutdown procedure and escape. Time Office maintains a copy of deployment of employees in each shift, at ECC. If necessary, persons can be evacuated by rescue teams.

All Clear Signal:

Also, at the end of an emergency, after discussing with Incident Controllers and Emergency Co-ordinators, the Site Controller orders an all-clear signal. When it becomes essential, the Site Controller communicates to the District Emergency Authority, Police, and Fire service personnel regarding help required or development of the situation into an Off-Site Emergency.

7.3.3.7 Off-site Emergency

The Off-site emergency plan deals with measures to prevent and control emergencies affecting public and the environment outside the premises. Off-site plan is the responsibility of district emergency authority to integrate plans. Plan must therefore be specific to the area. The District Offsite Emergency Plan will be kept in the factory premises.

Off-site emergency plan follows the on-site emergency plan. When the consequences of an emergency go beyond the plant boundaries, it becomes an off-site emergency. Off-site emergency is essentially the responsibility of the public administration. However, the factory management will provide the public administration with the technical information relating to the nature, quantum and probable consequences on the neighbouring population. The off-site plan in detail will be based on those events, which are most likely to occur, but other less likely events, which have severe consequence, will also be considered. Incidents which have very severe consequences yet have a small probability of occurrence should also be considered during the preparation of the plan. However, the key feature of a good off-site emergency plan is flexibility in its application to emergencies other than those specifically included in the formation of the plan.

The roles of the various parties who will be involved in the implementation of an off-site plan are described below. Depending on local arrangements, the responsibility for the off-site plan should be either rest with the works management or, with the local authority. Either way, the plan should identify an emergency co-ordinating officer, who would take the overall command of the off-site activities. As with the on-site plan, an emergency control centre should be setup within which the emergency co-ordinating officer can operate. An early decision will be required in many cases on the advice to be given to people living "within range" of the accident - whether they should be evacuated or told to go indoors. In the latter case, the decision can regularly be reviewed in the event of an escalation of the incident.

7.3.3.8 Aspects Proposed to be considered in the Off-Site Emergency Plan

The main aspects which should be included in the emergency plan, are:

Organization: Details of command structure, warning systems, implementation procedures, emergency control centres. Names and appointments of incident controller, site main controller, their deputies and other key personnel.

Communications: Identification of personnel involved, communication centre, call signs, network, list of telephone numbers.

Specialized knowledge: Details of specialist bodies, firms and people upon whom it may be necessary to call e.g. those with specialized chemical knowledge and laboratories.

Voluntary organizations: Details of organizers, telephone numbers, resources etc.

Chemical information: Details of the hazardous substances stored or procedure on each site and a summary of the risks associated with them.

Meteorological information: Arrangements for obtaining details of weather conditions prevailing at the time and weather forecasts.

Humanitarian arrangements: Transport, evacuation centres, emergency feeding treatment of injured, first aid, ambulances and temporary mortuaries.

Public information: Arrangements for dealing with the media press office and informing relatives, etc.

Assessment of emergency plan: Arrangements for: (a) Collecting information on the causes of the emergency; (b) Reviewing the efficiency and effectiveness of all aspects of the emergency plan.

7.3.3.9 Role of the Emergency Co-ordinating Officer

The various emergency services should be co-ordinated by an Emergency Co-ordinating Officer (ECO), who will be designated by the district collector. The ECO should liaison closely with the site main controller. The Emergency Operation centre (EOC) functioning at each Taluk office Collectorate, round the clock. Again, depending on local arrangements, for very severe incidents with major or prolonged off-site consequences, the external control should be passed to a senior local authority administrator or even an administrator appointed by the central or state government.

7.3.3.10 Role of the Local Authority

The duty to prepare the off-site plan lies with the local authorities. The Emergency Planning Officer (EPO) appointed should carry out his duty in preparing for a whole range of different emergencies within the local authority area. The EPO should liaison with the works, to obtain the information to provide the basis for the plan. This liaison should ensure that the plan is continually kept up to date. It will be the responsibility of the EPO to ensure that all those organizations, which will be involved in offsite handling of the emergency, know of their role and are able to accept it by having for example, sufficient staff and appropriate equipment to cover their responsibilities. Rehearsals for off-site plans should be organized by the EPO.

7.3.3.11 Role of Police

Formal duties of the police during an emergency include protecting life and property and controlling traffic movements. Their functions should include controlling bystanders, evacuating the public, identifying the dead and dealing with casualties, and informing relatives of death or injury.

7.3.3.12 Role of Fire Authorities

The control of a fire should be normally the responsibility of the senior fire brigade officer who would take over the handling of the fire from the site incident controller on arrival at the site. The senior fire brigade officer should also have a similar responsibility for other events, such as explosions and toxic release.

Fire authorities in the region should be appraised about the location of all stores of flammable materials, water and foam supply points, and fire-fighting equipment. They should be involved in on-site emergency rehearsals both as participants, and on occasion, as observers of exercises involving only site personnel.

7.3.3.13 Role of Health Authorities

Health authorities, including doctors, surgeons, hospitals, ambulances, and so on, should have a vital part to play following a major accident, and they should form an integral part of the emergency plan. For major fires, injuries should be the result of the effects of thermal radiation to a varying degree, and the knowledge and experience to handle this in all but

extreme cases may be generally available in most hospitals. For major toxic releases, the effects vary according to the chemical in question, and the health authorities should be apprised about the likely toxic releases from the plant, which will enable them in dealing with the aftermath of a toxic release with treatment appropriate to such casualties. Major off-site incidents are likely to require medical equipment and facilities additional to those available locally, and a medical "mutual aid "scheme should exist to enable the assistance of neighbouring authorities to be obtained in the event of an emergency.

7.3.3.14 Role of Government Safety Authority

This will be the factory inspectorate available in the region. Inspectors are likely to satisfy themselves that the organization responsible for producing the off-site plan has made adequate arrangements for handling emergencies of all types including major emergencies. They may wish to see well-documented procedures and evidence of exercise undertaken to test the plan. In the event of an accident, local arrangements regarding the role of the factory inspector will apply. These may vary from keeping a watching brief to a close involvement in advising on operations in case involvement in advising on operations. In cases where toxic gases may have been released, the factory inspectorate may be the only external agency with equipment and resources to carry out tests.

7.4 R&R ACTION PLANS

The Rehabilitation and Resettlement are not applicable since the project site is already used for industrial purposes, which is categorized as dry land & it is patta land and the total project land belongs to the Thejo Engineering Ltd partially on lease basis. The proposed expansion project will be implemented within the existing facility and additional land acquired which is located adjacent to the existing plant area on a lease basis for 25 years.

The Existing project site is in a non-notified industrial area, as per the Town and Country Planning/Development authority Classification. The project site is classified as dry land, and the land classification letter is enclosed as **Annexure-9** and DTCP approval copy is enclosed as **Annexure-2**.

The layout of the existing and proposed project site is enclosed as **Annexure-12** and **Annexure-13**. There are no R&R studies raised; Hence, Social Impact Assessment is not conducted.

7.5 Summary of the Chapter:

M/s Thejo Engineering Limited handles some hazardous chemicals, about their storage, quantity to be stored, possible hazards and control measures are given in detail. Hazard Identification and Qualitative & Quantitative Risk Assessment have been developed to improve upon the integrity, reliability, and safety of industrial plants, the same has been discussed. Further Thejo has prepared the Disaster Management Plan (onsite emergency plan) to effectively utilize all the resources at its disposal for the protection of life, environment, and property.

CHAPTER – 8

PROJECT BENEFITS

(This chapter would highlight the direct and indirect benefits on the physical infrastructure and social infrastructure due to proposed projects.)

8 PROJECT BENEFITS

M/s. Thejo Engineering Limited is an existing facility located at Survey No. 176/3, 181/5, 181/6A, 169/2B, 169/4D, 170/2B, 170/3B, 170/4, 175/3, 176/1, 176/2, 181/1B, 175/4B and 175/5B, Jaganathapuram Road, Irullipattu village, Ponneri Taluk, Thiruvallur Dist, Tamil Nadu State 600 067.

Project proponent has currently manufactured 199.99 TPM of Rubber Molded products (11 Nos) and 2 Nos of Adhesive (Hot & cold) of 38.5 KL/Month. The existing facility is established in 16916.46 Sq. m of area. The existing project is operating with valid consent orders vide PROCEEDINGS NO.F.0380GMP/RS/DEE/TNPCB/GMP/W/2024 valid up to March 31st, 2025.

Now, M/s. Thejo Engineering Limited proposed expansion in production of Rubber molded products (**199.99 TPM to 486 TPM**) and Adhesives (**38.5 KL/Month to 100 KL/Month**) & proposed PU Products manufacturing with production capacity of **6.352 TPM** due to increase in the demand of the existing and proposed projects along with enhancement of manufacturing facilities with additional area of **11.46 Acres (46364.97Sq. m)** The total area after expansion is **15.63 Acres (63221.43 Sq. m)**. The project cost for the proposed expansion proposal is **10699.99 Lakhs**.

The Major benefits of the project are as follows:

8.1 Financial Benefits:

- ✓ Revenue to Government
- ✓ The Proposed projected Annual Turnover will be 130 Crores & the Proposed projected Annual Profit will be 6.0 Crores.

8.2 Social Benefits:

- ✓ Employment generation for local people directly and indirectly and other businesses and ancillary industry in the state
- ✓ Establishment of small and medium scale engineering ancillaries
- ✓ Change in the socio-economic scenario of the area.
- ✓ Proposed project is of Export oriented unit will generate more foreign exchange, benefiting to the Nation.
- ✓ Development of surrounding region
- ✓ Income generation of the large community of farmers

8.3 Environmental Benefits:

- ✓ The major impact on the environment as it avoids overexploiting land, water shortages and reduces greenhouse gas emissions & proposed industrial activities are a source of pressure on the environment in the form of emissions to the atmosphere and water ecosystems, waste generation and resource consumption.
- ✓ 33% of land is allocated for Greenbelt development in and around the project site to capture the fugitive emissions, attenuate the noise generated and improve the aesthetics.

- ✓ Greenbelt helping to contiguous habitat network for wild plants, animals and wildlife, cleaner air and water.
- ✓ Effluent Treatment Plant (15 KLD) will be provided to treatment of wastewater recycling for reuse within the facility.
- ✓ Sewage Treatment Plant (25 KLD) will be provided to treatment of domestic wastewater for recycling for reuse within the facility.
- ✓ Rainwater harvesting will be implementation to reduce reliance on natural resources (Fresh water usage)
- ✓ Hazardous waste & other wastes and Municipal Solid Wastes will be disposed through Authorized dealers as per the Rules & Regulations issued.

8.4 Other Tangible Benefits

- ✓ The easy availability of infrastructure, manpower, raw materials will reduce the production cost, which indirectly beneficial to end user.
- ✓ The development of Greenbelt in and around the plant premises will improve the aesthetics of the area.

8.5 Summary

The proposed project will give major Financial and social & Environmental benefits due to development of infrastructure, Manufacturing of Plywood as well as generation of employment. project would help in increasing the living standard of the nearby populations/ habitants through CER program.

CHAPTER – 9

ENVIRONMENTAL COST BENEFIT ANALYSIS

(Highlights environmental value enhancement and benefits thereof if recommend in scoping stage only if recommended during scoping stage.)

9 ENVIRONMENTAL COST BENEFIT ANALYSIS

Not recommended during scoping stage.

CHAPTER – 10

ENVIRONMENTAL MANAGEMENT PLAN

(The chapter proposes the Environmental Management Plan highlighting the mitigation measures and roles and responsibilities of the management. This would include specific time frames for completion, resources required and specific responsibility.)

10 ENVIRONMENTAL MANAGEMENT PLAN

10.1 Introduction

This Environmental Management Plan (EMP) for the M/ Thejo Engineering Ltd identifies the principles, procedures and methods that will be used to control and minimize the environmental impacts of the proposed operational activities associated with the proposed project development. It is intended to ensure that commitments made by the Thejo will minimize project related environmental and social impacts.

As part of our ongoing commitment to excellence in environmental and social performance we will ensure the following:

- ✓ *Fulfil all environmental conditions associated with project approvals.*
- ✓ *Develop, promote, and foster a shared sense of responsibility for environmental and performance of the project.*
- ✓ *Promote environmental awareness and understanding among employees and contractors through training, identification of roles and responsibilities towards environmental management.*
- ✓ *Linking project performance to overall environmental performance.*
- ✓ *To monitor the environmental performance throughout the project and implement an adaptive management approach for continuous improvement and to meet the regulations.*

10.2 Objectives of the EMP

The EMP has the following goals:

- ✓ *Identifying project activities that may have a detrimental impact on the environment.*
- ✓ *Detailing the mitigation measures that will need to be taken, and the procedures for their implementation.*
- ✓ *Establishing the reporting system.*
- ✓ *An integrated plan for monitoring, assessing, and controlling potential impacts once the project has been approved and all permits and conditions granted.*
- ✓ *Facilitate a continual review of post operation activities.*
- ✓ *Preparation of Greenbelt Development.*
- ✓ *Preparation of rainwater harvesting scheme and energy conservation actions*
- ✓ *To prepare a detailed action plan for implementation of mitigation measures.*
- ✓ *Measure the effectiveness and success of proposed mitigation measures.*
- ✓ *Development of Environment Management Cell*

The EMP also serves to highlight specific requirements that will be monitored during the development, and should the environmental impacts not have been satisfactory prevented or mitigated; corrective action will have to be taken. The document should, therefore, be seen as a guideline that will assist in minimizing the potential environmental impact of activities.

