

**DRAFT ENVIRONMENT IMPACT  
ASSESSMENT AND ENVIRONMENT  
MANAGEMENT PLAN**

**FOR  
ESTABLISHMENT OF COMMON BIO-MEDICAL  
WASTE TREATMENT FACILITY - INCINERATOR  
CAPACITY 500 KG/HR**

**[Project or Activity of Schedule 7(da) under Category 'B1']**

**By**

**M/s. RAMNAD DOCTORS ASSOCIATION**

**Keelakottai Group, Muthuvayal Village, Paramakudi Taluk,  
Ramanathapuram District, Tamil Nadu**

**Consultant**



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**NABET SI. No. NABET/EIA/2225/RA 0265**

**Submitted to**

**Tamil Nadu State Pollution Control  
Board, Ramanathapuram.**

**Study Period: April to June 2021**

**January 2023**

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## TERMS OF REFERENCE



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

STATE LEVEL ENVIRONMENT IMPACT  
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Chennai - 600 015.  
Phone No. 044-24359973  
Fax No. 044-24359975

### TERMS OF REFERENCE (ToR)

Lr No.SEIAA-TN/F.No.8781/SEAC/ToR- 1217/2022 Dated : 26.07.2022

To

M/s. Ramnad Doctors Association  
Ramnad MRI & CT Scans  
No.53/6 1st Main Road  
R.R.Sehupathy Nagar  
Bio Medical Waste Treatment Facility 7(d)(a)  
Ramanathapuram-623501


Sir,

**Sub:** SEIAA, TN – Proposed common bio-medical waste treatment facility (CBMWTF) at S.F.No. 249/3 of Keelakottai village, Paramakudi Taluk, Ramanathapuram District, Tamil Nadu by M/s. Ramnad Doctors Association – Category 'B1' & Schedule Item No. 7(d) (a) – "Common hazardous waste treatment, storage and disposal facilities (TSDFs)" of EIA Notification, 2006 – Issue of Terms of References (ToR) with Public Hearing – Regarding

**Ref:** 1. Online Proposal No. SIA/TN/NCP/67235/2021 dated 03.09.2021.  
2. Your application for Terms of Reference dated: 09.09.2021.  
3. Minutes of the 291<sup>st</sup> SEAC meeting held on 01.07.2022 & 02.07.2022.  
4. Minutes of the 536<sup>th</sup> meeting of Authority held on 26.07.2022.

XXXXXX

The proponent of M/s. Ramnad Doctors Association have submitted application for Terms of References (ToR) on 04.11.2020, in Form-I, Pre- Feasibility report and draft ToR for the Proposed common bio-medical waste treatment facility (CBMWTF) at S.F.No. 249/3 of Keelakottai

  
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village, Paramakudi Taluk, Ramanathapuram District, Tamil Nadu.

**Discussion by SEAC and Remarks:**

**Proposed common bio-medical waste treatment facility (CBMWTF) at S.F.No. 249/3 of Keelakottai village, Paramakudi Taluk, Ramanathapuram District, Tamil Nadu by M/s. Ramnad Doctors Association - For Terms of Reference. (SIA/TN/MIS/67235/2021 Dt.03.09.2021)**

The proposal was earlier placed in 250<sup>th</sup> SEAC meeting held on 03.03.2022. The details of the project furnished by the proponent are given in the website (parivesh.nic.in).

The SEAC noted the following:

1. The Project Proponent, M/s. Ramnad Doctors Association has applied for Terms for Reference for the proposed common bio-medical waste treatment facility (CBMWTF) at S.F.No.249/3 of Keelakottai village, Paramakudi Taluk, Ramanathapuram District, Tamil Nadu.
2. The project/activity is covered under Category "B1" of Item 7(d)(a) "Common Bio-Medical Waste Treatment Facility" of the Schedule to the EIA Notification, 2006.
3. The project proponent has absent for the meeting. Hence, the proposal was again placed in 291<sup>st</sup> meeting of SEAC held on 1.7.2022. Based on the presentation made by the proponent, SEAC **recommended for the grant of Terms of Reference (TOR) with Public Hearing**, subject to the following TORs, in addition to the standard terms of reference for EIA study for non-coal mining projects and details issued by the MOEF & CC to be included in EIA/EMP Report:
  1. Details of alternate site shall be provided in the EIA Report and the PP shall select the site in terms of the Bio Medial Waste Management Rules 2016.
  2. Soil testing should be carried out at various depths in the proposed site as the PP stated that the same site was used before for deep burial of bio-medical waste.
  3. Details of various state of art of technology available for this filed and justification for selection of a particular technology.
  4. Details of permanent structures available within 2km from the project site shall be provided in the EIA.
  5. Commitment letter from competent authority for the supply of fresh water.
  6. Land requirement for the facility including its break up for various purposes, its availability and optimization.

5. Details of proposed layout clearly demarcating various activities such as security, Waste Storage Rooms, Waste Treatment Equipment Rooms/Areas, Treated Waste Storage Room, Pollution Control Devices like APCS and ETP, ash storage/disposal area, vehicle washing areas, and others such as admin area, worker's room, health centers, greenbelt, etc.
6. Details on collection and transportation of Bio Medical Waste from health care establishment. No. of vehicles and feature of vehicles, etc.
7. Details of waste storage facilities/rooms.
8. Details of the treatment equipment's capacity.
9. Details of the incineration system – a statement on the compliance to CPCB guidelines for common bio medical waste incinerators in respect of waste feed cut-offs, operating parameters of combustion chambers, flue gas cleaning, ash handling, etc.
10. Details on fuel requirement for incineration.
11. Details on flue gas emissions discharge through stack and proposed pollution control technologies.
12. Details on residue/ash generation and management.
13. Details of waste heat utilization, if any.
14. Details on wastewater management.
15. Details of the proposed overall safety and health protection measures.
16. Details on source of water and power to the facility.
17. Details of the existing access road(s)/walkways to the designed operations in the site and its layout.
18. Location of the incineration facility and nearest habitats with distances from the facility to be demarcated on a toposheet (1: 50000 scale).
19. Landuse map based on satellite imagery including location specific sensitivities such as national parks / wildlife sanctuary, villages, industries, etc.
20. Topography details.
21. Surface water quality of nearby water bodies.
22. Details on proposed groundwater monitoring wells, locations, frequency of monitoring, parameters, etc.
23. Action plan for the greenbelt development in accordance to CPCB guidelines.
24. Details on pollution control technologies and online monitoring equipment.

  
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25. Details on monitoring of pollutants at source –performance of the incinerator, including operating hours, fuel consumption, operating parameters (Combustion chamber – temperature, pressure, Stack temperature, total particulate matter, HCl, NOx as per Bio Medial Waste (Management & Handling) Rules 1998.
26. Stack and fugitive emissions may be monitored for SPM, HCl & NO2 as per Bio Medial Waste (Management & Handling) Rules 2016.
27. Specific programme to monitor safety and health protection of workers.
28. Details of administrative and technical organizational structure.
29. Details of the emergency preparedness plan and on-site & off-site disaster management plan. Submit details of a comprehensive Disaster Management Plan including emergency evacuation during natural and man-made disaster.
30. The EIA/EMP shall conform to the 'Revised Guidelines for Common Bio-medical Waste Treatment and Disposal Facilities' issued by the Central Pollution Control Board.
32. PP shall strive to generate a minimum of 50% of energy consumption by way of solar energy.
33. As part of CER, PP shall examine the possibility of providing electric crematoriums Ramanathapuram and Paramakudi municipalities.
34. Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project will be given.
35. The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP will be clearly spelt out..

**Discussion by SEAC and Remarks:**

The proposal was placed before the 536<sup>th</sup> Authority meeting held on 26.07.2022. The authority noted that this proposal was placed for appraisal in this 291<sup>st</sup> meeting of SEAC held on 02.07.2022. SEAC has furnished its recommendations to the Authority for grant of **Terms of Reference (TOR) with Public Hearing**, after detailed discussion the Authority decided to accept the recommendations of SEAC and grant Terms of Reference (ToR) with Public Hearing for undertaking the Environment Impact Assessment Study and preparation of Environment Management Plan subject to the ToRs as recommended by SEAC & subject specific standard ToR in addition to the following ToRs.

1. As per the MoEF& CC office memorandum F.No.22-65/2017-IA.III dated: 30.09.2020 and 20.10.2020 the proponent shall address the concerns raised during the public consultation and all the activities proposed shall be part of the Environment Management Plan.

**STANDARD TERMS OF REFERENCE (ToR) FOR EIA/EMP REPORT FOR PROJECTS/ACTIVITIES REQUIRING ENVIRONMENT CLEARANCE**

**7(d): STANDARD TERMS OF REFERENCE FOR CONDUCTING ENVIRONMENT IMPACT ASSESSMENT STUDY**

- 1) Reasons for selecting the site with details of alternate sites examined/rejected/selected on merit with comparative statement and reason/basis for selection. The examination should justify site suitability in terms of environmental damages, resources sustainability associated with selected site as compared to rejected sites. The analysis should include parameters considered along with weightage criteria for short-listing selected site.
- 2) Submit the details of the road/rail connectivity along with the likely impacts and mitigative measures
- 3) Submit the present land use and permission required for any conversion such as forest, agriculture etc
- 4) Examine the details of transportation of Hazardous wastes, and its safety in handling.
- 5) Examine and submit the details of on line pollutant monitoring.
- 6) Examine the details of monitoring of Dioxin and Furon.
- 7) MoU for disposal of ash through the TSDF.
- 8) MoU for disposal of scrubbing waste water through CETP.
- 9) Examine and submit details of monitoring of water quality around the landfill site.
- 10) Examine and submit details of the odour control measures.
- 11) Examine and submit details of impact on water body and mitigative measures during rainy season.
- 12) Environmental Management Plan should be accompanied with Environmental Monitoring Plan and environmental cost and benefit assessment. Regular monitoring shall be carried out for odour control.
- 13) Water quality around the landfill site shall be monitored regularly to examine the impact on the ground water.
- 14) The storage and handling of hazardous wastes shall be as per the Hazardous Waste

  
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Management Rules.

- 15) Submit details of a comprehensive Disaster Management Plan including emergency evacuation during natural and man-made disaster.
- 16) Public hearing to be conducted for the project in accordance with provisions of Environmental Impact Assessment Notification, 2006 and the issues raised by the public should be addressed in the Environmental Management Plan. The Public Hearing should be conducted based on the ToR letter issued by the Ministry and not on the basis of Minutes of the Meeting available on the web-site.
- 17) A detailed draft EIA/EMP report should be prepared in accordance with the above additional TOR and should be submitted to the Ministry in accordance with the Notification.
- 18) Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.
- 19) The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.
- 20) Any further clarification on carrying out the above studies including anticipated impacts due to the project and mitigative measure, project proponent can refer to the model ToR available on Ministry website "<http://moef.nic.in/Manual/Incinerator>"

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

1. Project name and location (Village, District, State, and industrial Estate (If applicable).
2. Products and capacities. If expansion proposal then existing products with capacities and reference to earlier EC.
3. Requirement of land, raw material, water, power, fuel, with source of supply( Quantitative)
4. Process description in brief specifically indicating the gaseous emission, liquid effluent and solid and hazardous wastes.
5. Measures for mitigating the impact on the environment and mode of discharge or disposal.
6. Capital cost of the project, estimated time of completion.
7. Site selected for the project- Nature of land-Agricultural(Single/double crop), barren, Govt/Private land, status of its acquisition, nearby (in 2-3 km), water body, population, within 10km other industries, forest, eco-sensitive zones, accessibility,(note-1 case of industrial estate this information may not be necessary)

  
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8. Baseline environmental data-air quality, surface and ground water quality, soil characteristic, flora and fauna, socio-economic condition of the nearby population
9. Identification of hazards in handling, processing and storage of hazardous material and safety system provided to mitigate the risk.
10. Likely impact of the project, on air, water, land, flora-fauna and nearby population
11. Emergency preparedness plan in case of natural or in plant emergencies.
12. Issues raised during public hearing (if applicable) and response given
13. CSR plan with proposed expenditure.
14. Occupational Health Measures,
15. Post project monitoring plan.

**Besides the above, the below mentioned general points should also be followed:**

1. The EIA document shall be printed on both sides, as far as possible.
2. All documents should be properly indexed, page numbered.
3. Period/date of data collection should be clearly indicated.
4. Authenticated English translation of all material provided in Regional languages.
5. The letter/application for EC should quote the MoEF & CC File No. and also attach a copy of the letter prescribing the ToR.
6. The copy of the letter received from the Ministry on the ToR prescribed for the project should be attached as an annexure to the final EIA-EMP Report.
7. The final EIA-EMP report submitted to the Ministry must incorporate the issues mentioned in ToR. The index of the final EIA-EMP report, must indicate the specific chapter and page no. of the EIA-EMP Report where the specific ToR prescribed by the Ministry have been incorporated. Questionnaire related to the project (posted on MoEF&CC website) with all sections duly filled in shall also be submitted at the time of applying for EC.
8. Grant of ToR does not mean grant of EC.
9. The status of accreditation of the EIA consultant with NABET/QCI shall be specifically mentioned. The consultant shall certify that his accreditation is for the sector for which this EIA is prepared.
10. On the front page of EIA/EMP reports, the name of the consultant/consultancy firm along with their complete details including their accreditation, if any shall be indicated. The consultant while submitting the EIA/EMP report shall give an undertaking to the effect that

  
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the prescribed ToRs (ToR proposed by the project proponent and additional ToR given by the MoEF & CC) have been complied with and the data submitted is factually correct (Refer MoEF & CC Office memorandum dated 4<sup>th</sup> August, 2009).

11. While submitting the EIA/EMP reports, the name of the experts associated with/involved in the preparation of these reports and the laboratories through which the samples have been got analysed should be stated in the report. It shall clearly be indicated whether these laboratories are approved under the Environment (Protection) Act, 1986 and the rules made there under (Please refer MoEF&CC Office Memorandum dated 4<sup>th</sup> August, 2009). The project leader of the EIA study shall also be mentioned.
12. All the ToR points as presented before the State Expert Appraisal Committee (SEAC) shall be covered.
13. The project proponent shall submit the detailed final EIA/EMP prepared as per ToR to the Ministry for considering the proposal for environmental clearance within 3 years as per the MoEF & CC O.M. No.J-11013/41/2006-IA-11(I) (P) dated 08.10.2014.
14. The consultants involved in preparation of EIA/EMP report after accreditation with Quality Council of India/National Accreditation Board of Education and Training (QCI/NABET) would need to include a certificate in this regard in the EIA/EMP reports prepared by them and data provided by other Organization(s) Laboratories including their status of approvals etc. vide Notification of the MoEF & CC dated 19.07.2013.
15. The prescribed ToR would be valid for a period of three years for submission of the EIA/EMP Reports.
16. A note confirming compliance of the ToR, with cross referencing of the relevant section/pages of the EIA report should be provided.
17. All documents may be properly referenced with index, page numbers and continuous page numbering.
18. Copy of permission related to Port facility, Desalination plant, wind mill/solar power plant from competent Authority.
19. Where data are presented in the report especially in tables, the period in which the data were collected and the sources should be indicated.
20. While preparing the EIA report, the instructions for the proponents and instructions for the consultants issued by MoEF & CC vide O.M. J-11013/41/2006-IA.II(I) dated 4th August, 2009, which are available on the website of the Ministry should also be followed.

  
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21. The consultants involved in the preparation of EIA/EMP report after accreditations with quality Council of India (QCI)/National Accreditation Board of Education and Training (NABET) would need to include a certificate in this regard in the EIA/EMP reports prepared by them and data provided by other organization/Laboratories including heir status of approvals etc. In this regard circular no. F.No. J-11013/77/2004-IA-II(I) dated 2nd December, 2009, 18th March 2010, 28th May 2010, 28th June 2010, 31st December 2010 & 30th September 2011 posted on the Ministry's website <http://www.moef.nic.in/> may be referred

After preparing the EIA (As per the generic structure prescribed in Appendix-III of the EIA Notification, 2006) covering the above mentioned points, the proponent will take further necessary action for obtaining environmental clearance in accordance with the procedure prescribed under the EIA Notification, 2006.

The final EIA report shall be submitted to the SEIAA, Tamil Nadu for obtaining Environmental Clearance.

The TORs prescribed shall be **valid for a period of three years** from the date of issue, for submission of the EIA/EMP report as per O.M. No. J-11013/41/2006-IA-II (I)(part) dated 29<sup>th</sup> August, 2017.

The receipt of this letter may be acknowledged.

  
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**Copy to:**

1. The Additional Chief Secretary to Government, Environment & Forests Dept,  
Govt. of Tamil Nadu, Fort St. George, Chennai - 9.
2. The Principal Secretary to Government, Industrial Department,  
Govt. of Tamil Nadu, Fort St. George, Chennai - 9.
3. The Chairman, Central Pollution Control Board, Parivesh Bhavan,  
CBD Cum-Office Complex, East Arjun Nagar, New Delhi - 110 032.
4. The Member Secretary, Tamil Nadu Pollution Control Board,  
76, Mount Salai, Guindy, Chennai - 600 032.
5. The CCF, Regional Office, Ministry of Environment & Forest (SZ),

Lr No.SEIAA-TN/F.No.8781/SEAC/ToR-1217/2022 Dated:26.07.2022

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- 34, HEPC Building, 1<sup>st</sup> & 2<sup>nd</sup> Floor, Cathedral Garden Road, Nungambakkam, Chennai - 34.
6. Monitoring Cell, I A Division, Ministry of Environment & Forests,  
Paryavaran Bhavan, CGO Complex, New Delhi - 110 003.
7. The District Collector, Ramanathapuram District.
8. Stock File.

**Terms of Reference - Compliance**

**M/s. Ramnad Doctors Association, Keelakottai Group, Muthuvayal Village, Paramakudi Taluk, Ramanathapuram District, Tamil Nadu. SEIAA Approved Terms of Reference (ToR) for EIA Study and Compliance (Letter No. SEIAA-TN/F.No.8781/SEAC/ToR-1217/2022 dated 26.07.2022)**

<b>S. No.</b>	<b>ToR Point</b>	<b>Reply</b>
1	Details of alternate site shall be provided in the EIA Report and the PP shall select the site in terms of the Bio Medial Waste Management Rules 2016.	No alternate site is provided for the proposed project. The proposed site is away from any other BMW facilities. It is located more than 2 km from the residential areas.
2	Soil testing should be carried out at various depths in the proposed site as the PP stated that the same site was used before for deep burial of bio-medical waste.	Given in Chapter 3 (Table 3.19 Pg.No.101)
3	Details of various state of art of technology available for this filed and justification for selection of a particular technology.	Given in Chapter 2 (Section 2.10 Pg.No.40)
4	Details of permanent structures available within 2km from the project site shall be provided in the EIA.	There are no permanent structures available within 2km from the project site
5	Commitment letter from competent authority for the supply of fresh water.	Enclosed in Annexure IV
6	Land requirement for the facility including its break up for various purposes, its availability and optimization.	Given in Chapter 2 (Section 2.5 Pg.No.38)
7	Details of proposed layout clearly demarcating various activities such as security, Waste Storage Rooms, Waste Treatment Equipment Rooms/Areas, Treated Waste Storage Room, Pollution Control Devices like APCS and ETP, ash storage/disposal area, vehicle washing areas, and others such as admin area, worker's room, health centers, greenbelt, etc.	Given in Chapter 2 (Fig 2.5 Pg.No.37)
8	Details on collection and transportation of Bio Medical Waste from health care establishment. No. of vehicles and feature of vehicles, etc.	Given in Chapter 1 (Table 1.2 – S.No. 3&7 Pg.No.26)
9	Details of waste storage facilities/rooms.	Given in Chapter 2 (Section 2.12.4 Pg.No.61)
10	Details of the treatment equipment's capacity.	Given in Chapter 1 (Table 1.2 – S.No. 4 Pg.No.26)

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11	Details of the incineration system — a statement on the compliance to CPCB guidelines for common bio medical waste incinerators in respect of waste feed cut-offs, operating parameters of combustion chambers, flue gas cleaning, ash handling, etc.	Given in Chapter 2 (Section 2.10.3 Pg.No.50)
12	Details on fuel requirement for incineration.	Given in Chapter 2 (Table 2.16 Pg.No.61)
13	Details on flue gas emissions discharge through stack and proposed pollution control technologies.	Given in Chapter 2 (Table 2.16 Pg.No.61)
14	Details on residue/ash generation and management.	Given in Chapter 2 (Section 2.12.4 Pg.No.61)
15	Details of waste heat utilization, if any.	No such activities are proposed.
16	Details on wastewater management.	Given in Chapter 2 (Table 2.15 Pg.No.59)
17	Details of the proposed overall safety and health protection measures.	Given in Chapter 7 (Section 7.5 Pg.No.179)
18	Details on source of water and power to the facility.	Given in Chapter 1 (Table 1.2 – S.No. 8,9&14 Pg.No.26)
19	Details of the existing access road(s)/walkways to the designed operations in the site and its layout.	Given in Chapter 2 (Fig. 2.5 Pg.No.37)
20	Location of the incineration facility and nearest habitats with distances from the facility to be demarcated on a toposheet (1: 50000 scale).	Given in Chapter 2 (Fig. 2.10 Pg.No.57)
21	Landuse map based on satellite imagery including location specific sensitivities such as national parks / wildlife sanctuary, villages, industries, etc.	Given in Chapter 4 (Map-3 Pg.No.135)
22	Topography details.	Given in Chapter 3 (Section 3.7 Pg.No.75)
23	Surface water quality of nearby water bodies.	Given in Chapter 3 (Table 3.17 Pg.No.97)
24	Details on proposed groundwater monitoring wells, locations, frequency of monitoring, parameters, etc.	Given in Chapter 6 (Table 6.2 Pg.No.165)
25	Action plan for the greenbelt development in accordance to CPCB guidelines.	Given in Chapter 10 (Section 10.7 Pg.No.195)
26	Details on pollution control technologies and online monitoring equipment.	Given in Chapter 6 (Section 6.2 Pg.No.161)
27	Details on monitoring of pollutants at source —performance of the incinerator, including operating hours, fuel	Given in Chapter 4 (Table 4.4 Pg.No.149)

	consumption, operating parameters (Combustion chamber — temperature, pressure, Stack temperature, total particulate matter, HCl, NOx as per Bio Medial Waste (Management & Handling) Rules 1998.	
28	Stack and fugitive emissions may be monitored for SPM, HCL & NO2 as per Bio Medial Waste (Management & Handling) Rules 2016.	Stack and fugitive emissions are monitored as per Bio Medial Waste (Management & Handling) Rules 2016.
29	Specific programme to monitor safety and health protection of workers.	Given in Chapter 7 (Section 7.6 Pg.No.180)
30	Details of administrative and technical organizational structure	Given in Chapter 10 (Section 10.2 Pg.No. 189)
31	Details of the emergency preparedness plan and on-site & off-site disaster management plan. Submit details of a comprehensive Disaster Management Plan including emergency evacuation during natural and man-made disaster.	Given in Chapter 7 (Section 7.9 Pg.No. 181)
32	The EIA/EMP shall conform to the 'Revised Guidelines for Common Bio-medical Waste Treatment and Disposal Facilities' issued by the Central Pollution Control Board.	The 'Revised Guidelines for Common Bio-medical Waste Treatment and Disposal Facilities' issued by the Central Pollution Control Boar is confirmed in this report.
33	PP shall strive to generate a minimum of 50% of energy consumption by way of solar energy.	50% of energy consumption will be through solar energy.
34	As part of CER, PP shall examine the possibility of providing electric crematoriums Ramanathapuram and Paramakudi municipalities.	Given in Chapter 10 (Table 10.3 Pg.No. 200)
35	Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project will be given.	Not Applicable
36	The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP will be clearly spelt out.	Project Cost – 147 lakhs Given in Chapter 10 (Table 10.2 Pg.No. 200)
<b>STANDARD TERMS OF REFERENCE FOR CONDUCTING ENVIRONMENT IMPACT ASSESSMENT STUDY</b>		
1	Reasons for selecting the site with details of alternate sites examined/rejected/selected on merit with comparative statement and	Given in Chapter 5 (Section 5.1 Pg.No. 155)

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	reason/basis for selection. The examination should justify site suitability in terms of environmental damages, resources sustainability associated with selected site as compared to rejected sites. The analysis should include parameters considered along with weightage criteria for short-listing selected site	
2	Submit the details of the road/rail connectivity along with the likely impacts and mitigative measures	Given in Chapter 2 (Table 2.1 Pg. No. 32)
3	Submit the present land use and permission required for any conversion such as forest, agriculture etc	There is no conversion of forests and agriculture lands.
4	Examine the details of transportation of Hazardous wastes, and its safety in handling.	Given in Chapter 2 (Section 2.12.5 Pg. No. 61)
5	Examine and submit the details of online pollutant monitoring.	Given in Chapter 6 (Section 6.2 Pg. No. 161)
6	Examine the details of monitoring of Dioxin and Furon.	Given in Chapter 6 (Section 6.2 Pg. No. 161)
7	MoU for disposal of ash through the TSDF.	Given in Annexure III (Pg. No.231)
8	MoU for disposal of scrubbing waste water through CETP.	Given in Annexure III (Pg. No.231)
9	Examine and submit details of monitoring of water quality around the landfill site.	Given in Chapter 3 (Table 3.17 Pg. No. 97)
10	Examine and submit details of the odour control measures.	Given in Chapter 10 (Section 10.8 Pg. No. 196)
11	Examine and submit details of impact on water body and mitigative measures during rainy season.	Given in Chapter 4 (Section 4.2 Pg. No. 139)
12	Environmental Management Plan should be accompanied with Environmental Monitoring Plan and environmental cost and benefit assessment. Regular monitoring shall be carried out for odour control.	Given in Chapter 10 (Section 10.0 Pg. No. 188)
13	Water quality around the landfill site shall be monitored regularly to examine the impact on the ground water.	Water quality around the landfill site will be monitored regularly
14	The storage and handling of hazardous wastes shall be as per the Hazardous Waste Management Rules.	The storage and handling of hazardous wastes will be as per the Hazardous Waste Management Rules.
15	Submit details of a comprehensive Disaster Management Plan including emergency evacuation during natural and man-made	Given in Chapter 7 (Section 7.9 Pg. No. 181)

	disaster.	
16	Public hearing to be conducted for the project in accordance with provisions of Environmental Impact Assessment Notification, 2006 and the issues raised by the public should be addressed in the Environmental Management Plan. The Public Hearing should be conducted based on the ToR letter issued by the Ministry and not on the basis of Minutes of the Meeting available on the web-site.	Will be Compiled after Public Hearing
17	A detailed draft EIA/EMP report should be prepared in accordance with the above additional TOR and should be submitted to the Ministry in accordance with the Notification	Will be compiled
18	Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.	Not Applicable
19	The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.	Project Cost – 147 lakhs Given in Chapter 10 (Table 10.2 Pg.No. 200)
20	Any further clarification on carrying out the above studies including anticipated impacts due to the project and mitigative measure, project proponent can refer to the model ToR available on Ministry website " <a href="http://moef.nic.in/Manual/Incinerator">http://moef.nic.in/Manual/Incinerator</a> "	No further clarifications needed.

**EXECUTIVE SUMMARY**

1	Project name and location (Village, District, State, and industrial Estate (If applicable)).	Compiled in Executive Summary
2	Products and capacities. If expansion proposal then existing products with capacities and reference to earlier EC.	Compiled in Executive Summary
3	Requirement of land, raw material, water, power, fuel, with source of supply( Quantitative)	Compiled in Executive Summary
4	Process description in brief specifically indicating the gaseous emission, liquid effluent and solid and hazardous wastes.	Compiled in Executive Summary
5	Measures for mitigating the impact on the environment and mode of discharge or disposal.	Compiled in Executive Summary
6	Capital cost of the project, estimated time of completion.	Compiled in Executive Summary

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7	Site selected for the project- Nature of land- Agricultural(Single/double crop), barren, Govt/Private land, status of its acquisition, nearby (in 2-3 km), water body,, population, with in 10km other industries, forest, eco-sensitive zones, accessibility,(note-I case of industrial estate this information may not be necessary)	Compiled in Executive Summary
8	Baseline environmental data-air quality, surface and ground water quality, soil characteristic, flora and fauna, socio-economic condition of the nearby population.	Compiled in Executive Summary
9	Identification of hazards in handling, processing and storage of hazardous material and safety system provided to mitigate the risk.	Compiled in Executive Summary
10	Likely impact of the project, on air, water, land, flora-fauna and nearby population	Compiled in Executive Summary
11	Emergency preparedness plan in case of natural or in plant emergencies.	Compiled in Executive Summary
12	Issues raised during public hearing (If applicable) and response given	Compiled in Executive Summary
13	CSR plan with proposed expenditure.	Compiled in Executive Summary
14	Occupational Health Measures.	Compiled in Executive Summary
15	Post project monitoring plan.	Compiled in Executive Summary

**GENERAL POINTS TO BE FOLLOWED**

1	The EIA document shall be printed on both sides, as for as possible.	Will be Compiled
2	All documents should be properly indexed, page numbered.	Will be Compiled
3	Period/date of data collection should be clearly indicated.	Will be Compiled
4	Authenticated English translation of all material provided in Regional languages.	Will be Compiled
5	The letter/application for EC should quote the MoEF & CC File No. and also attach a copy of the letter prescribing the ToR.	Will be Compiled
6	The copy of the letter received from the Ministry on the ToR prescribed for the project should be attached as an annexure to the final ELA-EMP Report.	Will be Compiled
7	The final EIA-EMP report submitted to the Ministry must incorporate the issues mentioned in ToR. The	Will be Compiled



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	index of the final EIA-EMP report, must indicate the specific chapter and page no. of the ELA-EMP Report where the specific ToR prescribed by the Ministry have been incorporated. Questionnaire related to the project (posted on MoEF&CC website) with all sections duly filled in shall also be submitted at the time of applying for EC.	
8	Grant of ToR does not mean grant of EC.	Will be Compiled
9	The status of accreditation of the EIA consultant with NABET/QCI shall be specifically mentioned. The consultant shall certify that his accreditation is for the sector for which this EIA is prepared.	Will be Compiled
10	On the front page of EIA/EMP reports, the name of the consultant/consultancy firm along with their complete details including their accreditation, if any shall be indicated. The consultant while submitting the ELA/EMP report shall give an undertaking to the effect that the prescribed ToRs (ToR proposed by the project proponent and additional ToR given by the MoEF & CC) have been complied with and the data submitted is factually correct (Refer MoEF & CC Office memorandum dated 4" August, 2009).	Will be Compiled
11	While submitting the EIA/EMP reports, the name of the experts associated with/involved in the preparation of these reports and the laboratories through which the samples have been got analysed should be stated in the report. It shall clearly be indicated whether these laboratories are approved under the Environment (Protection) Act, 1986 and the rules made there under (Please refer MoEF&CC Office Memorandum dated 4" August, 2009). The project leader of the EIA study shall also be mentioned.	Will be Compiled
12	All the ToR points as presented before the State Expert Appraisal Committee (SEAC) shall be covered.	Will be Compiled
13	The project proponent shall submit the detailed final ELA/EMP prepared as per ToR to the Ministry for considering the proposal for environmental clearance within 3 years as per the MoEF & CC O.M. No.J-11013/41/2006-IA-11(1) (P) dated 08.10.2014.	Will be Compiled
14	The consultants involved in preparation of EIA/EMP report after accreditation with Quality Council of India/National Accreditation Board of Education and Training (QCI/NABET) would need to include a	Will be Compiled

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	certificate in this regard in the EIA/EMP reports prepared by them and data provided by other Organization(s)/ Laboratories including their status of approvals etc. vide Notification of the MoEF & CC dated 19.07.2013.	
15	The prescribed ToR would be valid for a period of three years for submission of the EIA/EMP Reports.	Will be Compiled
16	A note confirming compliance of the ToR, with cross referencing of the relevant section/ pages of the EIA report should be provided.	Will be Compiled
17	All documents may be properly referenced with index, page numbers and continuous page numbering.	Will be Compiled
18	Copy of permission related to Port facility, Desalination plant, wind mill/solar power plant from competent Authority.	Will be Compiled
19	Where data are presented in the report especially in tables, the period in which the data were collected and the sources should be indicated.	Will be Compiled
20	While preparing the EIA report, the instructions for the proponents and instructions for the consultants issued by MoEF & CC vide O.M. J-11013/41/2006-IA.II(I) dated 4th August, 2009, which are available on the website of the Ministry should also be followed.	Will be Compiled
21	The consultants involved in the preparation of ELA/EMP report after accreditations with quality Council of India (QC1)/National Accreditation Board of Education and Training (NABET) would need to include a certificate in this regard in the EIA/EMP reports prepared by them and data provided by other organization/Laboratories including their status of approvals etc. In this regard circular no. F.No. J- /11013/77/2004-IA-II(I)_ dated 2 <sup>nd</sup> December, 2009, 18th March 2010, 28th May 2010, 28th June 2010, 31st December 2010 & 30th September 2011 posted on the Ministry's website <a href="http://www.moef.nic.in/">http://www.moef.nic.in/</a> may be referred.	Will be Compiled

## CHAPTER I INTRODUCTION

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### **1.0 Preamble**

M/s. Ramnad Doctors Association has proposed a Common Biomedical Waste Treatment Facility at S.F. No. 249/3, Keelakottai Group, Muthuvayal Village, Paramakudi Taluk, Ramanathapuram District, Tamil Nadu in a site area of about 7648.56 Sq.m (1.89 Acres).

This is a private limited company promoted by the Doctors Association of Ramanathapuram District.

In the said location, M/s. Neat and Clean Service Squad, was operating a BMW facility. The Bio medical waste was being disposed by deep burial as per the Consent Order issued by TNPCB vide No. 1808114295099 Date: 09.07.2018 of the Water (Prevention and Control of Pollution) Act 1974 and Consent Order No. 1808214295099 dated: 09/07/2018 of the Air (Prevention and Control of Pollution) Act 1981 valid up to 31.03.2020; and Authorization under BMW Rules no. BMW0009.

Thereafter, the facility was issued with Closure Directions by TNPCB and in letter dated 6.05.2019 directed M/s. Neat and Clean Service Squad, to collect the BMW in the region of its operation and to handover the waste to the nearby CBMWF for treatment.

As per the directions of TNPCB. The facility is closed and the old landfills are capped. Bio medica waste is now collected and disposed to CBMWF of M/s. Ramkey located at 65 km (By road 100 Kms) with capacity 120 T/M located at Virudhunagar.

Improper management of waste generated in health care facilities causes a direct health impact on the community, the health care workers and on the environment. Every day, a significant amount of potentially infectious bio-medical waste is generated around the world. Indiscriminate disposal of bio-medical waste and exposure to such waste poses serious threat to environment and to human health and so bio-medical waste requires specific treatment and management prior to its final disposal.

Now, M/s. Ramnad Doctors Association has come forward to establish a Common Bio Medical Waste Treatment Facility as per the guidelines issued by the Central Pollution Control Board (CPCB) and also as per the Biomedical Waste (Management and Handling) rules 2016.

Ministry of Environment, Forest and Climate Change (MoEF & CC), Government of India has issued a Rule under the Environment (Protection) Act 1986 called the Biomedical Waste (Management and Handling) rules 1998 with subsequent amendments (June 2nd 2000 and September 2003) and by the supersession of the Rule on 28<sup>th</sup> march 2016 vide Notification No. G.S.R 343(E) and named as the Bio-Medical Waste Management (Management and Handling) Rule, 2016.

Directorate General of Health Services Ministry of Health & Family Welfare; CPCB and MoEF & CC published the Guidelines for Management of Healthcare Waste as per Biomedical Waste Management Rules, 2016.

The Guidelines are published by Ministry of Health and Family welfare, Ministry of MoEF & CC and CPCB to improve the collection, segregation, transportation, processing, treatment & disposal of BMW in an environmental sound manner. Emphasis is given for reducing the BMW generation and its impact on the human health & environment.

According to Bio-Medical Waste Management Rules 2016, Bio-Medical Waste means “any waste, which is generated during the diagnosis, treatment or immunization of human beings or animals or research activities pertaining thereto or in the production or testing of biological or in health camps”.

Bio-medical waste can be managed properly by ensuring proper segregation at the source, the use of accurate packaging (leak resistant, puncture resistant and not susceptible to degradation by cleaning agents in case the packaging is reused), appropriate colour coding, proper in-house movement of waste (minimizing employee exposure to biomedical waste in a workplace), designating waste storage areas and disposing through incineration or decontamination by heating with steam under pressure in an autoclave.

As per the BMW Management Rules, 2016, it is the duty of every occupier (a person having control over an institution or premises) of an institution generating biomedical waste including a hospital, nursing home, clinic, dispensary, veterinary institution, animal house, pathological laboratory, blood bank to take all steps to ensure that such waste is handled without any adverse effect to human health and the environment.

Further as per the guideline;

- Bio-medical waste shall not be mixed with other wastes.
- Bio-medical waste shall be segregated into labeled and colored containers/bags at the point of generation prior to its storage, transportation, treatment and disposal.

- Untreated biomedical waste shall be transported only in such vehicles as may be authorized for the purpose by the competent authority as specified by the government.
- No untreated bio-medical waste shall be kept stored beyond a period of 48 hours.
- Every occupier shall make an application to the prescribed authority for grant of Authorization.
- Records shall be maintained related to generation, collection, storage, transportation, treatment and disposal of biomedical waste

### **1.1 SOURCES OF BIOMEDICAL WASTE**

The source of biomedical waste is categorized into two forms,

#### **Major Sources**

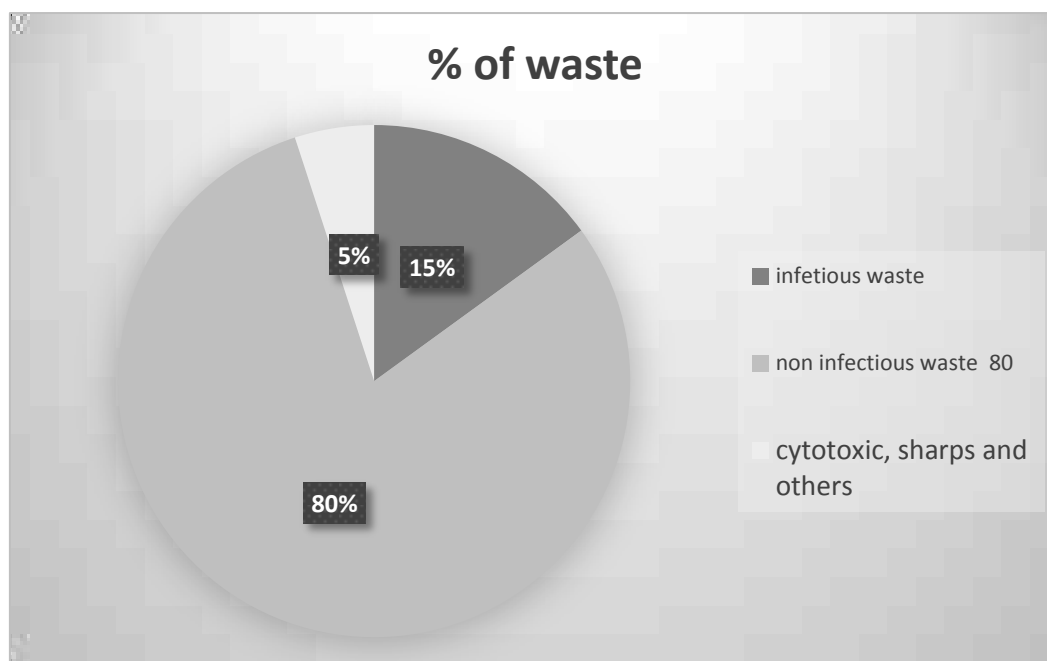
- ✓ Hospitals/Nursing Homes/Dispensaries
- ✓ Primary Health Centers
- ✓ Medical colleges and research centers/paramedic services
- ✓ Veterinary colleges and animal research centers
- ✓ Blood banks/mortuaries/autopsy centers
- ✓ Animal houses/slaughterhouses
- ✓ Biotechnology institutions
- ✓ Production units

#### **Minor Sources**

- ✓ Physicians/dental clinics
- ✓ Blood donation camps
- ✓ Vaccination centers

#### **Composition of biomedical waste is broadly classified as;**

- ✓ Non – infectious waste: 80 %
- ✓ Infectious Waste: 15 %
- ✓ Cytotoxic waste, glass, sharps etc.: 5 %



### 1.2 Common Bio-medical Waste Treatment Facility (CBMWTF)

Common Bio-Medical Waste Treatment Facility provides a scientific approach for handling, transportation, storage and disposal of the waste by professionally trained personnel and using facilities like incinerator, autoclave, shredding and disposal of the plastic to recyclers after disinfection and shredding.

The CBMWTF will enable the "Health care facility" (HCFs) means a place where diagnosis, treatment or immunization of human beings is provided irrespective of type and size of health treatment system, and research activity pertaining thereto. In pretext to these guidelines these health care facilities include District Hospitals, Sub Divisional Hospitals, Community Health Centers, Primary Health Centers and Sub centers to make use of the facility for hassle free disposal of the biomedical waste scientifically.

CBWTF is providing services to Health Care Units must manage bio-medical waste as prescribed in the rules such that it does not cause any harm to the environment. The primary responsibility of Health administrators is to manage hospital waste in the most safe and eco- friendly manner at site till the waste is handed over to the operator of the CBMWTF.

The wastes are categorized as per its nature, the wastes are to be disinfected, collected in the color-coded bags/containers and stored in a secured manner at the generators facility till it is handed over to the CBMWTF. The operator of the facility has to collect the waste within 48 hrs of its generation.

### 1.3 Duties of Operator

- A. Take all necessary steps to ensure that the bio-medical waste collected from the occupier is transported, handled, stored, treated and disposed of, without any adverse effect to human health and the environment, in accordance with these rules and guidelines issued by the Central Government or, as the case may be, the central pollution control board from time to time;
- B. Ensure timely collection of bio-medical waste from the occupier as prescribed under these rules;
- C. Establish bar coding and global positioning system for handling of bio- medical waste within one year;
- D. Inform the prescribed authority immediately regarding the occupiers which are not handing over the segregated bio-medical waste in accordance with these rules;
- E. Provide training for all its workers involved in handling of bio-medical waste at the time of induction and at least once a year thereafter;
- F. Assist the occupier in training conducted by them for biomedical waste management;
- G. Undertake appropriate medical examination at the time of induction and at least once in a year and immunize all its workers involved in handling of bio-medical waste for protection against diseases, including Hepatitis B and Tetanus, that are likely to be transmitted while handling bio-medical waste and maintain the records for the same;
- H. Ensure occupational safety of all its workers involved in handling of bio-medical waste by providing appropriate and adequate personal protective equipment;
- I. Report major accidents including accidents caused by fire hazards, blasts during handling of biomedical waste and the remedial action taken and the records relevant thereto, to the prescribed authority and also along with the annual report;
- J. Maintain a log book for each of its treatment equipment according to weight of batch; categories of waste treated; time, date and duration of treatment cycle and total hours of operation;
- K. Allow occupier, who are giving waste for treatment to the operator, to see whether the treatment is carried out as per the rules;
- L. Shall display details of authorization, treatment, annual report on its web-site;
- M. After ensuring treatment by autoclaving or microwaving followed by mutilation or shredding, whichever is applicable, the recyclables from the treated bio-medical wastes such as plastics and glass, shall be given to recyclers having valid consent or authorization or registration from the respective State Pollution Control Board or Pollution Control Board;
- N. Supply non-chlorinated plastic colored bags to the occupier on chargeable basis, if required;
- O. Common bio-medical waste treatment facility shall ensure collection of biomedical waste on holidays also;

- P. Maintain all records for operation of incineration, hydro or autoclaving for a period of five years;
- Q. If required, upgrade existing Incinerators to achieve the standards for retention time in the secondary chamber, Dioxin, and Furans within two years from the date of this notification.