10.3 Environmental Management Cell (EMC)

EMC roles and responsibilities

- ✓ All the activities will be monitored to ensure the appropriate implementation of all environmental mitigation activities and to identify areas where environmental management plan compliance is not satisfied.
- ✓ For effective implementation of the system, it is also necessary to have a permanent organizational set-up. Company has set-up permanent Environmental Management Cell (EMC) for the effective implementation and monitoring of environmental management system.
- ✓ The company assigned responsibility to the concerned for implementation of environmental control measures.
- ✓ The EMC will handle all issues related to different environmental attributes; it will be responsible for overall environmental and social management in project being undertaken by M/s Thejo Engineering Ltd from investigation level to execution at project level.
- ✓ The EMC will be responsible for the technical planning, implementation and monitoring of all environmental mitigation and compensation measures. The Environmental Management Cell (EMC) set-up by the company is given in **Figure 10-1**.
- ✓ Existing EHS policy of Thejo enclosed as **Annexure-19**.

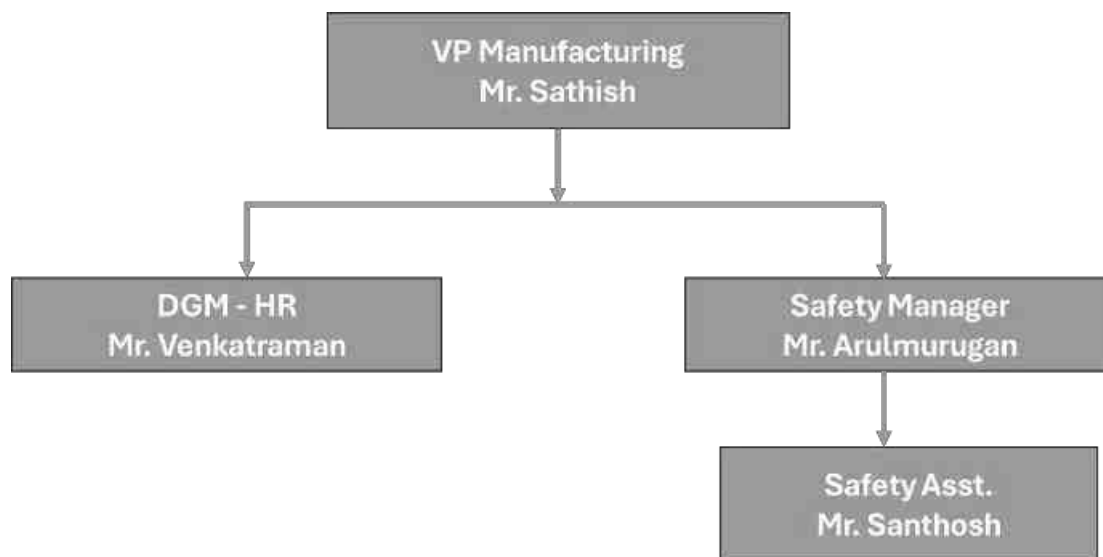


Figure 10-1 Environmental Management Cell

- ✓ This section describes the organizational structure and responsibilities for implementation of the EMP as shown in **Table 10-1**.
- ✓ Executive Director of the company will be responsible for total environmental management.

Table 10-1 EMC Responsibility

S. No.	Designation	Responsibilities
1	VP Manufacturing Mr. Sathish	- Establish an environment management cell. - Responsible for overall environmental management. Regularly coordinate with DGM, HR & Admin and take feedback regarding all the activities performed under EM and give directions to succeeding component. - Provide sufficient funds for environmental management cell to reduce the environment impacts.
2	DGM - HR Mr. Venkatraman	- Keep aware the Management about all the activities performed under EMC. - To ensure and study the feasibility of ETP working considering the present and future requirements and to suggest for improvements if any. - To ensure, implement and follow all the required safety procedures & facilities, avoid the unsafe act & conditions, organizing safety trainings, mock drills, availability of onsite & off-site emergency plans. Plan & implement good safety committee. - Applying and getting the consent of operation of air & water and authorization to store the hazardous waste.
3	Safety Manager Mr. Arulmurugan	- Treatment and disposal of trade effluents and sewage effluents as per consent. - Carryout ambient air quality monitoring as per consent. - Monitoring the stack / chimney. - Hazardous waste management handling and disposal. - Plant and maintain adequate numbers of trees and gardens around the industry. - Prepare Management Information System (MIS) reports and budget for environment management program. - To deal with the environmental issues and for ensuring compliance with the conditions prescribed by TNPCB. - Non-compliance / violation of environmental norms, if any are reported to GM/DGM HR & Admin and immediate required action is taken.
4	Safety Asst. Mr. Santhosh	- Daily ETP/STP work plan execution. - Preparation of SOP for STP and ETP related documents. - Sampling the effluent at different stages and analysing to check the efficiency of the plant. - Record the readings in the log sheet and preparation of daily report. - Coordinating with outside agency to carry out the AAQ, stack, Fugitive emission, noise level monitoring and water quality parameters checking. - Preparation of monthly returns (Form No.1, Form No.3 & analysis report), Form No.13, Form No.4, Form No.5 and compliance to TNPCB. - Ensuring Plant and Process Safety.

In addition to the above, company will have Safety, Health & Environment (SHE) policy to adhere with standard operating process to comply with the statutory and bring into focus any infringement of any norms and directives with regards to the SHE and to take further corrective actions

10.4 Environmental Policy

In addition to the Environment Safety& Health policy, Thejo will have Environmental Policy to adhere with standard operating process to comply with the statutory and bring into focus any infringement of any norms and directives with regards to the SHE and to take further corrective actions. The Environmental Policy is enclosed as **Annexure-19**.

In addition to the above, the company will have EHS policy to adhere with standard operating process to comply with the status and bring into focus any infringement of any norms and directives with regards to the Safety, Health & Environment and to take further corrective actions. The EHS Team will look after the operation of the Effluent & Sewage Treatment Plant and monitor and control the environmental quality. Members of the EHS Team shall be well qualified and experienced in the fields concerned.

Routine tests of wastewater such as pH, solids, temperature etc. will be carried out in the laboratory that will be established on site. However, for additional tests of water, wastewater, soil, air etc., services of accredited laboratories as well as that of a consultant would be hired.

10.5 Compliance against the Consent Condition

Compliance against the consented conditions shall be observed with respect to the following Acts,

- Water (Prevention & Control of Pollution) Act, 1974
- Air (Prevention & Control of Pollution) Act 1981
- Hazardous and Other Wastes (Management and Trans-boundary Movement) Rules 2016.

Table 10-2 Compliance against the consent condition

S. No.	Description	Frequency	Remark
1	Six Monthly Post EC-Compliance	Twice in a Year	Before end of June and Before end of December
2	Renewal of Consent	Once in 3/5 years	Application for renewal shall be done 60 days before the expiry date.
3	Environmental Statement	Once in a year	Would be submitted for every financial year before 30 th September of next year.
4	Hazardous Waste Returns	Once in a year	Would be submitted for every financial year before 30 th June of next year.

10.6 EMP for Construction Phase

The construction phase is for a short period hence the impacts will also be temporary and will be for short duration.

- ✓ During construction activities, mainly emission of dust and gases from movement of vehicles and construction activity is expected.
- ✓ Water will be sprinkled on loose topsoil to prevent re-suspension of dust into ambient air due to movement of vehicles etc.
- ✓ Separate civil construction material storage yard will be constructed within the site, and it will be covered.
- ✓ Possibility of raising green belt along with construction activity will also be explored.
- ✓ Transport vehicles and construction equipments / machineries will be properly maintained to reduce air emissions.
- ✓ Vehicles and equipment's will be periodically checked for pollutant emissions against stipulated norms. All vehicles' Pollution Under Control (PUC) Certificate shall be checked regularly.
- ✓ Exhaust vent of D.G. set will be kept at proper height to ensure quick dispersal of gaseous emissions.
- ✓ There shall not major housing facilities at site for construction workers and hence a major source of impact on water environment can be avoided.
- ✓ Proper and sufficient sanitary facilities shall be provided to construction workers to maintain all hygienic conditions at site.
- ✓ Care shall be taken during construction work and will not create any obstruction/dips in the topography which can lead to accumulation of water within premises leading to undesirable consequences like health and hygiene problems etc.
- ✓ The main solid waste generation during the construction phase includes rubble, brick bats, debris, steel scrap, wooden scrap, sand, gravel etc. However, these materials are inert in nature and will not result into leaching of any substance or constituent.
- ✓ Wooden scrap, steel scrap shall be given to scrap dealers.
- ✓ Acoustic enclosure shall be provided to all D.G. sets to control the noise during construction activity.
- ✓ All construction workers working in high noise areas will be provided appropriate PPEs like earmuffs and made to wear them during working hours.

10.7 EMP for Operational Phase

Monitoring during the operation phase shall reflect those environmental and socio-economic issues that may persist upon the completion of construction activities. Monitoring shall focus on evaluating the effectiveness of project mitigation measures and continuing baseline monitoring and sampling. The mitigation measures to prevent adverse impact during the operation phase of the project shall focus on the following:

1. Air Environment
 - a) Fugitive Emission Control
 - b) Odour control
2. Water Environment
3. Noise environment
4. Solid and Hazardous waste Management
5. Land environment
6. Ecology and Biodiversity
7. Socio Economic

8. Occupational Health and Safety
9. Greenbelt Development
10. Resource Conservation -Rainwater Harvesting
11. Corporate Environmental Responsibility (CER)
12. Budget For EMP

10.7.1 Air Environment

The major air pollution sources from the DG sets, Boilers, shot blasting & Ban Bury Section. The major air pollution sources from the industry are Boilers, DG sets and Shot blasting. The DG set and boiler sources are provided with stacks of adequate height, Boiler having a Common stack to disperse the emanating flue gases containing suspended particulate matter, oxides of sulphur and nitrogen without affecting the ground level concentrations. Shot Blasting is facilitated with Dust Collector followed by Stack height of 5m AGL. Ban Bury Section having Inbuilt dust collector. The existing and proposed APC measures for stacks are provided in **Table 4-23**.

a) Fugitive Emission

- ✓ *Water sprinkling systems will be installed to suppress dust emission from loading & unloading activities and roads will be paved for minimize the dust emission during transportation activities.*
- ✓ *All the liquids will be stored in tanks or barrels in a dedicated storage area. The containers will be kept tightly closed to prevent vapour emissions. All liquids will be charged through pumps with suitable seals to prevent any leakages and vapour emissions.*
- ✓ *Entire manufacturing activity will be carried out in closed container and no emissions occur during the manufacturing process.*
- ✓ *Raw materials (liquids) for adhesive plant will be transported in closed containers / closed pipelines and Solid raw material(bags) will be by suitable hand carts.*
- ✓ *Adequate ventilation systems will be provided in production area.*
- ✓ *Separate inward & outward paved roads for movement of trucks with segregated raw material storage area to minimize dust pollution.*
- ✓ *Greenbelt will be developed around the plant to arrest the fugitive emissions.*

b) Odour control Measures

- ✓ *All liquid raw material handled in drum will be cooled down during summer before charging to minimize its vapour pressure and control of odour.*
- ✓ *Handling the liquid chemicals from tankers will be by pump with a closed loop pipeline.*
- ✓ *Little or partial handling area is equipped with ventilators.*
- ✓ *A portable duct connection shall the mounted-on drum vent nozzle to exhaust fume while opening lid of the drum.*
- ✓ *Regular monitoring of work area by supervisors*
- ✓ *Source control of odours emanating from plants*
- ✓ *Sufficient Ventilation shall be provided in all plants as per factory Rules.*
- ✓ *Provision of RIDGE ventilators and louvers for ventilation and air circulation and odour dilution with the ambient air*

10.7.2 Water Environment

Water and wastewater management

During operation phase, water requirements of proposed project will be mainly for process, Process coolant, Cooling Tower, Boilers, Fire hydrant, Floor washings, Domestic use & Green belt etc.,

Table 10-3 Wastewater management

S. No	Description	Effluent generation (KLD)	Method of Treatment
1	Proposed effluent & Domestic Wastewater quantity and treatment details	Domestic- 23 KLD	Domestic Wastewater generation will be 23 KLD, will be treated in proposed 25 KLD MBBR STP and treated water (23 KLD) will be used Greenbelt.
		Effluents- 13 KLD	Effluent from Process, Coolant water, Colling Tower blowdown, RO Rejects from RO Plant and Boiler blowdown will be treated in Proposed ETP (15 KLD). Treated effluent (13 KLD) will be used in the plant for Fire hydrant storage and greenbelt ETP sludge will be sent to TSDF or Authorized recycler.

During the construction phase, the domestic sewage will generate 4.5 KLD and will be disposed through septic tank followed by soak pit, Septic tank will be cleaned periodically.

- ✓ After the proposed expansion Domestic Wastewater generation will be 23 KLD, will be treated in proposed 25 KLD MBBR STP and treated water (23 KLD) will be used for Flushing and Greenbelt.
- ✓ Effluent from Process, Coolant water, Colling Tower blowdown, RO Rejects from RO Plant and Boiler blowdown will be treated in proposed ETP (15 KLD). Treated effluent 13 KLD will be used in the plant for Fire hydrant storage and greenbelt development.
- ✓ ETP sludge will be sent to TSDF or Authorized recycler.

Proposed STP and ETP process flow diagram & specification report is enclosed as **Annexure.10 & 11** respectively.

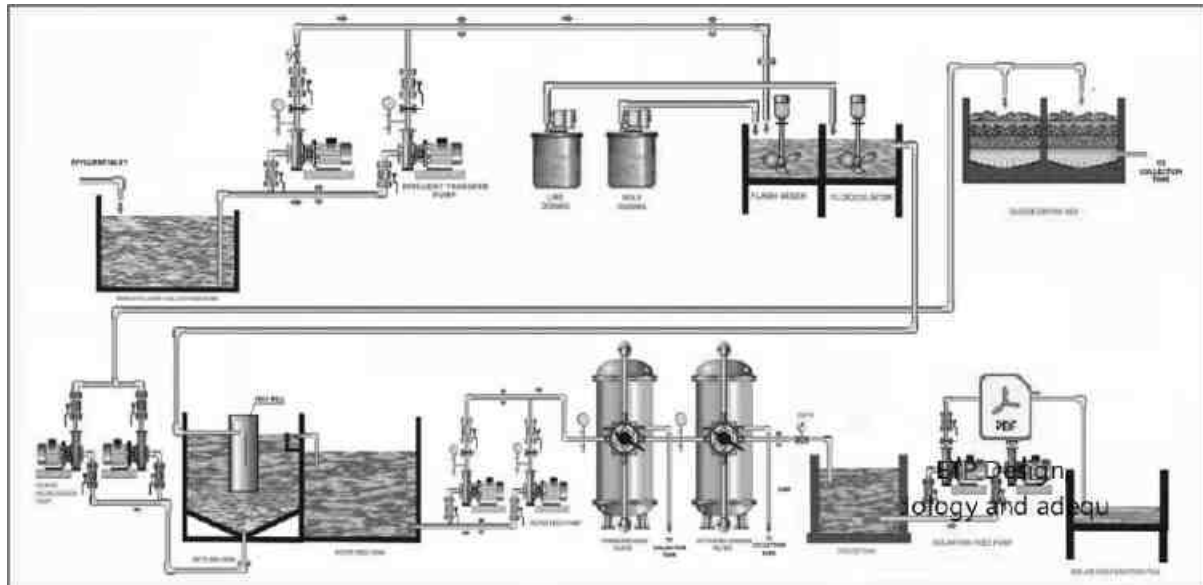


Figure 10-2 Proposed 15 KLD ETP Layout/Process Flow Diagram

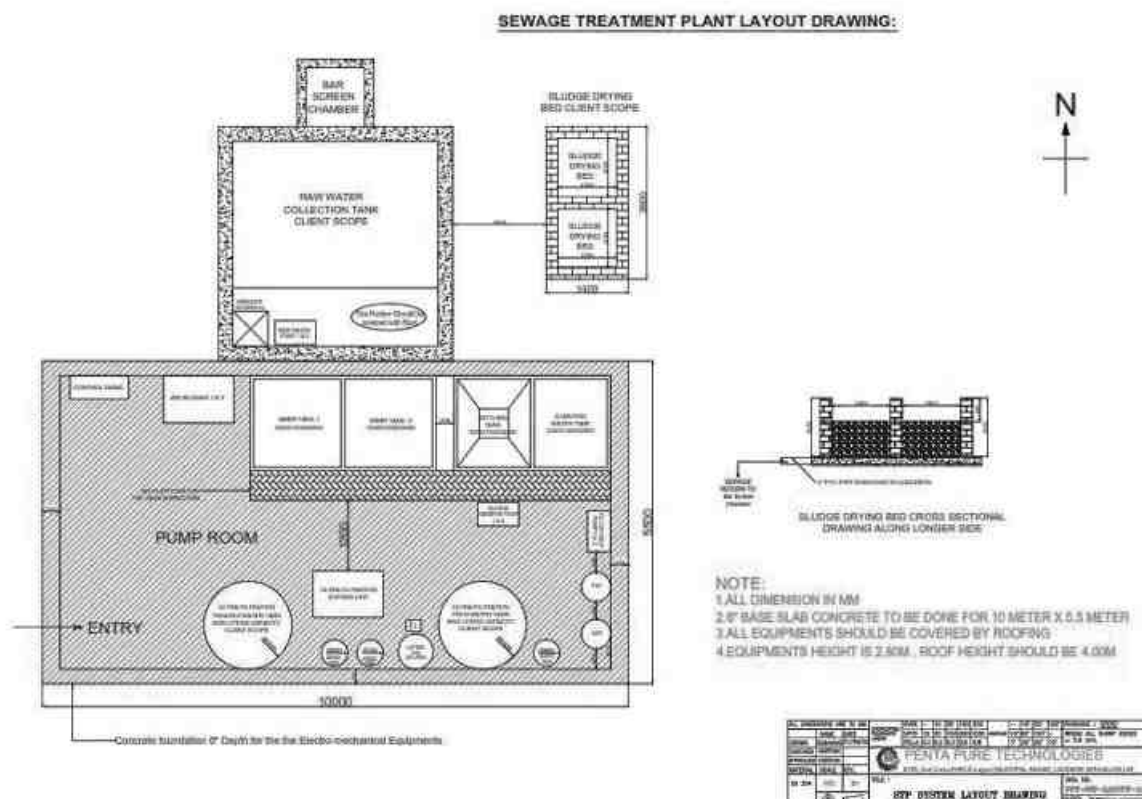


Figure 10-3 Proposed 60 KLD STP Layout/Process Flow Diagram

10.7.3 Noise Environment

The major sources of noise are Machineries, Generators, Compressors, boilers, and vehicular movements during operation phase for loading/unloading activities, feed pumps, ID fans, FD fans and other noise generating units like process equipment may increase noise level.

The following measures are proposed to mitigate the negative impact of the operation phase of the project on the surrounding noise environment.

- ✓ *DG sets and air compressors are provided with integral acoustic enclosures.*
- ✓ *Calibrator and sanding machines will have inbuilt acoustic panels.*
- ✓ *The ambient noise levels will be ensured within the ambient standards by inbuilt design of mechanical equipment and buildings.*
- ✓ *33% of Greenbelt & Land scaping around the factory building and premises to control the intensity of noise to the surrounding area.*
- ✓ *Providing personal protective equipment as a safety measure.*
- ✓ *Training will be imparted to personnel to generate awareness about the effects of noise and importance of using PPEs.*
- ✓ *Noise monitoring will be carried out to check the efficacy of maintenance schedules undertaken to reduce noise levels and noise protection measures.*

10.7.4 Solid and Hazardous waste management

10.7.4.1.1 Solid waste management

The collection, transportation and disposal of the solid waste generated during the operation phase of the proposed project will be done as per the Municipal Solid Wastes (Management & Handling) Rules, 2016 (MSW Rules). Recyclable items like paper, glass, iron bits, timber products etc. will be sold to local vendors. These generated solid wastes will be first segregated as plastic, glass, paper, and other waste separately and disposed of as per MSW Rule, 2016. The plastic, glass and paper waste may be collected by private vendors for recycling. Sludge generated from STP (after drying) will be filled in HDPE bags and used as manure for gardening purposes.

10.7.4.1.2 Hazardous Waste Management

The various hazardous waste generated from the process are used or spent oil, ETP sludge from wastewater treatment. ETP sludge waste is stored within the premises and disposed of as per the guidelines of CPCB and TNPCB which will be sent to TSDF facility. Hazardous waste materials will be properly disposed of as per the Hazardous and Other Wastes (Management and Transboundary Movement) Rules 1989 and subsequent amendment in 2016.

MSW Generation and Management is shown in **Table 2-25**. Hazardous waste generation and Management is given in **Table 4-27** and Other Solid Waste generation and Management during operational phase is given Error! Reference source not found..

10.7.5 Land environment

The following measures are proposed to mitigate negative impact during the operational phase of the project on the land environment.

- ✓ *Following measures are proposed to mitigate impact on Land Environment during operational phase of the project.*
- ✓ *Excavated earth will be backfilled in the trench after foundation work and topsoil will be restored for gardening purpose.*

- ✓ *The construction debris as well as debris from demolition work shall be utilized within the site for levelling purpose and base course preparation of internal roads.*
- ✓ *Municipal solid waste, Non-Hazardous and Hazardous waste will be disposed as per norms.*
- ✓ *ETP and STP will be provided to treat the effluents and Domestic wastewater. No effluent is discharged directly on land.*
- ✓ *Hazardous materials are prohibited to be drained or dumped in the premises. Accidental spills will be cleaned, reported, and monitored. HW will be disposed as per norms.*
- ✓ *Implementing Soil Conservation methods like 33 % of Greenbelt development with native plants, Windbreaks are composed of shrubs, plants and trees in garden/lawn areas, Regular watering soil along with plants, adding earthworms to soil and Control Storm Water.*

10.7.6 Biological Environment

There is no potential source of impact on terrestrial biology during the operational phase. The air pollution control devices along with greenbelt will control the release of air pollutants to a greater extent. It is expected that the ecology of the region will be preserved by these mitigation measures.

- ✓ *There is no eco- sensitive and there are no wildlife sanctuaries or national parks or biosphere reserves or wetlands, or important bird areas or migratory corridors of wildlife within 10km from the project site.*
- ✓ *The core area is non-planned land and dry land. It is sparsely covered by isolated thorny bushes and invasive weeds. There are no timber trees or any of the threatened taxa of the BSI. There are no Reserve/Protected Forests within 5km of the core area.*
- ✓ *The existing flora and vegetation of the project site is going to be lost on account of construction activities (fabrication and erection of sheds, workshops, material handling and storage facilities).*
- ✓ *Greenbelt will be developed from the construction phase to improve the aesthetic value in the area and to screen out the fugitive dust generated during construction & will be minimized through paving and water sprinkling.*
- ✓ *Implementing Soil Conservation methods like, Windbreaks are composed of shrubs, plants and trees in garden/lawn areas, Regular watering soil along with plants, adding earthworms to soil for improvement of soil fertility and perennial fodder production.*

10.7.7 Socio-Economic environment

The proposed project area is patta land, there are no R&R issues envisaged. The Existing project site is in a non-notified industrial area, which is categorized as dry land. As per the Town and Country Planning/Development authority Classification the project site is classified as dry land, and the land classification letter is enclosed as **Annexure-9** and DTCP approval copy is enclosed as **Annexure-2**. The proposed expansion project will be implemented within the existing facility and additional land acquired which is located adjacent to the existing plant area.

- ✓ The total project land belongs to partially owned by Thejo Engineering Limited of 4.18 Acres. The remaining portion of land is under a 25 Year lease. lease documents Land documents are enclosed as **Annexure-1**. The land ownership details are provided in **Table 2 6**.
- ✓ Due to proposed project the socio-economic scenario of the area will be changed& Development of surrounding region.
- ✓ Socio-economic benefit to the locals as it would provide both direct employment (600 Nos) and indirect beneficiary (1000–1500 Nos) during operational phase and during construction phase (50Nos).
- ✓ Employment generation for local people, farmers, transporters, carpenters, labourer and other businesses and ancillary industry in the state
- ✓ Establishment of small and medium scale engineering ancillaries
- ✓ The plywood produced from social agro forestry timber will motivate farmers to plant such trees and result in additional income.
- ✓ CER and CSR benefits to the local region people/Environment & Revenue to Government
- ✓ As per the OM F. No. 22-65/2027 -IA.III dated 1st May 2018 and its amendment, the project Proponent is allocated 1.5 % of the total project cost is 1,60, 49,985/- (Say 1,60,50,000). As the Project cost 10699.99 Lakhs will be allocated to nearby villages on the issued raised during public Hearing.

10.7.8 Occupational Health and Safety

Thejo will provide a safe and healthy work environment for its employees by conducting annual medical check-ups for all the employees.

The main objectives are.

1. Maintenance and promotion of workers' health and working capacity.
2. Improvement of working environment by following well-being program for its employees.
3. Monitor the workplace to maintain industrial hygiene practices.
4. Development of work culture in a direction which will support health and safety at work and thereby promoting positive social climate for smooth operation that will enhance productivity. Area monitoring is done.
5. Employees undergo annual health check-up.
6. All personnel will be provided with personal protective equipment individually as required.

The general functions of the safety committee will be.

- a. Identify workplace hazards.
- b. Conduct routine workplace inspections.
- c. Provide Personal Protective Equipment.
- d. Develop and implement safe work procedures and rules.
- e. Provide on-going safety training & Enforce safety rules and appropriate discipline.
- f. Promote safety awareness and reduce the potential for injury/loss.

- g. Enforce of safety rules, measure safety performance & reduce frequency/severity of injuries.

10.7.8.1 Possible Occupational Health Hazards and Impacts

Hazardous & Toxicity Characteristics of Raw Materials/Chemicals are shown in **Table 7-1**.

Details of Occupational Health Impacts and Safety Hazards are shown in **Table 10-4**

Table 10-4 Details of Occupational Health Impacts and Safety Hazards

S. No	Possibilities of Occupational Health Hazards	Occupational Health Impacts
1	Exposure to toxic chemicals	Toxic, irritation
2	Exposure to fire chemicals	Fall injury, electrocution,
3	Exposure to chemical dust	Body injury, burns, skin sensitization
4	Slip/trip, fall, electric shock, etc.	Severe irritation to eyes & skin
5	Spillage/leakage	Respiratory disorder
6	Overflow	Damage to nearby equipment
7	Exposure to corrosive chemicals.	Fatality etc.