The category of waste generation, treatment and disposal recommended in the BMW Rules is in Table 1.1.

**Table 1.1 Waste Category & Treatment Disposal**

<b>Option</b>	<b>Waste Category</b>	<b>Treatment &amp; Disposal</b>
<i>Category No. 1</i>	Human Anatomical Waste (human tissues, organs, body parts)	Incineration
<i>Category No. 2</i>	Animal Waste (animal tissues, organs, body parts, carcasses, bleeding parts, fluid, blood and experimental animals used in research, waste generated by veterinary hospitals, colleges, discharge from hospitals, animal houses)	Incineration
<i>Category No. 3</i>	Microbiology & Biotechnology Waste (Wastes from laboratory cultures, stocks or micro-organisms live or vaccines, human and animal cell culture used in research and infectious agents from research and industrial laboratories, wastes from production of biology, toxins, dishes and devices used for transfer of cultures)	Local autoclaving / microwaving / incineration
<i>Category No. 4</i>	Waste Sharps (Needles, syringes, scalpels, blades, glass, etc. that may cause puncture and cuts. This includes both used and unused sharps)	Disinfection (chemical treatment)/ autoclaving / microwaving and mutilation / shredding
<i>Category No. 5</i>	Discarded Medicines and Cytotoxic drugs (Waste comprising of outdated, contaminated and discarded medicines)	Incineration/ destruction and drugs disposal in secured landfills
<i>Category No. 6</i>	Soiled Waste (items contaminated with blood, and body fluids including cotton, dressings, soiled plaster casts, lines, bedding, other material)	Incineration/ autoclaving/ microwaving



	contaminated with blood)	
<i>Category No.</i> 7	Solid Waste (Waste generated from disposal items other than the sharps such tubing, catheters, intravenous sets etc.)	Disinfection by chemical treatment/ autoclaving/ microwaving and mutilation / shredding
<i>Category No.</i> 8	Liquid Waste (Waste generated from laboratory and washing, cleaning, housekeeping and disinfecting activities)	Disinfection by chemical treatment and discharge into drains
<i>Category No.</i> 9	Incineration Ash (Ash from incineration of any bio-medical waste)	Disposal in municipal landfill
<i>Category No.</i> 10	Chemical Waste (Chemicals used in production of biology, chemicals used in production of biology, chemicals used in disinfection, as insecticides, etc.)	Chemical treatment and discharge into drains for liquids and secured landfill for solids

#### 1.4 Purpose of the Report

Proposed establishment of Common Bio Medical Waste Treatment Facility is covered in EIA Notification 2006 vide activity under Schedule 7 (da), and category “B1” as per Gazette Amendment to the EIA Notification vide No. S.O. 1142(E) dated 17<sup>th</sup> April, 2015.

The application is made online through PARIVESH portal of MoEF & CC on 03.09.2021 for seeking prior EC for the proposed establishment of CBMWTF in S.F. No. 249/3, Keelakottai Group, Muthuvayal Village, Paramakudi Taluk, Ramanathapuram District, Tamil Nadu by M/s. Ramnad Doctors Association.

Accordingly, the SEIAA, Tamil Nadu has granted ToR on 26.07.2022 for carrying out the Environment Impact Assessment (EIA) studies. This EIA study report addresses all the ToR points and procedure laid down in the EIA Notification 2006.

#### 1.5 Project & Project Proponent

M/s. Ramnad Doctors Associations has proposed a CBMWTF at S.F. No. 249/3, Keelakottai Group, Muthuvayal Village, Paramakudi Taluk, Ramanathapuram District, Tamil Nadu in an area of 7648.56 Sq.m (1.89 Acres).

This is a private limited company promoted by the Doctors Association of Ramanathapuram District. The company has experience in operating the CBMWTF when M/s Neat and Clean Service Squad, was operating a BMW facility at the proposed location by deep burial method.

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The facility will have an incinerator of capacity 500 kg/hr and other allied facility with necessary pollution control measures and other allied facilities as per the guidelines issued by CPCB and in the BMW Rules 2016.

The proposed activities of the project will be as follows,

- Collection
- Transportation
- Storage
- Treatment
  - ✓ Incineration,
  - ✓ Autoclaving, & Shredding
- Final Disposal of ash and recyclable material after shredding

The proposed Common Bio-medical Waste Treatment Facility will have facilities as per the as per BMWM rules, 2016 and Guidelines for collection, treatment and safe disposal of Bio-medical waste generated from HCEs. Table 1.2 gives the salient features of the project.

**Table 1.2 Salient Features of the Project**

SI.No.	Parameters	Description																		
1	Name of the project and location	M/s. Ramnad Doctors Association – BMW Plant located at S.F. No. 249/3, Keelakottai Group, Muthuvayal Village, Paramakudi Taluk, Ramanathapuram District.																		
2	Project Activity Schedule, Category as per EIA Notification 2006 & amendment	The project falls under Category B1, schedule 7 (da) as per the EIA Notification 2016, amendment No. S.O 1142 (E) dated 17 <sup>th</sup> April, 2015.																		
3	HCEs covered and area of operation	Bio-medical waste generated from all Health Care Establishments (HCEs) like clinics, hospitals, nursing homes, veterinary institutions, animal houses, pathological laboratories, blood banks etc., located in Ramanathapuram district and part of Sivagangai District will be covered.																		
4	Plant Capacity	Capacity of CBMWF <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Equipment</th> <th>Nos.</th> <th>Capacity</th> </tr> </thead> <tbody> <tr> <td>Incinerator</td> <td>1</td> <td>500 kg/hr</td> </tr> <tr> <td>Autoclave</td> <td>1</td> <td>600 Lit./cycle</td> </tr> <tr> <td>Shredder</td> <td>1</td> <td>200 kg/h</td> </tr> <tr> <td>Sharp pit</td> <td>1</td> <td>5 cum</td> </tr> <tr> <td>Effluent Treatment Plant</td> <td>1</td> <td>10 KL</td> </tr> </tbody> </table>	Equipment	Nos.	Capacity	Incinerator	1	500 kg/hr	Autoclave	1	600 Lit./cycle	Shredder	1	200 kg/h	Sharp pit	1	5 cum	Effluent Treatment Plant	1	10 KL
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Sharp pit	1	5 cum																		
Effluent Treatment Plant	1	10 KL																		

5	Number of HCE's covered	1800 numbers. Number of beds covered 3500 numbers.										
6	Total Plot Area	1.89 Acres (7648.56 sq.m)										
7	BMW transport vehicles	GPS enabled vehicles - 2 No.										
8	Source of freshwater	Village Panchayat for supply for freshwater.										
9	Water Requirement	4.5 KLD freshwater and recycle water 4.5 KLD. Total water in the system 9 KLD										
10	Wastewater generation & mode of treatment	7.78 KLD Effluent – 7.5 KLD will be treated in 10 KLD ETP. Wastewater generated from the treatment of Bio-medical waste during autoclaving, washing of machines, vehicles and floors etc., will be treated in Effluent Treatment Plant and the plant will be operated on the principle of zero liquid discharge. Sewage – 0.28 KLD will be treated in septic tank followed by soak pit.										
11	Air Pollution Sources & control measures	<ul style="list-style-type: none"> <li>• Incinerator emission control scrubber and chimney of 30 m AGL height</li> <li>• DG set of 62.5 kVA with 4 m ARL stack height and acoustic enclosure will be provided.</li> </ul>										
12	Hazardous & Solid waste generation	<ul style="list-style-type: none"> <li>• Organic solid waste – 0.6 kg/day</li> <li>• Inorganic solid waste – 0.4 kg/day</li> <li>• Ash from the incinerator: 150 kg/d Disposed to TSDF</li> <li>• Plastic waste – 10 kg/d to recyclers</li> </ul>										
13	Man power	15 numbers										
14	Electricity/Power requirement	Power of 90 kW is supplied from TNEB.										
15	Land form, Land use and Land ownership	Unclassified Area										
16	Estimated Cost	<table border="1"> <thead> <tr> <th>Description</th> <th>Cost (Rs. In lakhs)</th> </tr> </thead> <tbody> <tr> <td>Land Cost</td> <td>20</td> </tr> <tr> <td>Construction Cost</td> <td>25</td> </tr> <tr> <td>Plant &amp; Machinery</td> <td>102</td> </tr> <tr> <td><b>Total</b></td> <td><b>147</b></td> </tr> </tbody> </table>	Description	Cost (Rs. In lakhs)	Land Cost	20	Construction Cost	25	Plant & Machinery	102	<b>Total</b>	<b>147</b>
Description	Cost (Rs. In lakhs)											
Land Cost	20											
Construction Cost	25											
Plant & Machinery	102											
<b>Total</b>	<b>147</b>											

### 1.6 Scope of the Report

#### ❖ To Determine the status of current environmental parameters

- This EIA study involves assessment of present environment and ecology, flora and fauna, climate, land use, socio-economic condition of the area, monitoring of atmospheric pollutants like air, water, noise and meteorological parameters.

- Studies in this respect were carried out in core zone (i.e., project area) as well as in buffer zone (area covering 10 km radius from the project) as per the TOR Granted.
  
- ❖ **To Assess, categorize, quantify and mitigate probable significant environmental impacts (considering alternate assignments, baseline scenario and public opinion)**
  - In order to predict the expected impact of processes and activities of the project on various environmental factors, a detailed study of interrelationship of project activities and environmental factors has been carried out in this report.
  
- ❖ **To prepare detailed Environmental Management Plan (EMP) along with cost for the same**
  - Air Quality & Air Pollution control measures.
  - Water management Scheme
  - Noise Management
  - Soil Pollution Control Measures
  - Mitigation of adverse impacts on land use
  - Socio-economics
  - Flora & Fauna
  - Ground water
  - Solid Waste Management
  - Risk Hazard Management
  - Hydrology & Geology

### **1.7 Applicable Legislations for the Project**

The proposed project falls under Category B1 activity 7 (da) (as per the notification EIA Notification, 2006 and amendment issued on 17<sup>th</sup> April, 2015 by MoEF & CC).

#### **The Water (Prevention and Control Of Pollution) Act 1974**

Under Section 25, Restrictions on New Outlets and New Discharges Applicable due to discharge of wastewater from the proposed facility. Under the above-mentioned act, we shall take consent “consent to establish” & “consent to operate” from the State Pollution Control Board.

#### **The Air (Prevention and Control of Pollution) Act, 1981**

Under section 21, Restrictions on the use of certain industrial plants. Applicable due to provision of DG Set, Incinerators which will be a source of air emissions to the atmosphere. Stack & Air Pollution Control Device shall be installed. Under the above-mentioned act, we shall take consent “consent to establish” & “consent to operate” from the SPCB.

#### **Biomedical Waste (Management and Handling) Rules, 2016 and Amendments (2018) & (2019)**

Applicable due to provision of Bio-medical waste treatment facility.

**Solid Wastes (Management and Handling) Rules, 2016**

As per this rule, solid waste is to be segregated and disposed of as per defined procedure at Solid Waste Disposal approved site or within its own complex by using different solid waste disposed technologies.

**Hazardous and Other Waste (Management & Transboundary Movement) Rules, 2016**

Hazardous wastes shall be collected, treated, stored at isolated locations It will be given to authorized recyclers/ service providers only.

**Plastic Waste Management Rules, 2016**

Applicable due to generation of some plastic wastes.

**The Noise Pollution (Regulation and Control) Rules, 2000**

**Public Liability Insurance Act, 1991**

The noise levels in any area zone shall not exceed the noise quality standards in respect of noise as specified in the schedule. The authority shall be responsible for the enforcement of noise pollution control measures and the due compliance of the noise quality standards in respect of noise.

**PUBLIC LIABILITY INSURANCE ACT, 1991**

An Act to provide for public liability- insurance for the purpose of providing immediate relief to the persons affected by accident occurring while handling any hazardous substance and for matters connected therewith or incidental thereto.

## CHAPTER II PROJECT DESCRIPTION

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### **2.0 Condensed Description of Those Aspects of The Project (Based on Project Feasibility Study), Likely to Cause Environmental Effects.**

#### **2.1 Type of the project**

Ramnad Doctors Association - BMW plant is proposed to operate a Common Bio-Medical Waste Treatment Facility at S.F. No. 249/3, Keelakottai Group, Muthuvayal Village, Paramakudi Taluk, Ramanathapuram District, Tamil Nadu. The plant is located in unclassified area and outside the designated industrial area.

In the said location, M/s. Neat and Clean Service Squad, was operating a BMW facility with Consent under the Water Act 1974 and the Air Act issued on 09/07/2018 valid up to 31.03.2020 and Authorization under BMW Rules no. BMW 0009. M/s. Neat and Clean Service Squad was operating old BMW treatment facility i.e., deep burial system.

The facility was closed as per the closure Directions of TNSPCB. M/s. Neat and Clean Service Squad was directed to collect the BMW in the region of its operation and to handover the waste to the nearby CBMWF for treatment as the deep burial system was closed.

At present the biomedical waste from this region is being sent to M/s. Ramky Energy and Environment Limited, Virudhunagar located at 65 Km from the proposed site.

Now, Ramnad Doctors Association - BMW plant has taken over the plant facility and proposed to install a 500 Kg/hr incinerator and other allied facilities for disposal of BMW for which prior Environmental Clearance is sought for SEIAA, Tamil Nadu.

It is proposed to cover about 1,800 numbers of Health Care Establishments (HCE) and total bed strength will be 3,500 numbers, The quantum of bio-medical waste generating is about 3500 kg/day. The area of operation is Ramanathapuram district and part of Sivagangai District.

The project falls under EIA Notification 2006 the activity falls under category 'B1' project in Schedule 7 (da) as per the MoEF & CC Notification dated 17<sup>th</sup> April, 2015 issued under the EIA Notification 2006. Project falls under Red category as per the categorization of Industry of CPCB/ TNPCB.

This proposal is being appraised under Category B1 project. The ToR is issued by SEIAA, Tamil Nadu.

## **2.2 Need of the project & objectives of the project**

### **2.2.1 Need of the project**

Ramnathapuram District Doctors Association - BMW plant proposes to cover 1800 HCU's in Ramnathapuram district and Sivagangai district covering about 3500 beds. The capacity of the incinerator will be 500 Kg/hr and supported with other facilities like autoclave shredder etc.

There exists only one biomedical waste treatment facility in the region i.e., M/s. Ramky Energy and Environment Limited, Virudhunagar operating with capacity 120 T/M covering 891 no of HCE's with 8633 no. of beds and located at 65 Km from the proposed site and also the number of beds has increased double/ triple in the past two decades. Further, due to the Covid-19 pandemic the numbers of beds are increasing rapidly. So, there is a huge generation of biomedical waste, accordingly it creates demand supply gap of BMW facilities.

Ramnathapuram District Doctors Association - BMW plant will be operated by Indian Medical Association and they will be well versed in the treatment of bio-medical waste in scientific methods. This facility will address the requirement of biomedical waste treatment facilities and to collect the biomedical waste generated in Ramanathapuram district and part of Sivagangai District covering radius of 75 km or more if required (from this facility, having 3500 Nos. beds). This will facilitate HCEs in the area of operation.

Therefore, need has arisen to establish Biomedical waste treatment facility at Keelakottai Group, Muthuvayal Village, Paramakudi Taluk, Ramanathapuram District, Tamil Nadu, so the pressure on the HCEs and CBWTF will be eased.

### **2.2.2 Objectives of the project**

- The facility will be operated by Indian Medical Association, RAMNAD district, they are well experienced in handling and disposal of Biomedical waste in scientific manner.
- To address the need for the disposal of Bio-medical waste generated from HCEs, the sanitary and bio medical waste generated from households collected by local municipality
- To provide environmentally sound solution for collection, transportation, treatment and disposal of bio-medical waste
- To ensure maximum collection of bio-medical waste to reduce environmental and health impacts from any unregulated waste
- To prevent transmission of diseases from patient to patient, from patient to health worker and workers in support services while handling bio-medical waste

### 2.3 Location of the Project

The project is located in unclassified land at S. F. No. 249/3, Keelakottai Group, Muthuvayal Village, Paramakudi Taluk, Ramanathapuram District, Tamil Nadu. The choice of land confers to various advantages, which are summarized below:

- There are four buildings with two rooms in one building and the other with one room these were used previously for storage of BMW, shedder, autoclave, steam generator & DG set and a building with single room in ground and first floor within the site which is used as security and office purpose. Existing facilities will be continued for use.
- Industry site is secured by compound wall.
- The site is well connected by road ways.
- Power is supplied through TNEB (presently, disconnected as per TNPCB closure directions)
- There is bore well within the site. However, facility will be sourcing the freshwater from local village Panchayat office.
- The site is geologically stable from adverse incidents of cyclones, earthquake, floods or landslides in the region.
- In 10 km radius there is no wet land, flood plains, eco sensitive zone, National Park, etc.,
- Availability of manpower
- Existing premises is adequate for proposed project

**Table 2.1 – Project location criteria and features**

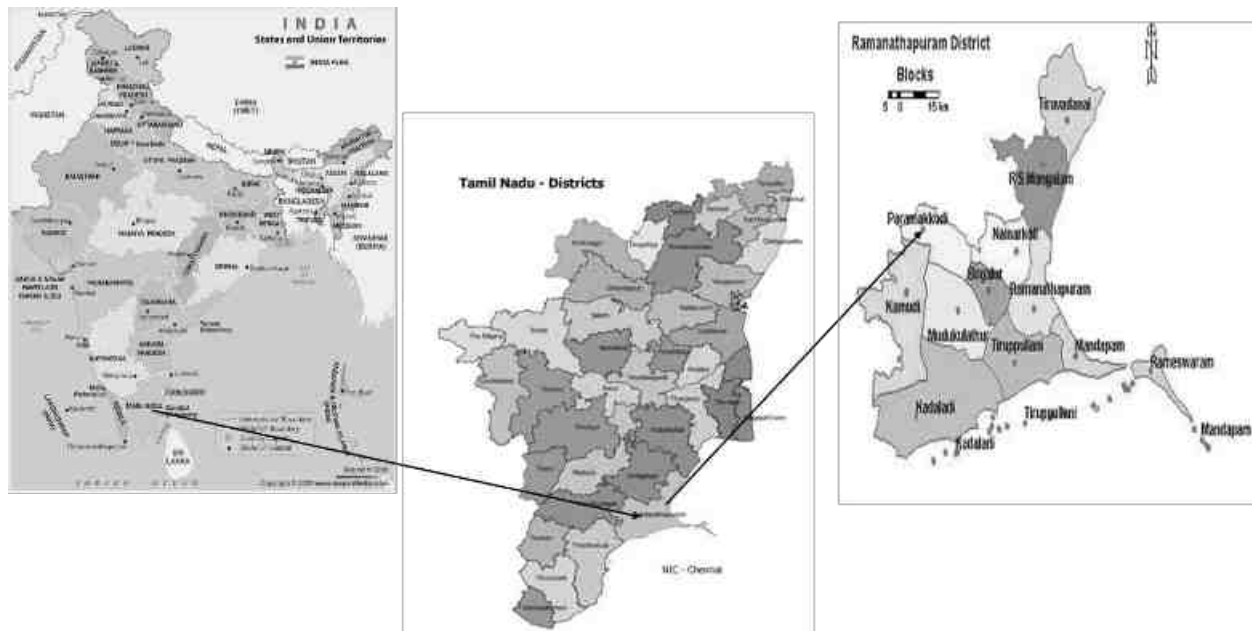
Sl. No.	Location Features / Criteria	Remarks
1	Nearest water bodies	<ul style="list-style-type: none"> <li>• Vaigai River is at a distance of 6 Km towards south.</li> <li>• Puthur and Ariyakudi lake at a distance of 2.5 Km towards South East.</li> <li>• There is a small natural water canal passing at a distance of about 60 m from the compound wall of the site. The water flows in the drain only during rainy days.</li> </ul>
2	Highway	Paramakudi - Ramnad, NH- 49 at a distance of 0.5 km towards West
3	Habitation	<ul style="list-style-type: none"> <li>• Keelakottai village at 1.1 Km towards South</li> <li>• Kumukkottai village at 2.5 Km towards North</li> <li>• Thiruvadi village at 2.9 Km towards North West</li> </ul>



		<ul style="list-style-type: none"> <li>• Muthuvayal village at 1.9 Km towards North East</li> <li>• Ariyakudi village at 1.3 Km towards South East</li> <li>• Sathirakudi village at 2.3 Km towards South East</li> <li>• Kamankottai village at 4.6 Km towards East</li> </ul>
4	Public parks	There are no public parks in the vicinity of project site.
5	Critical Habitat Area	No such area in the vicinity of project site.
6	Wetland / Economic Sensitive Area	No wetlands or economic sensitive area for about 10 km from project site.
7	Railway Station	Sathirakudi Railway Station at 8.0 km from site towards South East
8	Airports	Madurai International Airport at 130 km from project site towards North West.
9	Coastal Regulation Zone	CRZ is not applicable for the proposed project area.
11	CEPI/SEPI Area	Not applicable
12	Land sloping	Towards East
13	Man-made features	<ul style="list-style-type: none"> <li>• Government school Keelakottai is at 1.5 Km towards South West.</li> <li>• Government Veterinary hospital Pandiyur is at 6.5 Km towards North East</li> </ul>

The general location of project site is shown in Figure 2.1 in State and District map, project site boundary is given in Figure 2.2 on Google map marking project site boundary with co-ordinates in Table 2.2. and Google map of area 10 km radius from project site is shown in Figure 2.3. Layout plan is shown in Figure 2.5. Project site photographs are shown in Figure 2.6.

**Figure 2.1 – General Location of Project Site**



**Figure 2.2 –Project site boundary**



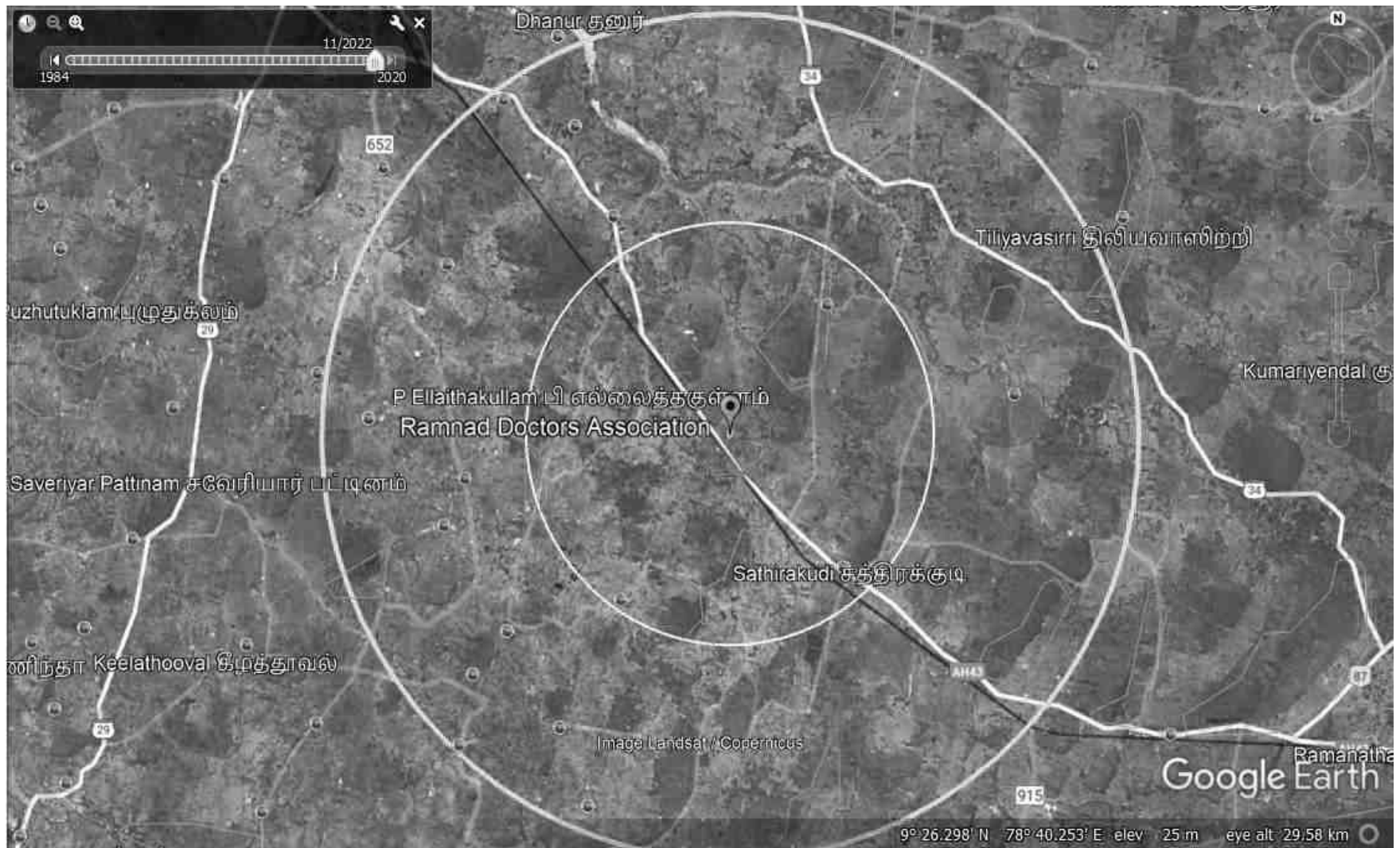
**Table 2.2 – Co-ordinates of project site**

Sl. No.	Co-ordinates	Directions
A.	9°26'13.37" N 78°40'38.95" E	North West
B.	9°26'13.06" N 78°40'40.37" E	North East
C.	9°26'8.26" N 78°40'39.30" E	South East
D.	9°26'8.46" N 78°40'37.49" E	South West



Figure 2.3 – Google map of area 0.5 km radius from the project site

M/s. Ramnad Doctors Association – BMW Plant



**Figure 2.4 – Base map covering 1 km, 5 km & 10 km radius from the project site**

- 10 km radius
- 5 km radius
- 0.5 km radius

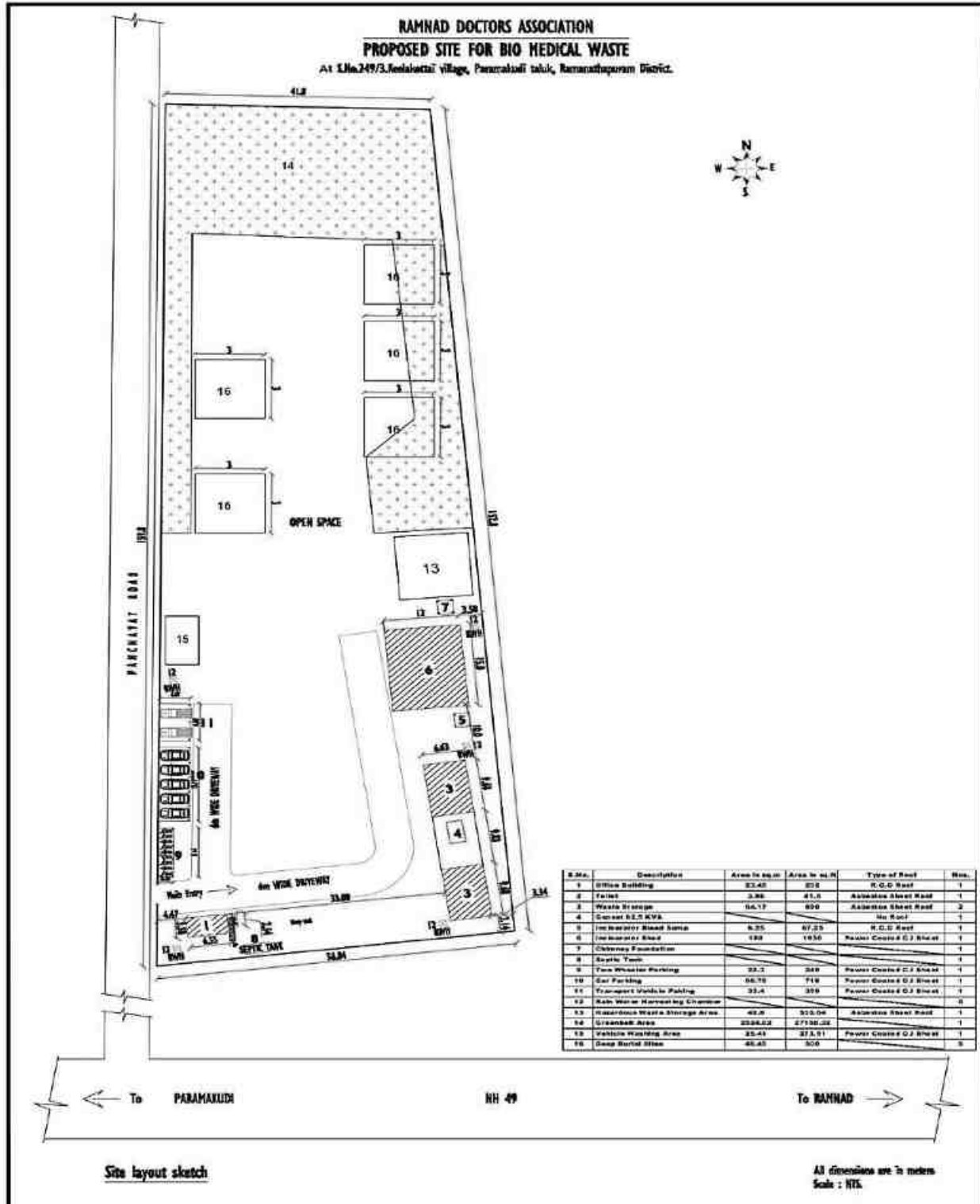
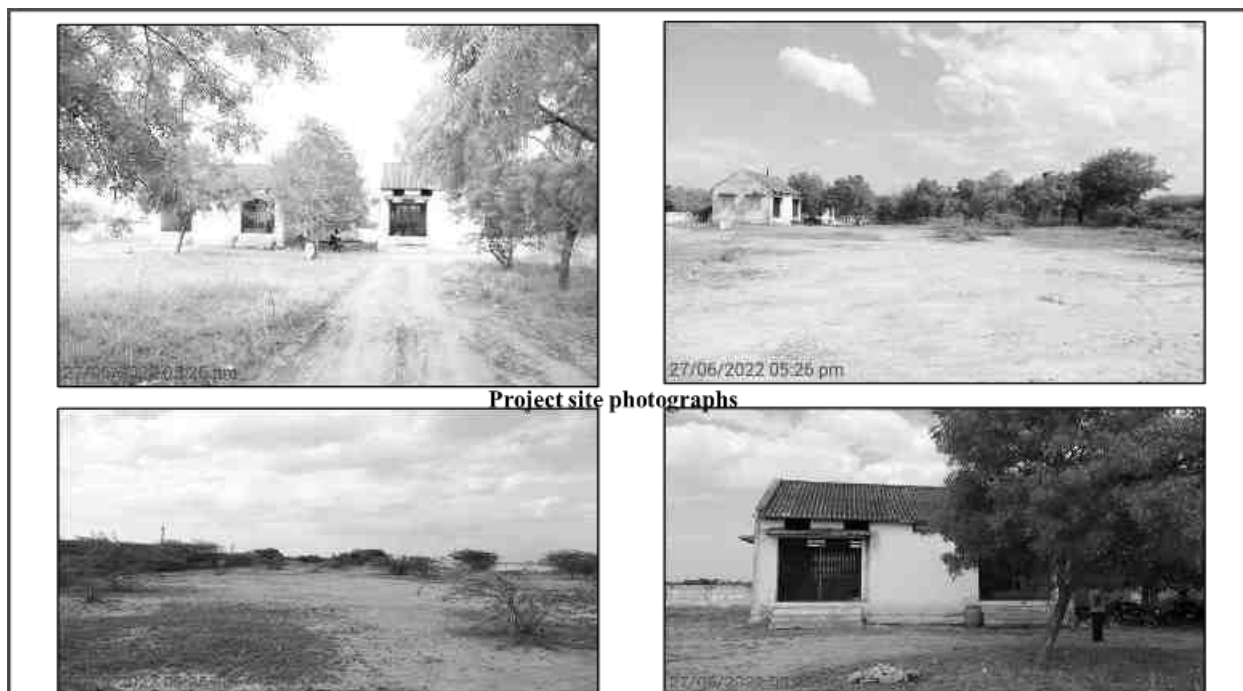


Figure 2.5 – Layout plan of project site indicating proposed infrastructure facility



**Figure 2.6 – Site Photographs**

**2.4 Size or magnitude of operation (including associated activities required by or for the project)**

**i. Size-** The Common Bio-medical Waste Treatment Facility project of Ramnad Doctors Association - BMW plant is a small-scale unit.

**ii. Capital Cost-** Total Project cost for the proposed establishment of CBWTF is Rs. 147 Lakhs. The break-up detail of project cost is shown in Table 2.3 below;

**Table 2.3 – Proposed project cost**

<b>Description</b>	<b>Cost (in Rs. lakhs)</b>
Land Cost	20.00
Construction Cost	25.00
Plant & Machinery	102.00
<b>Total</b>	<b>147.00</b>

**2.5 Land Details**

The total land area of the project site is 1.89 Acre (7648.56 sq m). Land use pattern of the project is shown in Table 2.4 below,

**Table 2.4 – Land use pattern**

Sl. No.	Description	Area in sq.m	Area in Acres	%
1.	Total plot area	7648.56	1.890	100
2.	Ground Coverage area	271.23	0.067	3.53
3.	Hard paved area including roads	390.00	0.096	5.07
4.	Greenbelt area	2529.28	0.625	33.06
5.	Parking	122.35	0.030	1.59
6.	Vacant & Others	4342.27	1.073	56.75

### 2.6 Site Bearings

The proposed project site is surrounded by vacant lands with Jali tree in all directions except north. Details shown in Table 2.5;

**Table 2.5 – Site bearings**

Sl. No.	Direction	Descriptions
1.	North	There is a concrete mixing plant operated by TN Government for road development
2.	South	Un classified land
3.	East	Agricultural land
4.	West	Village Road followed by un classified land

### 2.7 Manpower requirement

There are 15 Nos. direct job opportunity (both skilled & unskilled). Total manpower requirement is shown in Table 2.6;

**Table 2.6 – Man power requirement**

Sl. No.	Phase	Numbers
1	Construction Phase	15 Nos.
2	Operation Phase	15 Numbers of workers including operators, sorting people, vehicle drivers, supervisor and others. This also includes permanent & contract workers.

## 2.8 Power requirement

Total power requirement for the project is 90 kW (60 hp) which will be sourced from TNEB. DG set of capacity 62.5 kVA with 4 m ARL stack height and acoustic enclosure will be provided as power backup.

## 2.9 Proposed schedule for approval & implementation

As soon as the EC is accorded, the industry will obtain Consent for Establishment (CFE) from TNSPCB and take up construction work. The probable date of commissioning of project is scheduled is for May 2023. Time schedule for project implementation is given in Table 2.7;

**Table 2.7 – Time schedule for project implementation**

Sl. No.	Activity	Estimated completion time
1	Application for ToR to SEIAA, Tamil Nadu	03.09.2021
2	Receipt of ToR SEAC/ SEIAA – Tamil Nadu	26.07.2022
3	Baseline monitoring	April, May, June 2022
4	Submission of Draft EIA report to TNSPCB for conducting Public hearing	March 2023
5	Probable time of PH	May 2023
6	PH proceedings from TNSPCB	June 2023
7	Submission of Final EIA and other documents	June 2023
8	Approval of EC	July 2023
9	Application to TNSPCB for CFE	July 2023
10	Expected time of CFE from TNSPCB	August 2023
11	Civil works completion	November 2023
12	Commissioning & Operation	February 2024

## 2.10 Technology and process description

The facility is for treatment and disposal of bio-medical waste defined under Bio-medical waste Management Rules 2016.

### 2.10.1 Types of wastes handled in CBWTF

The types of wastes that the facility is going to handle, its source, quantity and mode of treatment & disposal are shown in Table 2.8.



**Table 2.8 – Types of waste, sources, quantity and mode of treatment & disposal**

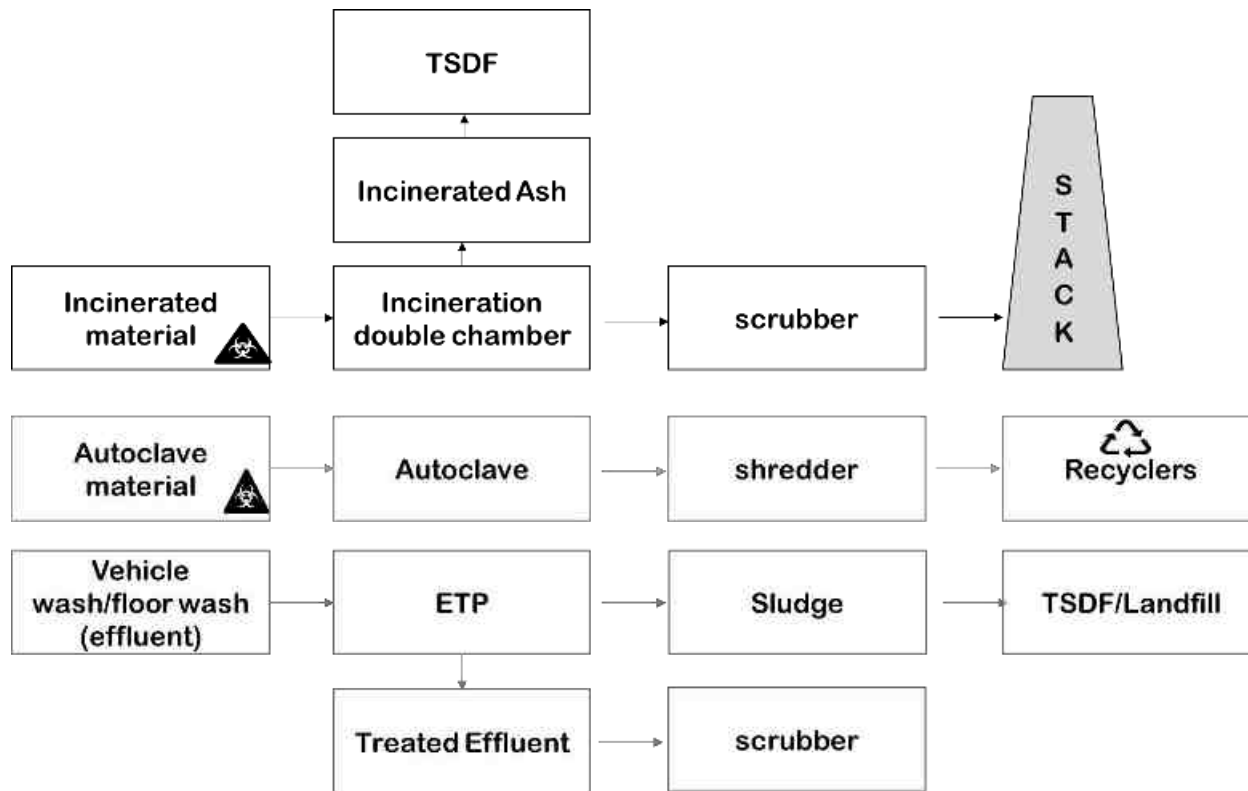
Sl. No.	Source of Bio-medical Waste	Type of waste	Quantity	Treatment & Disposal
1	Health Care Establishments	a) Human Anatomical waste	2350 kg/day	Incineration in Incinerator and Ash will be disposed in TSDF
		b) Animal anatomical waste		
		c) Soiled waste		
		d) Expired/discarded medicine		
		e) Chemical waste		
		f) Discarded linens		
		g) Micro biology, Bio-technology and other chemical waste		
		h) Contaminated waste (Recyclable)	700 kg/day	Autoclaving followed by shredding and handed over to recyclers
		i) Waste sharps including metals	100 kg/day	Autoclaved and incapsulated
	j) Glass Ware	150 kg/day	Disinfected and handed over to recyclers	
2	Expiry drugs from Drugs and logistics	Expiry and discarded drugs	200 kg/day	Incineration in Incinerator and Ash will be disposed in Treatment, Storage & Disposal Facility (TSDF)

**Note** -The wastes listed above will be transported through designated vehicles of treatment facility from HCEs to CBWTF. There are two designated vehicles for waste transportation from HCEs to CBWTF.

### 2.10.2 Process flow of treatment and disposal of bio-medical waste

The Figure 2.7 shows the process flow of common bio-medical waste treatment facility will be followed by M/s. Ramnad Doctors Association - BMW plant.

**Figure 2.7 – Schematic representation showing the process followed for waste treatment and disposal by CBWTF**



The CBWTF is going to follow the scientific guidelines for treatment and disposal of BMW as per the Guidelines stipulated for CBMWTF issued by CPCB during 2016 vis-à-vis meet the regulatory requirement as stipulated in BMW Rules, 2016.

Color coding of waste belonging to different categories with various treatment options as per BMW Rules 2016 are defined in the Table 2.9 below; Waste collection bags for this waste shall be made up of chlorinated plastics which shall not be incinerated.