10.7.8.2 Occupational Health Surveillance Programme

Surveillance is an important core activity in the practice of occupational health. Two broad groups of surveillance are commonly performed **hazard surveillance** is given in **chapter 7, Section 7.2** under Risk Assessment, and **health surveillance**. Although the focus of the former is hazards at the workplace, the latter type of surveillance pertains to the health of a person from a particular group of workers.

Health surveillance is an important part of health-risk management and seeks to confirm whether employees are potentially exposed to existing workplace hazards, whether the control measures are effective and the workers.

The Factories Act, 1948 (as amended in 1987), and the rules framed thereunder provide for preemployment and periodical medical examinations of workers employed in industries with hazardous chemicals/processes and dangerous operations under Section 41-C and Section 87, respectively. A list of 29 notifiable diseases in Schedule III, permissible exposure limit (PEL) values in Schedule II, and list of dangerous operations is given in the Factories Act. The Proposed Occupational Health Surveillance Planning is shown in **Table 10-5**.

Benefits of occupational health Programme:

- ✓ Prevents cost of absence and Ill-health redundancy
- ✓ Reduction in re-training and recruitment costs
- ✓ Helps in retention of staff and build employee loyalty.
- ✓ Increased productivity leading to increased profits.
- ✓ Decrease employer liability.
- ✓ Reduced risk and cost of litigation
- ✓ Rise in public profile of the company
- ✓ Helps to prevent occupational disease like deafness, cancers, asthma, etc.
- ✓ Protection of both physical and economic wellbeing of employees
- ✓ Corporate social responsibility

- ✓ Compliance with legislation
- ✓ Less insurance premium

The health program network will be proposed as follows:

I. Organize the Team

➤ Dept / section head	Team leader
➤ Field HSE representative	Member
➤ Site medical officer	Member
➤ Technical personal	Member
➤ Any specialist	Member

10.7.8.3 Occupational Health Surveillance Planning

- ✓ **Pre-Employment Screening/Examinations:** All employees will be subjected to pre-placement medical examinations to determine their fitness for the jobs on site. Potential exposure to the work environment will be considered before placing an employee on the job. (*List of Tests: Audiometric, Vision, Color Blindness, Chest, Urine, RBS, T.B., Cancer, AIDS, Liver Function Tests (LFT), Eye Test, CBC Urine, Chest X-Ray Glutamic Pyruvic Transaminase (SGPT) and Stool D/R etc.*)
- ✓ **Periodic Medical Examinations:** Periodic medical examinations are the same as the pre-employment screening and may be modified according to current conditions, such as changes in the employee's symptoms, site hazards or exposures. (*List of Tests: Periodical Check-up– Audiometric Test, Liver Function Tests (LFT), Color Blindness, Eye Test, Urine, RBS, complete blood count, dental X ray, Anemia, X Ray, Serum Glutamic Pyruvic Transaminase (SGPT) and Stool D/R, Medical fit test for use of Breathing Apparatus, vision etc.*)
- ✓ Comparison of sequential medical reports with baseline data is essential to determine biologic trends that may mark early signs of adverse health effects and thereby facilitate appropriate protective measures. The frequency and content of examinations are normally one year. Apart from this for workers working in Hazardous area, medical examination is conducted by Doctor Authorized by Factory Inspectorate.

Occupational Surveillance Planning, Break down areas as for HRA Assessment matrix in Production blocks, storage areas, Store, Control room, etc.

Table 10-5 Proposed Occupational Health Surveillance Planning

S. No	Cadre	Occupational Exposures	Possible Hazards	Surveillance Required		Frequency
				Screening	Vaccination	
1	Production maintenance Technicians	Noise level above 85dB for 8 hrs a day	Hearing loss	Liver Function Tests (LFT)	-	Initially/Upon entry
		During Electrical works	Color blindness	Audiometric Test, Liver Function Tests (LFT)	-	Annual
				Color Blindness (Only for electrical technicians)	-	Initially/Upon entry
2	Vehicle Operators	Driving for company business	Vision & hearing loss	Eye Test	-	Annual
				Audiometric Test	-	Initially/Upon entry
				Color Blindness	-	Initially/Upon entry
3	Forklift/Crane Operators	Loading/ unloading driving	Vision & hearing loss	Eye Test	-	Annual
				Audiometric Test	-	2 - yearly
				Color Blindness	-	Initially/Upon entry
4	Occupational Health Centre Staff	Infectious agents in blood and other body fluids, while handling the patients.	Transmission of contagious diseases from patients	-	Hepatitis B	Complete Course
				-	Tetanus	5 Yearly
5	Canteen Staff	Food preparation for PPL Staff	Transmission of contagious diseases e.g. Typhoid, A and Parasitic infections.	X Ray, Serum Glutamic Pyruvic Transaminase (SGPT) and Stool D/R		Upon entry
					Hepatitis A	Upon entry
					Typhoid	Upon entry
				Medical Review by Company Doctor based on medical screening results of SGPT and Stool D/R		Annually

6	Janitorial Staff	Exposure to effluent & hazardous wastes	Susceptible to diseases like Typhoid, Hepatitis etc.		Hepatitis B	Complete Course
					Tetanus	5 Yearly
7	Security & Safety team	Use of breathing apparatus Smokey conditions of fire emergency Sirens of high pitch during emergency.	Susceptible to cardio-respiratory distress and syncope. Vision & hearing	Medical fit test for use of Breathing Apparatus		Annually
				Vision		Annual for Staff above 45 yrs. Two yearly for Staff below 45 yrs.
				Audiometric		Two Yearly for all Staff

10.7.8.4 Health Risk Assessment (HRA)

Exposure assessment and risk assessment for target-organ damage; identify hazardous agents, materials, and processes; find out what health risk are; review work processes and toxicity of materials and prepare risk matrix; identify who might be at risk from exposure to those hazards and how; screen able health effects are those that can be detected during the preclinical phase and where intervention at this stage is more beneficial than during later stages of the disease.

Selection of goals and target population: Identification of the group(s) of workers for which surveillance or screening activities will be appropriate; periodic medical examinations at scheduled intervals.

Choice of testing modalities: Selection and standardization of test procedures and quality control for each screen able health effect dependent on target organ; do certain workers need special tests.

Collection of data and reconfirmation of abnormal results.

A health is generally defining as the likelihood that exposure to a hazard will result on occupational illness, disability, or death(severity).

- ✓ The risk obtained by combining the probability with severity is below:

$$\text{Risk}(R) = \text{probability/likelihood}(P) \times \text{severity}(S)$$

Categorizes health hazards as very high, high medium, low.

Table 10-6 Health Risk Assessment Matrix

↓ Severity		Likelihood / Probability(P) →				
Rating	Consequences	Very unlikely (could happen but probably not)	Unlikely (could happen but very rarely)	Often likely (could have happened at some time)	Likely (could happen once in a year)	Extremely likely (could happen at any time)
		1	2	3	4	5
1	No health effect	1	2	3	4	5
2	Minor / slight health effect	2	4	6	8	10
3	Major health effect	3	6	9	12	15
4	Single mortalities	4	8	12	16	20
5	Multiple mortalities	5	10	15	20	25

Setting Priorities:

Risk	Risk Rating
20-25	Intolerable/ very high (V/H)
12-16	High(H)
8-10	Medium (M)
<8	Low(L)

Table 10-7 Hierarchy of Control for Health Risk Assessment as per Matrix

↓ Severity		Likelihood / Probability(P) →				
Rating	Consequences	Very unlikely (could happen but probably not)	Unlikely (could happen but very rarely)	Often likely (could have happened at some time)	Likely (could happen once in a year)	Extremely likely (could happen at any time)
		1	2	3	4	5
1	No health effect	No Immediate Action required Third priority Second Priority First Priority				
2	Minor / slight health effect					
3	Major health effect					
4	Single mortalities					
5	Multiple mortalities					

10.7.8.5 Proposed Hierarchy of Control

- **Eliminate**- remove the risk entirely most preferred option.
- **Substitute**- use methods, tools, materials, equipment etc. that have a lower inherent hazard.
- **Engineering controls**- provide an engineered solution to the risk.
- **Administrative controls** –establish a procedure or instruction that reduces the exposure.
- **Personal protective equipment**- the last line of defence-least preferred answer

10.7.8.5.1 Control Measures of Health Hazards as per priority

1st Priority:

- Stop the exposure.
- Notify management immediately.
- Identify all sources.
- Implement immediate control improvements, e.g., introduce use of personal protective equipment as short-term measure until other more robust controls are in place.
- Consider need for exposure measurement,
- Review of HRA, including measurements, after improvements are made.

2nd priority:

- Reduce exposure to standard level.
- introduce use of personal protective equipment as short-term measure until other more robust controls are in place.
- Identify and implement work practice and control improvements consider hierarchy of controls.
- Consider need for exposure measurement.
- Review of HRA, including measurements, after improvements are made.

3rd priority:

- Identify and implement work practice and control improvements consider hierarchy of controls.
- Consider need for exposure measurement.
- Review HRA, including measurements after improvements are made.

10.7.8.6 Environment, Health, and Safety policy

Thejo Engineering Ltd is prepared Environment Health and Safety Policy (HSE) and will be placed it at appropriate places in the factory premises and record. The proposed Environmental Health and Safety Policy is enclosed as **Annexure-19**.

10.7.8.7 Proposed safety systems and precautionary measures

Personal protective equipment (IS approved) like safety helmet, safety shoes/ gumboots hand gloves, gas mask/ nose mask, PVC apron, SCBA Set, PVC pressure suit, goggles, hood, etc. will also be provided to the required personnel, the details are provided in the following sections.

Regarding safety management and measures taken to maintain a safe working atmosphere in the factory. The following programs will be arranged by PP.

Safety Committee: The Environmental Management Cell will act as the Safety committee will be held once in the quarter.

Operation Safety committee: This committee consists of members of departmental in charges such as production, store, electrical and mechanical, security, and logistics. The meeting of this committee is conducted once a month.

10.7.8.8 Details of Work Zone Monitoring

Work zone monitoring will be carried out by a third party once every 6 months. Location for samplings shall be identified. Ambient air & noise monitoring shall be done as per requirements.

The unit will have multi gas / toxic gas and oxygen detectors/VOC Monitor in that multi gas detector can be used to check oxygen, LEL, VOC, CO and H₂S concentration in atmosphere and in confined spaces like areas involved different process, overhead tanks, sumps etc., and oxygen detector can be used for checking oxygen concentration in atmosphere and in confined spaces like areas involved different process, overhead tanks & sump etc.

The following information will be incorporated in the format for maintaining records of work zone monitoring.

- ✓ Location/operation monitored.
- ✓ Identified contaminant.
- ✓ Sampling instrument used.
- ✓ Number of samples.
- ✓ Range of contaminant concentration as measured in sample.
- ✓ Average concentration.

- ✓ TWA concentration of contaminant.
- ✓ Reference method used for analysis.
- ✓ Number of workers exposed at the location being monitored.
- ✓ Signature of the person taking samples.

10.7.8.9 Monitoring of the Occupational Injury & it's Impact on Workers

The following action plan will be prepared & followed to monitor the occupational injury to workers:

- ✓ Each workplace will be evaluated for the existing work conditions.
- ✓ Unsafe act & unsafe practices will be identified.
- ✓ Unsafe equipment's, unsafe areas, etc., will be identified.
- ✓ Area will be checked for proper ventilation and illumination.
- ✓ Air-borne concentration of toxic chemicals will be measured, and records will be kept.
- ✓ Evaluation of training & on the job work
- ✓ Impact of the above-mentioned unsafe conditions on workers will be studied and remedial measures for the same will be adopted.

10.7.8.10 Safety Trainings & Mock Drills

Safety training (on safe material handling, first aid, & all safety aspects) shall be provided monthly by the safety officers to department wise.

Evaluate the effectiveness of emergency preparedness and spread awareness among employees' mock drill will be carried out at the interval of every six months. After completion of the mock drill, a summary report shall be made, and corrections will be made if any weakness has been observed. Emergency Preparedness Plan (Onsite Emergency Plan) is provided in **Chapter 7**.

Thejo is proposed an adequate SAFETY Systems details are provided in **Section 10.10.4** along with the above safety systems, the company also ensured the safety features below to ensure Zero Accident. Safety measures to remove hazards and use safety measures to handle those hazards. Thejo will adopt the following safety measures.

- ✓ *No maintenance work or fabrication work is permitted hot permit are issued.*
- ✓ *No ignitable zones are declared and marked so.*
- ✓ *Work permit system with strict compliance.*
- ✓ *Dedicated chemical storage area with good ventilation and exhaust system and all chemicals are stored as per compatibility.*
- ✓ *Dyke walls provided for chemical storage tanks.*
- ✓ *All reactor vessels are worked with low pressure and provided with safety/relief valve and cooling systems.*
- ✓ *Calibration is ensured for the gauges of pressure, temperature, and vacuum.*
- ✓ *Body earthing provided to all equipment involved in the process, electrical earthing, static earthing, and instrument earthing provided wherever required.*
- ✓ *The main manufacturing building is equipped with state-of-the-art RIDGE ventilators and Louvers to provide good clean environment inside the plant.*
- ✓ *Safety posters are displayed at vital places of work.*

- ✓ Safety slogans are conveyed on day-to-day basis by displaying on notice board.
- ✓ Housekeeping is maintained on top priority.
- ✓ Training programmes are conducted to create awareness about safety among staff/workers.
- ✓ Firefighting system is updated and maintained to meet any emergency at any time fire hydrant system and fire equipment are kept in serviceable condition. Firefighting training and mock fire drill are conducted monthly.
- ✓ Lifts, cranes, forklift will be examined in every six months by authorized agency.
- ✓ Safety of building and machinery is taken care of on top priority by concerned maintenance authority.

In respect to health measures, following measures are being taken in the factory:

- ✓ Housekeeping is carried out and maintained.
- ✓ Accumulation of dirt and refuse will be removed, flooring is kept clean, and waste is disposed.
- ✓ First aid boxes are kept and maintained at required places.
- ✓ Ambulance is kept in ready position to meet any case of emergency.

As per the provisions of factory Act’1948 and in exercise of powers conferred by section (40B), a medical officer assisted by one qualified subordinate. First aid training program will be conducted periodically. The following action is to be considered in the programs.

- ✓ Surrounding areas, drainages are kept clean.
- ✓ State of art RIDGE ventilation systems will be provided at every workplace.
- ✓ Sufficient lighting will be provided at every workplace.
- ✓ Drinking water facilities will be provided for workers in the factory.
- ✓ Latrines, urinals, and spittoons will be provided for workers.
- ✓ Occupational Health monitoring will be provided as given in the following sections.

10.7.8.11 Proposed Safety Systems

Proposed fire & safety systems are summarized in **Table 10-8**. The proposed Fire Hydrant System is given in **Table 10-9**. Suitability of Extinguishing Media for Different Fires is summarized in **Table 10-10**. Proposed Fire Extinguishers details are shown in **Table 10-11**.

Table 10-8 Fire & Safety Systems for proposed project

S. No	Name of the Equipment	Quantity (Nos)
1	Fire Hydrant System	1
2	Fire Extinguishers	251
3	Fire Alarm System	3
4	Eye wash fountain/Safety Showers	5
5	Emergency PPE cupboards	10
6	Wind Sack	1
7	Sand buckets	40
8	First Aid	10

Table 10-9 Proposed Fire Hydrant System

S. No	Equipment Name	Capacity and Nos
1	Jockey Pump	10.83 m ³ /hr – 2 Nos
2	Electrical pump	171 m ³ /hr – 1 Nos 410 m ³ /hr -1 No
3	DG pump	410 m ³ /hr – 1 Nos
4	Fire hydrant points	46
5	Fire hydrant pumps	3
6	Fire hose	95
7	Water storage tanks	1 No (150 KL)

10.7.8.12 Fire Extinguisher

Suitability of fire extinguisher depending on the combustible material, fires have been classified into four types. Suitability of extinguishing media for different fires is provided in **Table 10-10**.

Table 10-10 Suitability of Extinguishing Media for Different Fires

S. No	Class of fire	Suitable Fire Extinguisher
1.	Class A: Organic Material i.e., wood, papers, rubber & plastics.	DCP, Mechanical Foam
2.	Class B: Flammable Liquid and Flammable Gases i.e., Petroleum Products, Paints, Chemicals etc.	Mechanical Foam, CO ₂ and DCP
3.	Class C: Electrical	DCP and CO ₂
4.	Class D: Flammable Metals i.e., Lithium, Sodium, and Potassium etc.	Special DCP, Sand

The company will have trained personnel for firefighting and intends to improve the firefighting skills of employee by conducting frequent training on Firefighting. The unit will have 251 Nos. of different types (CO₂, ABC, M. Foam and Form extinguishers Water Jet, extinguishers placed in all prominent places in the factory the same will be proposed and maintained during expansion also. Proposed fire extinguishers are given in **Table 10-11**.

Table 10-11 Proposed Fire Extinguishers details.

S. No	Type	Proposed	
		Capacity	No's
1	ABC Fire Extinguishers	9 Kg	20
		2 Kg	25
		6Kg	90
2	M.Foam Fire Extinguishers	9 Ltr	45
		6 ltr	6
3	Foam Fire Extinguishers	25 kgs	25
4	CO ₂	4.5 Kgs.	35
		6.5 Kg	1
		2 Kg	4
Total			251

10.7.8.13 Emergency Equipment and PPEs

The unit will have total 10 numbers of Emergency cupboards. Each Emergency Cupboard will have the following items.

- Air suits / Air Line Respirators
- Nose Mask
- PVC / Acid Suit
- Helmet- Provided to individuals
- Ear Plug
- Safety Glass & Face Shield
- Gum boots
- Safety Belt
- Manila Rope / Life Safety Rope
- Fire Axe
- Fire Proximity Suit
- Fire Gel Blankets / Water Gel Blanket
- Resuscitator
- Spill Kit
- Safety Ladder
- Emergency Flameproof Torches
- Hand gloves

Details and Description of Safety equipment are shown below.

1. Fire Axe:

A fire axe is a type of axe which has been designed specifically for the use of fire-fighters, and it includes several features which make it ideally suitable to mitigate emergency services.



2. Helmet:

A helmet with a face shield is a form of protective gear worn on head to protect head and face from hazards such as flying objects and chemical splashes or potentially infectious fluid.



3. Fire Suit:

Fire suit is a protective clothing designed to protect a firefighter from high temperatures, especially near fires of extreme temperature.



4. Manila rope:

Manila rope is very durable, salt water and damage resistant, flexible fiber which shall be used to access at height/Confined space during emergency



5. Smoke escape mask:

Smoke masks assist people in safe egress from fire emergencies. It will provide respiratory protection from particulate matter, carbon monoxide, and other toxic gases commonly produced by structural fires.



6. Canvas Stretcher

A stretcher is a medical device used to carry injured or an incapacitated person from one place to another during emergency.



7. Compressed Air Pack

An emergency air supply which will provide enough air to allow a worker to exit oxygen depleted or contaminated area.



8. Powered Air purifying respirator

PAPR utilizes a powered mechanism to move ambient air through an air-purifying element(s) to remove contaminants from the ambient air.



9. Safety torch

Compact and simple to use, this torch is designed for use in emergency situations or wherever the need arises for a handheld safety torch



10.7.8.13.1 Eye Wash Fountain and Safety Shower

The unit proposed 5Nos. of Eye wash fountain / Safety showers. 2 nos will be in adhesive plant and chemical storage area, the remaining 3 will be arranged in plywood plant.

10.7.8.13.2 Wind Sack / Wind Direction Indicator

Wind sacks are placed above the Administration Block buildings.

10.7.8.14 Occupational Health Centre (OHC)

M/s. Thejo Engineering Ltd will have an agreement with nearby hospitals for their valuable service during emergencies along with 24/7 ambulance facility. Rs. 2,50,000/- Fund will be allocated for occupational health & safety of all employees and implementation of Fire and safety systems as proposed.

10.7.8.14.1 First aid Boxes

A first aid kit is a collection of supplies and equipment for use in giving first aid. First Aid boxes will be made available in the Security Room, Admin Block and OHC. First Aid items will be issued to injure only by authorized persons.

The following are the contents of First Aid Box,

1. Dettol – Antiseptic solution	9. Small Sterilized Dressings
2. Ciplox – Eye Drops	10. Medium Sterilized Dressings
3. Soframycin – Skin ointment	11. Roller Bandage – 5 cm wide
4. Silverex – Burn ointment.	12. Roller Bandage – 10cm wide
5. Betadine – Microbicidal solution	13. Band Aid
6. Iodex – Pain reliever	14. Crocin / Paracetamol Tablet
7. Sterilized Cotton Wool	
8. Surgical Paper Tape	

10.7.9 Greenbelt Development

The main objective of the greenbelt is to provide a barrier between the plant and the surrounding areas. The greenbelt helps to capture the fugitive emissions and to attenuate the noise generated in the plant apart from improving the aesthetics of the plant site. In order to control industrial pollutants, dense tree plantations are necessary.

Selection of Species for Greenbelt Selection of plants for green belt plantation will be made with the following criteria:

- The plant should be a fast-growing species.
 - It should have deep root system.
 - Should bear the leaves for a longer period.
 - Should be a local species.
 - Should have good survival rate.
-
- ✓ Thejo Engineering Limited is allocated 33% (20866.2 Sq. m) of land for green belt development as per norms.
 - ✓ The width of the greenbelt will be maintained as per CBCB guidelines and there shall be 3 rows of plants with a gap of 2m between the plants.
 - ✓ Thejo Engineering Limited is planted ~ 1000 in the existing facility. During expansion, 2000 trees under Greenbelt Development will be planted in a phased manner in and around the project boundary. Trees which are already within the project site same will be retained.
 - ✓ A capital cost of INR 3.0 Lakhs will be earmarked for this purpose and INR of 0.5 Lakhs will be allocated for recurring expenses towards green belt development and maintenance.

Table 10-12 List of Plants proposed for Greenbelt.

S. No	Common Name	No. of trees proposed
1	Ashoka Tree	300
2	Narra Tree	300
4	Neem Tree	500
5	Vagai Tree	250
6	Pungam Tree	200
7	Babhool Tree	150
8	Serakondrai Tree	300
Total		2000

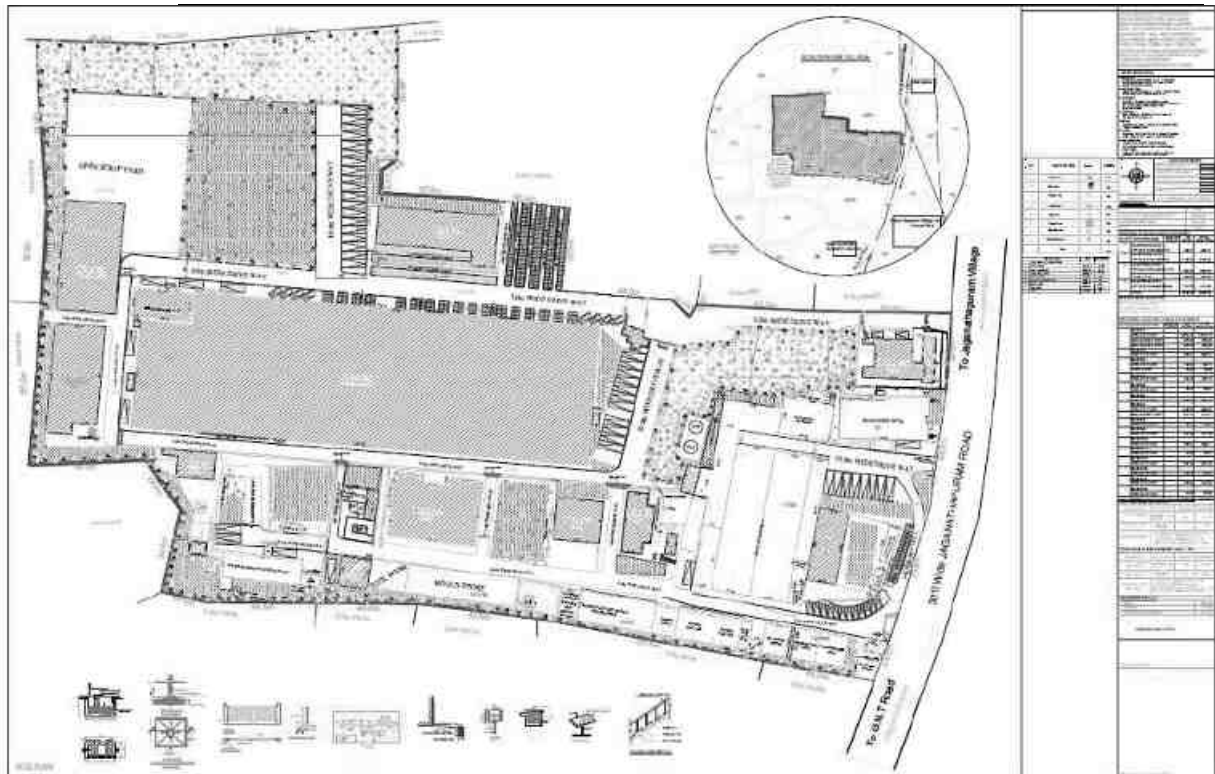


Figure 10-4 Proposed Greenbelt layout

10.7.10 Resource Conservation

10.7.10.1 Rainwater Harvesting (RWH)

Rainwater can be harvested either by storing in tanks for ready use or ground water recharging. Rainwater Harvesting system to prevent runoff and to help reduce freshwater consumption.

Rainwater will be collected from the roof top to the rainwater storage tank /RCC Pond, without any contamination or after removing impurities i.e., leaves, floating materials, birds drop out etc. Rainwater Harvesting layout & Storm water layout is enclosed as **Annexure-16**.

Rainwater harvesting and Ground water recharging.