**Table 2.9 – BMW categories, collection, treatment and disposal options as per BMW Rules 2016**

<b>Category</b>	<b>Type of Waste</b>	<b>Type of Bag or Container to be used</b>	<b>Treatment and Disposal options</b>
<b>(1)</b>	<b>(2)</b>	<b>(3)</b>	<b>(4)</b>
Yellow	<b>(a) Human Anatomical Waste:</b> Human tissues, organs, body parts and fetus below the viability period (as per the Medical Termination of Pregnancy Act 1971, amended from time to time).	Yellow colored non-chlorinated plastic bags	Incineration or Plasma Pyrolysis or deep burial*
	<b>(b) Animal Anatomical Waste:</b> Experimental animal carcasses, body parts, organs, tissues, including the waste generated from animal used in experiments or testing in veterinary hospitals or colleges or animal houses.		
	<b>(c) Soiled Waste:</b> Items contaminated with blood, body fluids like dressings, plaster casts, cotton swabs and bags containing residual or discarded blood and blood components.		Incineration or Plasma Pyrolysis or deep burial. In absence of above facilities, autoclaving or microwaving or hydroclaving followed by shredding or mutilation or combination of sterilization and shredding. Treated waste to be sent for energy recovery
	<b>(d) Expired or Discarded Medicines:</b> Pharmaceutical waste like antibiotics, cytotoxic drugs including all items contaminated with cytotoxic drugs along with glass or plastic ampoules, vials etc.	Yellow colored non-chlorinated plastic bags	Expired cytotoxic drugs and items contaminated with cytotoxic drugs to be returned back to the manufacturer or supplier for incineration at temperature >1200 °C or to common bio-medical waste treatment facility or

		hazardous waste treatment, storage and disposal facility for incineration at >12000C or Encapsulation or Plasma Pyrolysis at >12000C.  All other discarded medicines shall be either sent back to manufacturer or disposed by incineration.
<b>(e) Chemical Waste:</b> Chemicals used in production of biological and used or discarded disinfectants.	Yellow colored non-chlorinated plastic bags	Disposed of by incineration or Plasma Pyrolysis or Encapsulation in hazardous waste treatment, storage and disposal facility.
<b>(f) Chemical Liquid Waste :</b> Liquid waste generated due to use of chemicals in production of biological and used or discarded disinfectants, Silver X-ray film developing liquid, discarded Formalin, infected secretions, aspirated body fluids, liquid from laboratories and floor washings, cleaning, house-keeping and disinfecting activities etc.	Separate collection system leading to effluent treatment system	After resource recovery, the chemical liquid waste shall be pre-treated before mixing with other wastewater. The combined discharge shall conform to the discharge norms given in Schedule- III.
(g) Discarded linen, mattresses, beddings contaminated with blood or body fluid.	Non-chlorinated yellow plastic bags or suitable packing material	Non-chlorinated chemical disinfection followed by incineration or Plasma Pyrolysis or for energy recovery.  In absence of above facilities, shredding or mutilation/ combination of

			sterilization and shredding. Treated waste to be sent for energy recovery or incineration or Plasma Pyrolysis.
	<p><b>(h) Microbiology, Biotechnology and other clinical laboratory waste:</b> Blood bags, Laboratory cultures, stocks or specimens of micro-organisms, live or attenuated vaccines, human and animal cell cultures used in research, industrial laboratories, production of biological, residual toxins, dishes and devices used for cultures.</p>	Autoclave safe plastic bags or containers	Pre-treat to sterilize with non-chlorinated chemicals on-site as per National AIDS Control Organization or World Health Organization guidelines thereafter for Incineration.
Red	<p><b>Contaminated Waste (Recyclable)</b> (a) Wastes generated from disposable items such as tubing, bottles, intravenous tubes and sets, catheters, urine bags, syringes (without needles and fixed needle syringes) and vacutainers with their needles cut) and gloves.</p>	Red colored non-chlorinated plastic bags or containers	<p>Autoclaving or microwaving/ hydroclaving followed by shredding or mutilation or combination of sterilization and shredding. Treated waste to be sent to registered or authorized recyclers or for energy recovery or plastics to diesel or fuel oil or for road making, whichever is possible.</p> <p>Plastic waste should not be sent to landfill sites.</p>
White (Translucent)	<p><b>Wastesharps including Metals:</b> Needles, syringes with fixed needles, needles from needle tip cutter or burner, scalpels, blades, or any other contaminated sharp object that may cause puncture and cuts. This includes both used,</p>	Puncture proof, Leak-proof, tamper-proof containers	Autoclaving or Dry Heat Sterilization followed by shredding or mutilation or encapsulation in metal container or cement concrete; combination of shredding cum autoclaving; and sent for

	discarded & contaminated metal sharps		final disposal to iron foundries (having consent to operate from the State Pollution Control Boards or Pollution Control Committees) or sanitary landfill or designated concrete waste sharp pit.
Blue	<b>(a) Glassware:</b> Broken or discarded and contaminated glass including medicine vials and ampoules except those contaminated with cytotoxic wastes.	Cardboard boxes with blue colored marking	Disinfection (by soaking the washed glass waste after cleaning with detergent and Sodium Hypochlorite treatment) or through autoclaving or microwaving or hydroclaving and then sent for recycling.
	<b>(b) Metallic Body Implants</b>	Cardboard boxes with blue colored marking	

### 2.10.3 Operation methodology of CBWTF

#### Equipment and chemical requirement

There will be requirement of color-coded trolleys & bags, PPE's for workers, Diesel for operation of DG set and incinerator, Necessary chemicals for Treatment etc., as raw material. Material Required for Treatment Facility is given in Table 2.10.

**Table 2.10 Material Requirement**





S. No.	Particulars	Source	Quantity
1	Color Coded Trolley	Locally	Based on requirement
2	Non-chlorinated color-coded bags	Locally	Based on requirement
3	Diesel	Petrol bunk dealers	Based on requirement
4	Chemicals - Sodium hypochlorite, Caustic soda, Lime, Alum & Disinfectant	Locally	Based on requirement
5	Personal Protection Equipment (PPE's)	Locally from manufacturers	Based on requirement

#### a) Segregation of BMW at source:

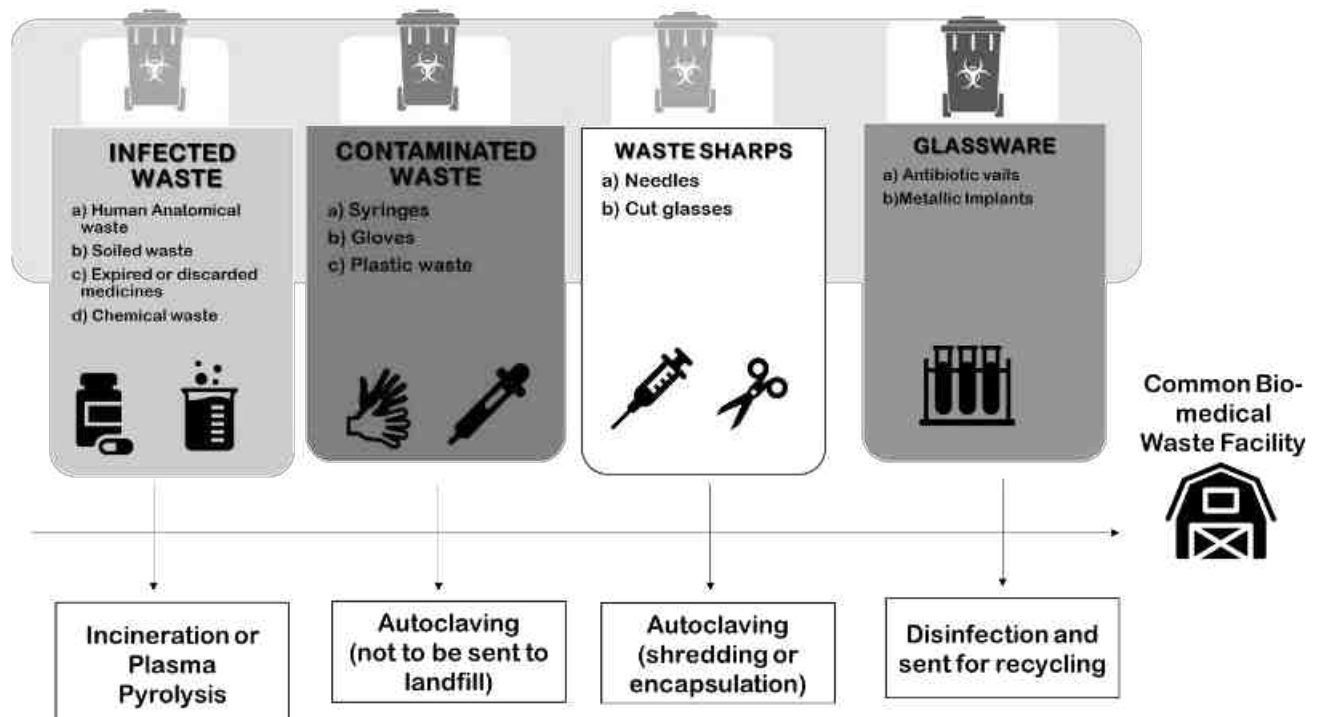
It is the responsibility of Health Care Establishment (HCE) to segregate the waste at

source and to contain them in color-coded containers/ plastic bags as stipulated in BMW (Management & Handling) Rules, 2016.

**Figure 2.8 – Color coded containers/plastic bags stipulated by BMW Rules, 2016**

Cat.	Type of Bag/ Container used	TYPE OF WASTE	Treatment /Disposal options
Yellow 	non-chlorinated plastic bags  Separate collection system leading to effluent treatment system	a) <b>Human Anatomical Waste</b> b) <b>Animal Anatomical Waste</b> c) <b>Soiled Waste</b> d) <b>Expired or Discarded Medicines</b> e) <b>Chemical Waste</b> f) <b>Micro, Bio-t and other clinical lab waste</b> g) <b>Chemical Liquid Waste</b>	Incineration or Plasma Pyrolysis or deep burial*
Red 	non-chlorinated plastic bags or containers	<b>Contaminated Waste (Recyclable)</b> tubing, bottles, intravenous tubes and sets, catheters, urine bags, syringes (without needles) and gloves.	Auto/ Micro/Hydro and then sent for recycling. not be sent to landfill
White 	(Translucent) Puncture, Leak, tamper proof containers	<b>Waste sharps including Metals</b>	Auto or Dry Heat Sterilization followed by shredding or mutilation or encapsulation
Blue 	Cardboard boxes with blue colored marking	<b>Glassware</b>	Disinfection or auto/ Micro/hydro and then sent for recycling.

The BMW collected as per the color-coded containers/plastic bags are stored at CBWTF in storage room before treatment.



**b) Transportation of BMW from HCE's to CBWTF:** All BMW segregated using color coding container at HCE's is transported to treatment facility / plant. The designated vehicle of treatment facility transports the waste from HCE to CBWTF and unloads in a common room where the segregation takes place for incineration, autoclaving, sharps for shredding and encapsulating, glass wares, and other waste and disposed accordingly.

The vehicle incorporated for transportation of bio-medical waste satisfy the following specifications-

- waste will be transported by road, and by ensuring compliance to relevant provisions under Motor Vehicles Act.
- at the generators end the BMW containers will be bar coded to identify the waste
- Separate cabins are provided for driver/ staff and for bio medical waste cabin in the vehicle.
- The base of the waste cabin of vehicle is leak proof and easy to wash.
- The inner surface of the waste cabin is made of smooth surface to minimize water retention.
- The vehicles are properly labelled with the symbol of Biohazard as per schedule III of the BMW Rules, 2016 and display the name, address and telephone number of the company.
- The waste cabin has sufficient opening from rear so that Bio Medical waste can be easily loaded and unloaded.
- The vehicles are provided with the First Aid Kit to handle emergency situations.
- Mobile phones are given at all the vehicles for effective supervision and monitoring of collection and transportation work
- The CBMWTF biomedical waste shall be responsible for transportation
- and the risks and liabilities associated with transportation.
- Only covered vehicles will be used for transportation of bio-medical waste
- Vehicle is also fitted with GPS tracking system as per the directive of the TNSPCB.
- A spill kit containing absorbent material, a disinfectant, a leak proof waste disposal container and heavy-duty reusable glove will be used by the
- Personnel handling the waste during the transport will be kept in the transport vehicle.
- All the vehicles used for collection of bio waste from the health care facilities will have the symbol of BMW and the label displayed as prescribed in the BMW rules.





Two designated vehicles with GPS system satisfying the above conditions are used for transportation of bio-medical waste in the facility.

### **Storage of bio-medical waste**

The waste collected from HCEs and bought in by the vehicles to the facility is stored in a designated storage area in the facility as shown in Figure 2.7. The storage area is as per the bio-medical waste management rules consisting of the following;

- A roofed storage shed with impervious flooring to prevent seepage of liquid waste into the soil and ground water
- The shed is well ventilated to control odour
- Storage area is designed to withstand the load of waste stocked and ensuring no probable impact from bio-medical waste spillage
- The shed will be provided with proper slopes which acts as secondary containment as well as the floor level is at least 150 mm above the maximum flood level
- In case of spills /leak from the stored waste, cotton will be used to mop the leachate from the floor and incinerated
- Smoking is prohibited in and around the storage area
- Proper housekeeping and maintenance of the storage area
- Only person authorized and trained will have access to the bio-medical waste storage area

**c) Treatment process:** An integrated CBMWTF consists of Incinerator, Autoclave, Shredder and Effluent Treatment Plant. The treatment process will be adopted by Ramnad Doctors Association - BMW plant tis Figure 2.7.

### **Treatment Process-**

**i) Segregation:** Segregation is the separation of different types of Bio-Medical Waste by sorting or the systemic separation into designated categories. It is the most important step in the entire process of Bio-medical waste management as it needs special

attention to be given to the relatively small quantities of infectious and hazardous waste, thereby reducing not only the risks but also the cost of handling, treatment and disposal.

**ii) Incineration:**

Propose to install, Incinerators of capacity 500 kg/hr at the facility.

It is a controlled combustion process where waste is completely oxidized and harmful microorganisms present in it are destroyed/denatured under high temperature. The fuel used for the incinerator is HSD. The incinerator is modular type with two chambers; working temperature of the primary chamber is  $800^{\circ}\text{C}\pm 50^{\circ}\text{C}$  and that of the secondary chamber is  $1050^{\circ}\text{C}\pm 50^{\circ}\text{C}$ , the secondary chamber gas residence time being a minimum of two seconds.

The expected incinerator operating hours in a day is approximately 8 to 12 hours in the initial stage according to the Incinerable waste received. The incinerated ash will be stored in ash storage room and later handed over to secured landfills for disposal.

**Incineration Process Description-**

Incineration system contains basic elements such as feed system, combustion chambers (primary and secondary), exhaust system and residue disposal system. The incinerator equipment includes material feeding system at front end of the incinerator in to the primary combustion chamber and air pollution control devices at the back end of the incinerator. The incineration plant is divided into following sections:

1. Waste Receiving and Storing Area
2. Feeding Section
3. Incineration Section/ Combustion chamber – primary and secondary
4. Pollution Control devices

**i. Feeding Section**

The BMW collected will be stored in the facility in a secured manner under the roof sorted and mixed as explained above. The BMW stored in the storage area is carried through trolleys to incineration section. The solid waste will be fed to the incinerator directly to the combustion chamber. The semi-solid will be injected at a controlled rate.

The waste in small bags will be stacked and taken to platform and fed manually. The wastes are quantified and inventory is maintained.

**ii. Incineration Section**

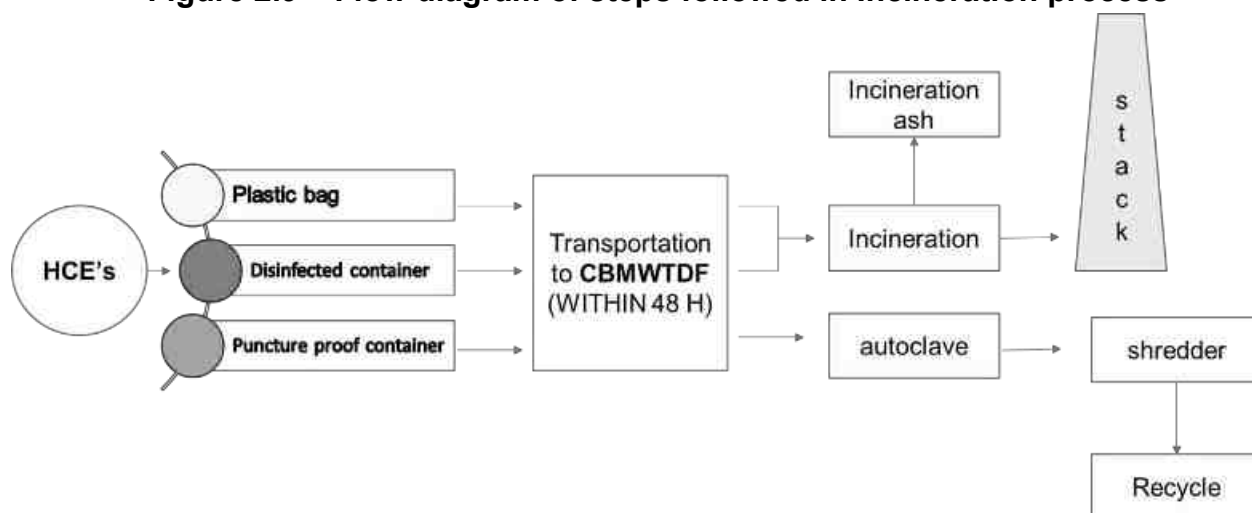
Incinerator Operating Standards

- The facility is designed to achieve a minimum temperature of  $850 \pm 50^{\circ}\text{C}$  in the primary chamber and  $1050 \pm 50^{\circ}\text{C}$  in secondary combustion chamber and within the gas retention time in secondary time in secondary combustion chamber not less than 2 seconds.
  - Incinerator will be operated in such temperature, retention time and turbulence so as to achieve total organic carbon (TOC) content in the slag and bottom ashes less than 3% or their loss on ignition is less 5% dry weight of the material.
- Combustion efficiency (CE) shall be at least 99%
  - The combustion efficiency is computed as follows:

$$\text{C.E} = \frac{\% \text{CO}_2 \times 100}{(\% \text{CO}_2 + \% \text{CO})}$$

Flow diagram of steps followed in Incineration process is shown in Figure 2.10 below;

**Figure 2.9 – Flow diagram of steps followed in Incineration process**



**Technical Specifications of the Incinerator Used-**

- Incineration operating hours 8 to 12 hours / day.
- Double chamber furnace – primary chamber min.  $800^{\circ}\text{C}$  – secondary chamber  $1050^{\circ}\text{C}$
- Secondary chamber gas residence time min. 2 sec.
- APC – Venturi dust collector, Scrubber and chimney
- Chimney ht. 30 m
- Continuous monitoring facility for emission. With automatic transfer of data to TNPCB and CPCB portal
- Combustion gas analyser online –  $\text{CO}_2$ ,  $\text{O}_2$  and  $\text{O}_2$
- The incinerated ash will be stored in ash storage room and further handed over to TSDF

➤ Scrubber water recycled after treatment in ETP

The plant is having structurally stiffened incineration chambers duly lined with environment compatible high alumina hot face and insulated with refractory bricks line, with openings for flue gases, instruments and burners. Technical specification of Incinerator is given in Table 2.11.

**Table 2.11 – Technical specification of Incinerator**

Sl. No.	Description	Parts	Specification
1	Incinerator Kiln	MOC of Outer Body	Mild Steel, 6 mm thick, MOC IS2062 Grade, Chamber size of dia 2.7 X 7 m Chamber Volume - 40.07 cubic meter & painted externally with heat resistant paint suitable to withstand temperature of 400°C.
		Brick Lining	High Alumina Fire Brick and insulation brick lining 315 mm thickness (2 layers) and shall confirm to high dense brick
		Operating Temperature	Primary chamber 850 ± 50°C
		Suction	The suction at Primary Combustion Chamber will always be maintained at 5 mmwc and measuring device will be fitted for measurement of the same.
		Manometer	Will be provided
		Manhole and Ash Discharge Doors	Will be provided
		Feeding System	Manual charging
		Burner	1 number - Oil Burner Capacity 5 Lac Kcal / hr kiln chamber. The Burners to maintain the temperature in primary chamber is 850 + 50 °C. The burners are fully automatic.
		MOC of Outer Body	Mild Steel, 6 mm Thickness MOC IS2062 Grade & painted externally with heat resistant aluminum paint suitable to withstand temperature of 200°C.
		Brick Lining	High Alumina Fire Brick and insulation brick lining 345 mm thickness (3 layers) and shall confirm to high dense brick

2	Discharge Breech		suitable for upto 1200°C
		Burner	1 number oil burner capacity 5 Lac Kcal/hr. The Burners is sufficient to raise and maintain the temperature 1100+/- 50°C. The burner is fully automatic.
		Suction Pressure Measurement Device	Will be provided
		Temperature Sensor	Will be provided
3	Secondary Combustion Chamber	MOC of Outer Body	Mild Steel, 6 mm Thickness MOC IS2062 Grade, Chamber size of dia 2.5 m, Chamber Volume - 19.63 cubic m & painted externally with heat resistant aluminum paint suitable to withstand temperature of 200°C.
		Brick Lining	High Alumina Fire Brick and insulation brick lining 345 mm thickness (3 layers) and shall confirm to high dense brick suitable for upto 1400°C
		Operating Temperature	Secondary chamber 1100 ± 50°C
		Minimum Flow of the Flue gas in the Secondary Chamber	The Secondary Combustion Chamber is designed, to ensure the 2 second - Temperature Residence Time and Turbulence
		Suction Pressure Measurement Device	Will be provided
		Manhole and Ash Discharge Doors	Will be provided
		Skin Temperature	Less than 70°C
		Temperature Sensor	Will be provided at the end of secondary chamber or before admission of dilution medium to cool the gas.
		Burner	1 number oil burner capacity 7 Lac

			Kcal/hr each for secondary chamber. The Burners is sufficient to raise and maintain the temperature in secondary chamber 1100+/-50°C. The burner is fully automatic.
		Insulation Cast	Insulate 13
4	Dry Scrubber	Fire Brick New Chamber Brick lining Work Lime storage tank Lime screw feeder with motor Carbon storage tank Carbon screw feeder with motor Root Blower with motor	
5	Ducting	Brick lining Work	Fire brick - 115 mm thickness
		New Duct	Fabrication and Erection work
		MOC	IS2062
6	Blowers with motors	Centrifugal type	Quantity - 3nos.
		Pressure	750 mm water column
		MOC	MS - IS2062
7	ID Fan	New One	Fixing with Motor
		Casing	MOC - MS IS2062
		Impeller	MOC - SS304
8	Chimney	Two additional chimneys each with spec.	MS - IS2062 grade 30 m height Self-supported with platform and ladder with Inside lining
9	PLC and MCC With Panel	New PLC Panel	With scada - Will be provided
10	On line emission monitor	To monitor emissions	As per specification of CPCB

**Emission standards for the flue gas:** The emission from the incineration stack will meet the emission standards stipulated in the BMW Rules 2016. The standards are shown in Table 2.12 below;

**Table 2.12 - Emissions Standards for Incinerator**

Sl. No.	Parameter	Standards	
(1)	(2)	(3)	(4)
		Limiting concentration in mg Nm <sup>3</sup> unless stated	Sampling Duration in minutes, unless stated
1.	Particulate matter	50	30 or 1NM <sup>3</sup> of sample volume, whichever is more
2.	Nitrogen Oxides NO and NO <sub>2</sub> expressed as NO <sub>2</sub>	400	30 for online sampling or grab sample
3.	HCl	50	30 or 1NM <sup>3</sup> of sample volume, whichever is more
4.	Total Dioxins and Furans	0.1 ngTEQ/Nm <sup>3</sup> (at 11% O <sub>2</sub> )	8 hours or 5 NM <sup>3</sup> of sample volume, whichever is more
5.	Hg and its compounds	0.05	2 hours of 1 NM <sup>3</sup> of sample volume, whichever is more

**ii) Autoclaving/ Microwaving/ Hydro claving:** Autoclaving is a low-heat thermal process where steam is brought into direct contact with waste in a controlled manner and 1 for sufficient duration to disinfect the wastes. Autoclave is exclusively designed for the treatment of bio-medical waste. It is pre-vacuum-based system. It has tamper-proof control panel for monitoring the operation.

- for disinfection
- Temperature not less than 121 °C
- Pressure 15 pound/sq/inch
- Duration 60 min
- Air coming out of autoclave decontaminated using HEPA filter and activated carbon filter

**iii) Shredder:** Shredder of 200 kg/hr is proposed. Shredding is a process by which waste are disintegrated or cut into smaller pieces. It helps in safe to dispose off.

**iv) Sharp Pit:** A sharp pit or a facility for sharp encapsulation shall be provided for treated sharps. An option may also be worked out for recovery of metal from sharps in a factory.

**v) Effluent Treatment Plant (ETP):** The effluent from washing of vehicles, equipments, floor cleaning etc will be sent to ETP. ETP of 10 KLD is proposed. This treated wastewater will be reused for scrubber and vehicle washing. Thereby maintaining Zero Liquid Discharge (ZLD). ETP sludge generated will be sent to TSDF for disposal.

**d) Record Maintaining:** Record of receipt of different category of waste and disposal details will be maintained as per the guidelines, published in the website of the facility and statutory returns as required will be submitted to the concerned authorities.

For monitoring the operation of the Incinerator and Autoclave the format published in the Guidelines for Management of Health Care Waste as per BMW Rules 2016.

#### **2.10.4 Reagents, Chemicals and Other Materials**

The required reagents, chemicals and other materials for pre-treatment / stabilization of Bio-medical waste are shown in Table 2.13;

**Table 2.13 – Reagents, chemicals and other materials**

<b>Sl. No.</b>	<b>Particular</b>	<b>Source</b>	<b>Quantity</b>
1	Diesel	Petrol bunk dealers	2.5 TPD
2	Chemicals- Sodium Hypochlorite, Caustic soda, Lime Alum Disinfectant	Chennai/ Madurai	Based on requirement

#### **2.11 Project description including drawings showing project layout, components of project, schematic representation of the feasibility drawing giving information important for EIA purpose**

##### **2.11.1 Project description including drawings showing project layout, components of project**

The proposed project is establishment of a CBWTF for treatment and disposal of bio-medical waste. The project site is a flat terrain with elevation of 24 m and gentle sloping from North to South. The Google map covering 10 m radius around the project site is shown in Figure 2.4 and Topo map of 10 km radius around project site is shown in Figure 2.11. Layout plan of the project is shown in Figure 2.6.



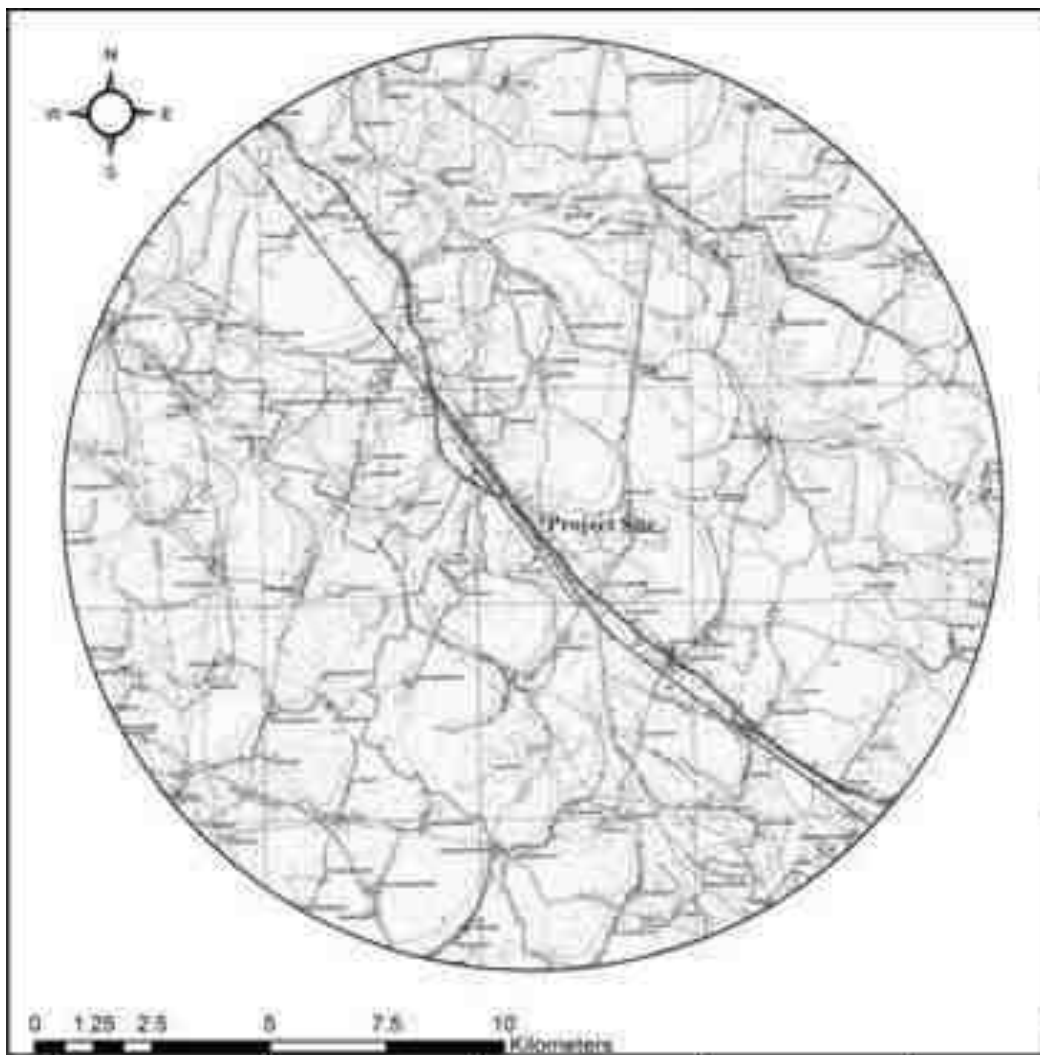


Figure 2.10 – Topo map covering 10 km radius around project site

Table 2.14 – Projects components and salient features within 10 km radius from the site

Sl. No.	Location Features / Criteria	Remarks		
		Sl. No.	Co-ordinates	Directions
1	Co-ordinates of the project site	A.	9 <sup>o</sup> 26'13.37" N 78 <sup>o</sup> 40'38.95" E	North West
		B.	9 <sup>o</sup> 26'13.06" N 78 <sup>o</sup> 40'40.37" E	North East
		C.	9 <sup>o</sup> 26'8.26" N 78 <sup>o</sup> 40'39.30" E	South East

		D.	9°26'8.46" N 78° 40'37.49" E	South West
2	Total Plot Area	1.89 Acre (7648.56 Sq m)		
3	Incinerator Capacity	500 Kg/hr		
4	Water Source and requirement	Local Panchayat supply and onsite bore well in case of emergency. Total water requirement – 9.0 KLD (Raw Water - 4.5 KLD and recycle – 4.5 KLD)		
5	Wastewater generation and mode of treatment	Effluent generation – 7.5 KLD will be treated in 10 KLD ETP. Sewage – 0.28 KLD will be treated in septic tank followed by soak pit.		
6	Nearest water source / water body	<ul style="list-style-type: none"> <li>• Vaigai River is at a distance of 6 Km towards North.</li> <li>• Puthur and Ariyakudi lake at a distance of 2.5 Km towards South East.</li> <li>• There is a small natural water canal passing adjacent to the project about 60 m from the compound wall of the site. The water flows in the drain only during rainy days.</li> </ul>		
7	Eco-sensitive Region	No eco-sensitive zone for about 10 km from the project site		
8	Reserve Forest area	No Reserve Forest for about 10 km from the project site		

## 2.12 Mitigation measures incorporated into the project to meet environmental standards, environmental operating conditions

### 2.12.1 Water demand and wastewater/effluent discharge

#### 2.12.1.1 Source of water supply

Water will be sourced from local village Panchayat and on-site bore well in case of emergency.

#### 2.12.1.2 Water demand and wastewater discharge during construction phase

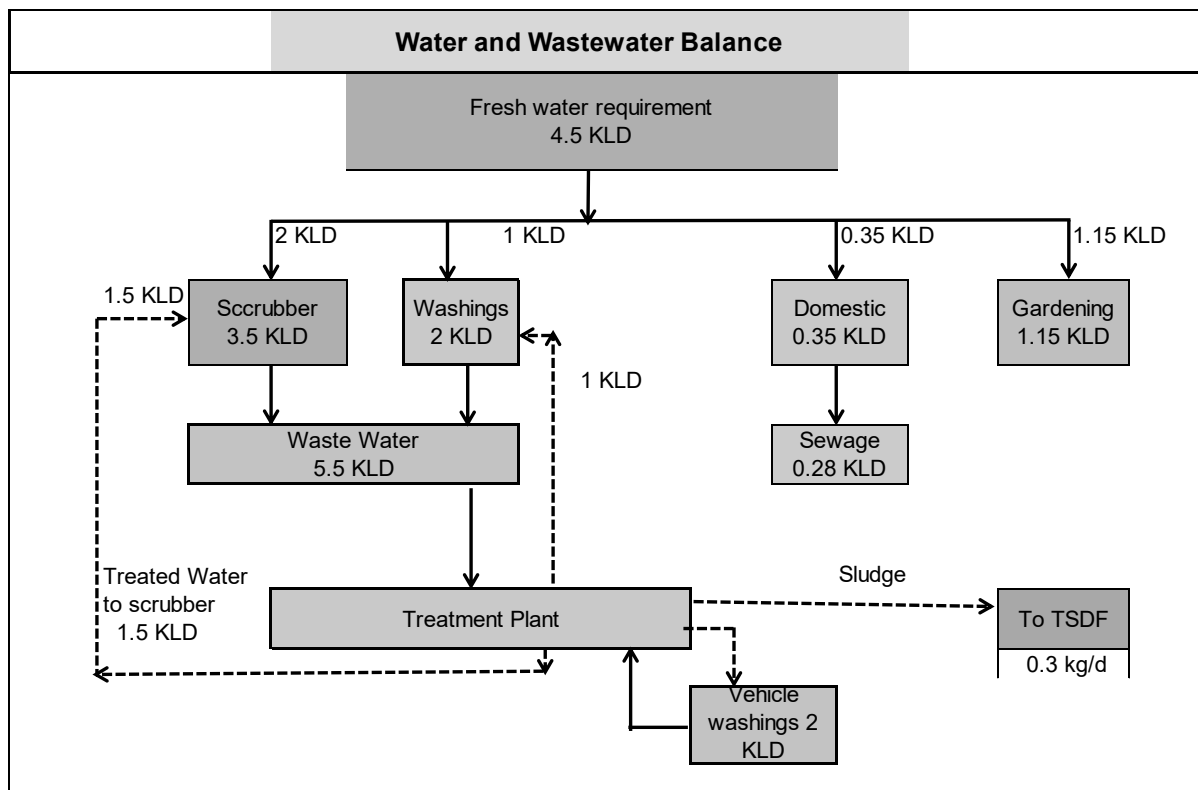
The water required for construction of a shed for incineration is very minimal. Laborers for construction of 10 -15 numbers will be locally sourced and the erection skilled man power from the suppliers will be deployed. The sewage generated will be treated in septic tank and soak pit during operation phase.

The water requirement for project during operation is augmented from village Panchayat

water supply source and through on-site bore wells in case of emergency. The total quantity of water required for the facility is 9 KLD. The break-up of the consumption of water and wastewater generation is shown in table 2.15 below;

**Table 2.15 – Water consumption and wastewater generation**

Sl. No.	Purpose	Water requirement KLD	Wastewater generation KLD	Mode of Treatment
1.	Domestic	0.35	0.28	The wastewater from process will be treated in ETP of 10 KLD and reused for scrubber. Hence, following Zero Liquid Discharge system.
2.	Scrubber	3.50	3.50	
3.	Washing	2.00	2.00	
4.	Vehicle washing	2.00	2.00	
5.	Gardening	1.15	-	The sewage water will be treated in septic tank followed by soak pit.
<b>Total</b>		<b>9.00</b>	<b>7.78</b>	

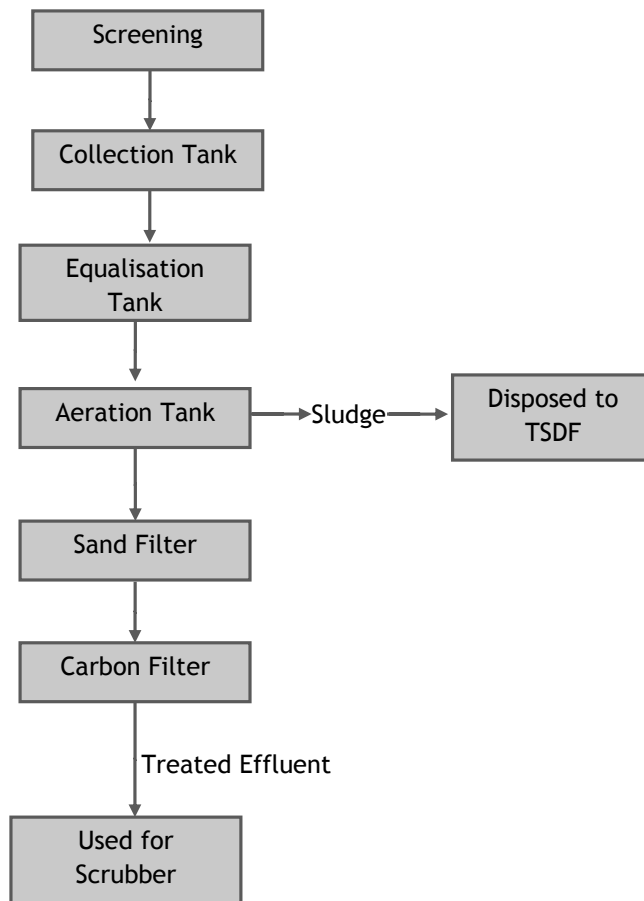


**Figure 2.11 – Water Balance Chart**

**2.12.1.3 Wastewater treatment and disposal details**

The plant facility follows a simple wastewater treatment mechanism.

The wastewater from washing vehicles, equipments and cleaning of floors will be screened and stored in collection tank. From collection tank the wastewater will be sent to equalization tank where the flow rate of the wastewater is maintained and sent to aeration tank. In aeration tank, through artificial aeration the wastewater is treated by biological process. Then, the supernatant water is sent to sand and carbon filter from which the treated wastewater is obtained and reused for scrubber at the plant site. Whereas, the sludge obtained after the biological process from aeration tank is recycled to aeration tank.



**Figure 2.12 – Effluent Treatment Facility**

### 2.12.2 Air pollution sources and management

The major sources of air pollution in the proposed project are from incinerator and DG set. Pollution control devices will be installed for the incinerator comprising of scrubber to scrub the flue gases to comply with prescribed standards as indicated in Table 2.12 for particulate matter, HCl, NO<sub>x</sub> (NO and NO<sub>2</sub> expressed as NO<sub>2</sub>), Dioxins/Furans, Hg

(and its compounds).

The air emission sources and air pollution control equipment details are shown in table 2.16 below;

**Table 2.16 – Air pollution sources and control measures**

Stack attached to	Capacities and Numbers each kg/h	Fuel HSD Quantity l/h	Stack Height AGL - m	Air Pollution control measures	Emissions
Incinerators	500	80	30	Venturi Scrubber	PM, NO <sub>2</sub> , HCL Hg and its compounds Total dioxins and Furans
DG set	62.5 kVA	27	4	Acoustic Enclosure	SO <sub>2</sub> , NO <sub>x</sub>

**Note:**

- Effluent from scrubber and floor washing shall flow through closed conduit or pipe network and be treated and reused in scrubber water makeup.
- The buildup in TDS in waste water of floor washings shall not exceed 1000 mg/l over and above the TDS of raw water used.

**2.12.3 Noise Generation and Management**

Major Noise pollution sources are from operating of equipments like incinerator and DG set. DG set will be provided with acoustic enclosure. Noise level within the industry premises is maintained within the limits prescribed by the development of greenbelt around the project site. Employees working in high noise zone will be provided with ear plugs and personnel protective equipment.

**2.12.4 Solid Waste Generation and Management**

- Organic solid waste–0.6 kg/day to compost in house and use as manure for greenbelt
- Inorganic solid waste – 0.4 kg/day to recyclers.

**Other solid waste**

- Plastic wastes are disinfected, disintegrated/shredded and handed over to recyclers
- Sharps are disinfected, shredded and encapsulated
- Glass waste will be disinfected and handed over to recyclers

**2.12.5 Hazardous Waste Generation Quantity and Mode of Disposal**

The incinerated ash and the ETP sludge are the Hazardous waste generated

- Ash from the incinerator: 150 kg/d Disposed to TSDF
- ETP Sludge to TSDF.

**2.12.6 Assessment of new & untested technology for the risk of technological failure**

The proposed project is a bio-medical waste treatment facility with necessary air and water pollution control measures. There is no risk of technological failure as the facility is designed and operated as per the guidelines published by CPCB and in-line with the Bio-medical Waste (Management and Handling) Rules, 2016.

## **CHAPTER III DESCRIPTION OF THE ENVIRONMENT**

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### **3.0 GENERAL**

The baseline data is generated through field study within the impact zone (Core Zone and Buffer Zone) for various components of the environment viz. Air, Noise, Water, Land/Soil, Ecology and Socioeconomic. With the project as the center, a radial distance of 10 km is considered as a 'study area' for baseline data collection. Baseline data was collected for various environmental attributes so as to compute the impacts that arise due to developmental activity.

The baseline environmental quality status is assessed through field studies within the study area for various components of environment, viz, air, noise, water, land, biological and socio-economic. Baseline data collection for each of the environmental components is based on the location of proposed project and anticipated distance of the significant impact. The study area is defined for each of the environmental components independently taking into consideration the vulnerability of the environmental component with respect to the activity of the proposed project. Majority of data on water quality, vegetation, air and noise quality was collected during field studies in April to June 2022.

This chapter illustrates the description of the existing environmental status of the study area with reference to the major environmental attributes. The existing environmental setting is considered to establish the baseline conditions which are described with respect to physical environment, air environment, water environment, noise environment, traffic pattern and density, land environment, biological environment and socio-economic conditions. The monitoring of environmental parameters has been conducted within the core zone and buffer zone (10 km radial distance) from project site at Muthuvayal, Ramanathapuram, Tamil Nādu in accordance with the guidelines issued by the Ministry of Environment, Forests and Climate Change, CPCB, and SPCB during the study period.

Baseline Environmental status in and around the project, depicts the existing quality of Air, Noise, Water, Soil, Ecology & Biodiversity and Socio-economic environment. Based on the baseline data, environmental impact assessment is carried out and Environmental Management Plan is prepared.

This baseline environmental study reveals information on existing environmental scenario.

- Delineation of project site and study area.

- Delineation of the environmental components and methodology.
- Delineation of study period.
- Delineation of the location of the Plant and description of its surroundings based on secondary data.

After delineation of the above for the present case the following studies were conducted:

- Baseline data generation/establishment of baseline for different environmental components.
- Baseline status of the existing plant site operating facilities.
- Traffic density at the inter-phase of project site and study area.

### **3.1 STUDY AREA**

Studies of various environmental parameters have been done within 10 km radius area of the proposed project site. The impact identification always commences with the collection of baseline data such as Ambient Air Quality, Micro-Meteorology, Ground and Surface Water Quality, Noise levels, Soil Quality, Land use pattern, Biological Environment and Socioeconomic aspects, Solid and Hazardous waste, Risk Assessment, Geology and Hydrology within the study zone of 10 km. radius.

### **3.2 STUDY PERIOD**

The baseline environmental study has been done for the period of April to June 2022 by M/s. Enviro Care India Private Limited, Madurai, NABL Accredited Lab (Certificate enclosed in Chapter-12) in accordance with the Guidelines for EIA issued by the Ministry of Environment Forests and Climate Change, Govt. of India and CPCB, New Delhi. Secondary data also collected from different sources.

### **3.3 COMPONENTS**

The data was collected from both primary and secondary sources. The baseline information on micro-meteorology, ambient air quality, water quality, noise levels, soil quality and floristic descriptions are largely drawn from the data generated by M/s. Enviro Care India Private Limited, Madurai (NABL Accredited Lab). Climatological data recorded at the nearest IMD station, Coimbatore Airport also collected. Micrometeorological data at site was recorded using automatic weather station. Apart from these, secondary data have been collected from Census Handbook, Revenue Records, Statistical Department, Soil Survey and Land use Organization, District Industries Centre, Forest Department, Central Ground Water Authority, etc.