Rainwater harvesting is an important component of wise resource use and environmental management. The total amount/quantity of water, i.e., received in the form of rainfall over an area is called the rainwater endowment of that area, out of which the amount of water that can be effectively harvested is called the rainwater harvesting potential. The collection efficiency accounts for the fact that all the rainwater falling over an area cannot be effectively harvested due to losses on account of evaporation, spillage or run-off etc.,

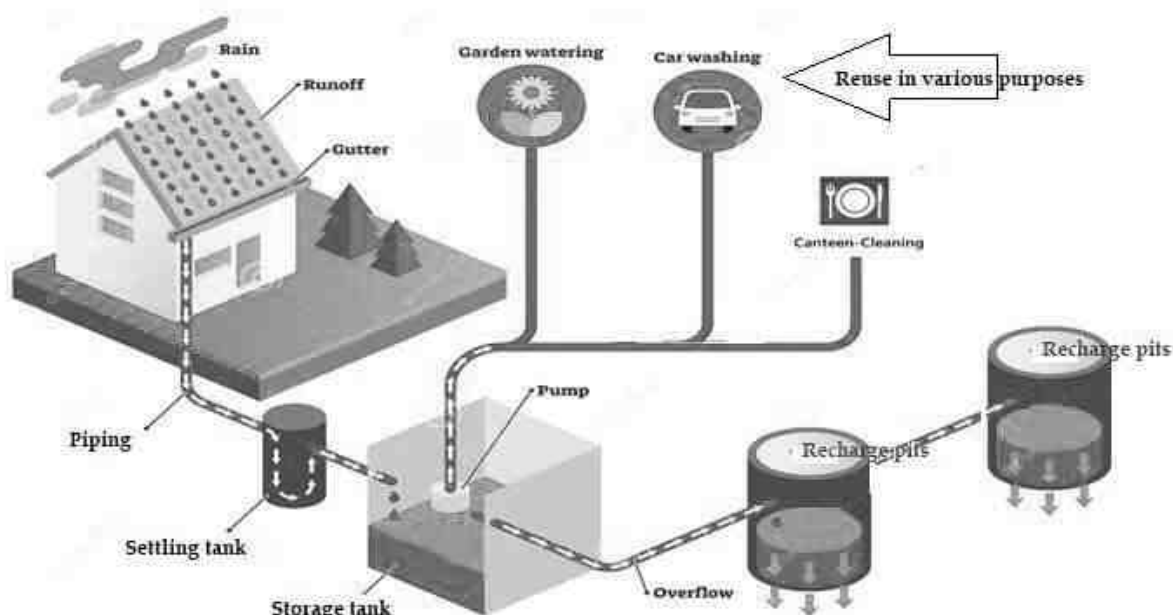


Figure 10-5 Schematic diagram of Rain water Harvesting

Rainwater Harvesting shall be implemented at project sites to conserve rainwater. Roof top area, greenbelt/green area, road/paved area, and open areas proposed. The formula used for running off estimation is based on CPCB guidelines (Rainwater Harvesting in India an Appraisal – Hosted by CPCB & MoEF&CC, Compiled, Prepared, Published by ENVIS Centre at CPCB on Control of Pollution, e-book@2016.).

As estimated, **1104.56 KL** of rainwater will be harvested during the rainy season. The estimated Rainwater is given in **Table 10-13**. Rainwater harvesting can be implemented by adopting the following measures.

Table 10-13 Rainwater Harvesting Estimation

S. No	Land Use	Area (m ²) (A)	Railfall (mm) (I)	Run off Co-efficient (C)	Volume harvested (m ³) $Q=(C*I*A)$
1	Ground coverage area /Built-up area	16242.95	0.08	0.85	1104.52
Total		-	-	-	1104.52

- Roof-top Rainwater Harvesting
- Settling tanks followed by Storage Pond
- Recharge pits

Roof-top Rainwater Harvesting:

In a typical roof top rainwater harvesting system, rainwater from the roof is collected in a storage vessel or tank for use during periods of scarcity. Such systems are usually designed to

support the drinking and cooking needs of the family and comprise a roof, a storage tank and guttering to transport the water from the roof to the storage tank.

Storage ponds/tanks are RCC civil structures to store harvested rainwater. From these storage facilities, water can be pumped directly to points of demand or supplied through overhead tanks. Recharge pits are recommended to be constructed near the harvesting structures.



Figure 10-6 A Model Storage Pond/Tank

Storm water networks will be designed throughout the site for collection of internal runoffs during the monsoon season. Pipeline and storm water drainage will be connected/ diverted to water storm water tank.

Recharge pits:

In addition to Roof-top rainwater harvesting, 38 Nos of recharge pits will be planned by the industry, Recharge pits of 2.0 m diameter with a depth of 3.0 m will be constructed. The pit must be back filled with a sequence of boulders, gravel, pebbles, and coarse sand from bottom to top. A model Recharge pit/Trench is shown in **Figure 10-7**.

20% of water will recharge the ground water and 80% of water will be discharged through storm water drain.

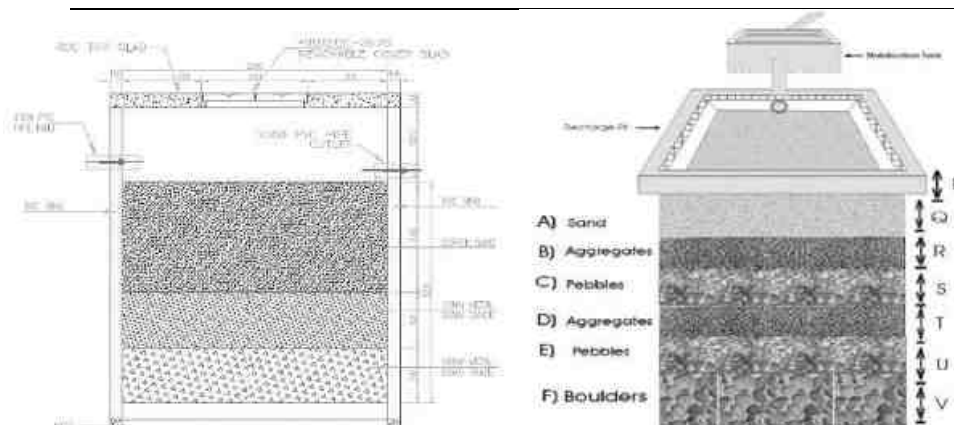


Figure 10-7 Recharge pit/Trench proposed design(left) & (right)

10.7.11 Corporate Environmental Responsibility (CER)

The proposed CER activities are based on the socio-economic indicators and based on the felt needs of the people during the primary survey. The need-based CER programs are proposed for the villages adjacent to the project site. Some of the key observations related to lack of facilities or people’s basic needs are illustrated below.

As per the OM F. No. 22-65/2027 -IA.III dated 1st May 2018 and its amendments, the project Proponent is allocated 1.5 % of the total project cost is 1,60, 49,985/- (Say 1,60,50,000) as the Project cost 10699.99 Lakhs. The proposed plan and activities will change according to the issues raised during the Public Hearing as per the above OM revised on 20.09.2020.

CER program proposes to supply good quality of water for drinking, Provide toilet facilities & Skill development for educations to nearby villages & Government Schools. The proposed CER Plan is given in **Table 10-14**.

Table 10-14 CER Proposal for period of 2025-26 to 2032-33

S. No	Proposed Activity	Cost break-up	Name of the Beneficiary village Name	Cost allocated in INR Rs	Period
1	Community hall cum marriage hall (25,00,000*2)	2 Hall*25,00,000/-	Irullipattu village Jaganadhapuram	50,00,000	2025-26
2	Greenbelt development as Avenue plantation at Govt. Schools	each village 500 Plants 500* 4=2000 Nos each plant cost including maintenance 200/-	Irullipattu village, Jaganadhapuram Alinjivakkam Janappan Chattram	4,00,000	2026-27
3	Smart Classroom with all relevant facilities for Govt School	for each village 2,00,000*4=8,00,000/-	Irullipattu village, Jaganadhapuram Alinjivakkam Janappan Chattram	8,00,000	2027-28
4	Skill Development programs with repudiated universities with certificate	Yearly once in each village 1,50,000*4=6,00,000/-	Irullipattu village, Jaganadhapuram Alinjivakkam Janappan Chattram	6,00,000	2028-29
5	Renovation and Desalting of existing water bodies	in the 4 villages (2,00,000*4=8,00,000/-)	Irullipattu village, Jaganadhapuram Alinjivakkam Janappan Chattram	8,00,000	2029-30
6	Rainwater Harvesting-	Ground water recharge pits in each village 10 Nos 4*10= 40 Nos pits Each pit cost = 25000*40 No pit	Irullipattu village, Jaganadhapuram Alinjivakkam Janappan Chattram	10,00,000	2030-31
7	Solar Street Lights at villages streets	Each village 20 light Each light 30,000*80	Irullipattu village, Jaganadhapuram Alinjivakkam Janappan Chattram	24,00,000	2031-32
8	Drinking water plant	Each village one Plant with maintenance 2.50,000*4	Irullipattu village, Jaganadhapuram Alinjivakkam Janappan Chattram	10,00,000	2032-33
Total				120,00,000	
Remaining: 40, 50,000/- Will be allocated under Public Hearing issues apart from the proposed activities.					

10.7.12 Cost Estimate for Environment Management Plan (EMP)

Capital cost of EMS estimates based on cost of air pollution control equipment 's, wastewater, waste management facility, greenbelt development and management plan, safety measures and other components of the EMP will be implemented along with the commissioning of the proposed project. The cost estimate for Environmental Management Plan is given in **Table 10-15**.

Table 10-15 Cost Estimate for Environmental Management Plan

S. No	Particulars	Existing Cost in Lakhs.		Proposed after expansion in Lakhs.	
		Capital Cost	Recurring Cost/Yr	Capital Cost	Recurring Cost/Yr
1	APC Measures				
	Shot Blasting & Ban Bury Section-Dust collector	4.0	0.5	-	0.5
	Bag Filter for Boiler	5.0	0.5	-	0.5
	DG Sets stack	3.0	0.2	-	0.2
	Metallic-I Fume Exhaust System	-	-	2.0	0.2
	Metallic-II Fume Exhaust System	-	-	2.0	0.2
	Ceramic Fume Exhaust System	-	-	4.0	0.2
	Mixing Dust collector	-	-	2.0	0.2
	PU Fume Exhaust System	-	-	4.0	0.2
2	ETP	0.5	0.5	8.5	0.5
3	STP	-	-	10.0	0.5
4	Solid waste management	1.0	0.20	1.0	0.5
5	Rainwater Harvesting	1.0	0.20	2.0	0.20
6	Green Belt Development	3.0	0.50	3.0	0.50
7	Occupational Health & Safety	2.27	0.50	2.5	0.50
8	Environmental Monitoring	-	1.5	-	2.3
Total Cost in Rs.		19.77	4.6	41	7.2
After Proposed Implementation Capital cost		60.77			
After Proposed Implementation Recurring cost		11.8			

10.8 Summary:

The main purpose of EMP is to minimize the identified potential environmental impacts to be generated from the proposed project and to mitigate the consequences. During construction phase materials will be transported through covered trucks. Greenbelt has been developed and will be maintained to reduce noise impacts. Regular water sprinkling will be done to reduce PM concentration in the atmosphere. PPEs will be provided to workers, and first aid

facilities will be kept at designated locations. During operation phase the industry will maintain Environment Management Plan in place for the proposed unit which will cover all the environment protection measures to mitigate environmental impact. Solid/Hazardous waste management will be done as per HW (Management, Handling and Trans boundary Movement) – 2016. Noise level within the plant premises will be measured regularly and will try to maintain range within permissible limit. Budget for ETP is Rs. **8,50,000 lakhs**, for STP is Rs. **10,00,000 lakhs**, for **APC is RS.14,00,000 Lakhs**, for Hazardous and Solid Waste is Rs. **1,00,000 Lakhs**, for Environmental OH&S is Rs. **2,50,000 Lakhs**, for Greenbelt is Rs. **3,00,000 Lakhs** and Budget for **CER is Rs. 1,60, 49,985/-** to be spent within a period of eight years.

CHAPTER – 11

SUMMARY AND CONCLUSION

(Summarize the entire report and conclude the summary of the EIA report.)

11 SUMMARY AND CONCLUSION

11.1 Introduction

This chapter aims to present the summary in wholesome of EIA report with conclusion and recommendation based on impact and mitigation measures suggested.

M/s Thejo Engineering Limited was the result of that dream set up by K.J. Joseph and Thomas John in 1974 as a company providing maintenance of belt conveyor systems, Thejo has grown today into India's foremost solution provider in the bulk material handling, conveyor systems, mineral processing, and corrosion protection sectors. 'THEJO', is a Pioneer in the field of Belt Conveyor Maintenance and a leading Engineering Services provider in the Mining and Material Handling Industry. 'THEJO', is a Pioneer in the field of Belt Conveyor Maintenance and a leading Engineering Services provider in the Mining and Material Handling Industry. Thejo has established globally through its offices in Australia, Saudi Arabia, Brazil and Chile.

M/s. Thejo Engineering Limited is an existing facility located at Survey No. 176/3, 181/5, 181/6A, 169/2B, 169/4D, 170/2B, 170/3B, 170/4, 175/3, 176/1, 176/2, 181/1B, 175/4B and 175/5B, Jaganathapuram Road, Irullipattu village, Ponneri Taluk, Thiruvallur Dist, Tamil Nadu State 600 067, proposed for expansion in production capacities and enhancement of manufacturing facilities with additional land.

Manufacturing of “Adhesives, Moulded rubber products and PU Products” is termed under Schedule 5(f), Synthetic Organic Chemicals, Category A as per the EIA notification dated 14th September 2006 and its subsequent amendments however and as the project is located at non notified industrial area hence the project will be appraised by the EAC, MOEF&CC. As a part of obtaining Environmental Clearance the Draft EIA report has been prepared as per the obtained ToR the draft report will be submitted to TNPCB for Public Consultation.

11.2 Project Description

Project proponent has currently manufactured 199.99 TPM of Rubber Molded products (11 Nos) and 2 Nos of Adhesive (Hot & cold) of 38.5 KL/Month. The existing facility was established in 16916.46 Sq. m of area. The existing project is operating with valid consent orders vide PROCEEDINGS NO.F.0380GMP/RS/DEE/TNPCB/GMP/W/2024 valid up to March 31st, 2026.

Now, M/s. Thejo Engineering Limited proposed expansion in production of Rubber molded products (199.99 TPM to 486 TPM) and Adhesives (38.5 KL/Month to 100 KL/Month) & proposed PU Products manufacturing with production capacity of 6.352 TPM due to increase in the demand of the existing and proposed projects along with enhancement of manufacturing facilities with additional area of 11.46 Acres (46364.97 Sq. m) The total area after expansion is 15.63 Acres (63221.43 Sq. m). The project cost for the proposed expansion proposal is 10699.99 Lakhs.

M/s. Thejo Engineering Limited applied for Environmental Clearance as the proposed expansion in production of Rubber molded products, Adhesives & proposed PU Products is termed under Schedule 5(f) Synthetic Organic Chemicals., Category A.’ and Environmental

Clearance (EC) to be obtained from EAC Delhi before the commencement of ground activity for the proposed expansion. Since the project site is categorized as non-Planned area. Hence, the project site is attracting Public Hearing.

In line with the said notification, TOR application was filed to MOEF&CC on 6th, May 2024 with ADS, vide proposal No. IA/TN/466248/2024 dated 20.03.2024 for grant of Terms of References (TOR), The standard ToR has granted with Public Hearing. The Base line Studies are carried out during the period of January 2024 to March 2024 as per OM. No. J-11013/41/2006-IA-II (I) (Part) dated; 29th August 2017 & the draft EIA report has been prepared in line with the prescribed ToR vide F. No. IA-J-11011/120/2024-IA-II(I) and TOR Identification No. TO24A2407TN5525112; dated 11.05.2024. The draft EIA report has been as per generic structure described in EIA Notification and will be submitted for Public Hearing. The Public Hearing details will be included in the Final EIA Report and will be submitted to EAC MOEFCC for project appraisal to obtain Environmental Clearance (EC).

The project site is well connected with National Highway NH - 16 (Chennai - Dankuni – Kolkata) ~0.82 Km (W), Chennai international airport at ~9.40 Km (S), the Nearest Railway station is Anuppambattu is located ~ 8.17 (ENE). Cholavaram town is the nearest to the project site at ~2.79 (S). The Raw materials and their consumption are shown in **Table 2-15**.

Project Summary:

S. No	Particulars	Proposed Project details
1	Category of products	
	a. Rubber molded products	486 TPM
	b. Adhesives	100 KLPM
	c. PU Products	6.352 TPM
2	Total Land area	6.33 Ha (63221.43 Sq. m)
3	Total Built up area (sq .m)	22626.24
4	Total Water Requirement (KLD)	116
5	Recycled Water (KLD)	36
6	Fresh water (KLD)	80
7	Source of Water	Private suppliers
8	Effluent Generation (KLD)	13
9	Sewage Generation (KLD)	23
10	Wastewater Treatment System & capacity	15 KLD of ETP (ZLD Concept)
11	Domestic Wastewater treatment system	25 KLD of STP
12	Power (kVA) Source: TANGEDCO	1200
13	Power Backup-DGs (kVA)	1 x 250 KVA 1 X 500 KVA
14	Air Compressor (m ³ /minute)	141
15	Boilers (Ton/Hr)	2 X 2 Ton/hr 1 x 6 Ton/hr
16	Diesel for DG Sets (Lts/Day/DG)-During power failure only	800
17	Briquettes for Boilers (T/Month)	260
18	Grease (Kg/Month) as a lubricant	25
19	Permanent Manpower (Nos)	600

20	Temporary Manpower (Nos)-Construction Phase only	50
21	Project Cost in crores (INR Lakhs)	10699.99 (106.99 Crore)
22	Environmental Management Plan (EMP) Cost (INR Lakhs)	60.77 (0.6 Crore)
23	CER -1.5 % of project cost (INR Lakhs)	160 (1.60 Crore)

Air Pollution control Measures:

The major air pollution sources from the DG sets, Boilers, shot blasting & Ban Bury Section. The major air pollution sources from the industry are Boilers, DG sets and Shot blasting. The DG set and boiler sources are provided with stacks of adequate height, Boiler having a Common stack to disperse the emanating flue gases containing suspended particulate matter, oxides of sulphur and nitrogen without affecting the ground level concentrations. Shot Blasting is facilitated with Dust Collector followed by Stack height of 5m AGL. Ban Bury Section having Inbuilt dust collector

Water requirement Wastewater Management:

The water requirement for the proposed project is 116 KLD (Fresh water is 80 KLD and recycled 36 KLD). Water requirements for the proposed project will be sourced from Private tankers. The total water requirement & breakup is shown in Table 2-11. The water balance for proposed expansion is shown in **Figure 2-10**. The total Water requirement will be sourced from private water supplier. However, rainwater harvesting system will be implemented and Water conservation measures will be followed. Hence no major impact will be envisaged on the surface or ground water resources.

- ✓ *After expansion the Domestic wastewater generation will be 23 KLD, will be treated in proposed 25 KLD STP and treated water (23 KLD) will be used for Greenbelt.*
- ✓ *STP Sludge/Other Solid waste will be composed and reused as manure for internal greenbelt.*
- ✓ *The total effluent generation of 13 KLD from process, coolant water, cooling tower blowdown, boiler blowdown, and RO rejects will be treated in the proposed 15 KLD Effluent Treatment Plant (ETP). The treated effluent will be reused within the plant for fire hydrant storage and greenbelt development.*
- ✓ *The sludge will be stored in a designated Hazardous waste room and sent to TSDF or Authorized recycler.*
- ✓ *Thejo will construct separate storm water drains and provide rainwater harvesting structures.*

Effluents/Sewage will not be discharged into any water bodies or aquifers under any circumstances. There is no liquid discharge from project in any means in to the any water bodies or inland surfaces. Treated wastewater will be utilized for gardening purpose and hence achieve zero liquid discharge concept.

Solid -Hazardous Waste Management:

The collection, storage and disposal of solid/ hazardous waste shall be carried out as per Hazardous and Other Wastes (Management & Transboundary Movement) Rules, 2016. The ETP sludge will be sent to the TSDF site, waste used oil will be collected and disposed of properly by selling it to registered refiners. Discarded containers will be sold to approved

recyclers. STP Sludge will be used as manure within the project premises and metal scrap will be collected, stored in scrap yard and reused.

Implementing Soil Conservation methods like 33 % of Greenbelt development with native plants, Windbreaks are composed of shrubs, plants and trees in garden/lawn areas, Regular watering soil along with plants, adding earthworms to soil and Control Storm Water.

Thus, no impact on land is envisaged due to discharge of gaseous emission, solid waste or liquid effluent from the proposed production capacity.

11.3 Description of the Environment

Meteorological Data for the Study Period (January 2024 - March 2024)

S. No	Parameter	Observation
1.	Temperature	Max Temperature: 38 °C Min Temperature: 23 °C Avg Temperature :30.32 °C
2.	Average Relative Humidity	75.73 %
3.	Average Wind Speed	2.93 m/s
4.	Predominant Wind Direction during study period	East

Air Environment:

The ambient air quality has been monitored at 8 locations for 12 parameters as per NAAQS 2009 guidelines within the study area. All the parameters are well within the National Ambient Air Quality Standards at all monitoring locations during the study period.

- *PM₁₀ (37.2 – 67.6 µg/m³)*
- *PM_{2.5} (20.5 – 37.2 µg/m³)*
- *SO₂ (5.1 – 13.4 µg/m³)*
- *NO₂ (13.2 – 26.9 µg/m³)*

Noise Environment:

- *In Industrial areas daytime noise levels are 53.4 dB(A) and 43.8 dB(A) during nighttime, which is within prescribed limit by CPCB (75 dB(A) Day time & 70 dB(A) Nighttime).*
- *In residential areas daytime noise levels varied from 50.9 dB(A) to 54.1 dB(A) and nighttime noise levels varied from 40.9 dB(A) to 43.8 dB(A) across the sampling stations. The field observations during the study period indicate that the ambient noise levels are well within the prescribed limit by CPCB (55 dB(A) Day time & 45 dB(A) Nighttime).*

Water Environment:

Surface Water:

The surface water results were compared with IS 2296:1992 standard and in respect of CPCB water Quality Criteria for designated best use. Based on comparison study of test results with Surface water Quantity Standards (Is 2296 Class A), it is interpreted that water qualities of studied locations are classified under Class E, which can be used for irrigation industrial cooling, and controlled waste disposal.

- The pH value ranges from 7.26 to 7.89 are within the limits (6.5 – 8.5) of IS 2296:1992.
- The Electrical Conductivity (EC) of the collected surface water ranges from 250 $\mu\text{S}/\text{cm}$ to 920 $\mu\text{S}/\text{cm}$.
- The chloride content in the collected surface water ranges from 58 mg/l to 142 mg/l.
- The sulphate content in the collected surface water sample ranges from 14.5 mg/l to 35.5 mg/l.
- The total hardness of the collected surface water sample ranges from 49.5 mg/l to 480.0 mg/l.
- COD of the collected surface water sample ranges from 16.3 mg/l to 65.5 mg/l.
- BOD of the collected surface water sample ranges from 1.5 mg/l to 17.7 mg/l.

Ground Water:

Based on comparison study of test results with drinking water standard, it is interpreted that water qualities of studied locations meet with the drinking water standards as per IS 10500: 2012. These interpretations relate to the sample tested for location only. To prevent ground water contamination and improving the quality and Quantity, rainwater harvesting, and groundwater recharging may be helpful.

- The ground water results of the study area indicate that the pH range varies between 7.40 and 7.79. It is observed that the pH range is within the limit of IS 10500:2012.
- The Total Dissolved Solids range varies between 160 mg/l – 952 mg/l for ground water. All the samples are well within the permissible limit of IS 10500: 2012.
- The acceptable limit of the chloride content is 250 mg/l and permissible limit is 1000 mg/l. The chloride content in the ground water for study area ranges between 40 mg/l – 219 mg/l. It is observed that all are well within the Acceptable Limit and permissible limit of IS 10500: 2012.
- The desirable limit of the sulphate content is 200 mg/l and permissible limit is 400 mg/l. The sulphate content of the ground water of the study area varies between 9.9 mg/l – 54.8 mg/l. It is observed that all the samples are within the Acceptable Limit and permissible limit of IS 10500: 2012.

Soil Environment:

As per the Indian Council of Agricultural research characterization all locations soils are having PH, Neutral, Slightly Acidic and Slight Alkaline range, Electrical conductivity is Sensitive to salts, potassium as Sufficient, Nitrogen as N is better range and Phosphorus range from average range.

- ✓ The pH of the soil samples ranged from 6.17 to 7.59 Indicating that the soils are slightly acidic to slightly alkaline in nature.
- ✓ The conductivity of the soil samples ranged from 41 $\mu\text{mhos}/\text{cm}$ to 180 $\mu\text{mhos}/\text{cm}$.
- ✓ Nitrogen content ranged from 211 kg/ha to 325 kg/ha.
- ✓ Phosphorous ranged from 49 kg/ha to 92 kg/ha.
- ✓ Potassium content ranges from 182 kg/ha to 258 kg/ha.

Biological Environment:

- During the primary survey, about 105 floral species were observed. The most dominant tree species in the entire study area dominated *Eucalyptus globulus*, *Mangifera indica*, *Anacardium occidentale*, *Tectona grandis*, *Acacia auriculiformis*, *Azadirachta indica*, *Delonix regia*, *Borassus flabellifer*, *Carica papaya*, etc. Most dominant shrubs in the study area were, *Calotropis procera*, *Datura metel*, *Euphorbia hirta*, *Lantana Camara*, etc. Among the herb species observed are *Cynodon dactylon*, *Chrysopogon aciculatus*, *Tridax procumbens*, *Achyranthes aspera*, *Catharanthus roseus*.
- Both direct (sighting) and indirect (evidence) observations methods were used to survey the faunal species around the study area. Additionally, references of relevant literatures (published/unpublished) and dialogues with local villagers were also carried out to consolidate the presence of faunal distribution in the area.
- A total of 57 species belonging to different families have been identified from Agricultural and nearby forest areas. A comparative chart of the total number of bird species belonging to different families along with their feeding preference and abundance, blue rock pigeon (*Columba livia*) categorized under Sch – IV, *Naja naja* & *Ophiophagus hannah* categorized under Sch II (Part II) as per WPA 1972.