The studies involved conducting field studies and analyzing various parameters that might be affected due to the industry and conducting socio-economic survey among the people.



For reconnaissance survey the sampling locations were identified based on,

- Existing topography and meteorological conditions
- Locations of water intake and waste disposal points.
- Location of human habitation and other sensitive areas present in the vicinity of the proposed project site.
- Representative areas for baseline conditions.
- Accessibility for sampling

The scoping and the extent of data generation were formulated based on interdisciplinary team discussions, and professional judgment keeping in view of TOR assigned. The baseline studies started with reconnaissance survey and the site visits in the study area for fixing the monitoring locations for collection of the primary data. Various Government and other organizations were approached for getting information for the secondary data generation. The various parameters surveyed and studied for the baseline study are tabulated below,

**Table 3.1 Environmental Component and their Methodologies**

Sl. No.	Environmental components	Parameters	Methodology
1	Air	Meteorology (Temp., RH, WS, WD, RF)	USEPA (Meteorological Monitoring guidance for regulatory modelling applications)
		Ambient Air Quality (PM <sub>10</sub> , PM <sub>2.5</sub> , SO <sub>2</sub> , NO <sub>x</sub> )	IS-5182, CPCB (guidelines for measurement of Ambient Air Pollutants).
2	Water	Water Quality (Surface & Ground)	<ul style="list-style-type: none"> <li>● Standard limits: Surface-IS:2296 and designated best use practices published by CPCB</li> <li>● Ground-IS 10500 Sampling Methodology-IS: 3025</li> </ul>
3	Noise	Ambient Noise Quality (dBA Lmax, Lmin, Leq)	IS:9989 (Assessment of noise with respect to community response)
4	Soil	Soil Quality (pH, EC, BD, Infiltration, Texture, SAR, Key nutrients, OM, OC, Fe, Zn and Cu)	Sampling Methodology and Analysis- IS: 2720
5	Land Use	Land use types, Land schedules, Satellite imagery	Bhuvan, NRSA
6	Ecology	Ecology studies (Floristic diversity, Terrestrial ecosystem sustainability, Greenbelt development, sinking capacity of	Field Study/ Secondary Data

		pollutants)	
7	Socio Economic	Demography and Occupational details, agricultural situation etc.	Census, District report Public Consultation by Questionnaire survey
8	Hydrology & Geology	Geological, hydrological, geomorphologic studies	Geological Survey of India, NRSC
9	Traffic Study	PCU/hr, LOS	IRC 106:1990, CPCB

### 3.4 Methodology

The baseline environmental quality has been assessed from April – June 2022 in a study area of 10 km radius distance from the project site. While generating the baseline status of the physical and biological environment of the study area, the concept of impact zone has been considered. The impact zone selection is based on preliminary screening and modeling studies.

### 3.5 Imagery of the Project Site

Latitude	Longitude	Elevation
9°26'10.4" N	78°40'39.0" E	24 m

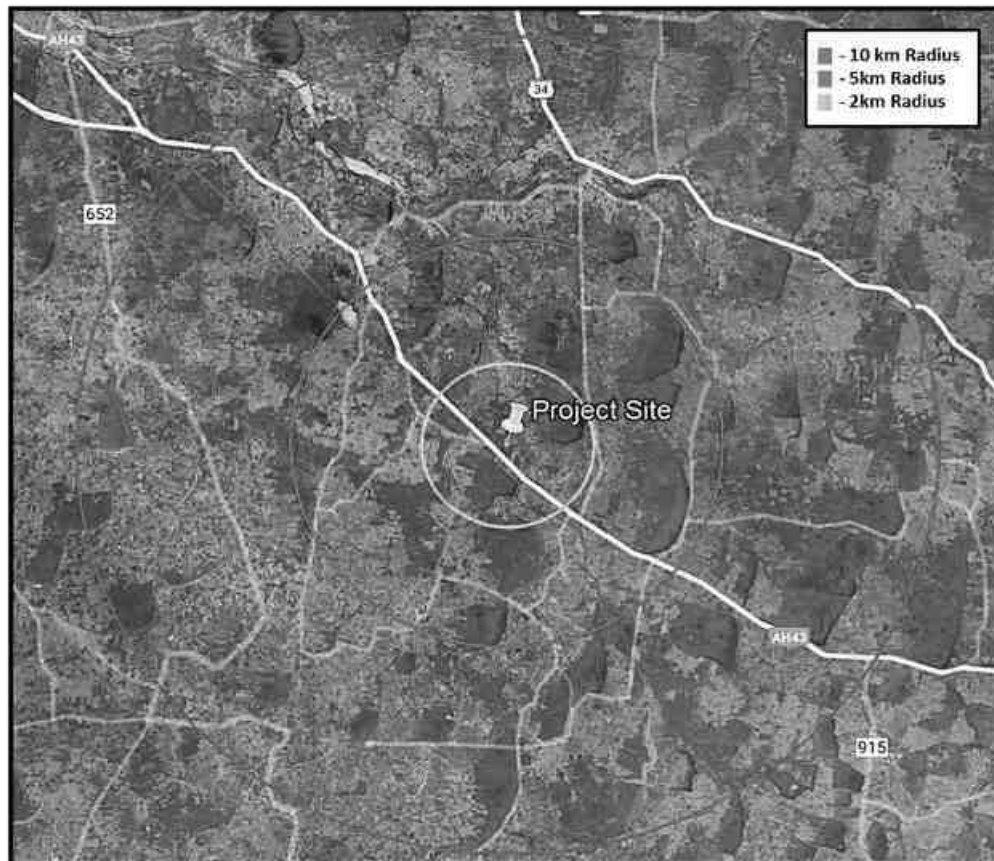


Fig. 3.1 Satellite Imagery of Project Site (10, 5, 2 km radius)

### 3.6 Meteorology

The proposed project is “Common Bio-medical Waste Treatment Facility” located at Ramanathapuram District. The meteorological data from Indian Meteorological Station was processed for the nearest IMD station at Madurai, which has been utilized for the study.

**Table 3.2 Meteorological Data**

Year	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec
<b>I.ELEMENT: MONTHLY MEAN MAXIMUM TEMPERATURE (DEG C)</b>												
2009	30.2	33.4	35.2	36.1	34.5	32.5	30.3	32	31.9	32.2	29.9	29.2
2010	30.6	33.3	36.2	37.3	35.3	32.9	31.5	30.9	31.9	31.7	29.1	28.9
2011	30.8	32.3	35.3	36.2	37.7	37.6	36.7	36.0	36.1	33.7	30.4	30.3
2012	30.9	33.1	36.7	37.8	38.6	39.2	39.1	38.0	37.5	33.7	32.7	32.8
2013	33.4	33.7	36.3	40.0	40.2	37.5	38.1	36.9	35.9	36.2	32.7	31.4
<b>II. ELEMENT: MONTHLY HIGHEST MAXIMUM TEMPERATURE (DEG C)</b>												
2009	32.5	37	37.7	38	37.4	37.2	35.6	33.9	35.1	34.2	33.1	32
2010	32.2	36	37.7	39.5	37.8	37	35	33.8	34.2	33.8	32.6	31.6
2011	32.0	35.0	36.8	38.4	39.4	40.0	40.0	38.4	37.0	36.4	32.8	31.6
2012	32.2	35.4	38.8	40.5	41.1	42.0	41.5	40.5	40.1	38.6	35.6	34.2
2013	34.6	36.5	39.3	41.9	42.0	40.2	40.8	39.0	38.6	39.2	34.6	34.4
<b>III. ELEMENT: MONTHLY MEAN MINIMUM TEMPERATURE (DEG C)</b>												
2009	18.7	19.9	22.3	24.3	23.8	23.4	22.3	22.7	22.9	22.3	22.1	20.9
2010	20.3	20.8	23	25.1	25	23.5	22.6	22.4	22.6	22.5	21.7	20
2011	21.1	21.4	22.9	25.2	25.7	26.0	25.6	25.2	25.0	24.0	22.5	21.5
2012	20.3	21.5	24.5	25.7	26.4	26.4	26.2	25.4	25.3	23.9	23.0	22.4
2013	21.5	22.0	23.7	26.3	26.6	27.0	27.0	25.4	25.3	24.5	23.8	21.9
<b>IV. ELEMENT: MONTHLY LOWEST MINIMUM TEMPERATURE (DEG C)</b>												
2009	16.1	17.8	19.7	22.6	21.4	21.2	21	21.6	21.6	20.2	19	17.8
2010	17.4	17.4	19.8	23	22	21.6	21.3	21.2	20.4	20.8	19	16.6
2011	16.6	16.0	20.2	23.0	22.0	23.8	22.0	23.7	23.0	22.2	18.5	17.0
2012	16.4	18.5	20.3	22.0	22.0	24.7	24.5	23.5	23.5	22.7	20.4	19.7
2013	19.0	17.0	19.1	24.0	25.1	25.2	26.0	22.6	23.6	22.0	21.6	19.4
<b>V. ELEMENT: MONTHLY MEAN R.H. AT 0830 HRS IST (%)</b>												
2009	78	68	71	73	79	77	82	82	81	75	86	81
2010	80	77	71	73	78	80	81	83	80	82	89	86
2011	75	72	70	71	65	61	61	64	62	76	78	77
2012	75	69	68	71	64	56	58	63	63	74	73	70
2013	70	72	69	65	57	59	54	63	67	66	74	74
<b>VI. ELEMENT: MONTHLY HIGHEST R.H. AT 0830 HRS IST (%)</b>												
2009	88	88	87	85	88	93	92	96	92	94	96	93
2010	91	86	88	81	91	95	91	98	95	96	98	96

M/s. Ramnad Doctors Association – BMW Plant

2011	85	88	87	92	83	87	70	87	75	96	96	91
2012	85	82	77	87	73	66	77	79	80	91	87	86
2013	77	95	87	75	70	68	62	80	90	93	90	91
<b>VII. ELEMENT: MONTHLY LOWEST R.H. AT 0830 HRS IST (%)</b>												
2009	68	50	48	61	59	64	69	75	66	49	64	72
2010	67	60	53	58	64	66	65	74	64	66	68	75
2011	64	54	59	57	51	49	52	52	54	61	58	64
2012	60	44	56	60	54	44	49	48	50	58	62	58
2013	62	51	51	52	49	49	45	45	49	49	61	62
<b>VIII. ELEMENT: MONTHLY MEAN R.H. AT 1730 HRS IST (%)</b>												
2009	35	23	27	37	55	61	67	63	67	51	68	57
2010	30	29	25	40	58	65	66	67	63	71	73	60
2011	56	48	37	49	45	45	49	52	52	66	69	64
2012	50	42	37	49	52	47	44	54	51	67	60	57
2013	47	46	43	41	44	50	46	55	54	54	61	54
<b>IX. ELEMENT: MONTHLY HIGHEST R.H. AT 1730 HRS IST (%)</b>												
2009	52	37	70	60	90	91	93	83	76	91	92	97
2010	71	40	45	65	85	90	95	85	74	96	95	98
2011	77	82	47	95	88	80	84	87	93	90	96	95
2012	88	63	45	100	92	95	76	95	80	95	74	92
2013	87	72	92	75	65	63	62	95	88	92	89	80
<b>X. ELEMENT: MONTHLY LOWEST R.H. AT 1730 HRS IST (%)</b>												
2009	16	14	11	13	37	41	48	42	45	42	48	33
2010	26	15	10	21	44	47	51	46	49	45	52	37
2011	46	36	23	30	34	33	40	38	35	46	49	31
2012	33	19	24	36	40	35	33	33	38	38	47	42
2013	38	27	26	33	32	40	38	38	40	31	50	39
<b>XI. ELEMENT: MONTHLY TOTAL RAINFALL (MM)</b>												
2009	0	0	5.8	3.1	91	8.7	42.8	55.9	68.7	51.3	227	1.3
2010	0.1	0	0	17.7	57.8	31.9	14.8	60.1	30.8	132.2	256.3	34.7
2011	7.4	42.9	0.4	52.5	68.9	28.2	70.4	65.2	74.0	219.1	189.1	15.5
2012	13.9	Trace	0.4	111.1	61.8	18.3	15.8	91.2	57.1	187.9	9.6	3.5
2013	3.9	23.1	18.2	12.8	25.2	6.9	0.1	195.5	44.3	182.2	33.7	80.5
<b>XII. ELEMENT: MONTHLY MEAN WINDSPEED (KMPH)</b>												
2009	3	4	4	6	9	10	11	9	9	5	3	4
2010	5	4	6	7	9	11	12	12	9	8	3	4
2011	5	6	5	4	4	4	4	4	4	3	5	5
2012	5	6	5	4	3	5	5	4	4	4	4	7
2013	12	6	6	5	4	6	6	4	4	3	4	5

Source: Indian Meteorological Department

### 3.6.1 Periodical Survey

The period selected for the baseline survey for the proposed project is April to June 2022. The important parameters considered are temperature, humidity, wind speed, wind direction and rainfall for the climatic data survey.

**Table 3.3 Periodic Climate Data (April)**

Date	Temperature	Dew Point	Humidity	Wind Speed	Pressure	Precipitation
April	° C   ° F	° C   ° F	%	Kph   Mph	Hg   Mb	Total (mm/in)
2022-04-01	29   84.2	22   71.6	68	13   8.08	29.83   1010	0.0   0.0
2022-04-02	29   84.2	23   73.4	73	17   10.56	29.8   1009	0.0   0.0
2022-04-03	29   84.2	23   73.4	74	18   11.18	29.83   1010	0.0   0.0
2022-04-04	29   84.2	22   71.6	71	13   8.08	29.85   1011	0.0   0.0
2022-04-05	29   84.2	24   75.2	75	13   8.08	29.85   1011	0.0   0.0
2022-04-06	30   86.0	25   77.0	78	16   9.94	29.85   1011	0.3   0.01
2022-04-07	30   86.0	24   75.2	75	21   13.05	29.8   1009	0.0   0.0
2022-04-08	30   86.0	24   75.2	75	19   11.81	29.83   1010	0.0   0.0
2022-04-09	30   86.0	24   75.2	75	20   12.43	29.83   1010	0.0   0.0
2022-04-10	30   86.0	22   71.6	69	16   9.94	29.85   1011	0.0   0.0
2022-04-11	30   86.0	22   71.6	66	13   8.08	29.88   1012	0.0   0.0
2022-04-12	30   86.0	22   71.6	67	12   7.46	29.85   1011	0.0   0.0
2022-04-13	30   86.0	22   71.6	67	13   8.08	29.83   1010	0.0   0.0
2022-04-14	30   86.0	22   71.6	69	16   9.94	29.83   1010	0.0   0.0
2022-04-15	30   86.0	23   73.4	70	14   8.7	29.85   1011	0.0   0.0
2022-04-16	30   86.0	23   73.4	72	17   10.56	29.8   1009	0.0   0.0
2022-04-17	31   87.8	24   75.2	75	19   11.81	29.8   1009	0.0   0.0
2022-04-18	31   87.8	24   75.2	72	19   11.81	29.8   1009	0.0   0.0
2022-04-19	31   87.8	25   77.0	76	20   12.43	29.8   1009	0.4   0.02
2022-04-20	30   86.0	24   75.2	74	17   10.56	29.8   1009	0.0   0.0
2022-04-21	30   86.0	23   73.4	71	15   9.32	29.83   1010	0.0   0.0
2022-04-22	30   86.0	24   75.2	74	20   12.43	29.8   1009	0.0   0.0
2022-04-23	31   87.8	25   77.0	75	21   13.05	29.77   1008	0.0   0.0
2022-04-24	31   87.8	25   77.0	75	23   14.29	29.77   1008	0.0   0.0
2022-04-25	31   87.8	25   77.0	74	21   13.05	29.77   1008	0.0   0.0
2022-04-26	31   87.8	25   77.0	75	23   14.29	29.8   1009	0.5   0.02
2022-04-27	31   87.8	25   77.0	76	20   12.43	29.83   1010	1.1   0.04
2022-04-28	31   87.8	24   75.2	72	19   11.81	29.83   1010	0.2   0.01
2022-04-29	31   87.8	24   75.2	72	15   9.32	29.8   1009	3.6   0.14
2022-04-30	31   87.8	24   75.2	72	16   9.94	29.8   1009	0.0   0.0

**Table 3.4 Periodic Climate Data (May)**

<b>Time</b>	<b>Temperature</b>	<b>Dew Point</b>	<b>Humidity</b>	<b>Wind Speed</b>	<b>Pressure</b>	<b>Precipitation</b>
<b>May</b>	<b>° C   ° F</b>	<b>° C   ° F</b>	<b>%</b>	<b>Kph   Mph</b>	<b>Hg   Mb</b>	<b>Total (mm/in)</b>
2022-05-01	31   87.8	25   77.0	74	19   11.81	29.8   1009	0.0   0.0
2022-05-02	31   87.8	25   77.0	73	19   11.81	29.74   1007	0.0   0.0
2022-05-03	31   87.8	25   77.0	73	19   11.81	29.74   1007	0.0   0.0
2022-05-04	31   87.8	24   75.2	73	18   11.18	29.77   1008	0.0   0.0
2022-05-05	30   86.0	24   75.2	74	19   11.81	29.77   1008	0.0   0.0
2022-05-06	31   87.8	25   77.0	75	18   11.18	29.74   1007	0.0   0.0
2022-05-07	31   87.8	25   77.0	74	22   13.67	29.77   1008	0.2   0.01
2022-05-08	31   87.8	25   77.0	74	21   13.05	29.77   1008	0.0   0.0
2022-05-09	31   87.8	25   77.0	73	18   11.18	29.74   1007	0.0   0.0
2022-05-10	31   87.8	25   77.0	74	18   11.18	29.74   1007	0.0   0.0
2022-05-11	31   87.8	24   75.2	70	16   9.94	29.77   1008	0.0   0.0
2022-05-12	32   89.6	25   77.0	71	14   8.7	29.77   1008	0.1   0.0
2022-05-13	31   87.8	25   77.0	71	14   8.7	29.74   1007	0.0   0.0
2022-05-14	31   87.8	24   75.2	70	14   8.7	29.71   1006	0.3   0.01
2022-05-15	31   87.8	24   75.2	72	13   8.08	29.68   1005	0.0   0.0
2022-05-16	34   93.2	24   75.2	65	14   8.7	29.62   1003	0.0   0.0
2022-05-17	36   96.8	22   71.6	49	16   9.94	29.56   1001	0.0   0.0
2022-05-18	35   95.0	23   73.4	54	20   12.43	29.53   1000	0.7   0.03
2022-05-19	36   96.8	22   71.6	51	17   10.56	29.53   1000	0.2   0.01
2022-05-20	35   95.0	22   71.6	51	22   13.67	29.56   1001	0.0   0.0
2022-05-21	35   95.0	23   73.4	53	25   15.53	29.62   1003	0.0   0.0
2022-05-22	33   91.4	24   75.2	60	23   14.29	29.65   1004	0.0   0.0
2022-05-23	33   91.4	25   77.0	66	25   15.53	29.65   1004	0.0   0.0
2022-05-24	32   89.6	26   78.8	75	27   16.78	29.68   1005	0.0   0.0
2022-05-25	32   89.6	26   78.8	77	23   14.29	29.71   1006	0.0   0.0
2022-05-26	32   89.6	26   78.8	74	23   14.29	29.71   1006	0.0   0.0
2022-05-27	32   89.6	26   78.8	74	26   16.16	29.71   1006	0.0   0.0
2022-05-28	33   91.4	24   75.2	65	27   16.78	29.68   1005	0.0   0.0
2022-05-29	33   91.4	24   75.2	65	26   16.16	29.68   1005	0.0   0.0
2022-05-30	32   89.6	24   75.2	67	28   17.4	29.74   1007	0.0   0.0
2022-05-31	32   89.6	24   75.2	67	30   18.64	29.77   1008	0.0   0.0

**Table 3.5 Periodic Climate Data (June)**

<b>Date</b>	<b>Temperature</b>	<b>Dew Point</b>	<b>Humidity</b>	<b>Wind Speed</b>	<b>Pressure</b>	<b>Precipitation</b>
<b>June</b>	<b>° C   ° F</b>	<b>° C   ° F</b>	<b>%</b>	<b>Kph   Mph</b>	<b>Hg   Mb</b>	<b>Total (mm/in)</b>
2022-06-01	32   89.6	25   77.0	68	28   17.4	29.74   1007	0.1   0.0
2022-06-02	33   91.4	24   75.2	63	29   18.02	29.74   1007	0.0   0.0
2022-06-03	32   89.6	23   73.4	62	24   14.91	29.74   1007	0.3   0.01
2022-06-04	32   89.6	23   73.4	62	25   15.53	29.71   1006	0.7   0.03
2022-06-05	32   89.6	24   75.2	65	24   14.91	29.74   1007	4.1   0.16
2022-06-06	32   89.6	23   73.4	64	22   13.67	29.71   1006	3.2   0.13
2022-06-07	31   87.8	22   71.6	65	22   13.67	29.71   1006	7.4   0.29
2022-06-08	33   91.4	22   71.6	59	18   11.18	29.68   1005	1.8   0.07
2022-06-09	32   89.6	23   73.4	64	17   10.56	29.68   1005	3.9   0.15
2022-06-10	30   86.0	22   71.6	65	18   11.18	29.65   1004	8.4   0.33
2022-06-11	30   86.0	22   71.6	66	19   11.81	29.62   1003	3.3   0.13
2022-06-12	31   87.8	21   69.8	57	18   11.18	29.62   1003	0.9   0.04
2022-06-13	31   87.8	21   69.8	60	18   11.18	29.62   1003	0.0   0.0
2022-06-14	32   89.6	22   71.6	58	19   11.81	29.65   1004	0.0   0.0
2022-06-15	32   89.6	23   73.4	59	20   12.43	29.65   1004	0.0   0.0
2022-06-16	32   89.6	23   73.4	62	21   13.05	29.65   1004	0.0   0.0
2022-06-17	32   89.6	23   73.4	60	19   11.81	29.65   1004	0.0   0.0
2022-06-18	32   89.6	23   73.4	64	16   9.94	29.71   1006	1.0   0.04
2022-06-19	32   89.6	23   73.4	63	20   12.43	29.71   1006	1.0   0.04
2022-06-20	33   91.4	22   71.6	57	16   9.94	29.68   1005	2.2   0.09
2022-06-21	33   91.4	22   71.6	57	18   11.18	29.65   1004	0.7   0.03
2022-06-22	31   87.8	23   73.4	67	14   8.7	29.65   1004	10.2   0.4
2022-06-23	31   87.8	22   71.6	62	18   11.18	29.68   1005	0.9   0.04
2022-06-24	29   84.2	22   71.6	66	18   11.18	29.68   1005	0.8   0.03
2022-06-25	31   87.8	23   73.4	66	16   9.94	29.65   1004	3.9   0.15
2022-06-26	29   84.2	23   73.4	70	22   13.67	29.65   1004	9.9   0.39
2022-06-27	31   87.8	23   73.4	65	23   14.29	29.62   1003	0.6   0.02
2022-06-28	31   87.8	24   75.2	69	18   11.18	29.65   1004	4.3   0.17
2022-06-29	31   87.8	24   75.2	67	18   11.18	29.62   1003	4.1   0.16
2022-06-30	29   84.2	24   75.2	75	16   9.94	29.62   1003	81.6   3.21

### 3.6.2 Wind Rose Diagram

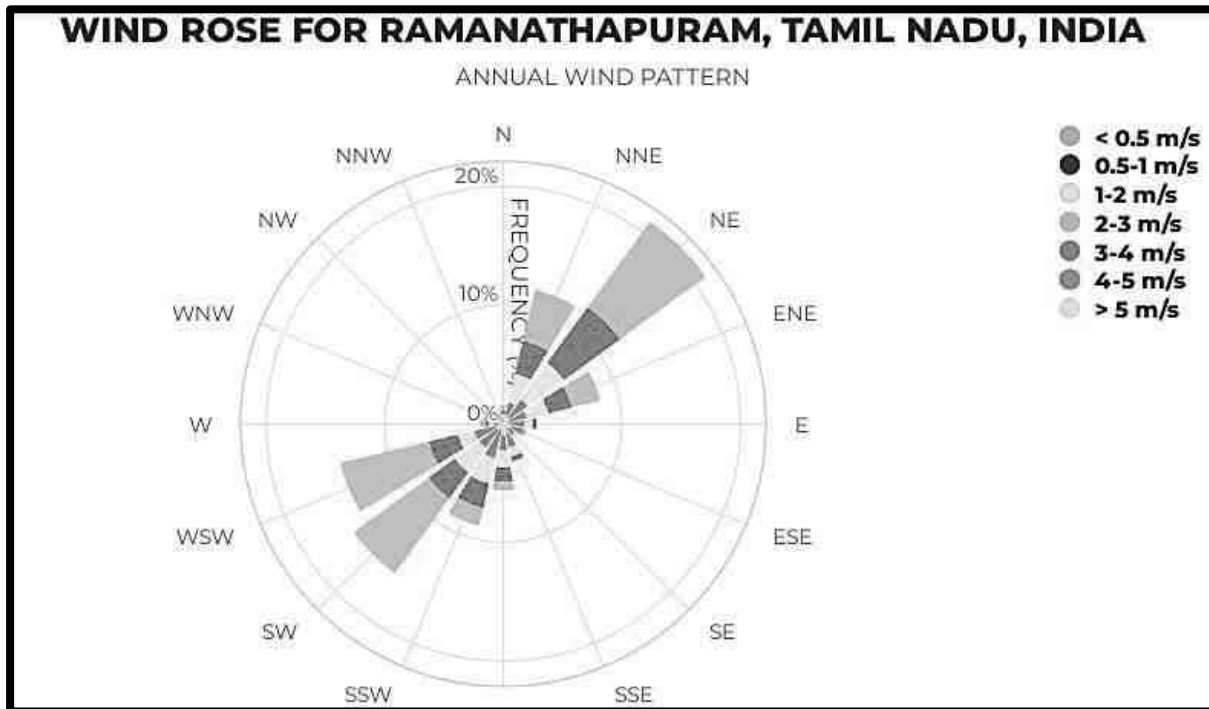


Fig. 3.2 Wind Rose Diagram (Annual)

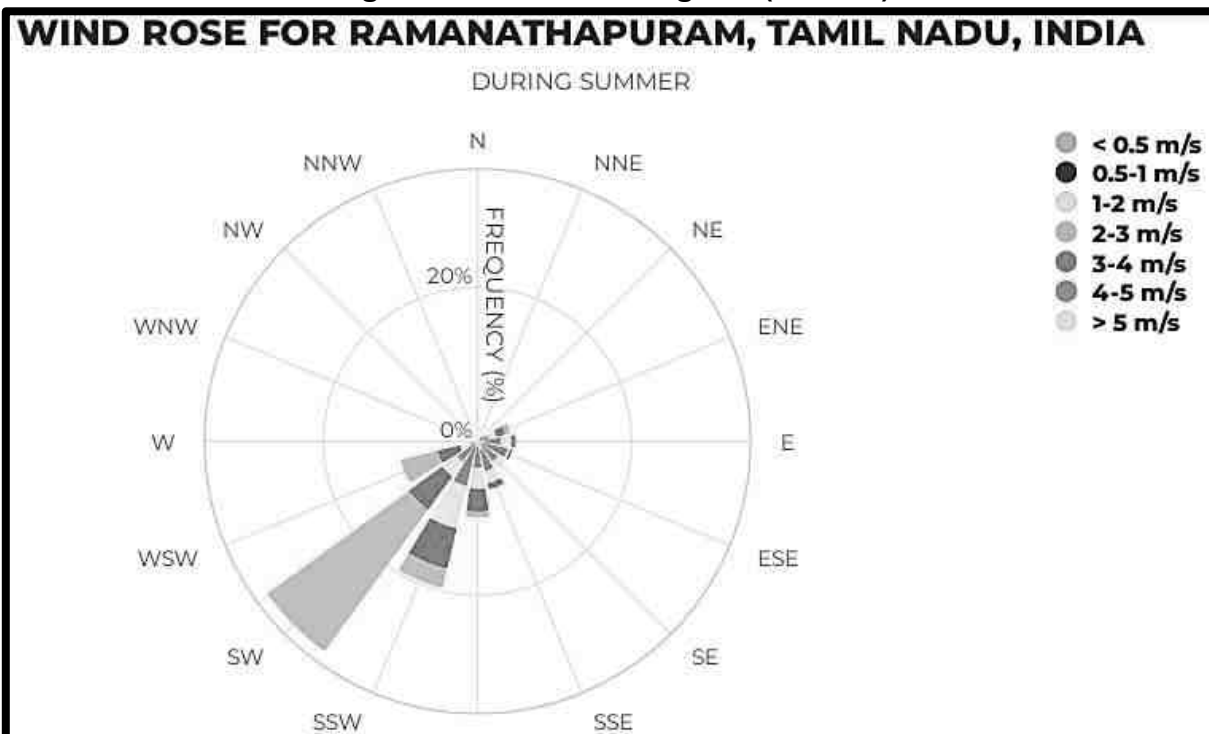


Fig. 3.3 Wind Rose Diagram (Summer)



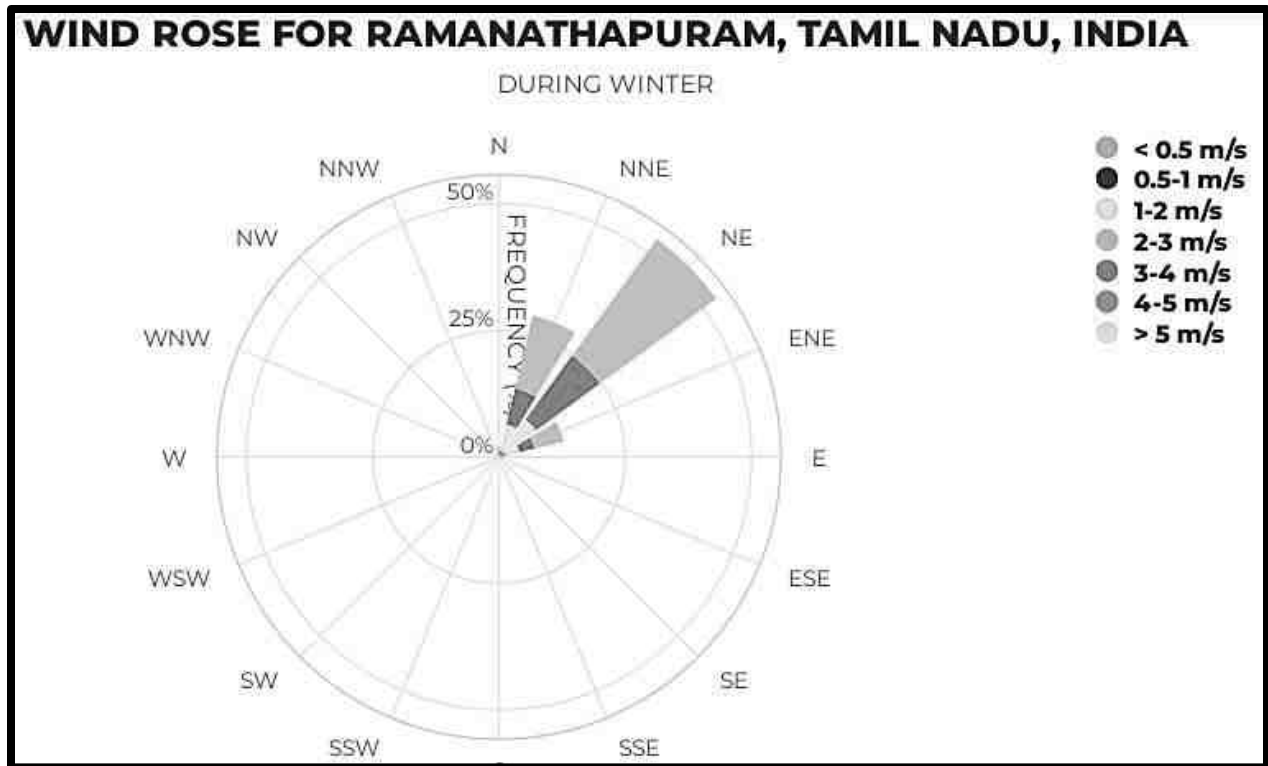


Fig. 3.4 Wind Rose Diagram (Winter)

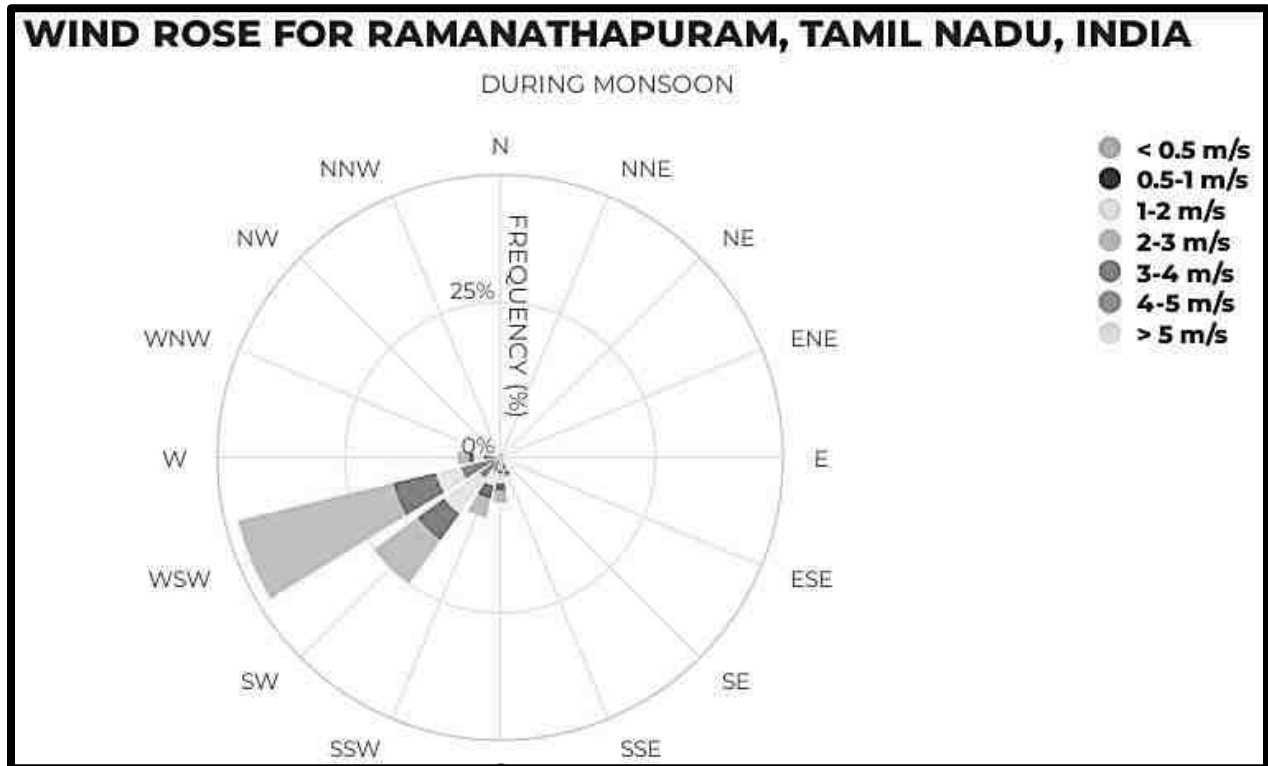


Fig. 3.5 Wind Rose Diagram (Monsoon)

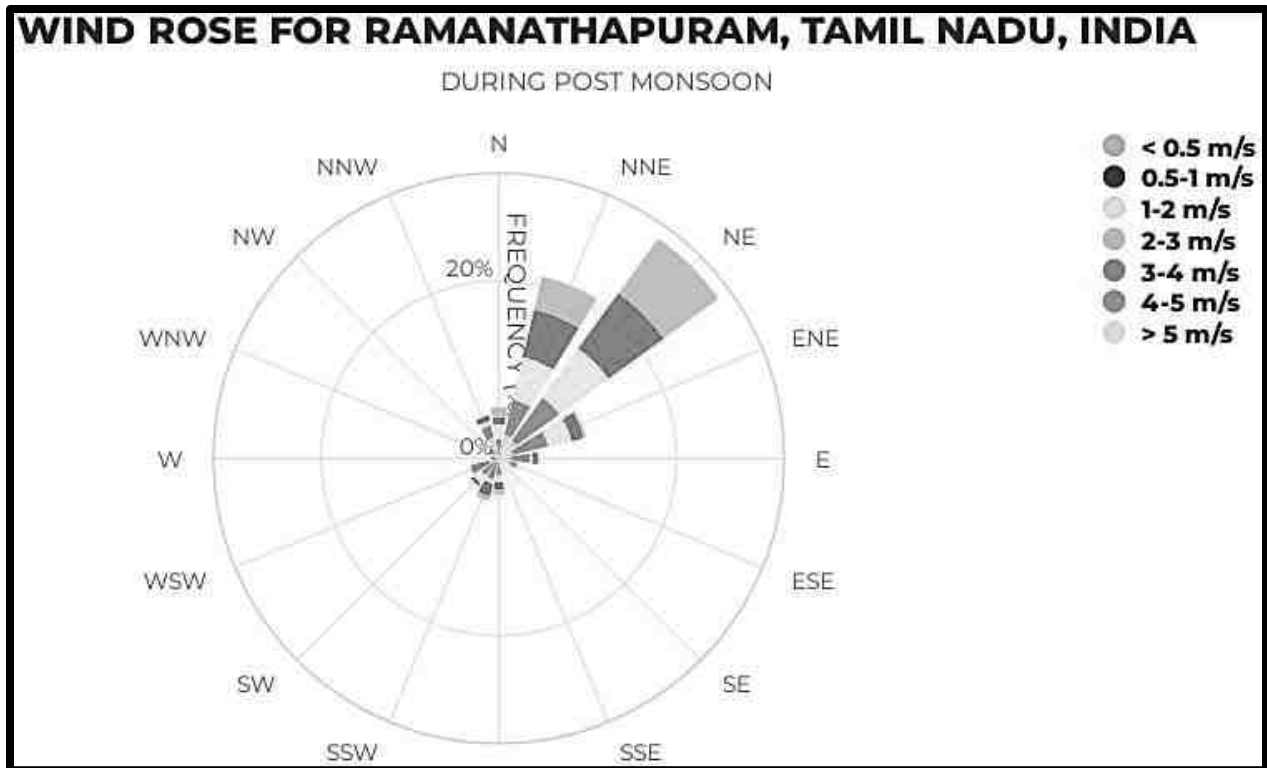


Fig. 3.6 Wind Rose Diagram (Post Monsoon)

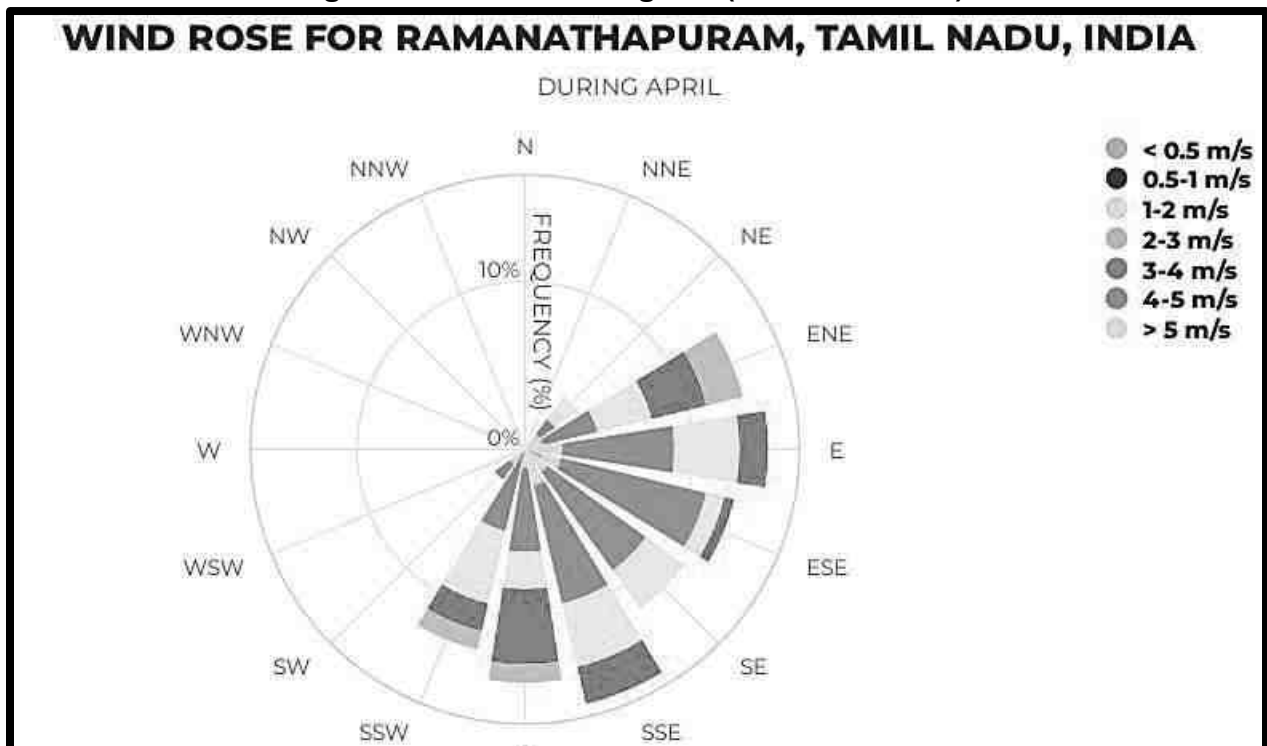


Fig. 3.7 Wind Rose Diagram (April)

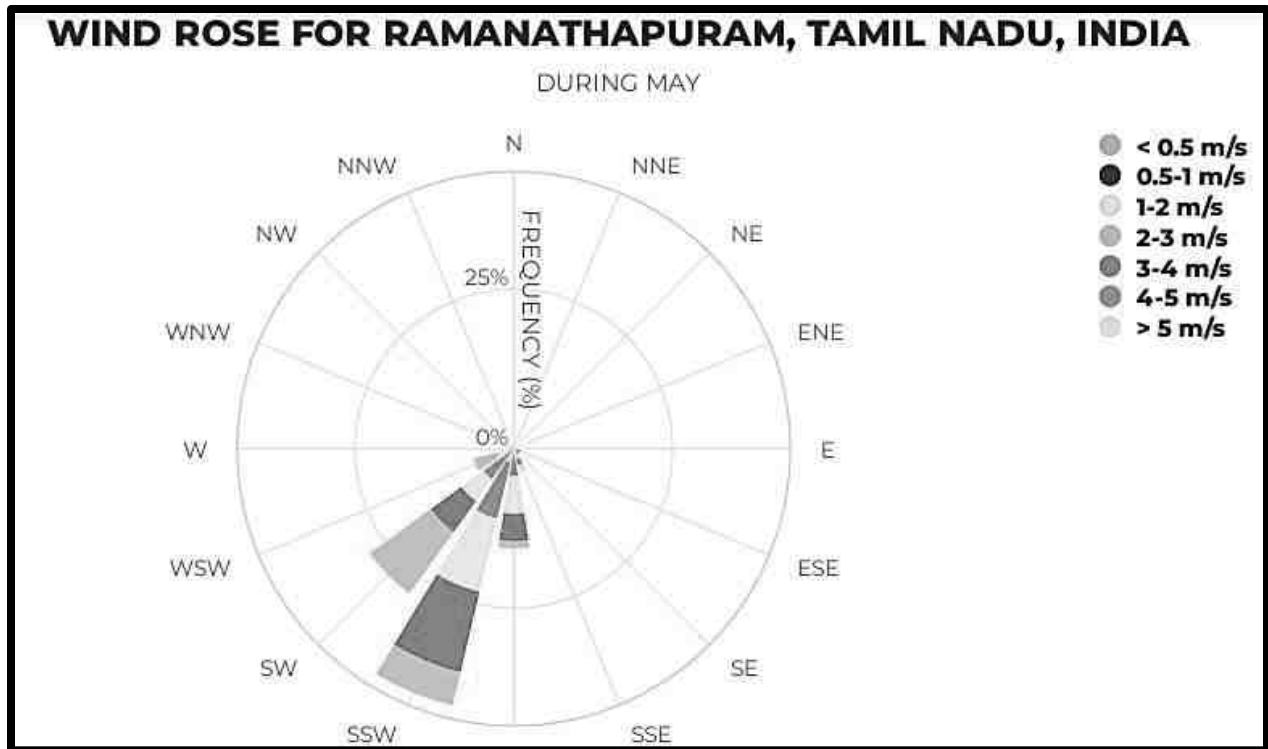


Fig. 3.8 Wind Rose Diagram (May)

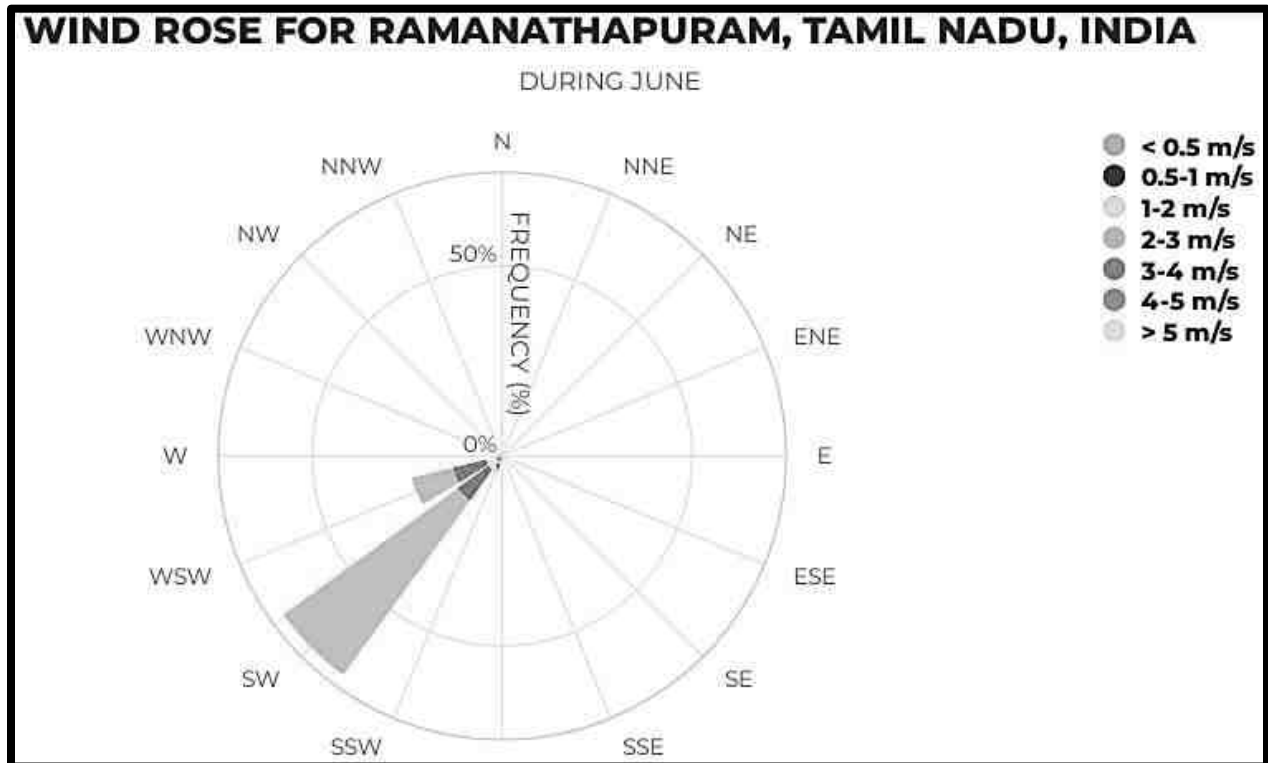


Fig. 3.9 Wind Rose Diagram (June)

### **3.7 TOPOGRAPHIC STUDY**

#### **3.7.1 Introduction**

The Project Site falls under the Ramanathapuram District, also known as Ramnad District, is one of the 38 administrative districts of Tamil Nadu state in southern India. The old Ramanathapuram District consists of present day Virudhunagar and Sivagangai districts, it touches the Western Ghats and bordered with the state of Kerala and east by Bay of Bengal. It was the largest district on that time. The town of Ramanathapuram is the district headquarters. Ramanathapuram District has an area of 4,123 Sq.km. It is bounded on the north by Sivaganga District, on the northeast by Pudukkottai District, on the east by the Palk Strait, on the south by the Gulf of Mannar, on the west by Thoothukudi District, and on the northwest by Virudhunagar District.