Socio Environment:

- ✓ The total population of the project area is 168245. The total number of villages in the study area is 47 Nos. The area has 84837 male and 83408 female population
- ✓ 73.87% of Literacy and 59.24% of Non-Workers in 0-5 km zone and 67.11% of Literacy and 54.93% of Non-Workers in 5-10 km zone. The literacy rate of the study region is 70.52%. The study area has more than 55% non-workers.
- ✓ There is a need to establish more industries so that the maximum number of employments can be generated

11.4 Anticipated Environmental Impacts and Mitigation Measures

The proposed project has no major adverse impact on the surrounding environment. During the movement of trucks, fugitive emissions will be minimized by water sprinkling on roads and regular vehicular maintenance. Trucks used for transportation shall be covered with tarpaulin sheets to avoid dust dispersion at site. Only PUC vehicles will be used for transportation. An air pollution control device will be installed to mitigate the impact of air pollution. Units will be provided with separate entry and exit for smooth traffic movement. The electricity will be supplied by TANGEDCO and hence D. G. set will be used only in case of power failure. Water shall be sourced from private suppliers; hence no major impact will be envisaged on surface or ground water resources. Effluent will be treated in proposed ETP. The treated effluent will be reused within premises. The sewage generated will be treated by proposed STP and treated sewage will be reused for gardening purposes. There is no liquid discharge from the proposed project in any means, hence it is a Zero Liquid Discharge unit. Proper sanitation facilities shall be provided within the premises to prevent contamination of water due to runoff. Solid/hazardous waste generated from the project activities only no waste generation from process and ETP shall be properly handled with adequate solid/hazardous waste management facilities. All the solid/hazardous waste generated shall be packed in HDPE bags and stored in Hazardous Waste Storage Facility. The ETP sludge will be sent to TSDF. Used oil will be collected and disposed of properly by selling it to registered refiners. Discarded containers will be sold to approved recyclers. STP Sludge will be used as

manure within the project premises and recyclable scrap will be collected, stored in scrap yard, and reused. The collection, storage and disposal of solid/hazardous waste shall be carried out as per Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016. The adequate greenbelt developed in and around the plant shall greatly serve as an efficient barrier for the prevention of air outside the plant premises.

11.5 Analysis of Alternatives (Technology and Site)

The Proponent of the company are experienced in establishing the similar plants and manufacturing process. Although the site is a non-Industrial area already being used for industrial purposes and with excellent road connectivity, the Company felt the necessity of setting up a new facility to meet the future market demand. The company proposed the adoption of the best practices/ technology to develop this manufacturing facility.

11.6 Environmental Monitoring Program

The environmental monitoring plan enables an environmental management system with early signs of need for additional action and modification of ongoing actions for environment management, improvement, and conservation. The environmental monitoring locations will be decided considering the environmental impacts likely to occur due to the operation of proposed project as the main aim of the monitoring program is to track, timely and regularly, the change in environmental conditions and to take timely action for protection of surrounding environment. Environmental sampling and monitoring will be done as per the guidelines provided by MoEF&CC /CPCB /TNPCCB. The project cost for the proposed expansion proposal is 10699.99 Lakhs. Environmental Management Plan Capital cost of the proposed project is 60.77 Lakhs (0.6 Crore). CER -1.5 % of project cost (INR 1,60,50,000/-).

11.7 Additional Studies

Manufacturing of “Adhesives, Moulded rubber products and PU Products” is termed under Schedule 5(f), Synthetic Organic Chemicals, Category A as per the EIA notification dated 14th September 2006 and its subsequent amendments however and as the project is located at **non notified industrial area** hence, the project will be appraised by the EAC, MOEF&CC. As a part of obtaining Environmental Clearance the Draft EIA report has been prepared as per the obtained ToR the draft report will be submitted to TNPCCB for Public Consultation.

In addition to the Public Consultation, Risk Assessment (RA), Disaster Management Plan, Occupational Health, and Safety and EIA & EMP reports have been carried out as obtained ToR for the proposed project as an additional study. Risk Assessment and hazard identification and control measures of the same have been carried out. Thejo has developed Emergency preparedness plan and Disaster Management Plan as a part of additional study and with appropriate personal protective equipment shall be provided to all workmen as and when required. All records of the On-Site and Off-Site Emergency Plan shall be well maintained and preserved.

11.8 Project Benefits

The proposed facility will bring business to many local vendors in terms of providing accommodation to contract workers, transportation, provision of construction equipment and getting subcontracts during infrastructure development and operational phases. The proposed project will provide employment for local people. During construction phase around 50 Nos. of workers and during operational phase 600 Nos. of workers will be employed.

- ✓ Thejo Engineering Limited is allocated 33% (20866.2 Sq. m) of land for green belt development as per norms.
- ✓ The width of the greenbelt will be maintained as per CBCB guidelines and there shall be 3 rows of plants with a gap of 2m between the plants.
- ✓ Thejo Engineering Limited is planted ~ 1000 in the existing facility. During expansion, 2000 trees under Greenbelt Development will be planted in a phased manner in and around the project boundary. Trees which are already within the project site same will be retained.

A capital cost of INR 3.0 Lakhs will be earmarked for this purpose and INR of 0.5 Lakhs will be allocated for recurring expenses towards green belt development and maintenance. The implementation of Rainwater Harvesting will help in decreasing the demand for freshwater consumption of the project as per 38 Nos of ground water recharge pits is proposed. Due to the operation of the proposed project, the surrounding areas would be expected to occur and generate revenue for local and state economies.

11.9 Environmental Cost Benefit analysis

Not recommended during scoping stage

11.10 Environmental Management Plan (EMP)

The main purpose of EMP is to minimize the identified potential environmental impacts to be generated from the proposed project and to mitigate the consequences. During construction phase, impacts are short period of time. Green belts will be developed to reduce noise impacts. Construction activities will be carried out during the daytime only. Regular water sprinkling will be done to reduce PM concentration in the atmosphere. PPEs will be provided to workers, and first aid facilities will be kept at designated locations during the construction phase. During the operation phase the industry will maintain an environment management plan for the proposed unit which will cover all the environment protection measures to mitigate identified environmental impacts. The EMC will work as an integrated managerial body from various disciplines to co-ordinate the project activities concerned with implementation of environment control measures and management. The proponent will carry out various activities under the EMP for various Environmental attributes like Air Environment, Water Environment, Biological Environment, Noise Environment, Occupational Health & Safety, etc. Apart from this, measures like the Water Management Plan, Greenbelt Development Plan and Sewage treatment System have been proposed. Proposed

Environmental Management Cell (EMC) will address the different environmental aspects of the proposed project.

Budget of Rs. 60.77 Lakhs is allocated for ETP, STP, Air pollution control device, Solid/Hazardous Waste Management, OH&S and Greenbelt Development. Positive impact will be on Socio economic environment Thejo allocated 1.5 % of the total project cost is 1,60,49,985/- (Say 1,60,50,000) as the Project cost 10699.99 Lakhs, to nearby villages (Irullipattu village, Jaganadhapuram , Alinjivakkam, Janappan& Chattram).

11.11 Conclusion

The proposed project is in a non-Notified industrial area and would not have any considerable impact on the environment with efficient mitigation measures implemented. The waste generation in form of gas (flue and process), effluent and solid waste may have impacts on environmental parameters, but the proponent has planned & installed most efficient technologies for prevention of emission & treatment of effluent. Further, the solid/hazardous waste will be disposed of through TSDF site. Sewage generated from industry will be treated in proposed STP and treated sewage will be utilized for gardening purposes. Effluent generated from process washing activity will be treated in proposed ETP and treated effluent will be utilized for Greenbelt and other utilities.

There is no liquid discharge from projects in any means into the inland surfaces or water bodies. Treated wastewater will be utilized for gardening purposes and achieve the zero liquid discharge concept. Hence there would not be any considerable impact on the environment. With the implementation of the mitigation measures and EMP, the proposed project activities will have positive beneficial effect on the local population, economic output, and other related facilities viz. employment, development of business, transportation etc. Risk assessment including emergency response plan & DMP has been prepared to handle any sort of emergencies. The industry will be proposed 33 % green belt area.

Hence looking to the overall project justification, process, pollution potential and pollution prevention measures, technological adoption and Environmental Management activities of the proponent has been concluded that, the proposed project would not have any significant impacts on environment as well as socio-economic and ecological conditions of the project area as Thejo engineering Ltd allocated 1.5 % of the total project cost is 1,60,49,985/- (Say 1,60,50,000) as the Project cost 10699.99 Lakhs, to nearby villages (Irullipattu village, Jaganadhapuram , Alinjivakkam, Janappan& Chattram). Hence proposed project may be recommended, considering Environmentally safe.

CHAPTER – 12

DISCLOSURE OF CONSULTANTS ENGAGED

(Provides the brief profile of the EIA consultant organization and EIA project team for the current study.)

12 DISCLOSURE OF CONSULTANTS ENGAGED

12.1 General

M/s. Thejo Engineering Limited is an existing facility located at Survey No. 176/3, 181/5, 181/6A, 169/2B, 169/4D, 170/2B, 170/3B, 170/4, 175/3, 176/1, 176/2, 181/1B, 175/4B and 175/5B, Jaganathapuram Road, Irullipattu village, Ponneri Taluk, Thiruvallur Dist, Tamil Nadu State 600 067.

Project proponent has currently manufactured 199.99 TPM of Rubber Molded products (11 Nos) and 2 Nos of Adhesive (Hot & cold) of 38.5 KL/Month. The existing facility was established in 16916.46 Sq. m of area. The existing project is operating with valid consent orders vide PROCEEDINGS NO.F.0380GMP/RS/DEE/TNPCB/GMP/W&A/2024 valid up to March 31st, 2026, for carrying out this Environmental Impact Assessment Study as per the EIA notification, 2006 as amended till date.

M/s. Thejo Engineering Limited, as part of compliance with regulatory requirements for obtaining Environmental Clearance (EC) from the Expert Appraisal Committee (EAC), appointed Environmental Consultants accredited by the National Accreditation Board for Education and Training (NABET) – Quality Council of India (QCI), New Delhi.

The initial assignment for conducting field studies and preparing the Form-1, Pre-Feasibility Report (PFR), Baseline Studies, and EIA/EMP Report (under Category A) was awarded to M/s. AM Enviro Engineers, Bangalore, an organization accredited by NABET-QCI under Certificate No. NABET/EIA/2326/RA 0306_Rev 01, valid up to 30.06.2026. After obtaining the Terms of Reference (ToR), the project proponent decided to change the consultant due to delays in the process, primarily caused by the non-availability of an EIA Coordinator at M/s. AM Enviro Engineers.

Consequently, the project proponent reassigned the work including completion of Baseline Studies, Impact Assessment, preparation of the EIA/EMP Report, Public Hearing consultation, and Environmental Clearance appraisal under Category A (MOEFCC) to M/s. Envirosphere Consultant and Engineers LLP, Pune, which is accredited by NABET-QCI for the Synthetic Organic Chemicals Industry under Category A, vide Certificate No. NABET/EIA/23-26/IA 0130, valid up to December 8, 2026.

12.2 About Envirosphere Consultant and Engineers LLP

Envirosphere Consultant and Engineers is QCI NABET Accredited Consultant, providing a wide range of services to the public and private sector. Our firm provides strategic planning, cost effective sustainable solutions to our clients for obtaining statutory clearances and consents from MoEFCC, Pollution Control Boards, MIDC, and other government authorities. The organisation is guided by a code of ethics, professional practices, philosophies leading it towards attaining the stated vision and mission.

We have a team of specialised professionals to provide comprehensive services such as Environmental Impact Assessment (EIA), Compliance of Environmental Laws & Regulations, etc. We conduct studies in various sectors such as Industry building and construction, Infrastructure Development, Industrial Estate, Coastal Regulatory Zone (CRZ) and Sustainable Services such as Energy Modelling, Wind and Shadow analysis, Carbon Footprint, Environment Due Diligence (EDD), ESG Reporting, Environmental Site Assessment Phase I and II, and Solid waste Management.

We also provide comprehensive services - in Consent Management; Post EC Compliance, Environmental Monitoring; Operation and Maintenance of ETP & STP, MIDC Approval, Fire NOC, DISH Approval, CGWB Authorisation, PESO License and other industrial approvals.

VISION

We aspire to be recognised as a leading environmental consultant by applying our expertise with utmost integrity and diligence while balancing the opportunities of today with the needs of tomorrow.

MISSION

We at Envirosphere Consultant & Engineers are focused on providing sustainable environmental solutions to meet customer satisfaction through collaboration, responsiveness, teamwork and continual improvement while balancing the environment's long-term interests.

QUALITY POLICY

We Aim to be one of the Pioneer Consulting Firm Providing a complete range of EC services to our clients by focusing on meeting client's expectations on quality and timely delivery. We will achieve this by:

- Working closely with our clients to understand their needs
- Motivating and training our employees.
- Continually improving our quality management systems and process.

12.3 Certification of NABET Accreditation:




National Accreditation Board for Education and Training

Certificate of Accreditation

Envirosphere Consultant and Engineers LLP, Pune

Shree Ganesh Ace Arcade, Office No. 506, 5th Floor, Building A, Kojane Chowk,
Rahatani, Pune, Maharashtra-411027

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.	Thermal power plants	4	1 (d)	B
2.	Metallurgical industries (ferrous & non-ferrous)	8	3 (a)	A
3.	Synthetic organic chemicals industry	21	5 (f)	A
4.	Distilleries	22	5 (g)	A
5.	Sugar Industry	25	5 (j)	B
6.	Building and construction projects	38	8 (a)	B
7.	Townships and Area development projects	39	8 (b)	B

Note: Names of approved EIA Coordinators and Functional Area Experts are mentioned in IAAC minutes dated January 12, 2024, posted on QCI-NABET website.

The Accreditation shall remain in force subject to continued compliance to the terms and conditions mentioned in QCI-NABET's letter of accreditation bearing no QCI/NABET/ENV/ACO/24/3139 dated February 19, 2024. The accreditation needs to be renewed before the expiry date by Envirosphere Consultant and Engineers LLP, Pune following due process of assessment.

Issue Date
February 19, 2024



Mr. Ajay Kumar Jha
Sr. Director, NABET



Certificate No.
NABET/EIA/23-26/1A 0130

Valid up to
December 8, 2026



Prof (Dr) Varinder S Kanwar
CEO-NABET

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