The district contains the Pamban Bridge, an east–west chain of low islands and shallow reefs that extend between India and the island nation of Sri Lanka, and separate the Palk Strait from the Gulf of Mannar. The Palk Strait is navigable only by shallow draft vessels. As of 2011, Ramanathapuram district had a population of 1,353,445 with a sex-ratio of 983 females for every 1,000 males. The district is home to the pilgrimage center of Rameshwaram. In 1910, Ramanathapuram was formed by clubbing portions from Madurai and Tirunelveli district. Shri J.F. Bryant I.C.S was the first collector. And this district was named as Ramanathapuram. During the British period this district was called "Ramnad". The name continued after independence. Later the district was renamed as Ramanathapuram to be in conformity with the Tamil name for this region.

#### **3.7.2 Climate and Rainfall**

The district receives the rain under the influence of both southwest and northeast monsoons. The northeast monsoon chiefly contributes to the rainfall in the district. Most of the precipitation occurs in the form of cyclonic storms caused due to the depressions in Bay of Bengal. The southwest monsoon rainfall is highly erratic and summer rains are negligible. Rainfall data from two stations over the period 1901-2000 were utilized and a perusal of the data shows that the normal annual rainfall over the district is 827mm with the maximum around Pamban and all along the coast and it decreases towards inland.

The district enjoys a Tropical climate. The period from May to June is generally hot and dry. The weather is pleasant during the period from December to January. Usually, mornings are more humid than afternoons. The relative humidity is on an average between 79 and 84%. The mean minimum temperatures are 25.7°C and mean maximum daily temperature is 30.6°C respectively.

### 3.7.3 Drainage

The major part of Ramanathapuram district falls in Gundar-Vaigai river basin. Vaigai and Gundar are the important rivers and in addition, Virusuli, Kottakariyar & Uppar are the other rivers draining the district. The drainage pattern, in general, is dendritic. All the rivers are seasonal and carry substantial flows during monsoon period.

River Vaigai, which is one of the important rivers of the district, which is flow and drain in the Paramakudi, Bogalur, Tirupullani and Mandapam blocks. The Gundar river originates in Kottamalai hills in the Saptura forest and enters the district near Anankulam and flows in a south –eastern to due south direction and enters the Bay of Bengal neare Mukaiyur. The river assumes the name of “Reghunatha Cauveri” from Kamudhi. The Kottakarai, Virusuli and Uppar are other rivers flowing in south easterly direction and entering the Bay of Bengal.

### 3.7.4 Irrigation Practices

The chief irrigation sources in the area are the tanks, wells and tube/bore wells. The block wise and source wise net area irrigated in Ha is given below (2005-06).

**Table 3.6 Net Area Irrigated**

Sl. No.	Block	Net Area Irrigated				Total Net Area Irrigated
		Canals	Tanks	Tube/bore wells	Open wells	
1	Paramakudi	-	5529	170	590	6289
2	Bogalur	-	3134	40	194	3368
3	Nainarkovil	-	3676	42	743	4461
4	Ramanathapuram	-	4541	0	424	4965
5	Mandapam	-	121	0	3638	3759
6	Tiruppullani	-	2850	0	3278	6128
7	Tiruvadanai	-	8605	90	25	8720
8	R.S.Mangalam	-	9405	8	12	9425
9	Mudukulathur	-	4787	90	809	5686
10	Kadaladi	-	9151	3	433	9587
11	Kamuthi	-	5235	0	924	6159
<b>Total</b>		-	<b>57034</b>	<b>443</b>	<b>11070</b>	<b>68547</b>

(Source: Department of Economics & Statistics, Govt. of Tamil Nadu)

### 3.7.5 Geology

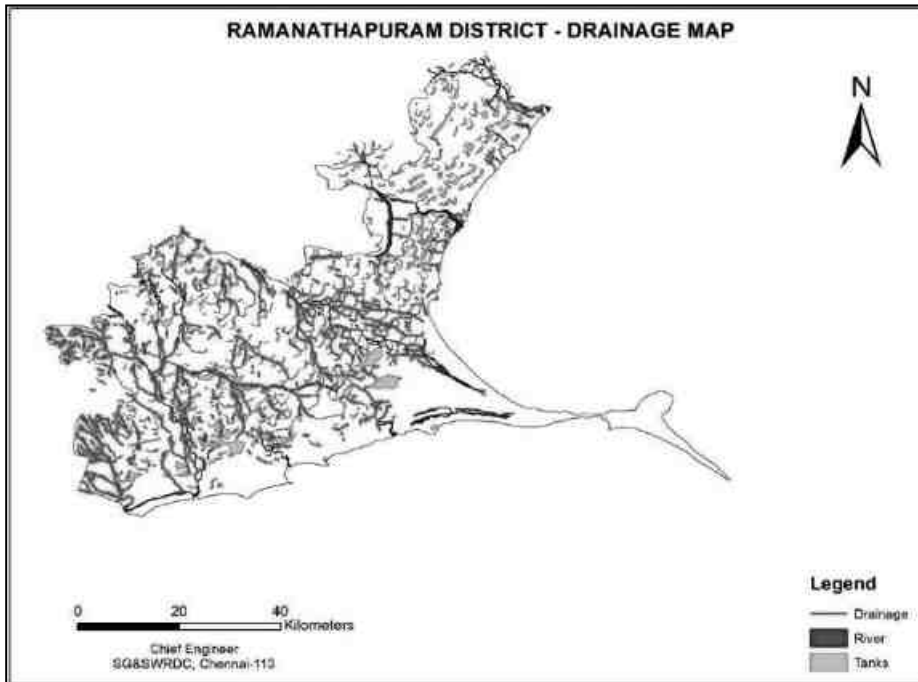
#### 1. PHYSIOGRAPHY & DRAINAGE PATTERN:

Ramanathapuram is located between 09° 05' and 09° 50' North latitude and between 78° 10' and 79° 27' East longitude. Ramanathapuram is a coastal district situated in South-eastern part of Tamil Nadu and it is something in dumper shape. It is bounded on the north by Sivaganga District, on the northeast by Pudukkottai District, on the east by the Palk Strait, on the south by the Gulf of Mannar, on the west by Thoothukudi District, and on the northwest by Virudhunagar District. It covers the geographical area of 4175.00 Sq. km.



Physio-graphically, the entire district is a plain terrain. There are seasonal rivers named as Sarugani River, Manimuthar River, Vaigai River, Gundar, Kottakaraiyar and Vaippar River etc. The major part of Ramanathapuram district falls in Gundar-Vaigai river basin. Vaigai and Gundar are the important rivers and in addition, Virusuli, Kottakariyar & Uppar are the other rivers draining the district. The drainage pattern, in general, is dendritic. The district is part of the composite east flowing river basin, “Between Gundar and Vaigai” as per the Irrigation Atlas of India. Virusuliaru, Kottakkarai, and Rameswaram Island are the important Sub-basins/ Watersheds.

All the rivers draining in the district are seasonal and carry substantial flows during monsoon period. Vaigai., which is one of the important rivers of the district, flow and drain in the Paramakudi, Bogalur, Tirupullani and Mandapam blocks. The Gundar river originates in Kottamalai hills in the Saptura forest and enters the district near



Anankulam and flows in a south –eastern to due south direction and enters the Bay of Bengal near Mukaiyur. The river assumes the name of “Reghunatha Cauveri” from Kamudhi. The Kottakarai, Virusuli and Uppar are other rivers flowing in

south easterly direction and entering the Bay of Bengal.

The drainage pattern in the local environs is sub-dendritic to parallel in nature and in some places radial drainage system is noticed due to the vigorous surface runoff from the higher gradient and hence the surface runoff seems to be uneven. Sparse drainage density is noticed in the north, east and western part of the plot, where the seasonal cultivable lands are noticed.



NATURAL NALLA – 60M SOUTH OF PLANT SITE (FLOW W-E)

## 2. GEOLOGY OF THE AREA:

Geologically, the entire district is comprised of sedimentary formations of alluvium, tertiary except 1% of hard rock formations of Quartzite and gneissic formations. Quaternary deposits occur at the top and they range in thickness from 30m to 160m from west to east. They consist of sand, silt, clay, calcareous sand stone fossiliferous

sand stone, etc. Tertiary deposits occur below the Quaternaries and they range in thickness from 200-250 m. They consist of sandstone and mottled clay. Cretaceous formation underlain the tertiaries and the rock types include chiefly limestone.

The archaean basement rock is reported to occur at a depth varying from 1000 m to 1700m from ground level as per the information obtained from ONGC. At Mandapam, the basement is met with at a depth of 1641m which is revealed from the bore hole drilled by ONGC.

### GRANITIC GNEISS WITH INTRUSIONS



There are three types of major formations occur in and around the study area viz. granitic gneiss & granitoid of Peninsular Gneissic complex, quartzites, sandstone/ limestone of Archaean to quaternary age and alluvial deposits of Pleistocene to recent period. The granites & granitoids have undergone low grade of metamorphism and shows thin gneissic structure at higher altitude places. The order of geological succession of the study environs is given hereunder.

**Table 3.7 The major geological variations noticed in the study area & its environs**

<b>Geological Succession (Age)</b>	<b>Details of Rock Types &amp; aggregates</b>
Pleistocene to Recent	Alluvial deposits of black sandy gravelly soil (some places, red sandy loamy soil)
Tertiary to Quaternary	Sand, silt, clay, calcareous sand stone fossiliferous sand stone
Archaean	Peninsular Gneissic Complex – Granitic Gneisses (Amphiboles?)



It is also recorded that some part of the district namely south and south eastern portion, Recent Alluvium, Laterite, Cuddalore Sandstones & Crystalline rock (Quartzite, Hornblende, granite) are noticed as isolated patches and out of which, Sandstone, Limestone & granitic gneisses acts as major water bearing formations.

The study area regionally appears to be partly encouraging the vigorous runoff due to sheet and hard rock cover and partly for infiltration. However, within the plot area, the zone supports for complete runoff and negligible infiltration. There are two main types of erosion noticed in the environs of the study area viz. a) Sheet erosion due to weathered granitic gneiss and b) Gully erosion due to black soil and sandy loamy soil cover at places. They are often found combined in nature.

### 3.7.6 Geomorphology:

Ramanathapuram district has a long coastline of around 260 km. The coastal areas are flanked by Beach ridge complex-sand dunes, swales, swamps and backwater. The sand flat is another feature of the coast comprising of clays and silts, often inundated by seawater and encrusted with salt. Other features are the shallow pediment plain of Kamdhi, parts of Paramakudi and Tiruvadana taluks with thin veneer of soil cover over weathered hornblende gneiss, laterite and the buried pediments.

Eastern part of the district comprises vast plain with tidal lakes giving rise to Bird Foot Delta, Flood Plain, Beach Ridge Complex comprising sand dunes, swamps and backwaters and Shallow Buried Pediments.

Geomorphologically, the study area is characterized by even topography. However, the area in the vicinity of the study plot is mainly of gentle slope towards south and southeast with sporadic isolated hidden and cluster of rocky masses. The general slope of the area in and around the plot is from north to south and west to east. Geo-morphologically the terrain around the area of investigation is plane to moderately undulating and is characterized by the rolling topography with;

- **Pediplain shallow (PPS)** – Pediplain is characterized by plain portion of the environs with differential weathering and mainly identified with moderate to thick soil cover, having gentle to very gentle slopes and acts as local groundwater repository. The pediplain constitute low relief area having matured dissected rolling topography with erosional land slope covered by a layer of red loamy soil of varied thickness. The pediplains is dissected by streamlets flowing in southeastern direction.
- **Pediment (PD)** – Pediment is the particular portion on the gneissic terrain with slight elevation and undulation, characterized with thin soil cover over it, having high to medium slopes and acts as runoff zone and local water divider.

Geo morphologically the land belong to BMW plant site and its environs may be classified as pediplain shallow to moderate zone based on the gradient and thick weathered soil cover & presence of alluvial deposits.

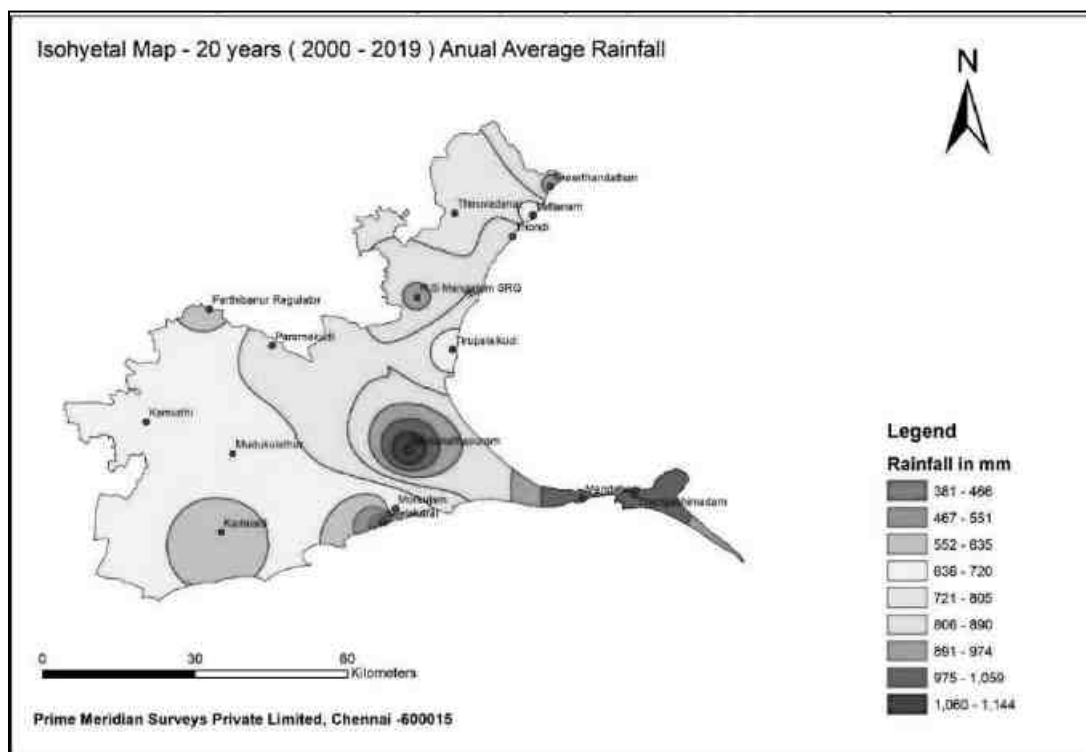
### 3.7.7 RAINFALL AND CLIMATE

The Ramanathapuram district receives rain under the influence of both southwest and northeast monsoons. The Northeast monsoon chiefly contributes to the rainfall in the district. Most of the precipitation occurs in the form of cyclonic storms caused due to the depressions in Bay of Bengal. The Southwest monsoon rainfall is highly erratic and summer rains are negligible. The average annual rainfall over the district is 827 mm with the maximum around Pamban and all along the coast and it decreases towards inland.

The district enjoys a Tropical climate. The period from May to June is generally hot and dry. The weather is pleasant during the period from December to January. Usually, mornings are more humid than afternoons. The relative humidity is on an average between 79 and 84%. The mean minimum temperature is 25.7°C and the mean maximum daily temperature is 30.6°C respectively. The average annual rainfall and the 10 years rainfall collected from IMD, Chennai & various other sources (TWAD) is given in Table 3.8 & 3.9 for understanding.

**Table 3.8**

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Normal Rainfall
Rainfall (mm)	896	618	947	1114	349	607	650	923	860	1041	827



**Table 3.9**

<b>Monsoon Period</b>	<b>Normal</b>	<b>Actual</b>
South West Monsoon	149.5	145.2
North East Monsoon	491.7	521.6
Winter Period	62.3	80.58
Hot Weather period	123.5	127.4
<b>Total</b>	<b>827</b>	<b>879.2</b>

The rainfall data reveals that erratic precipitation has occurred continuously 03 years up to 2018 and there have been rain deficit years for Ramanathapuram. However, since 2019, it has been receiving widespread rainfall in October and November and copious showers have been recorded during this period. Hence, it is presumed that the abundant rainfall might bring a relief to the farmers and dwelling community and stop further migration from the rural areas.

The various analyses indicate that pre-monsoon and post-monsoon rainfall in the region are showing positive trend. Whereas monsoon rain fall shows marginally negative trend. From the rain fall analysis it is clear that, rainfall increases from June month and drastically decreases during August. Again, there is an increasing trend in rainfall in September and reaches peak during October, and starts declining from November beginning onwards. The study area receives more rainfall during northeast (NE) monsoon due to successive low pressure created in Bay of Bengal when compared to southwest (SW) monsoon season.

### **3.7.8 HYDROGEOLOGY:**

Groundwater occurs in phreatic conditions or unconfined conditions in the weathered zone and under semi confined to confined conditions in fractured and jointed rock formations. The occurrence of Groundwater movement and recharge to aquifers are controlled by various factors like fracture pattern, degree of weathering, geo morphological setup and amount of rainfall received.

The Ramanathapuram 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 and fractured crystalline rocks.

The porous formations can be grouped into three aquifer groups, viz., Cretaceous sediments, Tertiary Sediments and Quaternary Sediments. The cretaceous aquifer is semi confined to confined in nature and consists of two zones. The top unit comprises fossiliferous sandstone red in colour and compact in nature, while the bottom is pinkish or grayish sandstone intercalated with shales.

The aquifers are characterized by freshwater and occurs at the depth range of 116-407 and 205-777 m bgl and has thickness in the range of 68 to 535 m. The aquifer is made up of compact sandstone and the potential is limited. The wells may yield a discharge of 5-10 lps and can sustain a pumping of 10-15 hours a day. However, because of the presence of potential shallow tertiary aquifer, this aquifer has not been extensively developed. Cuddalore Sandstone of Tertiary sediments consists Sandstone, Clay & Conglomerate. They are encountered at the depth of 15-75 m bgl with the thickness ranging from 20 to 70 m.

The groundwater occurs under unconfined condition with thickness varying from 15-20m and under confined condition in deeper depths. The unconfined aquifer can be tapped by dug well/ dug cum bore well and can yield about 10-15 lps and can sustain a pumping of 10-15 hours a day. The deeper tube wells can yield about 15-20 lps and can sustain a pumping of 10-15 hours a day. However, the quaternary sediments comprise fluvial and coastal sands and laterites. The alluvium with alternate layer of sand and clay with a thickness of 15-25 m and are characterized by floating freshwater lenses limited to a depth 6-7 m bgl and can sustain a pumping of 2 – 3 hours and can yield about 2-5 lps.

The water-bearing properties of crystalline formations which lack primary porosity depend on the extent of development of secondary inter granular porosity. The occurrence and movement of groundwater in these rocks are generally confined to such spaces. These aquifers are highly heterogeneous in nature due to variation in lithology, texture and structural features even within short distances. Groundwater generally occurs under phreatic conditions in the weathered mantle and under semi confined conditions in the fissured and fractured zones at deeper levels. The thickness of weathered zone in the district is in the range of 4 to 15 m. The depth of the wells ranged from 10.00 to 15.00 m bgl.

The yield of large diameter wells in the district, tapping the weathered mantle of crystalline rocks ranges from 40 to 110 lpm and are able to sustain pumping for 2 to 6 hours per day. The Specific capacity of large diameter wells tested in crystalline rocks ranges from 20.25 to 95 lpm / m. of drawdown. The yield characteristics of wells vary considerably depending on the topographic set-up, litho logy and nature of weathering. The transmissivity of weathered formations computed from pumping test data using empirical methods range  $<1$  m<sup>2</sup>/day. The yield of bore wells drilled down to a depth of 40 to 70 m, by various state agencies mainly for domestic purposes ranged from 10 to 250 lpm.

The State Ground and Surface Water Resources Data Centre, during the course of investigation have drilled more than 197 boreholes spread over the entire district.

### 3.7.9 Aquifer parameters

#### a) Hard rock

The thickness of aquifer in this district is highly erratic and varies between 10m and 40m below ground level. The intergranular porosity is essentially depending upon the intensity and degree of weathering and fracture development in the bed rock. No boreholes have been drilled in hard rock formations.

#### b) River alluvium: Sedimentary area

The river alluvium occurs as a major patch in Ramanathapuram district. The ranges of parameter values for alluvium are furnished in Table 3.10 below.

**Table 3.10 Parameter Values for Alluvium**

Parameters	Range
Well yield in LPM	315-1080 lpm
Transmissivity (T) m <sup>2</sup> /day	210-1500 m <sup>2</sup> /day
Permeability (K) m/day	20-50 m/day
Depth range in m	20-30 m

#### c) Coastal alluvium

The coastal alluvium occurs as the entire coastal track of Ramanathapuram district. The ranges of parameter values for coastal sand are furnished in Table 3.11 below.

**Table 3.11 Parameter Values for Coastal Sand**

Parameters	Range
Well yield in LPM	650-2200lpm
Transmissivity (T) m <sup>2</sup> /day	350-2500 m <sup>2</sup> /day
Permeability (K) m/day	45-95 m/day
Depth range in m	30-50 m

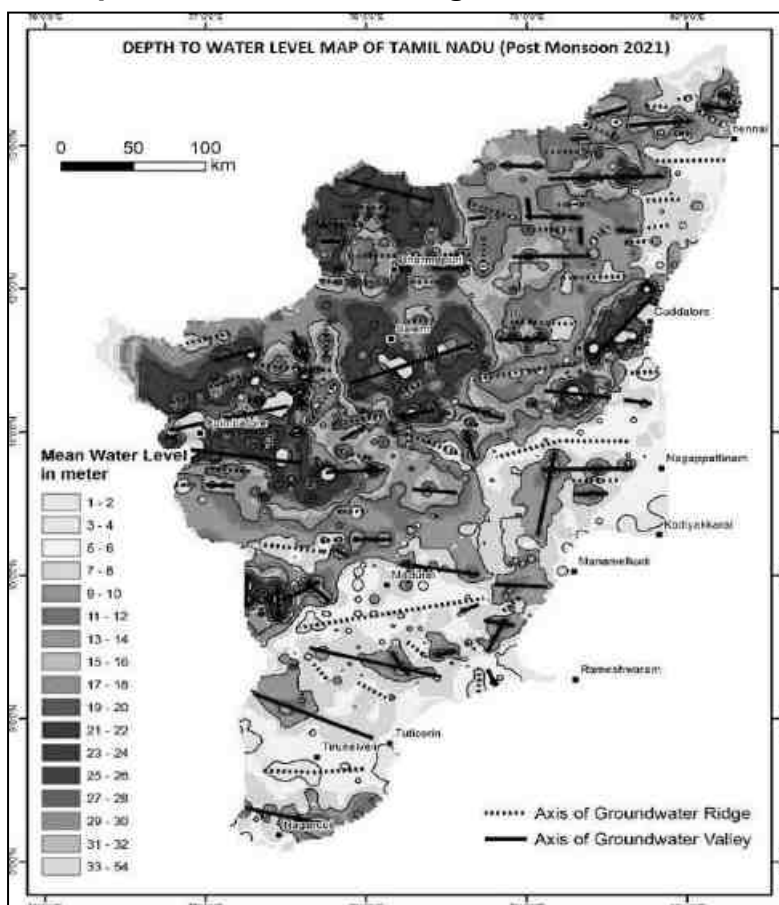
The depth to water level in the district varied between 0.67 – 12.12 m bgl during pre-monsoon depth to water level (May 2006) and varied between 0.49 – 8.78 m bgl during post monsoon depth to water level (Jan 2007). The seasonal fluctuation shows a rise in water level, which ranges from 0.35 to 2.8m bgl. The piezometric head varied between

3.49 to 16.23m bgl (May 2006) during pre-monsoon and 1.29 to 8.06 m bgl during post monsoon.

### 3.7.10 Behaviour of groundwater level

Behaviour of groundwater level is essentially controlled by physiography, lithology and rainfall. Groundwater level behaviour has been analysed based on monitoring of groundwater level from the network hydrograph stations (NHS) established by CGWB. In Ramanathapuram district, there are about 110 observation wells and 14 piezometers, totally 124 wells are monitoring on monthly basis. These wells are also being monitored four times in a year during May, August, November & January for understanding the behaviour of the groundwater levels.

### 3.7.11 Depth to water level during 2021



The pre-monsoon depth to water level in majority of the stations located in Ramanathapuram district has deeper water level in the range of 2.30 - 20 m bgl. In general, pre monsoon depth to water levels of the peizometer ranges from 4 to 20 m bgl. In dug wells, it ranges from 2 to 7 m. Whereas, the post-monsoon depth to water level in majority of the stations located in Ramanathapuram district has shallow water level in the range of 0.01 - 12 m bgl. In general, post monsoon depth to water levels of the piezometer ranges from 01 to 10 m

bgl.

In dug wells, the water level ranges from 01 to 04 m. However, Figure 3 illustrates the annual water table levels in Ramanathapuram district during 2021 monsoon.

Based on the interpretation of pre and post monsoon rainfalls, it can be assessed that the depth to water level at the study area during the pre-monsoon will be in the range of

03 to 12m bgl, and during the post monsoon, it will be in the range of 0.10 to 05m bgl. Hence, groundwater level is expected to be depleting during pre-monsoon period in the specified area and is attributed to be due to irrational and uneven extraction of groundwater by the users & community.

### **3.7.12 Groundwater potential:**

Groundwater resource of the Ramanathapuram district has been assessed keeping in view, the sustainable and optimum development of the resource. The estimation has been done based on Groundwater Estimation Methodology (GEM)-1997. Assessment is done taking into consideration of various hydrologic units' viz. command, non-command hilly area with more than 20% slope and poor-quality area. However, the proposed site has been identified as poor groundwater potential zone.

Net annual groundwater availability in the district is 33541 ham, gross groundwater draft is 12366 ham, and groundwater balance available for future groundwater development is 21143 ham. Thus, draft is less than the total available groundwater resources, leaving additional groundwater resources for future use. However, the stage of groundwater development in Paramakudi taluk is about 23% and is falling within the safe (S) category (Net annual groundwater availability in the taluk is 2520 ham, gross groundwater draft is 578 ham, and groundwater balance available for future groundwater development is 1940 ham). Therefore, both Central Ground Water Authority (CGWA) and Tamil Nadu Groundwater Authority (KGA) are planning to consider this taluk for appropriate development of groundwater resources.

The development of groundwater for irrigation in the district is mainly through dug wells tapping the weathered residuum or recent alluvial deposits. Bore wells have also become popular as the source for irrigation in the district in recent years. Dug wells with extension bores wherever necessary is ideal for hard rock areas whereas large diameter dug wells with radials is suitable for alluvial areas.

Large diameter collector wells are ideal structures for groundwater extraction in the river alluvial tracts, where the granular zones are generally restricted to 35 m bgl. The coastal sands in the eastern part of the district also form good aquifer material. The tube wells may be constructed down to a maximum depth of 40 m bgl in the district. The width and position of the screen in the wells may be decided based on the depth to piezometric surface and discharge required.

### **3.7.13 Rainwater Harvesting Potential:**

There is considerable scope for implementation of rain water harvesting in the project,. The schemes, which are simple in design and comparatively cheap, could serve to improve the groundwater levels and improve groundwater quality, if taken up in sufficient numbers. The area around the old burial pits are to be avoided. Recharge pits/

Shafts/ Trenches of suitable design are ideal structures for rain water harvesting. Roof top rain water harvesting can also be attempted. Free technical guidance for implementation of roof-top rain water harvesting schemes is also being provided by Central Ground Water Board and manual is also published to give more scientific design tips.

#### **3.7.14 Recommendation:**

- The identified site for BMW plant is already having 01 bore well at southern corner of the premises with a total depth 35m bgl. Hence, the same structure is recommended to be utilized for future water requirements.
- The groundwater level is recorded to be shallow i.e. 04m bgl and the aquifer is adequately influenced by the existing drainage system noticed towards south of the BMW plant site. Hence, the artificial groundwater system/ structures are not recommended in order to avoid groundwater logging and groundwater pollution.
- In case of groundwater utilization through existing bore well, pumping shall be restricted to not more than 08 hours in a day and shall be in staggered manner (so as to avoid saline water intrusion). Adequate time need to be given for groundwater recuperation in order to maintain the aquifer sustainability.
- It is advisable to have periodicall water table level observation of the existing bore well and also test the quality of groundwater. Suitable remedial measure need to be taken up in case of water quality issues (to ensure potability).

#### **References:**

- ✓ Rainfall Data – IMD, Chennai and TWAD Board, Tamil Nadu.
- ✓ Ramnad District Diagnostic Report (2019) - Tamil Nadu Rural Transformation Project (TNRTP).
- ✓ District Groundwater brochure, Ramanthapuram District, CGWB, Tamil Nadu (2009).
- ✓ Ramanathapuram District Profile, TWAD Board – 2021
- ✓ Water Level Data – Groundwater Year Book 2019-20, CGWB.
- ✓ Groundwater Information Booklet – CGWB, SE Region, Chennai.
- ✓ HG Notes on Ramanthapuram District – 2019.
- ✓ A report on Ramanathapuram agriculture potentials – TN Agriculture University.
- ✓ Consultancy contract for WASCA-TN ‘Ground Water’ its dynamics with Surface Water for ‘CWRMP’ for Ramanathapuram Districts – By Prime Meridian Surveys Private Limited
- ✓ Field Investigations, Primary data generation, Interpretations, Analysis etc.

#### **3.8 AMBIENT AIR QUALITY**

The ambient air quality with respect to the study zone of 10 km radius around the project site forms the baseline information. The prime objective of the baseline air



quality study was to assess the existing air quality of the area. This will be useful for assessing the conformity to standards of the ambient air quality during the operation of the proposed project. The study area represents mostly residential environment. This section describes the selection of sampling locations, methodology adopted for sampling, analytical techniques and frequency of sampling. The results of monitoring carried out for study period of April to June 2022.

Dispersion of different air pollutants released into the atmosphere have significant impacts on the neighborhood air environment and forms an important part of impact assessment studies. The ambient air quality status with respect to the study zone of 10 km radial distance from the plant site will form the base line information over which the predicted impacts due to the proposed expansion plant can be super imposed to find out the net (Final) impacts on air environment.

The design of monitoring network in the air quality surveillance program has to be based on the following considerations.

- Meteorological conditions on synoptic scale.
- Topography of the study area.
- Representation of regional background levels.
- Representation of plant site.
- Representation of cross-sectional distribution in the downward direction.
- Influence of the existing sources if any, are to be kept at minimum.
- Inclusion of major distinct villages to collect the baseline status.

Ambient air quality monitoring is done to determine the general background concentration levels.

### **3.8.1 Selection of Sampling Locations**

The main sources of air pollution in the region are incinerator and DG set. The due consideration during the selection of sampling locations was given to the likely affected zones during construction and operation of the plant. The location of human habitation and other sensitive areas within the study area were also considered in selection of ambient air quality monitoring locations. Eight (8) numbers of monitoring stations were set up to assess the existing air quality of the study area. One station was located inside the proposed project site (core zone) and the seven others, outside (buffer zone) the proposed project site. The locations of the monitoring stations were based on the frequent wind directions in order to site the stations as close as feasible to the anticipated maximum pollutant deposition areas, moreover, duly considering human habitation and proximity to sensitive zones within the study area. Logistic considerations as ready accessibility, security, availability of reliable power supply etc. were examined

while finalizing the monitoring locations. The Ambient Air Quality Monitoring locations have been presented in Fig. 3.10.

### 3.8.2 Methodology

The baseline status of the ambient air quality has been assessed through a scientifically designed ambient air quality monitoring network. The design of monitoring network in the air quality surveillance program has been based on the following considerations:

- Meteorological conditions are synoptic scale
- Topography of the study area
- Representative of regional background air quality for obtaining baseline status
- Representatives of likely impact areas

Ambient Air Quality Monitoring (AAQM) stations were set up at eight locations with due consideration to the above-mentioned points.

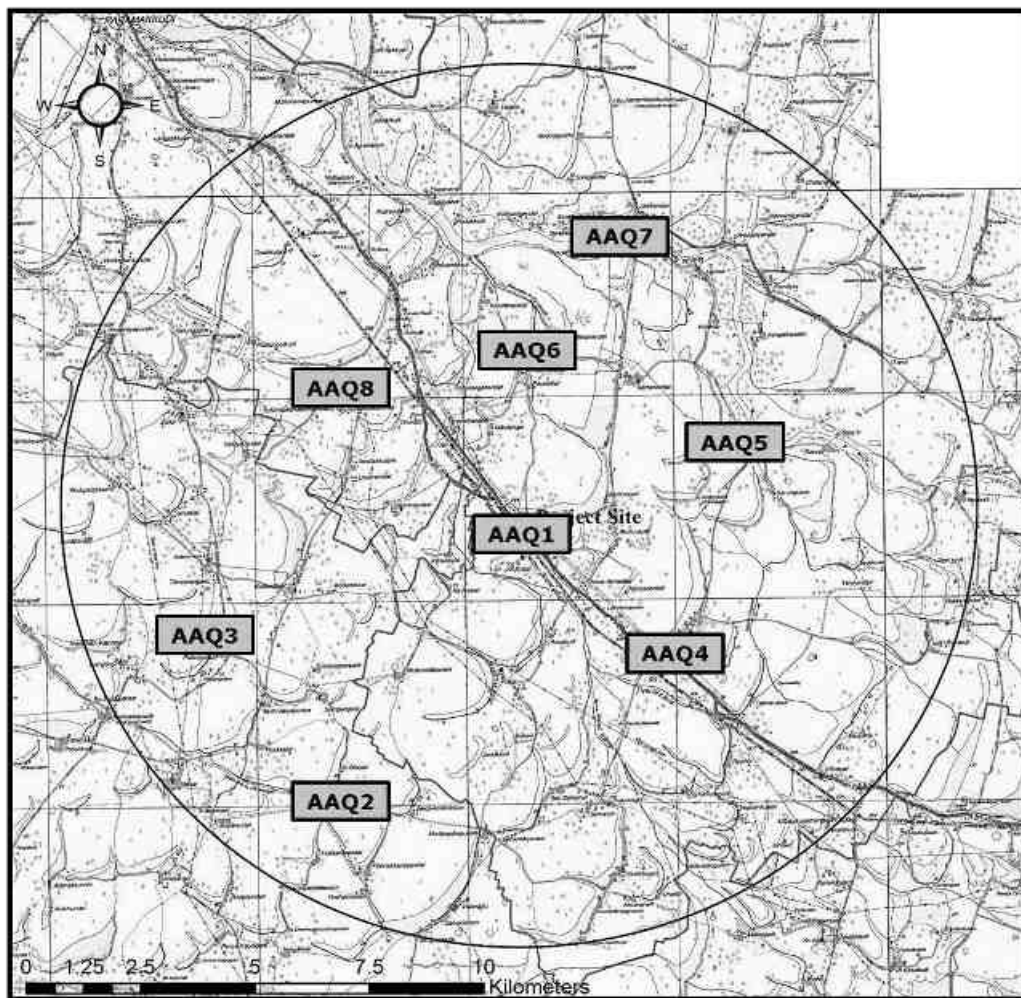


Fig. 3.10 Air Sampling Locations

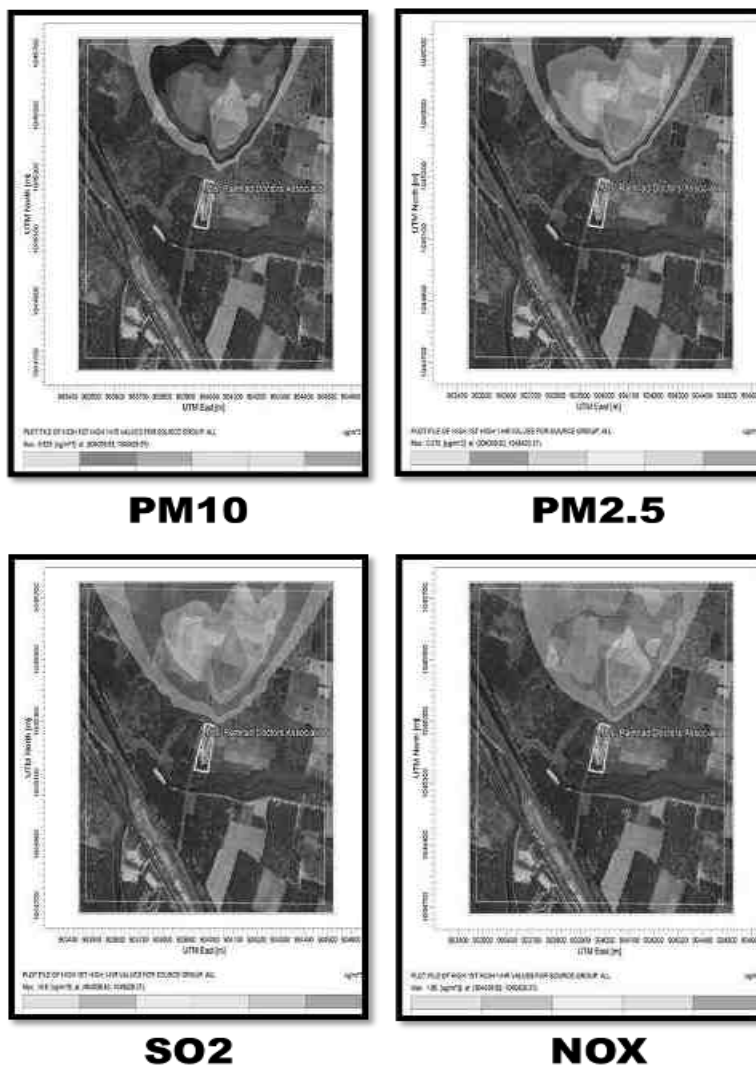
**Table 3.12 Air Monitoring Locations**

Code	Location	Latitude	Longitude	Distance (km)	Direction
AAQ1	Project Site	9°26'10.54"N	78°40'38.96"E	-	-
AAQ2	Ulaiyur	9°22'40.79"N	78°38'59.30"E	7.07	S
AAQ3	Palankulam	9°24'20.71"N	78°37'6.46"E	7.24	SW
AAQ4	Sathirakudi	9°24'20.10"N	78°42'9.39"E	4.26	SE
AAQ5	Posur	9°26'50.19"N	78°43'27.57"E	5.34	E
AAQ6	Keelakottai	9°27'43.12"N	78°42'1.58"E	3.79	NE
AAQ7	Manjakollai	9°29'24.31"N	78°41'59.37"E	6.52	N
AAQ8	Manjur	9°27'38.26"N	78°38'56.90"E	4.21	NW

**Table 3.13 Air Quality Results**

CODE	Locations	PM <sub>10</sub> , µg/m <sup>3</sup>				PM <sub>2.5</sub> , µg/m <sup>3</sup>				SO <sub>2</sub> , µg/m <sup>3</sup>				NO <sub>x</sub> , µg/m <sup>3</sup>			
		Min	Max	Avg.	98 per	Min	Max	Avg.	98 per	Min	Max	Avg.	98 per	Min	Max	Avg.	98 per
AAQ1	Project Site	17	28	22.5	27.4	8.85	11.9	13.83	11.7	2.1	3.2	2.65	3.14	1.05	1.6	1.33	1.57
AAQ2	Ulaiyur	25	39	32	38.2	11.45	14.2	12.83	13.9	3.7	5.3	4.50	5.19	1.85	2.65	2.25	2.60
AAQ3	Palankulam	21	36	28.5	35.2	7.90	10.5	9.2	10.3	1.3	2.9	2.10	2.84	0.65	1.45	1.05	1.42
AAQ4	Sathirakudi	30	41	35.5	40.1	11.65	15.2	13.43	14.9	2.4	3.1	2.75	3.04	1.2	1.55	1.38	1.52
AAQ5	Posur	19	30	24.5	29.4	9.15	11.5	10.33	11.3	1.8	3.4	2.60	3.33	0.9	1.7	1.30	1.67
AAQ6	Keelakottai	33	48	40.5	47.0	15.30	23.2	19.25	22.7	3.3	5.5	4.40	5.39	1.65	2.75	2.20	2.70
AAQ7	Manjakollai	22	35	28.5	34.3	9.35	11.6	10.48	11.4	1.7	3.2	2.45	3.14	0.85	1.6	1.23	1.57
AAQ8	Manjur	27	37	32	36.2	11.25	13.0	12.13	12.7	2.6	3.8	3.20	3.72	1.3	1.9	1.60	1.86
<b>NAAQ Standards</b>																	
<b>Industrial / Residential/ Rural and Other Area</b>		<b>100</b>				<b>60</b>				<b>80</b>				<b>80</b>			

## INCINERATOR



**Fig. 3.11 Isopleths of Various Pollutants from Incinerator**

The prime objective of the ambient air quality study is to assess the existing air quality of study area and to establish the existing ambient air quality within the study area and its conformity to NAAQS.

### **3.8.3 Interpretation of Air Quality Results**

#### **Particulate Matter (PM<sub>10</sub>)**

The study reveals that maximum concentration was observed to be 33 $\mu\text{g}/\text{m}^3$ . The highest 24-hourly concentration was recorded at Keelakottai location. The average concentration of PM<sub>10</sub> can be said to be ranged between 22.5 - 40.5  $\mu\text{g}/\text{m}^3$ . It should be noted that the concentration of PM<sub>10</sub> was not observed to be exceeding the standards prescribed by the CPCB.

### **Particulate Matter (PM<sub>2.5</sub>)**

The maximum of PM<sub>2.5</sub> (23.2 µg/m<sup>3</sup>) during the study period was recorded at Keelakottai, whereas the minimum value (7.9 µg/m<sup>3</sup>) concentration was recorded at Palankulam. The average concentration of PM<sub>2.5</sub> during the study period was computed to be in the range of 9.2 – 19.25 µg/m<sup>3</sup>.

### **Sulphur Dioxide (SO<sub>2</sub>)**

High level of SO<sub>x</sub> in ambient air indicates the presence of combustion of fossil fuel in the vicinity. The ambient air monitoring results indicate that the lowest concentration of SO<sub>2</sub> is experienced at Palankulam (1.3 µg/m<sup>3</sup>). The presence of working industries mainly brick kilns and fuel burning within village are the principle source of emission for SO<sub>x</sub>. The average concentration of SO<sub>x</sub> recorded during the study period ranged between 2.1-4.2 µg/m<sup>3</sup> respectively.

### **Oxides of Nitrogen (NO<sub>x</sub>)**

The various forms of Nitrogen in NO, NO<sub>2</sub> and N<sub>2</sub>O are collectively called as Oxides of Nitrogen. The highest value of NO<sub>x</sub> during the monitoring period was observed at Ulaiyur (1.85 µg/m<sup>3</sup>) while the minimum value was recorded at Palankulam (0.65 µg/m<sup>3</sup>). The average concentrations were in the range of 1.05-2.25 µg/m<sup>3</sup>.

## **3.9 Noise Quality**

Noise levels were recorded at 8 locations by Sound Level Meter in dB (A). Noise levels were recorded as per IS: 9989 entitled “Assessment of noise with respect to community response” methodology. Noise levels were recorded at approximately 1.5 meter above the ground level and about 3 m away from walls, buildings or other sound reflecting sources.

### **3.9.1 Methodology**

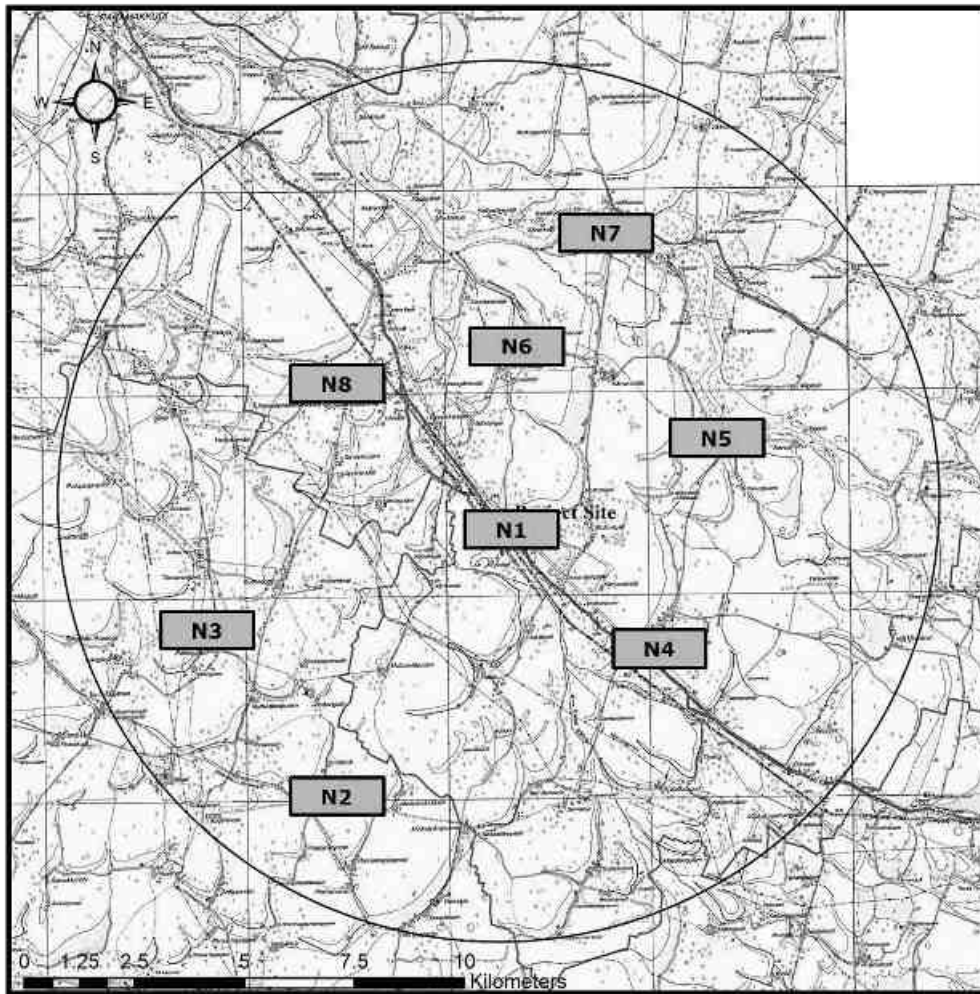
For noise measurement calibrated and integrated sound level meter manufactured by Lutron (SL-4001) was used. SLM was mounted on a tripod as per the standard methodology for noise measurements. Special care was taken for not making noises while observing the meter during the measurement and ensuring the least amount of reflective surface is exposed from our body to the meter. The measurements were carried out 1 m away from the sources and 1 m away from the edge of the roads. In order to reduce the disturbances from standing waves, the noise levels measurements were averaged over + 0.5 m each of at least three positions. The mean values were taken for reporting. Ambient noise levels were compared with National Ambient Air Quality Standards in respect of noise.

### 3.9.2 Equivalent Sound Pressure Level

The  $L_{eq}$  is the equivalent continuous sound level, which is equivalent to the same sound energy as the actual fluctuating sound measured in the same period. This is necessary because sound from noise source often fluctuates widely during a given period of time. This is calculated from the following equation,

$$L_{eq} = L_{50} + (L_{10} - L_{90}) / 2$$

$L_{day}$  is defined as the equivalent noise level measured over a period of time during day (6 am to 10 pm).  $L_{night}$  is defined as the equivalent noise level measured over a period of time during night (10 pm to 6 am).



**Fig. 3.12 Noise Sampling Locations**

**Table 3.14 Noise Quality Monitoring Locations**

Code	Location	Latitude	Longitude	Distance (km)	Direction
N1	Project Site	9°26'10.54"N	78°40'38.96"E	-	-
N2	Ulaiyur	9°22'40.79"N	78°38'59.30"E	7.07	S
N3	Palankulam	9°24'20.71"N	78°37'6.46"E	7.24	SW
N4	Sathirakudi	9°24'20.10"N	78°42'9.39"E	4.26	SE
N5	Posur	9°26'50.19"N	78°43'27.57"E	5.34	E
N6	Keelakottai	9°27'43.12"N	78°42'1.58"E	3.79	NE
N7	Manjakollai	9°29'24.31"N	78°41'59.37"E	6.52	N
N8	Manjur	9°27'38.26"N	78°38'56.90"E	4.21	NW

**Table 3.15 Noise Quality Results**

Code	Locations	Lmax dB(A)		Lmin dB(A)		Leq dB(A)	
		Day	Night	Day	Night	Day	Night
N1	Project Site	46.8	36.7	31.8	26.7	42.8	33.7
N2	Ulaiyur	31.8	24.6	21.5	13.8	25.6	16.4
N3	Palankulam	33.6	26.6	21.2	11.4	29.3	23.8
N4	Sathirakudi	32.8	25.4	18.2	11.8	28.6	21.4
N5	Posur	29.6	23.4	17.1	10.6	26.3	20.2
N6	Keelakottai	42.8	33.6	26.6	19.8	39.3	16.3
N7	Manjakollai	31.2	25.2	17.8	11.2	28.2	19.3
N8	Manjur	33.2	26.4	20.2	11.4	28.8	22.8

### 3.9.3 Interpretation of Noise Quality Results

#### Project Site

The ambient noise level at the project site during day is 42.8 dB (A) which is within the standard limit of industrial area 75 dB (A). During the night time, the noise level is 33.7 dB (A) which is also within the standard limit of industrial area 70 dB (A).

Noise impact will be well within the plant premises and immediate neighborhood say 100m radius. There are no inhabitants within 100 m hence the impact is not significant

#### Locations within 5km Radius (N4, N6, N8)

The ambient noise levels at the following locations during day time vary from 28.6 to 39.3 dB (A) which is within the standard limit of residential area 55 dB (A). During the night time, the noise level ranges from 16.3 to 22.8 dB (A) which is also within the standard limit of residential area 45 dB (A).

#### Locations above 10km Radius (N2, N3, N5, N7)

The ambient noise levels at the following locations during day time vary from 25.6 to 29.3 dB (A) which is within the standard limit of residential area 55 dB (A). During the night time, the noise level ranges from 16.4 to 23.8 dB (A) which is also within the standard limit of residential area 45 dB (A).

### **3.10 Water Quality**

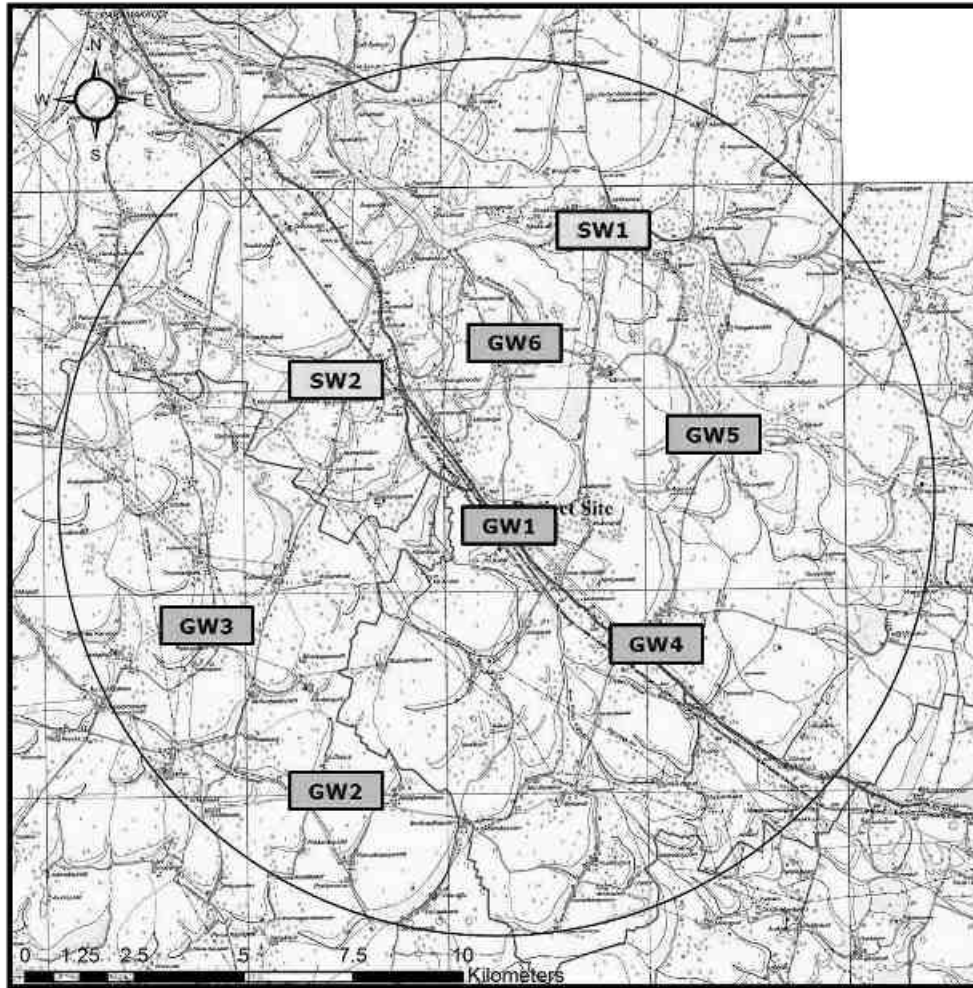
Water of high quality is essential to human life, and water of acceptable quality is essential for agricultural, industrial, domestic and commercial uses; in addition, most recreation is water based; therefore, major activities having potential effects on surface water are certain to be of appreciable concern to the consumers.

The hydrological environment is composed of two interrelated phases; groundwater and surface water. Impacts initiated in one phase eventually affect the other. For example, a groundwater system may charge one surface water system and later be recharged by another surface water system. The complete assessment of an impact dictates consideration of both ground water and surface water. Thus, pollution at one point in the system can be passed throughout, and consideration of only one phase does not characterize the entire problem.

#### **3.10.1 Methodology**

Water samples were collected from 8 locations. Samples were collected as per IS: 3025 (Part 1) methodology. Necessary precautions were taken while collecting, preserving and transporting. The parameters like pH, Turbidity, TDS etc., were measured at the site while collecting the sample. All the parameters were analyzed as per "Methods of Sampling and Test (Physical and Chemical) for water and waste water" IS: 3025 and 'Standard Methods for the Examination of Water and Wastewater' APHA. The results are then compared with the standards (IS: 10500 & IS: 2296) as per the quality of water. About 6 ground water and 2 surface water samples were collected from the study area to assess the water quality during the study period. The ground water samples were drawn from the hand pumps and open wells being used by the villagers for their domestic needs. Surface water sampling was carried out from Rivers/ Ponds present within 10 Km of the project site. The location of the ground water and surface sampling stations are shown in fig 3.13, and Table 3.16.





**Fig. 3.13 Water Sampling Locations**

**Table 3.16 Water Monitoring Locations**

Code	Location	Latitude	Longitude	Distance (km)	Direction
GW1	Project Site	9°26'10.54"N	78°40'38.96"E	-	-
GW2	Ulaiyur	9°22'40.79"N	78°38'59.30"E	7.07	S
GW3	Palankulam	9°24'20.71"N	78°37'6.46"E	7.24	SW
GW4	Sathirakudi	9°24'20.10"N	78°42'9.39"E	4.26	SE
GW5	Posur	9°26'50.19"N	78°43'27.57"E	5.34	E
GW6	Keelakottai	9°27'43.12"N	78°42'1.58"E	3.79	NE
SW1	Pond Near Majakollai	9°29'24.31"N	78°41'59.37"E	6.78	N
SW2	Vaigai River	9°27'38.26"N	78°38'56.90"E	4.71	NW

The results of the monitored data is in Table 3.17

**Table 3.17 Ground & Surface Water Quality Results**

Sl. No.	Parameters	Unit	GW1	GW2	GW3	GW4	GW5	GW6	SW1	SW2
1.	pH	-	7.5	7.2	7.5	7.5	7.1	7.6	7.3	7.1
2.	Colour (Visual)	-	Colour Less							
3.	Odour	-	Decent							
4.	Turbidity (NTU)	NTU	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
5.	Electrical conductivity	( $\mu$ S/Cm)	1114	1703	1206	1970	1348	1622	1611	2055
6.	Total alkalinity (CaCO <sub>3</sub> )	mg/L	216	190	164	290	164	290	208	184
7.	Total hardness (CaCO <sub>3</sub> )	mg/L	428	644	304	536	446	514	572	834
8.	Calcium (Ca)	mg/L	91	183	77.3	149	177	129	139	199
9.	Magnesium (Mg)	mg/L	61	65	21	58	49	65	79	94
10.	Iron (Fe)	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
11.	Sulphates (SO <sub>4</sub> )	mg/L	53	131	91.7	75	97	68	45	65
12.	Fluorides (F)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
13.	Nitrates (NO <sub>3</sub> )	mg/L	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
14.	Total dissolved solids	mg/L	724	1090	772	1300	876	1038	1047	1356
15.	Chloride as Cl	mg/L	51	127	102	138	117	105	25	16.6
16.	Dissolved Oxygen	mg/L	5.1	4.8	5.9	5.4	4.9	5.7	4.4	4.3
17.	BOD (3 days @ 27 °C)	mg/L	-	-	-	-	-	-	5.14	6.52
18.	COD	mg/L	-	-	-	-	-	-	15.0	26.0
19.	Total Coliform	MPN/100 ml	-	-	-	-	-	-	1300	1200
20.	Fecal Coliform	MPN/100 ml	-	-	-	-	-	-	900	800

**Inference of ground water monitored data:**

The quality of ground water is compared with IS 10500 – 2012 and the CPCBs designated Best use practices.

**3.11 Soil Quality**

It is essential to determine the potential of soil in the area and identify the impacts of urbanization and industrialization on soil quality. Accordingly, a study of assessment of the soil quality has been carried out.

The types of soils identified in Ramanathapuram District are Black Clayey soil, Sandy soil and Red –ferruginous soil. Soils in the area have been classified into i) Black Clayey soil, ii) Sandy soil and iii) Red –ferruginous soil. In Ramanathapuram district, majority of the area is covered by Black Clayey soil type. These soils are mostly black or black to brownish in colour and are found in parts of Ramanathapuram, Paramakudi, Kamuthi, Tiruvadanaï and Mudukulathur blocks. Sand occurs in flat elevation along the Rameshwaram and Kadaladi blocks and the alluvial soils occur along the river courses of Vaigai and Gundar river covering in the blocks Paramakudi, Tiruvadanaï and Muthukulayhur. The Red ferruginous soil of the Chettinad plains occur as few pockets around Paramakudi and Tiruvadanaï blocks.

The soil in the study area is appears to be derived from granitic gneisses and sedimentary formations interpreted with occasional patches of fragile quartz and pegmatite.

**Red sandy loamy soil at BMW Plant site**



**Black clayey soil in the vicinity of Plant site**



The soils range from red sandy loams to red clay loam, and black sandy gravelly to black clay cover. The soil cover is very thin along the ridges and higher elevations, and relatively thick in slopes and valley portions. The soils in low lying areas are thin gravelly and underlain with a murrum zone containing highly weathered rock. The soils are highly leached and rich in bases. The water holding capacity is low to moderate in these

soils. On the other hand, the soils under the old channel areas are high in clay. The infiltration

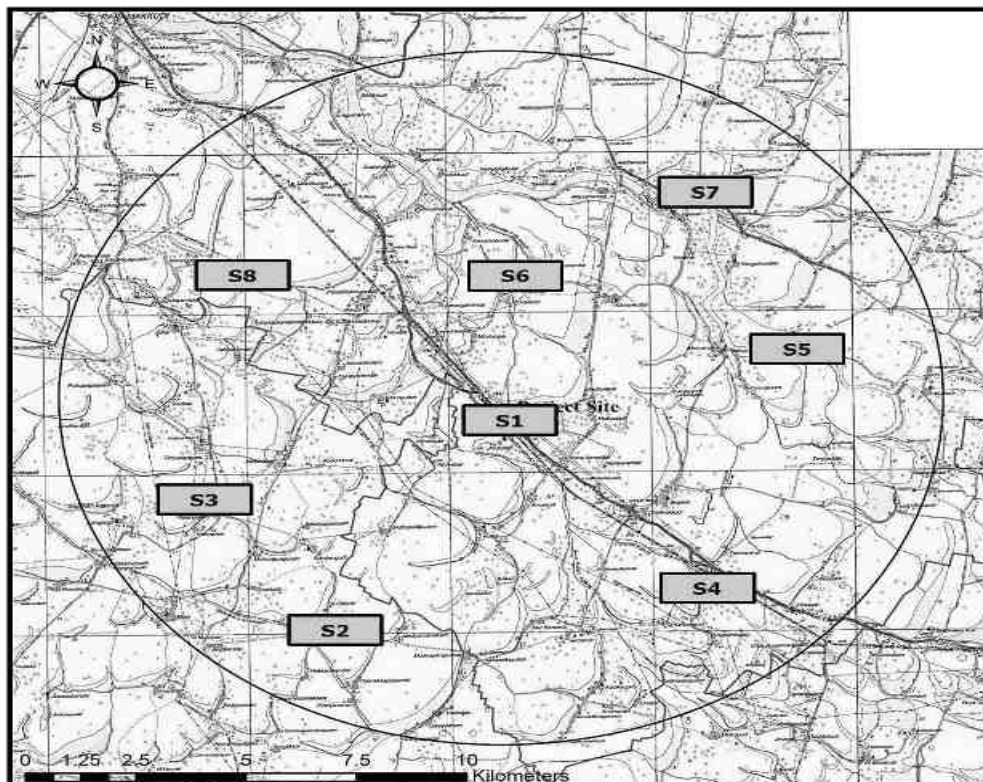
### **3.11.1 Methodology**

For studying soil profile of the region, sampling location was selected to assess the existing soil condition in and around the plant representing various land use conditions. The physical, chemical and heavy metal concentrations were determined. The samples were collected by ramming a core-cutter into the soil up to a depth of 90 cm. Simultaneously, in-situ infiltration test using double ring infiltrometer was carried out at all location to determine the permeability. The present study on the soil profile establishes the baseline characteristics and identifies the incremental concentrations if any, due to the existing and proposed activities.

The sampling locations have been identified with the following objectives:

- To determine the baseline soil characteristics of the study area;
- To determine the impact on soil more importantly from agricultural productivity point of view.

Eight locations within 10 km radius of the plant site were selected for soil sampling. At each location, soil samples were collected from three different depths viz. 30 cm, 60 cm, and 90 cm below the surface and homogenized. The homogenized samples were taken during April – June 2022 to identify soil conditions. The location of the soil monitored stations is shown in Fig. 3.14 and Table 3.18 and Soil Quality Results Table 3.19



**Fig. 3.14 Soil Sampling Locations**

**Table 3.18 Soil Monitoring Stations and Results**

Code	Location	Latitude	Longitude	Distance (km)	Direction
S1	Project Site	9°26'10.54"N	78°40'38.96"E	-	-
S2	Ulaiyur	9°22'40.79"N	78°38'59.30"E	7.07	S
S3	Palankulam	9°24'20.71"N	78°37'6.46"E	7.24	SW
S4	Sathirakudi	9°24'20.10"N	78°42'9.39"E	4.26	SE
S5	Posur	9°26'50.19"N	78°43'27.57"E	5.34	E
S6	Poovalathur	9°27'38.30"N	78°40'42.06"E	2.69	N
S7	Valasai	9°28'58.73"N	78°42'54.59"E	6.64	NE
S8	Kalaiyur	9°28'22.30"N	78°36'52.14"E	8.01	NW

PARAMETERS		SAMPLING LOCATIONS							
		S1	S2	S3	S4	S5	S6	S7	S8
pH		6.3	6.9	6.8	6.3	6.7	6.8	6.7	6.5
EC Decisiements / mmhos / cm		19.0	13.0	11.0	12.0	13.0	9.0	16.0	8.0
Macro	N	313.8	266.9	244.6	311.4	237.2	217.5	299	219.9

<b>Nutrient (Kg/Hec.)</b>	<b>P</b>	14.6	15.1	11.6	17.1	13.6	11.4	18	13.3
	<b>K</b>	113.7	122.6	96.4	133.4	153.2	121.1	168	148.3
<b>Micro Nutrient Ppm</b>	<b>Zn</b>	1.3	1.2	0.8	1.2	1.0	0.8	1.2	1.0
	<b>Cu</b>	1.0	1.4	0.9	1.3	1.0	0.9	1.3	1.3
	<b>Mn</b>	1.8	1.6	1.5	2.2	1.9	1.8	3.3	1.0
	<b>Fe</b>	3.4	3.1	2.7	2.5	2.8	2.6	2.1	1.8
<b>Natural Moisture Content (%)</b>		1.4	5.6	0.90	1.1	0.8	1.7	3.7	2.7
<b>Grain Size Distribution</b>									
<b>Gravel (%)</b>		1	-	2	-	-	1	-	1
<b>Sand (%)</b>		31	32	23	26	37	21	24	33
<b>Slit (%)</b>		48	42	42	46	39	45	50	47
<b>Clay (%)</b>		20	26	33	28	24	33	26	19
<b>Textural Class</b>		Silty Loam	Silty Clay Loam	Sandy Silty Loam	Silty Loam	Sandy Silty	Sandy Loam	Silty	Silty Loam

Table 3.19 Soil Results at different levels in the project site

PARAMETERS		DEPTH OF THE SOIL		
		Top Soil	Soil at 30cm	Soil at 60cm
pH		6.3	6.2	6.3
EC Decisiements / mmhos / cm		19	21	17
<b>Macro Nutrient (Kg/Hec.)</b>	<b>N</b>	313.8	315.6	312.4
	<b>P</b>	14.6	14.2	14.5
	<b>K</b>	113.7	114.1	113.3
<b>Micro Nutrient Ppm</b>	<b>Zn</b>	1.3	1.27	1.38
	<b>Cu</b>	1	1.1	1.3
	<b>Mn</b>	1.8	1.91	1.84
	<b>Fe</b>	3.4	3.2	3.6
<b>Natural Moisture Content (%)</b>		1.4	1.5	1.7
<b>Organic Carbon (%)</b>		0.53	0.52	0.48
<b>Grain Size Distribution</b>				
<b>Gravel (%)</b>		1	1	1

<b>Sand (%)</b>	31	29	32
<b>Slit (%)</b>	48	49	44
<b>Clay (%)</b>	20	21	23

### 3.12 BIOLOGICAL ENVIRONMENT

A habitat or an area comprises of different kinds of plants and animals within its boundary. The distribution of flora and fauna in the given area represents the biological environment. The biological portion of the environment includes, what is present in the study area, its values, and its responses to impacts description of community uniqueness, the dominant species, and an evaluation of rare or endangered species. Natural vegetation is mostly a barren land and the bio-diversity of the area is low. Species diversity and food web index of the surrounding area will be negligible. However, the proposed proper re-vegetation techniques and development of green belt, the impact on the terrestrial environment will be nominal. The unit has to earmarked more than 33% of total area of for developing the Greenbelt as per the existing Environmental Quality Policy of the Company. The proposed Green Belt will have significant long-term impact during the Operation Phase.

#### 3.12.1 Ecological Survey

An ecological survey of the study area was conducted particularly with reference to recording the existing biological resources. The objectives of the survey were intended to:

- Generate baseline data from field observations from various terrestrial ecosystems,
- Collect secondary data from Government records,
- Compare the data so generated with authentic past records to understand changes,
- Understand the impact of the proposed activity on vegetational structure in the site.

To accomplish the above objectives, a general ecological survey covering an area of 10 km radius area was conducted. The locations were identified for phyto-sociological aspects to assess the current status. Phyto-sociological studies were carried out by using least count quadrat method. Trees species were surveyed by taking quadrates of 100 m x 100 m distributed randomly. Shrub species were surveyed by taking quadrates of 10m x 10 m. Herb species were surveyed by taking quadrates of 1m x 1m. The data obtained was further used to estimate Relative Dominance, Relative Density (RD), Relative Frequency (RF) and Importance Value Index (IVI) as per the formula.

Faunal survey covers the Terrestrial Fauna, Avian Fauna and Aquatic Fauna. The survey was based on Personal observation, enquiry with local population and Records available. This survey will include identification of endangered and rare species as per Red Book.

### **3.12.2 Flora and Fauna**

#### **Survey Methodology**

An ecological survey of the study area was conducted particularly with reference to recording the existing biological resources. The objectives of the survey were intended to:

- Generate baseline data from field observations from various terrestrial ecosystems,
- Collect secondary data from Government records,
- Compare the data so generated with authentic past records to understand changes,
- Understand the impact of the proposed activity on vegetational structure in the site.

To accomplish the above objectives, a general ecological survey covering an area of 10 km radius area was conducted. The locations were identified for phyto-sociological aspects to assess the current status. Phyto-sociological studies were carried out by using least count quadrat method. Trees species were surveyed to accomplish the above objectives, a general ecological survey covering an area of 10 km radius area was conducted.

The locations were identified for phyto-sociological aspects to assess the current status. Phyto-sociological studies were carried out by using least count quadrat method. Trees species were surveyed by taking quadrates of 100 m x 100 m distributed randomly. Shrub species were surveyed by taking quadrates of 10 m x 10 m. Herb species were surveyed by taking quadrates of 1 m x 1 m. The data obtained was further used to estimate Relative Dominance, Relative Density (RD), Relative Frequency (RF) and Importance Value Index (IVI) as per the formula.

Faunal survey covers the Terrestrial Fauna, Avian Fauna and Aquatic Fauna. The survey was based on Personal observation, enquiry with local population and Records available. This survey will include identification of endangered and rare species as per Red Book.

The flora and fauna studies were carried out in the entire study area of 10 km radius around the proposed site. The diversified plant genera distributed in this area. The



natural vegetation of the study area had more population with variety of species. Many varieties of plant species were growing naturally. The overall aerial and close observations lead to the conclusion that the diversity of plant species was more in the buffer zone.

### 3.12.2.1 Flora

The Study of flora involved intensive sample survey of vegetation in the project site and other locations applying standard methods (e.g., Greig-Smith 1983, Caustan 1988). To examine the trees and shrubs, quadrats of 25 x 25 m and for herbs 2 x 2 m were laid. In each of the larger quadrats (i) Species (ii) their number, and (iii) Girth at Breast Height (GBH), were measured. (Chaturvedi and Khanna, 1982). The species of vegetation found in each station were identified and listed according to their families, both in dicotyledons and monocotyledons of the plant kingdom. The plant species were classified as per the classifications of “Bentham and Hooker” and identified by using Gambles book on “Flora of Madras Presidency” and Mathew’s book on “Flora of the Tamil Nadu Carnatic”.

**Table 3.20 List of Flora in the Study Area**

Sl. No.	Scientific Name	Vernacular Name (Tamil)	Family	IUCN Status
<b>TREES</b>				
1	<i>Azadiracta indica</i>	Veppamaram	Meliaceae	LC
2	<i>Annona squamosa</i>	Sitapalam Maram	Annonaceae	NE
3	<i>Cocus nucifera</i>	Thennai	Arecaceae	NE
4	<i>Acacia nilotica</i>	Karuvela maram	Febaceae	LC
5	<i>Acacia auriculoformis</i>	Kaththi Savukku	Febaceae	NE
6	<i>Prosopis juliflora</i>	Velikaruvai	Febaceae	LC
7	<i>Acacia leucophloea</i>	Velvelam	Febaceae	NE
8	<i>Ficus religiosa</i>	Bothimaram	Moraceae	NE
9	<i>Mangifera indica</i>	Mamaram	Anacardiaceae	DD
10	<i>Psidium guajava L</i>	Koiyya	Myrtaceae	NE
11	<i>Tamarindus indica</i>	Puliyamaram	Febaceae	LC
12	<i>Syzygium cumini</i>	Navva Pazham	Myrtaceae	NE
13	<i>Borassus flabilifer. L</i>	Panaimaram	Arecaceae	NE
14	<i>Ziziphus mauritiana</i>	Elenthai	Rhamnaceae	NE
15	<i>Cassurina equistifolia</i>	Savukku Maram	Casuarinaceae	NE
16	<i>Phoenix pusilla</i>	Eecham	Arecaceae	NE
17	<i>Phyllanthus emblica</i>	Nelli	Phyllanthaceae	NE

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18	<i>Ailanthus excelsa</i>	Perumaram	Simaroubaceae	NE
19	<i>Anogeissus latifolia</i>	Vellai Nagai	Combrataceae	NE
20	<i>Anacardium occidentale L</i>	Mundhirimaram	Anacardiaceae	NE
21	<i>Thespesia populnea</i>	Poovarasa Maram	Malvaceae	NE
22	<i>Malikara zapota</i>	Sappotta	Sapotaceae	NE
23	<i>Pithecellobium dulce</i>	Kodukapuli	Fabaceae	G5 (Common)
24	<i>Aegle marmelos</i>	Vilva Maram	Rutaceae	NE
25	<i>Ficus bengalensis</i>	Alamaram	Moraceae	NE
26	<i>Ficus religiosa</i>	Arasamaram	Moraceae	NE
27	<i>Ficus hispida</i>	Pei-attho	Moraceae	NE
<b>HERBS</b>				
1	<i>Senna auriculata</i>	Avaarai	Fabaceae	NE
2	<i>Solanum torvum</i>	Sundaikai	Solanaceae	NE
3	<i>Ocimum tenuiflorum</i>	Thulasi	Lamiaceae	NE
4	<i>Carrisa spinarum</i>	Kalakai	Apocynaceae	NE
5	<i>Solanum trilobatum</i>	Thoodhuvalai	Solanaceae	NE
6	<i>Crisus quadrangularis</i>	Pirandai	Vitaceae	NE
7	<i>Ipomea carnea</i>	Kattamanakku	Convolvulaceae	NE
8	<i>Croton bonplandianus</i>	Reil Poondu	Euphorbiaceae	NE
9	<i>Calatropis gigantean</i>	Erukkan Chedi	Apocynaceae	NE
<b>SHRUBS</b>				
1	<i>Jasminum unguifolium</i>	Kattu Malli	Oleaceae	NE
2	<i>Parthenium hysterophorus</i>	Famine Weed	Asteraceae	NE
3	<i>Phoenix pusilla</i>	Eecham	Arecaceae	NE
4	<i>Jatropha gossypifolia</i>	Kattu Amanakku	Euphorbiaceae	NE
5	<i>Crotalaria verrucosa</i>	Salangaichedi	Leguminosae	NE
6	<i>Canthium coromandelicum</i>	Karai Chedi	Rubiaceae	NE
<b>CREEPERS</b>				
1	<i>Gloriosa superba</i>	Kallapai Kilangu	Colchicaceae	LC
2	<i>Abrus precatorius</i>	Kundumani	Leguminosae	NE
3	<i>Clitoria ternatea</i>	Asian Pigeonwings	Fabaceae	NE
4	<i>Mimosa pudica</i>	Thottal Chiningi	Fabaceae	LC
5	<i>Diplocyclos palmatus</i>	Aivirali	Cucurbitaceae	NE
6	<i>Asparagus racemosus</i>	Thannir Vittan	Asparagaceae	NE

7	<i>Hemidesmus indicus</i>	Nannari	Apocynaceae	NE
<b>GRASSES</b>				
1	<i>Chloris montana</i>	-	Poaceae	NE
2	<i>Aristida setacea</i>	-	Poaceae	NE
3	<i>Digitaria bicornis</i>	Kuttai Pul	Poaceae	NE
4	<i>Heteropogan contortus</i>	-	Poaceae	NE

**Source: DFO**

### 3.12.2.2 Fauna

Both direct and indirect observation methods were used to survey the fauna. Visual encounter (search) method was employed to record vertebrate species. Additionally, survey of relevant literature was also done to consolidate the list of vertebrate fauna distributed in the area (Smith 1933-43, Ali and Ripley 1983, Daniel 1983, Prater 1993, Murthy and Chandrasekhar 1988). Since birds may be considered as indicators for monitoring and understanding human impacts on ecological systems (Lawton, 1996) attempt was made to gather quantitative data on the group.

**Point Survey Method:** Observations were made in each site for 15 minutes duration.

**Road Side Counts:** The observer traveled from site to site, all sightings were recorded (this was done both in the day and night time). An index of abundance of each species was also established.

**Pellet and Track Counts:** All possible animal tracks and pellets were identified and recorded (South Wood, 1978).

Based on the Wildlife Protection Act, 1972 (WPA 1972, Anonymous 1991, Upadhyay 1995, Chaturvedi and Chaturvedi 1996) species were short-listed as Schedule II or I and considered herein as endangered species.

**Table 3.21 List of Fauna in the Study Area**

S. No	Scientific Name	Vernacular Name (Tamil)	Family	IUCN Status
<b>MAMMALS</b>				
1	<i>Bandicota bengalensis</i>	Sind Rice Rat	Muridae	LC
2	<i>Cynopterus shinx</i>	Short-nosed Fruit Bat	Pteropodidae	LC
3	<i>Funambulus palmaram</i>	Squirrel	Sciuridae	LC
4	<i>Herpestes edwardii</i>	Mongoose	Herpestidae	LC
5	<i>Rattus norvigicus</i>	Field Mouse	Muridae	LC
6	<i>Rattus rattus</i>	House Rat	Muridae	LC

<b>REPTILES</b>				
1	<i>Chameleo zeylanicus</i>	Indian Chameleon	Chameleonidae	LC
2	<i>Ptyas mucosa</i>	Rat Snake	Clubridae	LC
3	<i>Eutropis macularia</i>	Aranai	Scincidae	LC
4	<i>Calotes versicolor</i>	Common Garden Lizard	Agamidae	NA
5	<i>Naja naja</i>	Indian Cobra	Elapidae	LC
<b>AMPHIBIANS</b>				
1	<i>Bufo melanostictus</i>	Toad	Bufoidea	LC
2	<i>Hyla arborea</i>	Tree Frog	Hylidae	LC
3	<i>Rana cyanophlyctis</i>	Frog	Bufoidea	LC
4	<i>Haplobatrachus tigerinus</i>	Bull Frog	Bufoidea	LC
5	<i>Rana hexadactyla</i>	Common Frog	Dicroglossinae	LC
6	<i>Bufo bufo</i>	Toad	Bufoidea	LC
<b>BIRDS</b>				
1	<i>Tachybaptus ruficollis</i>	Little Grebe	Podicipedidae	LC
2	<i>Francolinus pondicerianus</i>	Kowdhari	Phasianidae	LC
3	<i>Eudynamis scolopaceus</i>	Asian Koel	Cuculidae	LC
4	<i>Phalacrocorax niger</i>	Little Cormorant	Phalacrocoracidae	LC
5	<i>Ardeola grayii</i>	Paddy Bird	Ardeidae	LC
6	<i>Ardea alba</i>	Large Egret	Ardeidae	LC
7	<i>Haliastur indus</i>	Brahminy Kite	Accipitridae	LC
8	<i>Ardea cinerea</i>	Grey Heron	Ardeidae	LC
9	<i>Mirafra erythroptera</i>	Vaanambadi	Alaudidae	LC

Source: DFO

### 3.13 TERRESTRIAL ECOLOGY

The site is proposed in a remote dry agricultural and predominantly barren lands covered with some thorny bushes in patches. There is no tree cutting or removal of plantations is anticipated. There is no forest land is involved. There is no Wild Life Sanctuary or National Park or Biosphere or Hotspots within the study area of 10 km.

### 3.14 SOCIO ECONOMIC ENVIRONMENT

Industrial development and consequent economic development should lead to improvement of environment through better living and greater social awareness. On the other hand, the proposed project is likely to have several benefits like improvement in indirect employment generation and economic growth of the area, by way of improved infrastructure facilities and better socio-economic conditions. Better hygienic conditions,

as Bio medical waste with solid waste being dumped at several places will be brought to one place for further treatment and scientific disposal.

### Scenario of Covid Biomedical Waste Generated

India generated 56,898 tonnes of Covid-19 Biomedical waste between June 2020 and June 2021, data from the Union ministry of environment, forest and climate change shows.

The waste burden correlates to some extent to infections. Maharashtra generated the maximum at 8,317 tonnes, followed by Kerala (6,442), Gujarat (5,004), Tamil Nadu (4,835), Delhi (3,995), Uttar Pradesh (3,881) and Karnataka (3,133)

<b>HIGH BURDEN</b>	
<b>STATE</b>	<b>WASTE</b>
Maharashtra	<b>8,317</b>
Kerala	<b>6,442</b>
Gujarat	<b>5,004</b>
Tamil Nadu	<b>4,835</b>
Delhi	<b>3,995</b>
Uttar Pradesh	<b>3,881</b>
Karnataka	<b>3,133</b>

From June 2020-June 2021 | Figures in tonnes | Source: Union ministry of environment forest and climate change

To track Covid bio-medical waste (BMW) and ensure safe disposal, the Ministry had developed Covid BMW, an app.

### BIOMEDIAL WASTE GENERATION IN TAMIL NADU

<b>Total no. of health care facilities / occupiers</b>	26597
Bedded Hospitals and Nursing Homes (bedded)	7601
Clinics, dispensaries	10537
Veterinary Institutions	1625
Animal Houses	24
Pathological Laboratories	2046
Blood banks	46
Clinical Establishment	4636

Research Institutions	13
Ayush	69
<b>Total No. of Beds</b>	<b>5848</b>
Quantity of Bio-medical waste Generation (in kg/day)	45215,93 Including Covid-19 BMW -9716
Bio-medical waste generation by Bedded hospitals (in kg/day)	37627.43
Bio-medical waste generation by non-bedded hospitals (in kg/day)	7588.5
<b>Total quantity of waste generated</b>	
Number of Bio-Medical Waste Treatment Facilities in Operation	10 are in operation
Total bio-medical waste treated in kg/day	45215

Source Note: Annual Report 2021, Tamil Nadu Pollution Board

### 3.14.1 Socio Economic survey and over view:

The assessment of socio-economic environment forms an integral part of an EIA study. Socio-Economic status of the population is an indicator for the development of the region. Any developmental project of any magnitude will have a bearing on the living conditions and on the economic base of population in particular and the region as a whole. Similarly, the proposed project site will have its share of socio-economic influence in the study area. The section delineates the overall appraisal of society relevant attributes. The data collection for evaluation of impact of proposed project site on socio-economic aspects in in the study area has been done through primary household survey and through the analysis of secondary data available for study area.



### 3.14.2 Methodology

The methodology adopted in assessment of socio-economic condition is as given below;

- ❖ To assess socio-economic conditions of the Population.
- ❖ Analysis of the identified social attributes like population distribution, availability of public utilities etc., through Census of India 2011.
- ❖ Primary household survey to assess the present status of population of the study area.

### 3.14.3 Socio-Economic Survey

In order to assess and evaluate the likely impacts arising out of any developmental project on socio-economic environment, it is necessary to measure the apprehensions of the people in the project area. Socio-economic survey serves as an effective tool for fulfilling this requirement. The nearby villages were identified for socio-economic survey. The lists of villages are as given in Table 3.22. Sarpanch of each village and respondents (adult's male and female) were chosen for collection of awareness and

opinion, by using random sampling/ focused group discussion, method representing various socio-economic sections of the community.

The impact of development projects occurs in different forms, among the people interviewed 50% of the people accepted the project, 30% were unaware of the project, 20% were against the project. Among the total People interviewed 75% were literates, there is no Habitat within 3km of project site. Uncultivated land around the project for many years.

### 3.22 Field Survey Report

Sl. No	Survey Villages	No. of People Interviewed		Total	% age
		Male	Female		
1	Keelakottai	4	2	6	15.79
2	Ariyakudi	3	2	5	13.17
3	Bogalur	2	1	3	7.89
4	Manjakollai	2	1	3	7.89
5	Manjur	2	2	4	10.53
6	Kalaiyur	2	1	3	7.89
7	Sathirakudi	2	2	4	10.53
8	Thabal Chavadi	2	2	4	10.53
9	Kilambali	2	1	3	7.89
10	Kumukotte	2	1	3	7.89
<b>TOTAL</b>		23	15	38	100.00

#### 3.14.14 Sources of Information

As per the scope of this study, the information on socio-economic aspects has been gathered and compiled from several secondary sources. These include Taluk Office, Collectorate, Agriculture Department, Irrigation Department, Central Ground Water Board, Directorate of Census Operation, Tamil Nadu etc. The demographic data has mainly been compiled from the Census of India 2011. The socio-economic details are briefly described in following sections. This section includes the present status of the socio-economic environment in the study area. To determine the baseline socio-economic pattern, at and around the project site, the required data have been obtained from the published data. Socio-economic base line data were collected for the following indicators:

- ❖ Demographic Structure
- ❖ Economic Structure
- ❖ Availability of Basic Amenities

The major demographic and economic structure of the study area are classified into population, literacy rate and workers details.



### 3.14.15 Demographic Structure

Ramanathapuram district is divided into 2 Revenue Divisions namely Ramanathapuram and Paramakudi. There are 9 Taluks, 4 Municipalities, 7 Town Panchayats, 11 Panchayat Unions and 429 Village Panchayats in this district. Raja Singa Mangalam Taluk is newly created in 2017. This district is having 4 legislative assembly constituencies and 1 Lok Sabha constituency.

Ramanathapuram district had a population of 13,53,445 as of Census 2011. The district was 30.34% urbanized and less urbanized than the State, urbanization of 48.40%. The district consists of 69.66% of the rural population. This district has the highest number of Muslims (as a percentage of total population) in the State followed by Vellore District. The religious composition of the district: Hindus - 80.41 percent; Muslims - 14.4 percent; Christians - 5.08 percent; and others - 0.11 percent. The district has a population density of 331 inhabitants. The district population density is lower than that of State, 555 in 2011 census. Its population growth rate over the decade 2001-2011 is 13.96% lower than the growth rate of State, 15.61% and nation 17.64% district has a sex ratio of 983 females for every 1000 males and child sex ratio of 961 girls for every 1000 boys in the age group 0 to 6 years as per Census 2011. Ramanathapuram district occupies a share of 1.88% of the total population of the State. Scheduled caste and scheduled tribe's population in the total population is 18.40% and 0.08% respectively.

**Table 3.23 Demographic Structure of the Ramanathapuram District**

Description	Unit	Figure
<b>POPULATION</b>		
Total Population	Nos.	13,53,445
Male Population	"	6,82,658
Female Population	"	6,70,787
Rural Population	"	9,42,746
Urban Population	"	4,10,699
Density	Nos./Sq. Km	330
Sex Ratio	For 1000 Males	983
Population Growth	%	13.96%
<b>LITERATES</b>		
<b>Total Literates</b>	<b>Nos.</b>	<b>9,78,946</b>
Male	"	5,36,487
Female	"	4,42,459
Total Literacy Rate	%	80.7%
Male Literacy Rate	%	78.59%
Female Literacy Rate	%	65.96

<b>HOUSEHOLDS</b>		
<b>Total Households</b>	<b>Nos.</b>	<b>3,23,905</b>
Urban Households	"	95,141
Rural Households	"	2,28,764
<b>Scheduled Caste Population</b>	<b>"</b>	<b>2,49,008</b>
Male	"	1,25,015
Female	"	1,23,993
<b>Scheduled Tribe Population</b>	<b>"</b>	<b>1,105</b>
Male	"	559
Female	"	546
<b>WORKERS</b>		
Total Workers	Nos.	6,02,977
Male Workers	"	3,92,751
Female Workers	"	2,10,226
<b>Main workers</b>	<b>Nos.</b>	<b>4,86,150</b>
Male	"	3,33,342
Female	"	1,58,808
<b>Cultivators</b>	<b>Nos.</b>	<b>1,73,767</b>
Male	"	1,02,635
Female	"	71,132
<b>Agricultural Labours</b>	<b>Nos.</b>	<b>1,53,874</b>
Male	"	78,181
Female	"	75,693
<b>Household Industries</b>	<b>Nos.</b>	<b>25,228</b>
Male	"	11,414
Female	"	13,814
<b>Other Workers</b>	<b>Nos.</b>	<b>2,50,108</b>
Male	"	2,00,521
Female	"	49,587
<b>Marginal Workers</b>	<b>Nos.</b>	<b>1,16,827</b>
Male	"	59,409
Female	"	57,418
<b>Non Workers</b>	<b>Nos.</b>	<b>7,50,468</b>
Male	"	2,89,907
Female	"	4,60,561

### 3.14.16 Infrastructure facility / public amenities

**Power** This region is all set to emerge as one of the top power producers in the State with the establishment of a 4000 MW thermal power plant in Kadaladi. Adani Green

Energy (Tamil Nadu) Ltd unveiled the World's largest solar power plant at a single location of 648 megawatts (MW) at Kamuthi, Ramanathapuram located at a distance of ...km from project site. The Tamil Nadu Generation and Distribution Corporation (TANGEDCO) have also started work for setting up a 1600 MW coal-based thermal power plant at Upper near Thiruvadana.

**Communications:** There are 300 post offices in the district. As per 2011 census, the percentage of people using mobile phones in the district was 66.07% and the percentage of people using land lines were 5.59%. All the major telecom service providers provide telephone and cellular phone services throughout the District.

**Roads:** Ramanathapuram town is in south east Tamil Nadu and connected by NH 49 to Madurai from Rameswaram. East Coast Road is the major coastal road in east Tamil Nadu which connects the state capital Chennai and Ramanathapuram; this road also connects Ramanathapuram with Pondicherry, Tuticorin and Kanyakumari. Ramanathapuram has a bus terminus. Mofussil buses, intra-city buses, Private Omni buses are available from major cities of Tamil Nadu. East coast road is very close to the proposed project site.

**Port:** Rameswaram Port is located 109 km from the project site in Rameswaram Island of Ramanathapuram District. Pamban Port is located at 60 Kms is an ancient Port in Ramanathapuram district, which connects East and West Coast of Indian Ocean borne via Pamban Channel (Pamban Pass).

**Railway Station:** Ramanathapuram district has 2 railway stations namely Ramanathapuram railway station located at a distance of 20 km from the project site and Rameswaram railway station is located at 70 km. The Rameswaram railway station links the pilgrim town as well as the rest of the Island to the mainland via the highly acclaimed Pamban Rail Bridge is well connected to the major cities of the Country via Express/Passenger Trains.

**Financial Institutions:** Ramanathapuram district is well served by a network of 209 banks. They include 88 nationalized banks, 21 Scheduled banks, 28 Grama banks, 58 Agricultural banks and 14 Mortgage banks.

### **3.14.17 Education**

Ramanathapuram district has 9,78,946 Nos. of total literates which of both male (536,487 Nos.) and female (4,42,459 Nos.). The total literacy rate of the district is 80.7%. The male and female literacy rates are 78.59% and 65.96% respectively. Higher educational institution details are as given in below Table 3.24.

**Table 3.24 Educational Institutions in Ramanathapuram District**

<b>Description</b>	<b>Institutions (Nos.)</b>
Government I.T.I	3
Teacher Training Schools	6
Self-Financing College of Engineering	3
Government Engineering College	1
Government College of Arts and Science	2
Self-Financing College of Arts & Science	7
District Institute of Education and Training	1
Government Music School	1

**Medical Facility:** Most of the villages having health facility in the form of Primary health Sub center.

**Drinking Water:** The water supply in the study area is through wells, tap water, hand pumps Tube well, river and canal sources. Source of Drinking Water is shown in subsequent sections.

### **3.14.18 Health**

Health of the people is not only a desirable goal, but it is also an essential investment of human resources. As per the National Health Policy (1983), Primary Health Care has been accepted as main instrument for achieving the goal of development and strengthening rural health infrastructure through a three-tier system, viz. sub - centre, primary health centre (PHC) and community health center (CHC), which have been established.

Lack of building, shortage of manpower and inadequate provision of drug supplies are hampering the operation of these units. The standards to be met according to National Health Policy are given below Table 3.25.

**Table 3.25 Standards According National Health Policy**

<b>Population</b>	<b>Infrastructure</b>	<b>Personnel</b>
3,000 – 5,000	1 Sub-Centre	1 ANM
25,000 – 30,000	1 PHC, 6 Beds	2 Medical Officers
1,00,000	Rural	Medical Superintend

**Table 3.26 BIOMEDIAL WASTE GENERATION IN RAMNATHAPURAM**

Total No. of Health Facilities being covered	332
Government Hospital	11
Public Healthcare Centre	54
Health Sub Centre	267
Total number of Beds covered	1339
Total Qty of Bio Medical Waste Collected Kg/day	180

Comparison of some major health indicators of Ramanathapuram with State data shows that the district has made notable strides. The overall population growth rate of the district was 13.96 percent, but in urban context the same illustrated about 35.82 percent, it was 5.5-fold higher than the rural population growth rate of 6.50 percent. Apart from birth and death, migration places an important role in population growth rate in urban areas.

Life expectancy at birth (LEB) indicates the health status of the people in the district. According to the State Human Development Report, 2003, LEB for Ramanathapuram was 63.19 years for male and 67.24 years for female which was lower than the State, 64.91 years and 68.85 years, respectively. Currently, the LEB of the district had increased to 71.2, 68.9 and 70.1 for female, male, overall, respectively during 2013-14. It shows the improvement in health sector and health seeking behavior of the population.

#### **3.14.19 Economic Attributes**

Economic resource base of any region mainly depends upon its economically active group i.e. the working population involved in productive work. Work may be defined as participation in any economically productive activity. Such participation may be physical or mental in nature. Work involves not only actual work but also effective supervision and direction of work. It also includes unpaid work on farm or in family enterprise.

There are different types of workers that may be classified as - Those persons who had worked for at least six months or 183 days are treated to be Main Workers, on the other hand if person categorized as worker has participated in any economic or productive activity for less than six months or 183 days during the last one year are treated as Marginal Workers and Non – Workers are those who have not worked any time at all in the year preceding the enumeration.

The workers coming under the main and marginal workers category are; cultivators, agricultural labors, live-stock, forestry, fishing, hunting, and plantations, orchards and allied activities, mining and quarrying, manufacturing, processing, servicing and repairs in household industry, construction trade and commerce, transport, storage and communication, other services. The summary of employment pattern in study area is as follows.

The total main workers of the District was 6,02,977 Nos. which includes of males (3,33,342 Nos.) and females (2,10,226 Nos.). Ramanathapuram people are working in various sectors such as Cultivators (1,73,767 Nos.), Agricultural Labours (1,53,874 Nos.), Household industries (25,228 Nos.), Other workers (2,50,108), Marginal workers (1,16,827 Nos.) and Non-workers (7,50,468).



### 3.14.20 Cultural and Aesthetic Attributes

Ramanathapuram district has some important historical places, attractive spots and religious centers. Some of the renowned temples are such as Ramanathaswamy Temple of Rameswaram, Pagampiriyal Temple at Thiruvettriyur, the Siva Temple at Thiru. Uthiragasamangai are in this District. The Ramanathaswamy Temple can be taken as one of the wonders as the corridor of this temple is 1220 Meters long which is considered to be the lengthiest corridor in this world. The world-famous Angkor-Thom-corridor of Vishnu Temple in Cambodia comes only second.

Ramanathapuram district is known as an important site for pilgrims, marine biosphere, and bridge over the marine area. Every year minimum 7.5 lakhs pilgrims and tourist visit Rameshwaram and other historic places of Ramanathapuram.

Tourism in Ramanathapuram is an emerging livelihood opportunity for villagers. Promoting tourism literacy and capacity building on the traditional, artisanal skill is the need of the hour. Important sites and monuments attracting tourist towards the districts are Dhanuskodi, Kurusadai Island, Ramanathapuram palace cum museum, Rameswaram, Seawater Aquarium, Mandapam and Pamban, Annai Indira Gandhi Bridge, Mela-Keela Selvanoor Bird Sanctuary and Chitrangudi Bird Sanctuary, Agni Theertham, Dr. A.P.J Abdul Kalam's memorial and Erwadi Darha.

**Table 3.27 List of Survey Villages around the project Site**

Sl. No	Survey Villages	Direction from Site	Distance in Km
1	Keelakottai	South East	1.5
2	Ariyakudi	South	4
3	Bogalur	East	11
4	Manjakollai	North	13
5	Manjur	North West	3
6	Kalaiyur	North West	10
7	Sathirakudi	North West	4
8	Thabal Chavadi	South East	1.5
9	Kilambali	South West	3.5
10	Kumukotte	North	3

**Table 3.28 Demographic Details of Villages**

Particulars	Total	Male	Female
<b>KEELAKOTTAI</b>			
Total No. of Houses	353	-	-
Population	1,390	693	697
Child (0-6)	137	58	79
Schedule Caste	613	299	314
Schedule Tribe	1	1	0
Literacy	77.49 %	87.87 %	66.83 %
Total Workers	821	429	392
Main Worker	547	-	-
Marginal Worker	274	142	132
<b>ARIYAKUDI</b>			
Total No. of Houses	676	-	-
Population	2,630	1,332	1,298
Child (0-6)	246	131	115
Schedule Caste	880	450	430

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Schedule Tribe	0	0	0
Literacy	73.36 %	83.10 %	63.48 %
Total Workers	1,672	866	806
Main Worker	1,183	-	-
Marginal Worker	489	221	268
<b>BOGALUR</b>			
Total No. of Houses	1,175	-	-
Population	5,402	2,794	2,608
Child (0-6)	524	274	250
Schedule Caste	2,124	1,067	1,057
Schedule Tribe	0	0	0
Literacy	82.04 %	89.84 %	73.71 %
Total Workers	2,521	1,626	895
Main Worker	2,139	-	-
Marginal Worker	382	163	219
<b>MANJAKOLLAI</b>			
Total No. of Houses	359	-	-
Population	1,368	688	680
Child (0-6)	113	61	52
Schedule Caste	567	286	281
Schedule Tribe	0	0	0
Literacy	73.71 %	85.49 %	61.94 %
Total Workers	456	382	74
Main Worker	444	-	-
Marginal Worker	12	7	5
<b>MANJUR</b>			
Total No. of Houses	603	-	-
Population	2,509	1,229	1,280
Child (0-6)	261	127	134
Schedule Caste	1,406	684	722
Schedule Tribe	0	0	0
Literacy	78.25 %	87.66 %	69.20 %
Total Workers	1,146	662	484
Main Worker	1,029	-	-
Marginal Worker	117	34	83
<b>KALAIYUR</b>			
Total No. of Houses	356	-	-
Population	1,406	712	694
Child (0-6)	117	61	56



Schedule Caste	1,022	520	502
Schedule Tribe	0	0	0
Literacy	65.94 %	73.58 %	58.15 %
Total Workers	902	481	421
Main Worker	882	-	-
Marginal Worker	20	11	9

### 3.15 BENEFITS FROM COMMON BIO MEDICAL WASTE TREATMENT FACILITY

The Bio-Medical Wastes Management Rules 2016 and its subsequent amendments under the aegis of Environment (Protection) Act, 1986, Also new guidelines for the Collection, transportation and treatment of waste generated from the treatment of patients of COVID -19 is in the service of a huge population. The hospitals are generating “Bio-Medical Wastes” that are incompatible with the environment. These wastes need professional attention for effective management as the infectious nature of the waste can cause irreparable damage to the human health and the environment. It has become imperative to monitor and control the management and handling of these wastes. Following benefits are associated with the project;

**i. Physical Infrastructure** The beneficial impact of proposed project on the civic amenities will be substantial after the commencement of project activities. The basic requirement of the community needs will be strengthened by extending healthcare to the community, building/strengthening of existing roads in the area which will help in uplifting the living standards of local communities.

**ii. Employment Opportunities** The project will create opportunities for employment. Skilled and unskilled manpower will be needed. The total 15 number of manpower will be required for this project. Secondary jobs are also bound to be generated to provide day-to-day needs and services to the work force. This will also temporarily increase the demand for essential daily utilities in the local market. Due to this proposed project, relevant to this project other job opportunities may generate which will improve the socio-economic status of the area. Neighboring villagers of the project will get its benefits more by giving preference to them in relation to direct employment associated with the various project activities. Construction and operation phase of the proposed project will involve a certain number of laborers, contractors and construction workers. Local people will be engaged for this purpose to the extent possible and hence improve the existing employment scenario of the region.

**iii. Improvements in the Social Infrastructure** Agriculture & plantation are one of the basic sectors of employment for the local people in this area. The project will lead to indirect and direct employment opportunity. Employment is expected during

construction and operation period, waste lifting and other ancillary services. A major part of this labour force will be mainly from local villagers who are expected to engage themselves both in agriculture and project activities. This will enhance their income and lead to overall economic growth of the area.

The following changes in socio-economic status are expected to take place with this project.

- The project is going to have positive impact on environment and quality of life as the scientific management of biomedical waste shall lead to prevention of spread of infective diseases.
- The project is going to bring improved income generation.
- Due to the corporate social responsible activities by project authorities, the socio economic condition of the people will be improved.
- People perceive that the project will in the long run help in the development of social infrastructures such as road for transportation,

#### **iv. Other Tangible Benefits**

- Facility to set up requisite biomedical waste treatment facilities on site or ensure requisite treatment of waste at a Common Biomedical Waste Treatment Facility (CBWTF).
- Improvement in communication, transport, education, community development and medical facilities.
- Overall change in employment and income opportunity.
- Tax Benefits to State and Central Govt.

a. The strengths and weaknesses of a system are determined by internal elements, whereas external forces dictate opportunities and threats. Strengths can be defined as any available resource that can be used to improve its performance. Weaknesses are flaws/ shortcomings of any system that may cause to lose a competitive advantage, efficiency or financial resources.

### **3.16 ENVIRONMENTAL COST AND BENEFIT ANALYSIS**

The proposed project will generate direct and indirect employment opportunities for the local people. The proposed project of setting up of the Common Bio-medical Waste Treatment Facility (CBMWTF) includes Incinerator, Autoclave, Shredder and Effluent Treatment Plant which will create employment including skilled as well as semi-skilled staff directly or indirectly. During Construction phase, the labors and workers will be hired from nearby villages. 15 Number of persons required during operation.

The common facility is essential for effective treatment and disposal of biomedical wastes generated in the State. As per the Biomedical Waste (Management & Handling) Rules 1998 and its subsequent amendments, it is mandatory for every hospital/ Health Care

The estimated cost of the project is Rs. 147 lakhs. The project is technically feasible and financially viable. All the financial indicators are satisfactory. Financial viability is dependent on the facility being patronized.

The organization will provide the helping hand in the development of the nearby villages by arranging regular medical checkup camp for the employees under CER/CSR activities.

### **Unregulated biomedical waste: A Threat**

Unregulated biomedical waste management (BMWM) is a public health problem. This has posed a grave threat to not only human health and safety but also to the environment for the current and future generations. Safe and reliable methods for handling of biomedical waste (BMW) are of paramount importance. Effective BMWM is not only a legal necessity but also a social responsibility.

This article reviews the current perspectives on BMWM and rules, conventions and the treatment technologies used worldwide. BMWM should ideally be the subject of a national strategy with dedicated infrastructure, cradle-to-grave legislation, competent regulatory authority and trained personnel. Improving the management of biomedical waste begins with waste minimization.

These standards, norms and rules on BMWM in a country regulate the disposal of various categories of BMW to ensure the safety of the health-care workers, patients, public and environment. Furthermore, developing models for the monitoring of hospital health-care waste practices and research into non-burn eco-friendly sustainable technologies, recycling and polyvinyl chloride-free devices will go in long way for safe carbon environment.

### **CONCLUSION:**

While significant benefits result for the society, the project area people may often bear the brunt of adverse impacts. This is now a growing concern over the needs to understand the impact, so that mitigation plan could be put in place in advance. In current project of upgradation of M/s. Ramnad Doctors Association Biomedical waste plant, the major benefit of the society will be in the form of disposal of infectious Biomedical waste i.e., City will become safe against the harmful infectious waste that can cause serious epidemic to the society along with the safe guard against the threat of BMW, various employment opportunities will be generated from implication of project like plant operator, drivers direct and indirect employment opportunities.

## CHAPTER IV ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

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### 4.0 DETAILS OF INVESTIGATED ENVIRONMENTAL IMPACTS DUE TO PROJECT LOCATION, POSSIBLE ACCIDENTS, PROJECT DESIGN, PROJECT CONSTRUCTION, REGULAR OPERATIONS, FINAL DECOMMISSIONING OR REHABILITATION OF COMPLETED PROJECT

#### 4.1 GENERAL

In this chapter, identification of environmental impacts and the proposed mitigation measures for the proposed CBMWTF. Generally, the environmental impacts can be categorized as either primary or secondary. Primary impacts are those, which are attributed directly to the project. Secondary impacts are those, which are indirectly induced and typically include the associated activity and changed patterns of social and economic activities by the proposed activities. The impacts have been identified based on the status of existing site conditions delineated based on the baseline environmental monitoring and possible change if any in the environmental attributes duly considering the control/mitigative measures incorporated in the project.

Prediction of impacts and mitigation measures is the most important component in the Environmental Impact Assessment studies. Several scientific techniques and methodologies are available to predict impacts of developmental activities on physical, ecological and socio-economic environments. Such predictions are superimposed over the baseline (pre-project) status of environmental quality to derive the ultimate (post-project) scenario of environmental conditions. The prediction of impacts helps to minimize the adverse impacts on environmental quality during pre and post project execution.

For the proposed project, the impact assessment is made in following steps;

- Identification of interactions between activities and environmental receptors.
- Identification of potentially significant environmental impacts.

Based on this preliminary identification, environmental indices that are likely to be impacted due to the project are:

- Land use / Land cover:** site preparation and construction/installation.
- Air quality:** Dust generation during construction/installation, vehicle movement, loading/unloading, operation of the CBMWTF, transportation and operation of Incinerator, DG set, APCS, etc.

- **Noise:** Vehicle movement during construction, operation of incinerator, DG set, APCS and operation of the facility in general
- **Water:** Disposal of waste water from construction activity/ labour operation of the facility / process, scrubbing of off gases from the incinerator, cleaning/washing of transport vehicles, washing of the storage area and sewage from the domestic use
- **Soil:** Excavation activity and chemical contamination. Impact on soil and ground water due to the deep burial of the BMW earlier by the facility.
- **Solid and hazardous waste:** Storage and handling of Chemicals, solid and hazardous waste.
- **Ecology and Biodiversity:** clearance of vegetation during construction and emission from operational activities
- **Socio – Economic:** positive impact due to creation of jobs and increase in indirect income.
- **Occupational health, community Health and safety:** Occupational risk during various activities associated with construction

#### 4.1.1 Identification & Characterization of Impacts

The wastes and pollutants generated due to various activities of the project cause impacts on different environmental attributes. The secondary impacts are quantified/rated using the following matrix with due consideration to SSPD i.e. Scale of Impact, Severity of Impact, Probability of occurrence of Impact and Duration of Impact. The purpose is to segregate the vital impacts from trivial ones to focus with additional attention for these vital impacts for suggesting mitigation measures.

#### 4.1.2 Criteria for determining significance of impact

Matrix for Identification and rating of impacts and Criteria for rating Scale, Severity, Probability and Duration are given in Table 4.1.

**Table 4.1 Matrix for Identification and rating of impacts (Template)**

IDENTIFICATION AND RATING OF ENVIRONMENTAL IMPACTS							
Sl. No	Activity	Cause/ Aspect	Impact				
			Scale 1 to 5	Severity 1 to 5	Probability 1 to 5	Duration 1 to 5	Significance Rating = S x S x P x D

Scale S	Rating
At the work area	1
Within premises	2
Outside Premises in 1 km radius	3
Outside Premises beyond 1 km & less than 5 km radius	4
Beyond 5 km radius	5

Severity S	Rating
Minor Injury requiring first aid	1
Injury requiring hospitalization	2
Temporary disability	3
Permanent disability	4
Loss of life/s	5

Probability of Occurrence P	Rating
Once a Year	1
Once a month	2
Once a week	3
Daily but intermittently	4
Continuous	5

Duration D	Rating
Less than 1 hour	1
Less than 4 hours	2
One day	3
More than a day	4
Few months	5

Significance is arrived at by multiplying the individual ratings assigned to Scale, Severity, Probability and Duration as the impact is interdependent on each of these parameters. Higher the number, higher is the significance, the significance rating varies from min 01 to max 625.

## LAND USE AND LAND COVER OF THE IDENTIFIED AREA

### Introduction

Land is a valuable natural resource utilized for cultivation of crops, settlements of population, creation of dams and reservoirs, development of industries and maintaining forests, and wildlife. Any kind of permanent (or) cyclic intervention of land is called as land use. It is the surface utilization of a vacant or developed land for a clear purpose, at a given time. The economic value (or) potentiality of a region depends upon the land use properties.

Land use is an emerging socio-economic activity wherein a region of one major specific purpose utility may be converted into another land for general purpose utility. A good agricultural land adjacent to a National Highway is converted into a Motel or Hotel (or) Fun Park is typical examples. Population explosion, demand for increased production of commodities, establishment of varieties of infrastructural facilities like road networks, airports, layouts, motels, hotels, flyovers, hospitals bridges and canals and such activities force people to sell their lands or use them for conversions.

Land use planning is a separate branch of study in geography, geology, town planning, architecture, forestry, agriculture, civil and environmental engineering, and development

studies. The utility value of a land depends on various geographic factors. The types of land use depend on the location, availability of water and soil, moisture soil, fertility or proximity to other human activities. A large number of land use types and categories have been worked out by various researchers of different disciplines. The classification of a land into its various uses and how these uses change over a period of time provide the background information needed for planning land resources. The basic level of categorization separates them into two major groups as:

- a) Urban Land use and
- b) Rural Land use

Land utilized for residential, commercial, industrial, institutional, transportation, communications and general utilities all belong to the Urban Land use categories. All other land not classified as urban, including agricultural land, farmland, cropland, rangeland and forest land belong to the Rural Land use categories, in general. Urban development is a major mission of every city of every developing nation in the world. There is an unprecedented increase and expansion of urban sprawls due to concentrated amenities and facilities in many major towns and cities.

#### **Classification of Land use:**

At Continental Levels, Land use classification is attempted based on the agro-climatic conditions, topography and soil types. Another major factor involved in this classification is the rainfall. Based on meteorological parameters, agro-meteorological regions are also classified for analyzing the rainfall intensities and drought. The pattern of land use of a country at any time is determined by its physical, economic and institutional framework.

In India, out of the total geographical area of 328.73 million hectares, land use statistics is available for roughly 305 million hectares, contributing 93% of the total land. Till 1950, land area was classified into five broad categories as;

- a) Forest Area
- b) Area not available for cultivation
- c) Permanent pastures and other grazing lands
- d) Land under miscellaneous tree crops
- e) Cultivable wasteland

Later with the lead role played by the Ministry of Food and Agriculture, and including Science and Technology, a nine-fold classification was introduced as;

- 1) Forestland

- 2) Land not available for cultivation
- 3) Non-agricultural uses
- 4) Barren and uncultivable
- 5) Other cultivated land
- 6) Permanent pastures and other grazing land
- 7) Miscellaneous Tree Crops and Groves
- 8) Cultivable wasteland
- 9) Fallow Land

Today, Urban Land use is broadly classified into the following classes;

1. BUILT-UP URBAN
  - a. Residential
  - b. Commercial
  - c. Industrial
  - d. Recreational
  - e. Public/Semi Public utility lands
2. RURAL BUILT-UP
3. RURAL -AGRICULTURAL
4. Vegetation-Forests & others
5. Transportation & Communication
6. Water bodies
7. Wastelands
8. Open spaces

### **Methodology**

The remote sensing application through satellite image interpretations, with its synoptic view and repetitively, is very helpful in order to cover large areas within a short time to characterize land use / land cover qualitatively. Remote Sensing is a powerful and accurate means of collecting data. The study of satellite imagery gives an excellent opportunity to monitor the quantitative extent of vegetation cover as well as qualitative changes due to changes in environment.

Land use land cover of the of the study area is derived through interpretation of satellite remote sensing image in digital environment using remote and GIS software Erdas Imaging (version 8.5). Satellite Image of the study area was downloaded from Indian Geo platform of Indian Space Research Organization (ISRO)/ National Remote Sensing Centre (NRSC) and U.S. Geological Survey web site USGS Earth Explorer ([www.earthexplorer.usgs.gov](http://www.earthexplorer.usgs.gov)) and then land use map was prepared. The following are the steps involved in preparation of Land use Land cover map. The optimal season and



latest cloud free data chosen for better discrimination of various land use types in the study area. Accordingly, satellite scene was selected on the ISRO (Bhuvan) and USGS website by giving the geographic coordinates of the project site and acquired the satellite image. The satellite image selected is from Cartosat-1 & Resourcesat-2 with Linear Image Self scanning Spectrum (LISS3) and Multispectral Instrument (MSI) sensor comprising of 13 spectral bands and spatial resolution ranging from 10 - 60m.

Ortho-rectified satellite image obtained from USGS website was cross-checked by overlaying on the geo-referenced Survey of India Toposheet for corrections. Geo-referencing was done using UTM projection system. Subset of the correctly geo-referenced satellite image was taken using circular vector layer of 10 km radius from the project site (developed using buffer function taking project site location as center point). The subset of the satellite image was subjected to image enhancement including band combinations before subject to classification for better understand of the land use/ land cover classes. Histogram stretching which is one of the image enhancement techniques applied to a 12-bit multispectral data. The digital classification technique has been used for the extraction of the land use/land cover information from the imagery.

For onscreen interpretation, the satellite data was displayed in standard false color composite (FCC) format by assigning blue, green and red color of the monitor to the green, red and near infra-red bands of satellite data respectively, in ordered to discriminate the land use features clearly. Other band combination was also used in discriminating the different land use / land cover classes. This enhanced FCC was used to identify the misclassified pixels and re-classify them into correct classes. Misclassified pixels were also identified through thorough ground truth. Ground truth has been done in the study area using handheld Garmin eTrex GPS for recording the coordinates of the different land use / land cover classes. These were used to improve the classified map.

Further, other ancillary data such as drainage pattern derived from Survey of India Toposheet and Transportation network & Settlements derived from Toposheet & satellite image were used to improve the land use / land cover classification of the study area. The classified output has a 'salt and pepper' appearance, because of the difference in reflectance value of each pixel. A low pass filter (5 x 5) was applied for smoothening of the output data and to minimize the 'salt and pepper' effect.

### **Results and Discussion**

The date of acquisition of the satellite image for the study area is 08<sup>th</sup> February 2022 with False Color Composite (FCC) mode. Drainage pattern of the study area was developed using Survey of India (SOI) Toposheet of the numbers 58K/10, 58K/11 and

58K/15 of the scale 1:50,000. Hard copy of Toposheet was procured from Survey of India (SOI) and the soft copy of the Toposheet was downloaded from Online maps Portal of Survey of India website (<https://onlinemaps.surveyofindia.gov.in>). The drainage pattern thus developed clearly shows that most of the drainage flows towards west and northwest direction and joining Vaigai River, which is flowing towards the northern portion of the study area (Map – 1).

#### **Land use Land cover classification**

Five different land use/land cover classes have been identified in the study area and the image was classified accordingly. Table 4.2 shows the information about the extent of identified land use/land cover classes thus derived from the satellite image in the study area and represented in Map - 3.

**Table 4.2**

#### **Classification of Land use/land cover within 10 km radius of the project site**

<b>Sl.No.</b>	<b>Land use/ Land cover class</b>	<b>Area (in Ha)</b>	<b>Area (%)</b>
1	Drainage Network & Water Body	10676.00	34.00
2	Transportation Network & Settlements	3925.00	12.50
3	Agriculture/ Cultivable land	11304.00	36.00
4	Agriculture Harvest	2041.00	6.50
5	Fallow land & Scrub Forest (Prosopis juliflora – Ballary Jaali)	3454.00	11.00
	<b>Total</b>	<b>31400.00</b>	<b>100</b>

Following are the land use land cover classes in the study area with descriptions of the each of the classes.

#### **A. Drainage Network & Water body**

This category comprises areas with surface water, in the form of streams, nallas, small lakes, ponds, river, reservoir etc. These are seen clearly on the satellite image in blue to dark blue or dark cyan color depending on the depth of the water level color of the water (clear/turbid etc.). Path of the drainage or stream flow can also be identified and interpreted through Topomaps and satellite images. The areas of drainage & water body were identified and mapped as water bodies. This class is spatially distributed by covering 10,676 Ha space with 34% to the total area.

#### **B. Transportation Network & Settlements**

This category comprises areas with habitations, hamlets, villages, towns, cities etc., in the form of cluster of buildings and infrastructure. The approach roads, village

access, district roads, state highways, national highways, railway line etc., are identified and coined as transportation network in the given are. These are seen clearly on the satellite image in light yellow to black depending on the type and extent of network and area of settlement. Path of the approach network or roads can also be identified and interpreted through Topo maps and satellite images. The area of transportation network & settlements is spatially distributed by covering 3,925 Ha space with 12.50% to the total area.

### **C. Agriculture/ Cultivable land**

This land use class is the dominant land use around the project site within 10 km radius. This category consists of paddy, sugarcane and cotton and other crops such as jowar, pulses and plantations of coconut, banana, papaya etc., in the study area. Agriculture fields and plantations were identified with bright red tone having definite structures in the satellite image. Hence, the agriculture category has occupied about the 11,304 Ha areas in the study area which is estimated about 36%.

### **D. Agriculture Harvest**

Agriculture harvest is the portion of agriculture but either it is harvested (in most of the cases it is paddy & sugarcane) or to be harvested (paddy, sugarcane or other crops) in the study area. Since they are harvested or about to harvest, they have started drying with brown leaves, which appears lighter bluish tone in the satellite image with proper boundaries. Hence, the agriculture harvest category has occupied about 2,041 Ha of the total portion in the study area, which can be estimated to be about 6.50%.

### **E. Fallow land & Scrub Forest**

This land cover category consists of scrub forests with majority of *Prosopis juliflora* (Ballary Jaali) and Euphorbiaceous thorny species in southern, eastern and western part of the of the project site. This land cover portion can be seen throughout the upper reaches and runoff zones. However, scrub forest & jaali can be seen adjacent to drainage pattern, nalla alignments etc. Out of total area, 3,454 Ha portion comes under this land use/land cover class and percentage wise it is around 11% of the total area.

### **Assessment of Impacts and measures**

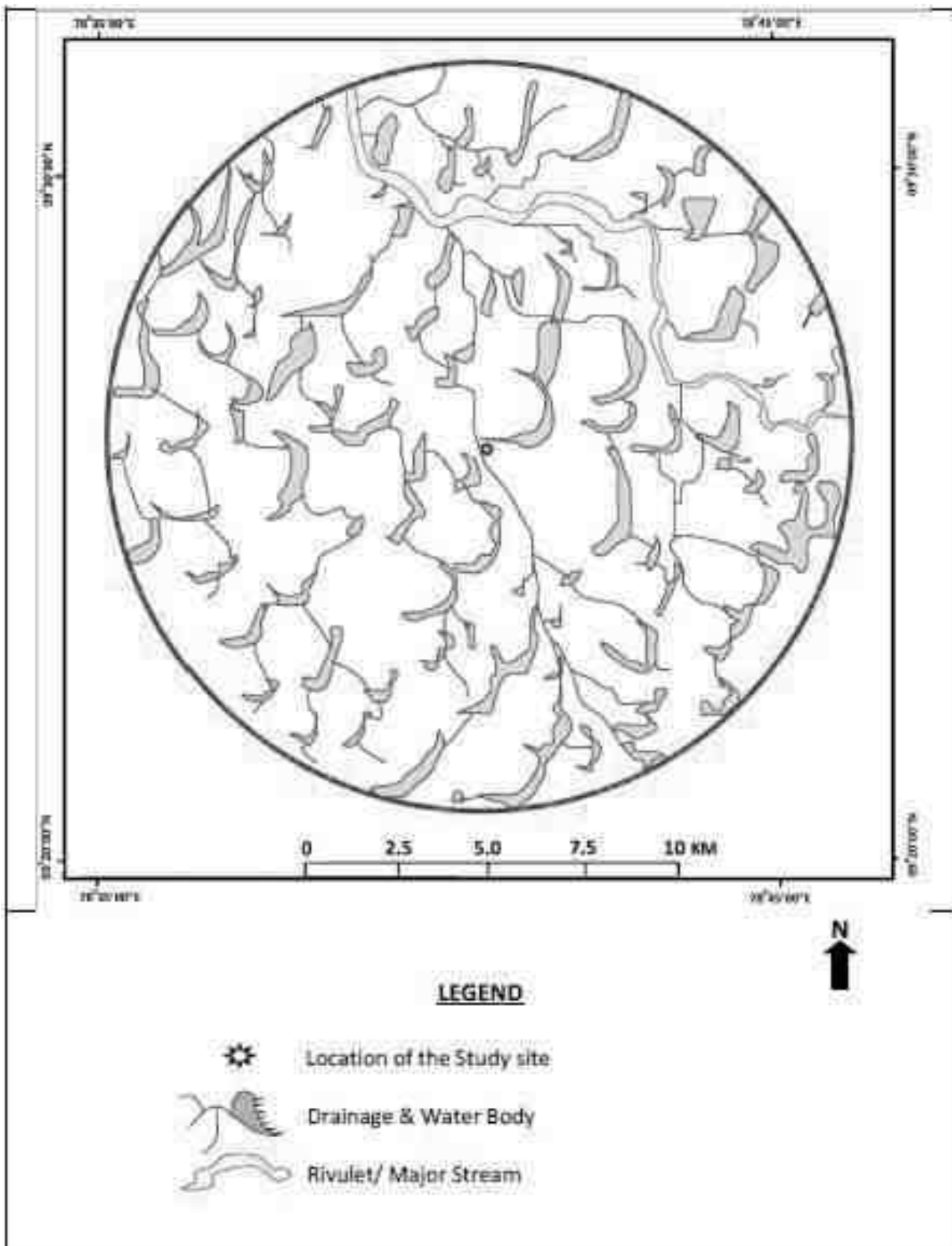
There are patches of thorny species provide good habitat for birds and other faunal species such as reptiles. Also, many of these thorny species are good larval and nectar host for many insects especially butterflies and bees, these in tern play an important role as pollinators.

## M/s. Ramnad Doctors Association – BMW Plant

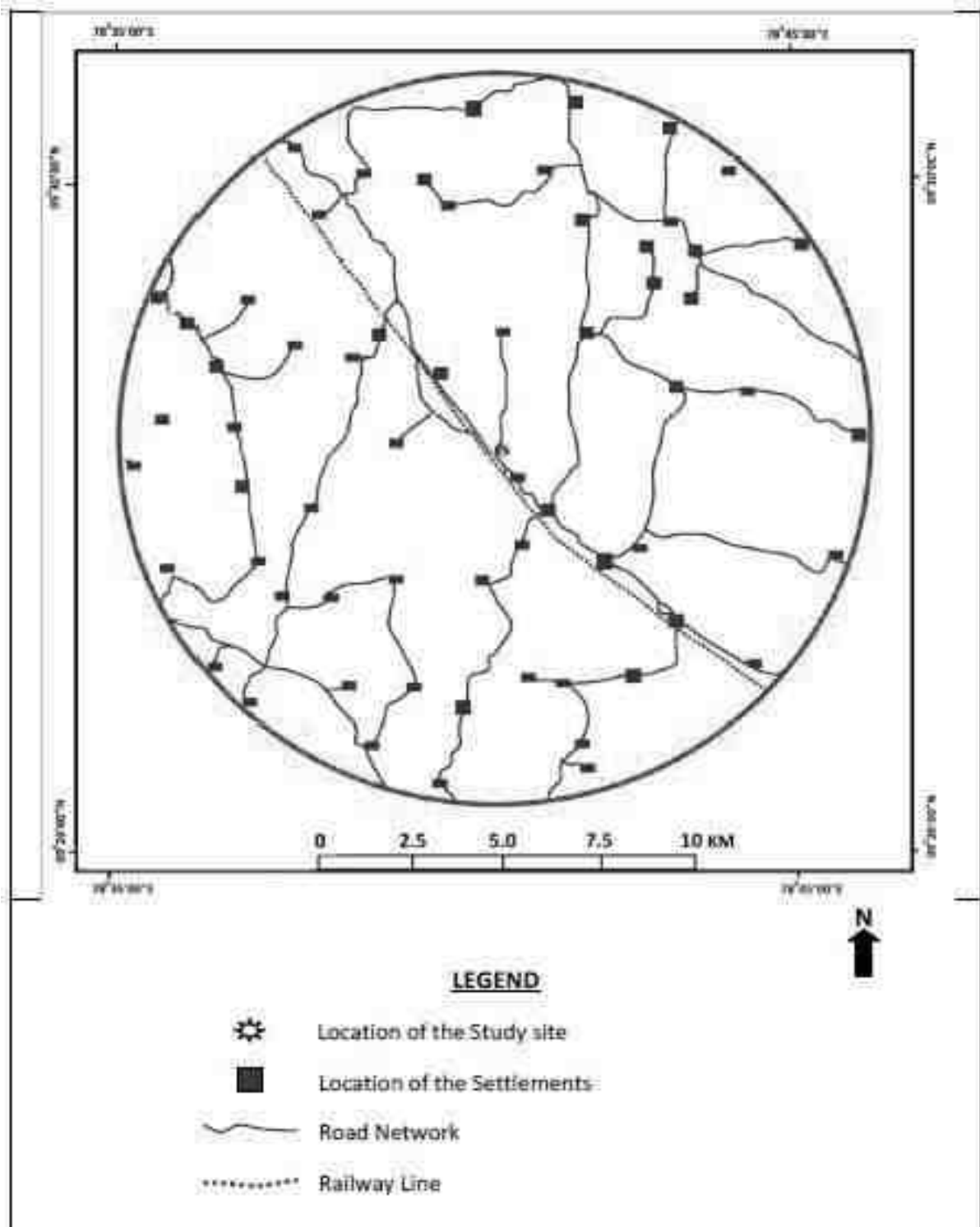
Expected disturbance from the BMW plant, such as escape of dust and gaseous pollutants, noise and any leakage of liquid and solid wastes will be avoided. Escape of dust from the plant will be prevented by strengthening the proposed system, which also helps to cut down the escape of noise from the industry which otherwise disturb the faunal species in the surrounding green cover.

The bountiful of lakes and water bodies which are receiving water through Vaigai River network are the major surface water sources in the region and provide water to all the agricultural activities in the region. These water bodies naturally encourage the important breeding pockets of many aquatic birds. The possible impacts such as leaching of wastes (both solid and liquid and organic as well as inorganic) generate in the premises of the BMW facilities to the river will be carefully monitored and avoided. Here, a proper will be taken to ensure the zero discharge and also suitable measures will be taken to avoid the escape of any possible leakage of chemicals to the stream and reaching the surface water bodies.

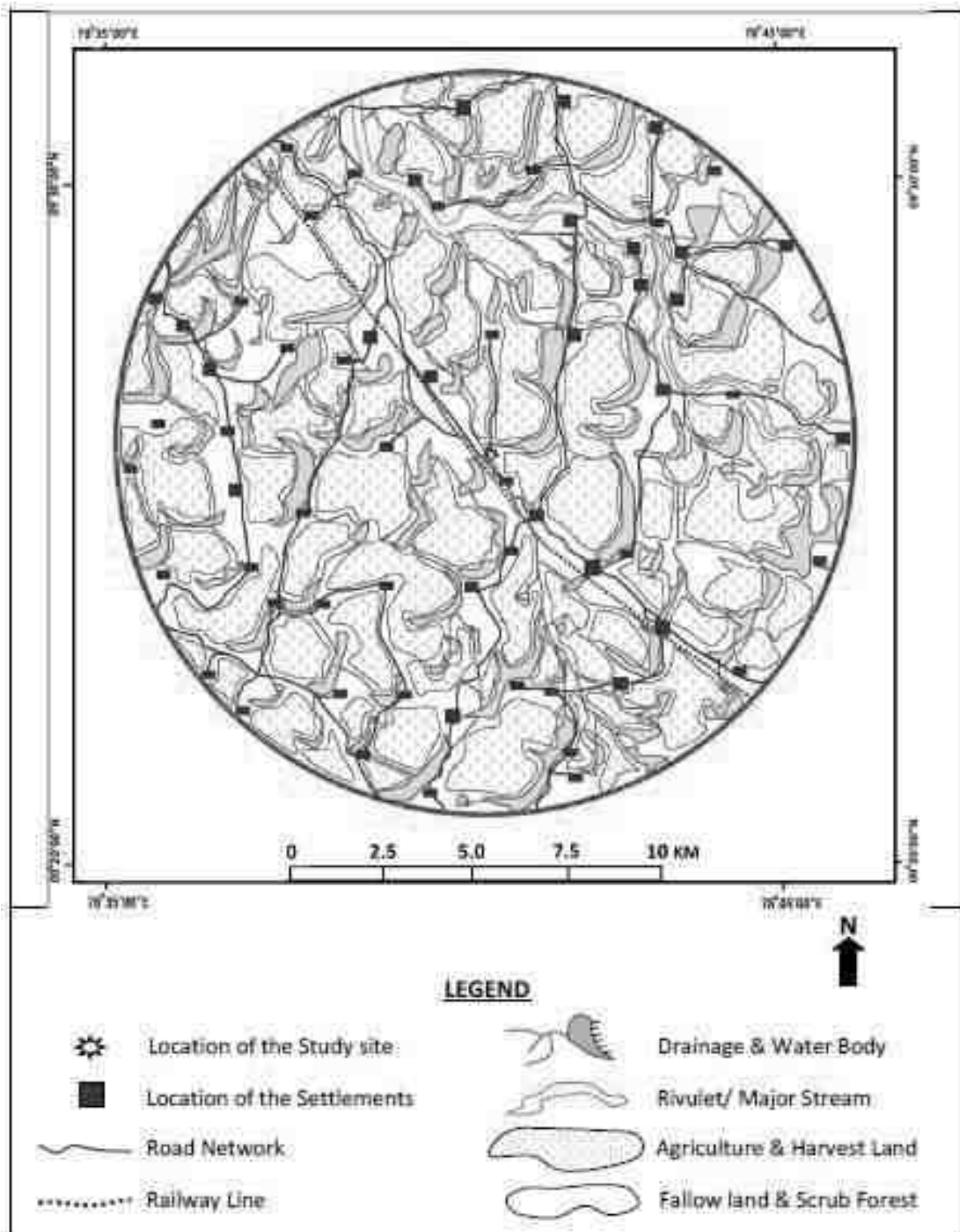
**MAP – 1**  
**DRAINAGE NETWORK & WATER BODY**



**MAP – 2**  
**TRANSPORTATION NETWORK & SETTLEMENTS**



### MAP – 3 LAND USE AND LAND COVER MAP



## 4.2 Identification & Characterization of Impacts

### 4.2.1 Construction Phase

#### 4.2.1.1 Site Preparation & Leveling

The site is fairly flat and there is no vegetation. There are two sheds housing an autoclave, shredder and hot water generator. The BMW sorting was also being done one of the buildings earlier. A separate DG set is also installed in a container. There is a security cum office building. These old buildings will be maintained

It is proposed to retain the old buildings for receipt and storage of the waste till the treatment and disposal. In the present proposal there will be an incinerator building, ETP and transport vehicle washing area.







**Aspects**

- Loss of green cover
- Increased PM/ dust
- Increased gaseous emissions
- Increased ambient noise

**Table 4.3 Impacts during Site Preparation, construction and erection of plant and machinery**

<b>Environmental Components</b>	<b>Aspect</b>	<b>Impact</b>	<b>Proposed Mitigation Measures</b>	<b>Significance</b>
Air Environment	Site preparation and foundation	Increased PM level and dust generation. May cause respiratory problems to the workers.	- Water sprinkling will be done to reduce the dust generation. -- Adequate PPE and nose masks will be provided to the workers	Construction activities for the project will be confined to the project site only for a short duration. Impact is not significant
Water Environment	The storm water management	- Storm water pollution due to runoff from the plant area carrying the pollutants and the leachate and joining the water	- Proper drainage for storm-water will be maintained. - At the lowest point before the discharge of storm water out side the premises a storm	Temporary impact and significant

M/s. Ramnad Doctors Association – BMW Plant

		body. - Surface water quality may deteriorate affecting aquatic life.	water tank is proposed it will act as an observation tank. The collected storm water to be used on land for greenbelt.	
Land Use		-	-	
Soil Environment	Foundation soil	Decrease in fertility of top soil.	- To store the top soil and to use it for basement filling and excess for green belt and levelling within the premises - The area where the deep burial is done should not be disturbed.	Insignificant
Socio-Economic		Positive impact	Employment to local people	Insignificance.
Ecology Biodiversity	Deposition of dust on leaves	- Increased PM due to construction activity will result in deposition of dust on leaves, which may cause decrease in Transpiration rate of flora.	- to use water sprinkling on the construction material.	Temporary and Insignificance
Noise & Vibration	Noise due to movement of construction and construction vehicles, compactors, compressors etc. Vibration of machineries. Erection of plant and machineries	Vibration affecting the operator and also may cause auditory impact. Noise and vibration may cause physiological and psychological effects on the operators like annoyance, headache, etc.	- To carry out the construction during the daytime only. Excavator deployed will have a closed cabin with vibration isolator. - Self compacting concrete will be used in place of consolidating the concrete by means of vibrators	Temporary and insignificance as the impact will be within the site area.

			<p>or hand consolidation due to which there will be minimal or negligible noise and vibration generation.</p> <p>-Proper barricading of the site will be done.</p> <p>Workers will be provided with ear plugs/muffs and other PPEs required for the construction workers.</p> <p>Vehicle movement will be regulated.</p>	
Solid and Hazardous Waste	Construction debries	- eye sore to the public	To be disposed for land filling of low laying area	

**4.2 Environmental attributes impact and mitigation measures during operation stage**

**A. Air environment**

There are three major categories of air pollution sources during operation phase as under:

1. Area source- from operation involving waste receipt, unloading, processing, storage of waste. The wind will carry odor generation and gases from project site
2. Point source- Emission of pollutants from incineration and DG set
3. Line source- Emission of smoke by vehicles arriving and leaving project site

**Impact-**

- Increase in baseline levels of parameters PM, SO<sub>2</sub>, NO<sub>x</sub>, CO, Total Dioxins, Total Furans etc.
- Odor nuisance due to storage of waste
- Emission of carcinogenic and toxic pollutants like total dioxin, total furans, Hg and its compounds,

**Mitigation measures- The project is designed to meet the following specification to mitigate the impact:**

- Odor from BMW from storage shed will be controlled by quick treatment and disposal of waste in incinerator, spraying suppressing non-toxic sprays
- The incinerator to be of specification mentioned in the Biomedical Waste (Management and Handling) Rules 2016. It shall have two chambers primary and

secondary with temperature  $800^{\circ}\text{C} \pm 50^{\circ}\text{C}$  in primary chamber and  $1050^{\circ}\text{C} \pm 500^{\circ}\text{C}$  secondary chamber and in secondary chamber gas residence time shall be min. 2 sec. to ensure complete combustion of total organic carbon content. Also to reduce the incineration ash and residue to less than 10% and their loss on ignition is less than 5% on dry weight

- Incinerator to be provided with a chimney of height 30 M AGL, wet scrubber and bag filter.
- Dioxin and furans emissions are controlled by reducing the flue gas temperature from  $1000^{\circ}\text{C}$  to  $< 200^{\circ}\text{C}$  by cooling by adopting rapid quench/spray dryer/catalyst/adsorption by activated carbon etc.,
- To control acidic emissions dry lime and activated carbon to be used. It will also take care of conversion of mercury in waste if present to mercury compounds which are less harmful
- Scrubber to be provided to control emissions to the standards prescribed in the EP Rules
- For DG set, 4 m ARL height chimney with acoustics is provided it shall be maintained
- Bio-medical waste transportation using vehicles having valid PUC and fitted with GPS.
- Ensure waste transportation through covered vehicles as specified in BWM Rules 2016 with label and GPS tracking of vehicle
- Use odor neutralizing sprays where necessary
- Develop green belt to contain the fugitive pollutants by trees with broad leaves

#### 4.2.1 Air pollution dispersion modeling studies

Dispersion models have been used to estimate or predict the downwind concentration of air pollutants emitted from sources. The models are typically employed to determine whether existing APC facilities are adequate to control or proposed new air pollution sources impact on the Ambient Air Quality to remain within the limits specified under National Ambient Air Quality Standards (NAAQS). Prediction of impacts on the air environment has been carried out using Lakes Environmental Software, Version 19191 and designed for multiple sources for predicting the maximum ground level concentration (GLC).

In this project the predicted GLC caused by incinerator is considered with following specifications given in Table 4.4 and isopleths are shown in Figure 4.1, Figure 4.2, Figure 4.3 & Figure 4.4

**Table 4.4 Data considered for AERMOD studies**

Sl. No.	Particular	Incinerator (500kg/h)- Proposed
1	Stack height(m)	30

M/s. Ramnad Doctors Association – BMW Plant

2	Stack Diameter(m)	0.4
3	Velocity of gas(m/s)	6.5
4	Exit gas temperature( <sup>o</sup> C)	70
5	PM Emissions, g/s	0.103
6	SO <sub>2</sub> Emissions, g/s	0.4
7	NOx Emissions, g/s	0.8

Meteorological data obtained from Lakes Environment has been used for computations. The hourly meteorological data is pre- processed using U.S. EPA AERMET program software.

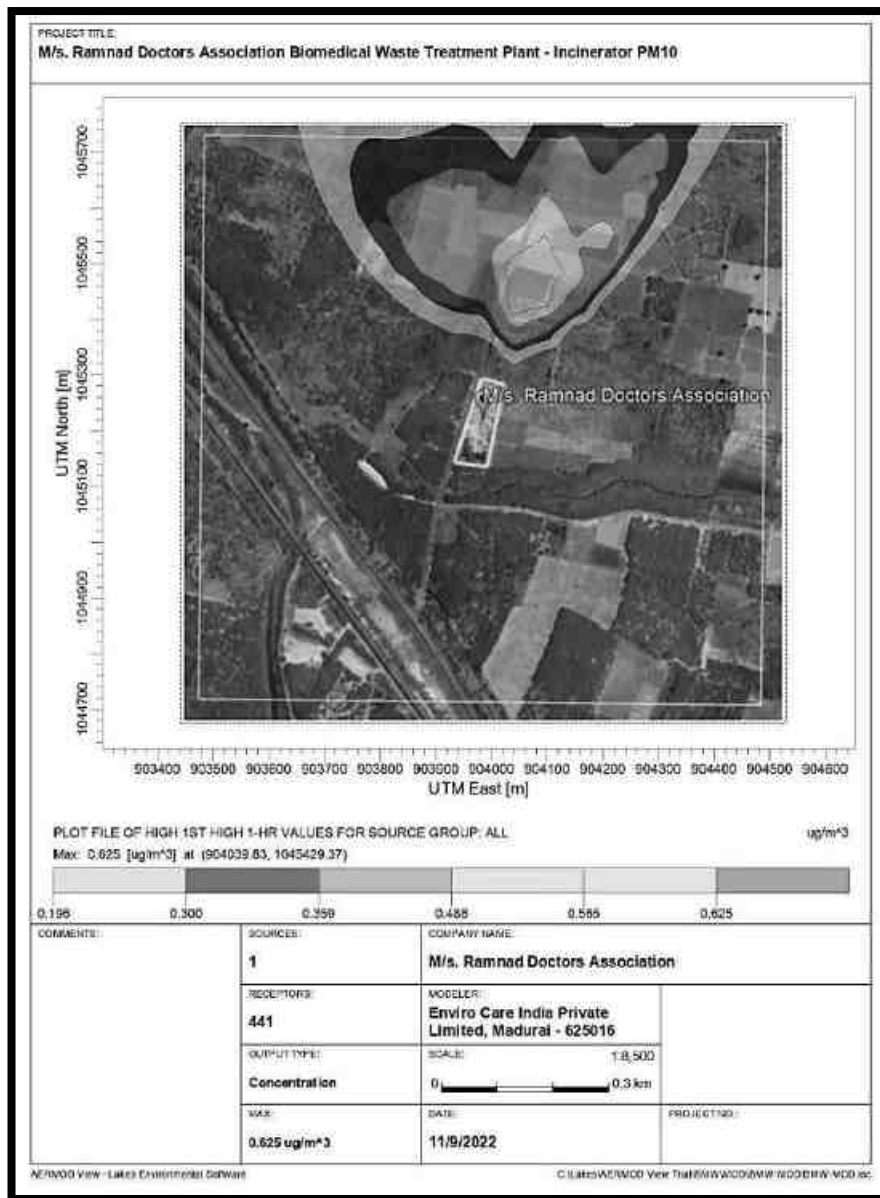
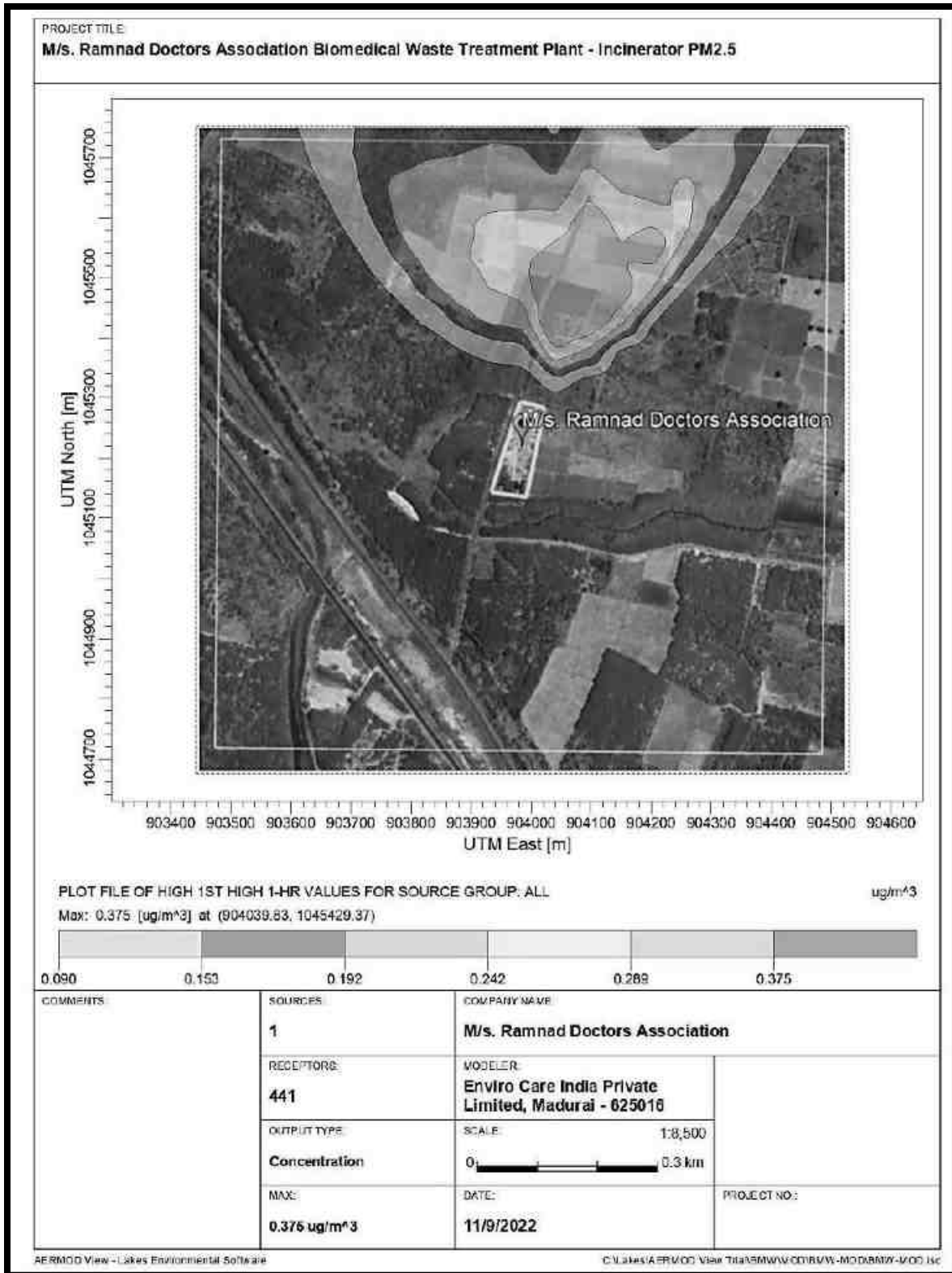


Figure 4.1 - Predicted 24- hourly average GLCs of PM<sub>10</sub> (μg/m<sup>3</sup>) at 10 km radius



**Figure 4.2: Predicted 24- hourly average GLCs of PM<sub>2.5</sub> (µg/m<sup>3</sup>) at 10 km radius**

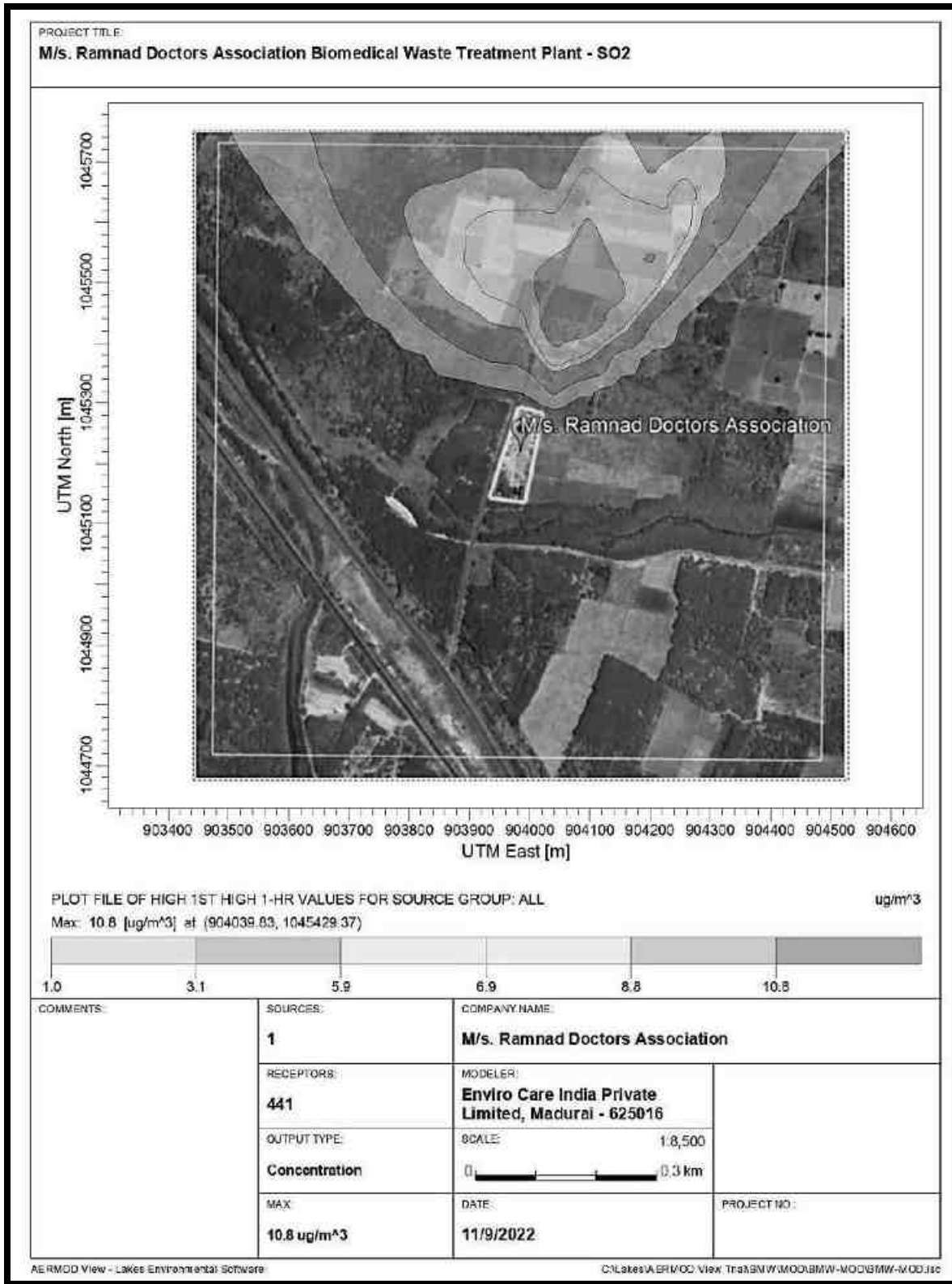
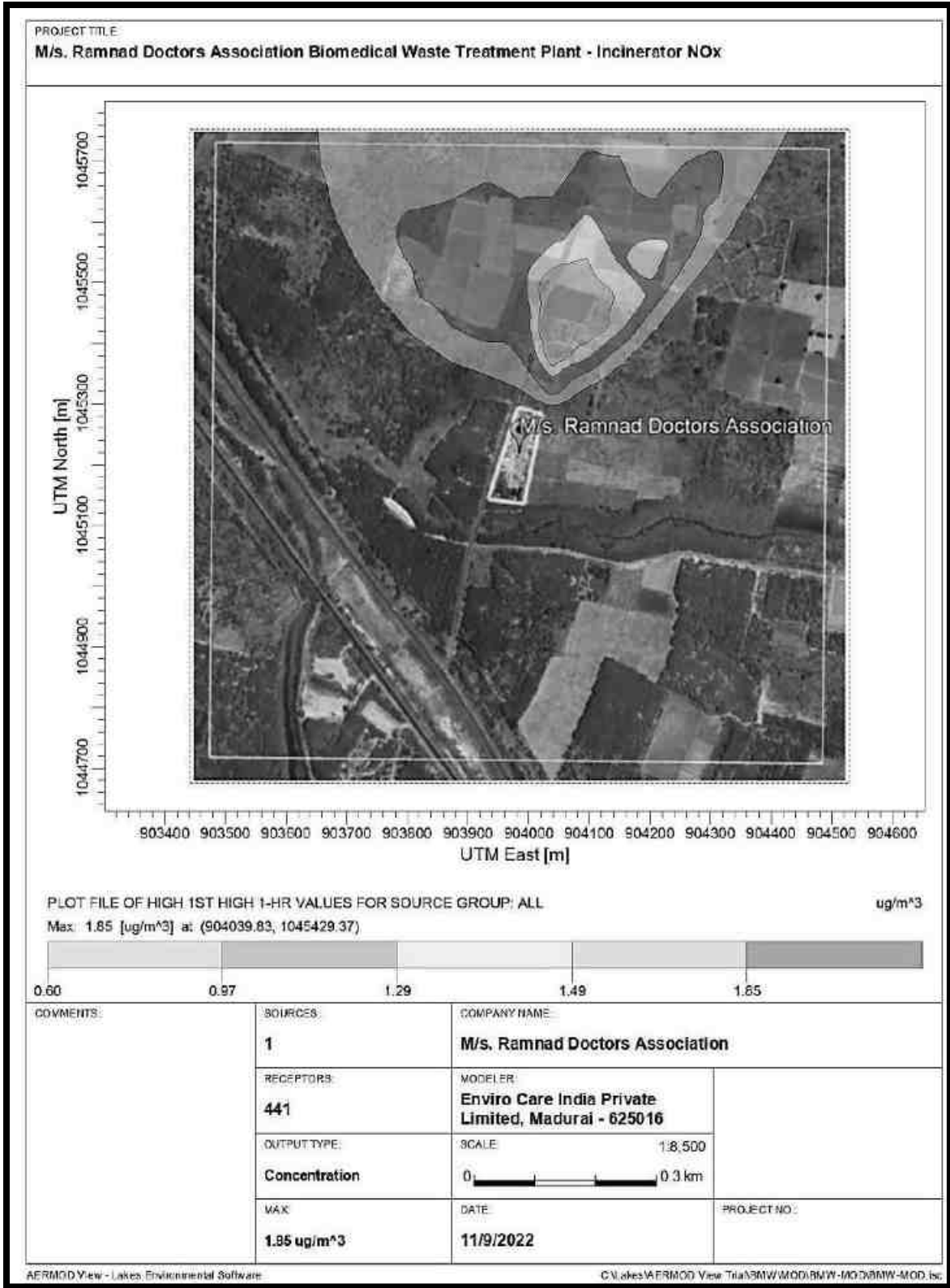


Figure 4.3: Predicted 24- hourly average GLCs of SO<sub>2</sub> (µg/m<sup>3</sup>) at 10 km radius



**Figure 4.4: Predicted 24- hourly average GLCs of NOx ( $\mu\text{g}/\text{m}^3$ ) at 10 km radius**



**Presentation of Results**

The simulations were made to evaluate incremental concentrations due to proposed activity of the industry within the study area of 10 km. In the simulations, the incremental concentrations were estimated to obtain an optimum dispersion of variations in concentrations within study area of 10 km radius. The maximum short-term incremental ground-level concentrations Table 4.5(i) are compared with the baseline data to get likely resultant levels during peak loads. The maximum concentrations that can be attained during peak loads are tabulated in Table 4.5(ii).

**Table 4.5 (i) – Predicted GLC Concentration**

SI No.	Pollutant	Concentration ( $\mu\text{g}/\text{m}^3$ )
1	PM10	0.625
2	PM2.5	0.375
3	SO <sub>2</sub>	10.8
4	NO <sub>x</sub>	1.85

**Table 4.5 (ii) – Resultant maximum 24 hourly concentration**

Pollutant	Unit	Predicted GLC	Max. Baseline Conc.	Max. resultant Conc.	Limit as per MoEF for industrial areas (24 hrs)
<b>Project site (A1)</b>					
PM10	$\mu\text{g}/\text{m}^3$	0.625	28	28.625	100
PM2.5	$\mu\text{g}/\text{m}^3$	0.375	11.9	12.275	60
SO <sub>2</sub>	$\mu\text{g}/\text{m}^3$	10.8	3.2	14	80
NO <sub>x</sub>	$\mu\text{g}/\text{m}^3$	1.85	1.6	3.45	80
<b>A2</b>					
PM10	$\mu\text{g}/\text{m}^3$	0.625	39	39.625	100
PM2.5	$\mu\text{g}/\text{m}^3$	0.375	14.2	14.575	60
SO <sub>2</sub>	$\mu\text{g}/\text{m}^3$	10.8	5.3	16.1	80
NO <sub>x</sub>	$\mu\text{g}/\text{m}^3$	1.85	2.65	4.5	80
<b>A3</b>					
PM10	$\mu\text{g}/\text{m}^3$	0.625	36	36.625	100
PM2.5	$\mu\text{g}/\text{m}^3$	0.375	10.5	10.875	60
SO <sub>2</sub>	$\mu\text{g}/\text{m}^3$	10.8	2.9	13.7	80
NO <sub>x</sub>	$\mu\text{g}/\text{m}^3$	1.85	1.45	3.3	80
<b>A4</b>					
PM10	$\mu\text{g}/\text{m}^3$	0.625	41	41.625	100
PM2.5	$\mu\text{g}/\text{m}^3$	0.375	15.2	15.575	60

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SO <sub>2</sub>	µg/m <sup>3</sup>	10.8	3.1	13.9	80
NO <sub>x</sub>	µg/m <sup>3</sup>	1.85	1.55	3.4	80
<b>A5</b>					
PM10	µg/m <sup>3</sup>	0.625	30	30.625	100
PM2.5	µg/m <sup>3</sup>	0.375	11.5	11.875	60
SO <sub>2</sub>	µg/m <sup>3</sup>	10.8	3.4	14.2	80
NO <sub>x</sub>	µg/m <sup>3</sup>	1.85	1.7	3.55	80
<b>(A6)</b>					
PM10	µg/m <sup>3</sup>	0.625	48	48.625	100
PM2.5	µg/m <sup>3</sup>	0.375	23.2	23.575	60
SO <sub>2</sub>	µg/m <sup>3</sup>	10.8	5.5	16.3	80
NO <sub>x</sub>	µg/m <sup>3</sup>	1.85	2.75	4.6	80
<b>(A7)</b>					
PM10	µg/m <sup>3</sup>	0.625	35	35.625	100
PM2.5	µg/m <sup>3</sup>	0.375	11.6	11.975	60
SO <sub>2</sub>	µg/m <sup>3</sup>	10.8	3.2	14	80
NO <sub>x</sub>	µg/m <sup>3</sup>	1.85	1.6	3.45	80
<b>(A8)</b>					
PM10	µg/m <sup>3</sup>	0.625	37	37.625	100
PM2.5	µg/m <sup>3</sup>	0.375	13	13.375	60
SO <sub>2</sub>	µg/m <sup>3</sup>	10.8	3.8	14.6	80
NO <sub>x</sub>	µg/m <sup>3</sup>	1.85	1.9	3.75	80

**Inference:**

The above table indicates that there will be slight changes in concentration of AAQ parameters relevant to the activity. However, the resultant ambient air quality at peak loads of incineration operation will be within the ambient air quality limits specified by MoEF & CC. The APC equipment will be provided to control the emissions.

**B. Noise environment**

**Impact-**

Potential impact on noise quality is anticipated from vehicles, loading and unloading of waste and during operation of incinerator and DG sets. Also, handling and conveying of bio-medical waste can also be a source of noise pollution.

**Mitigation measures-**

- Providing PPE to the employees
- Procuring proper standard machineries complying to regulatory requirement in respect of stipulated noise levels
- Providing acoustic enclosures to noise generating equipment like DG sets

### **C. Impact on road & traffic Impact**

Operational traffic will be passing through NH-87 and project site road. The residence will not be disturbed, as the frequency of operational traffic will not be very significance to cause the impact.

#### **Mitigation measures-**

- All vehicles entering into the project will be informed to maintain speed limits and not blow horns unless it is required
- Vehicular movement will be regulated as per the Motor Vehicle Act

### **D. Water environment**

The water requirement for the project during operation is augmented town panchayat water supply sources. The total water requirement for the plant is about 9 KLD. Source of impact are sewage, floor and vehicles washings etc.,

#### **Impact-**

- Contamination of surface water, ground water and land contamination

#### **Mitigation measures-**

- The sewage generated is sent to septic tank and soak pit and the wastewater generated from washing of floors from the facility is to be treated in ETP of 10 KLD and the treated waste water will be recycled in scrubber and for washing purpose
- Water consumption will be monitored and awareness will be brought to workmen to conserve water
- Continuous monitoring flow meter is proposed
- Storm water harvesting and utilization

### **E. Land environment**

#### **Impact-**

Land environment in the area has potential for contamination due to storage of bio-medical waste in the project site, discharge of untreated wastewater and deposition of particulate emission on plants.

#### **Mitigation measures-**

- Wastewater generated at the project site is to be treated in ETP of 10 KLD and reused for scrubber within the site
- Bio-medical waste will be securely stored, handled, treated and disposed as per

the Bio-medical waste (Treatment and Handling) Rules, 2016 and as per the guidelines published by CPCB

- The incinerated ash to be collected and stored in secured manner in an impervious container and disposed through authorized TSDF

#### **F. Biological environment**

The project activities are restricted to the factory site except the vehicular movement. There are no endangered flora and fauna in the study area. No impact of project on biological environment is expected during operation of CBMWTF. Impact of emission from Incinerator will be minimal as the emission will be controlled and as per the air quality modeling study it is observed that the incremental increase of pollutants is marginal and the air quality conforms to the National Ambient Air Quality Standards.

#### **G. Socio-economic environment**

- The proposed project is expected to have positive impacts on socio-economic condition of the people
- There will be employment opportunities for the people around the industrial area
- There will be improvement in the infrastructure facility in and around the industrial area
- There will be no positive or negative impact on the socio-economic conditions of the people in the study area as the size of the industry is small scale.
- The facility should ensure that they follow all pollution control measures as stipulated by the PCB and also by the Authority issuing the EC.

Table 4.6 indicate the overall impact, quantification and mitigation measures during the operation phase

**Table 4.6 - Overall Impact Assessment during Operation Phase**

Sl. No.	Environmental components	Source of impact and quantification	Impact	Mitigation measures
1	Ambient air quality	<p>➤ Emission from Incinerator &amp; DG set.</p> <p>➤ Vehicular movement</p> <p><b>Quantity of pollutants from incinerator limiting to:</b></p> <ul style="list-style-type: none"> <li>• Particulate emission: 50 mg/Nm<sup>3</sup></li> <li>• NO<sub>2</sub> : 400 mg/Nm<sup>3</sup></li> <li>• HCl : 50 mg/Nm<sup>3</sup></li> <li>• Total Dioxins and Furans: 0.1ngTEQ/Nm<sup>3</sup></li> <li>• Hg and its compounds: 0.5 mg/Nm<sup>3</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Increase in baseline levels of parameters PM, SO<sub>2</sub>, NO<sub>x</sub>, CO, Total Dioxins, Total Furans etc.</li> <li>• Odor nuisance due to storage of waste</li> <li>• Emission of carcinogenic pollutants like total dioxin, total furans etc.,</li> </ul>	<ul style="list-style-type: none"> <li>• Odor from BMW from storage shed to be controlled by quick treatment and disposal of waste in incinerator, spraying suppressing non-toxic sprays at storage facility.</li> <li>• The incinerator to be of specification mentioned in the Biomedical Waste (Management and Handling) Rules 2016. It shall have two chambers primary and secondary with temperature 800<sup>0</sup>C ± 50<sup>0</sup> C in primary chamber and 1050<sup>0</sup>C ± 50<sup>0</sup> C secondary chamber and in secondary chamber gas residence time shall be min. 2 sec. to ensure complete combustion of total organic carbon content. Also to reduce the incineration ash and residue to less than 10% and their loss on ignition is less than 5% on dry weight</li> <li>• Incinerator to be provided with a chimney of height 30 M AGL, wet scrubber.</li> <li>• Dioxin and furans emissions are to be controlled by reducing the flue gas temperature from 1000° C to &lt; 200° C by cooling by adopting rapid quench/spray dryer/catalyst/ adsorption by activated carbon.</li> <li>• To control acidic emissions dry lime and activated carbon to be used. It will also take</li> </ul>

				<p>care of conversion of mercury in waste if present to mercury compounds which are less harmful. Scrubber to be provided to control emissions to the standards prescribed in the EP Rules, for DG set with 4 m ARL height chimney and acoustics is provided &amp; shall be maintained</p> <ul style="list-style-type: none"> <li>• Bio-medical waste transportation using</li> <li>• vehicles having valid PUC and fitted with GPS.</li> <li>• Ensure waste transportation through covered vehicles as specified in BWM Rules 2016 with label Label indicating that the Biohazard material is transported to the displayed on the vehicle.</li> <li>• Use odor neutralizing sprays where necessary</li> <li>• Develop green belt to contain the fugitive pollutants by trees with broad leaves</li> </ul>
2	Noise	<ul style="list-style-type: none"> <li>➤ Operation of Incinerator &amp; equipment</li> <li>➤ Operation of DG set</li> <li>Vehicular movement</li> </ul> <p><b>Quantification:</b> The noise level of incinerator and DG machineries are to be limited to Noise standards prescribed in the Noise rules.</p>	<ul style="list-style-type: none"> <li>➤ Increase in the ambient Noise levels</li> <li>➤ Health of workers due to continuous exposure to noise</li> </ul>	<ul style="list-style-type: none"> <li>• Providing PPE to the employees</li> <li>• Procuring proper standard machineries complying to regulatory requirement in respect of stipulated noise levels</li> <li>• Providing acoustic enclosures to noise generating equipment like DG sets</li> </ul>

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3	Water quality	<ul style="list-style-type: none"> <li>• Washing, scrubbed water from scrubber.</li> <li>• Vehicle wash</li> <li>• Leachate</li> <li>• Domestic sewage</li> </ul> <p><b>Quantification:</b>                      1. Water consumption – 9 KLD                      2. Wastewater Generation recycled</p>	<ul style="list-style-type: none"> <li>➤ Infiltration into ground</li> <li>➤ Odour nuisance</li> <li>➤ Surface runoff</li> <li>➤ Sewage will be sent septic tank &amp; soak pit and wastewater generated will be treated in ETP of 10 KLD and reused for scrubber</li> </ul>	<ul style="list-style-type: none"> <li>• The sewage generated will be directed to septic tank and soak pit and wastewater generated from washing of floors, vehicle and other handling equipments from the facility is to be treated in ETP of 10 KLD and to use it in scrubber</li> <li>• The treated effluent to be chlorinated before use for garden</li> <li>• Storm water harvesting and utilization</li> </ul>
4	Land environment	<ul style="list-style-type: none"> <li>➤ Handling and Storage of Biomedical waste</li> <li>➤ Discharge of untreated wastewater</li> <li>➤ Spillage on ground</li> <li>➤ due to emissions and incinerated ash</li> </ul> <p>Old deep burial sites within the project site</p>	<ul style="list-style-type: none"> <li>➤ Effect on top soil</li> <li>➤ Deposits of acidic particulate on land</li> <li>➤ Land contamination</li> </ul>	<ul style="list-style-type: none"> <li>• Old deep burial sites within the project site to be continuously monitored for any soil contamination</li> <li>• Secure storage, treatment and disposal of bio-medical waste to be carried out as per the guidelines of CPCB and BMW Rules.</li> <li>• The incinerated ash to be collected and stored in secured manner in an impervious container and disposed through authorized TSDF</li> <li>• The BMW process area to be sanitized every day with Sodium Hypochlorite solution</li> </ul>

### **Occupational Health Measures**

Health surveillance program for employees will be based on site specific needs and potential exposure to the handled at the site. The measures include Employee health surveillance, Impact due to accidents, Providing PPEs, Plant safety, Safety audit, etc

#### **i. Employee Health Check Up**

As per Bio Medical Waste Management Rules, 2016, it will be ensured that a comprehensive health check-up of each employee and other staff involved in BMW handling is carried out at the time of induction and also as a mandatory procedure to be followed for each year for every employee.

- Annual medical check-up
- Medic aim scheme for all employees
- Doctor on call in case of first aid requirement
- Comprehensive Health Check-up includes following but not limited to;
  - Present Complaints (If any), with duration
    - Vaccination History (especially with respect to Covid, Hepatitis B and Tetanus Toxoid)
    - Past Medical History
    - Past Surgical History
    - General Physical Examination
    - Dental Examination
    - Systemic Examination including Cardiovascular System, Respiratory System, Central Nervous system, Gastrointestinal System, Uro Genital System, Gynae and Obstet. (in case
  - of females), Musco-skeleton System, EYE and ENT.
    - Lab Investigations including: Hb, TLC, DLC, RBS, Blood Urea, S. Creatinine, Urine, Stool etc.
    - Radiological Investigations: Chest X ray, USG (If needed), CT or MRI (if needed)
    - Inference with Diagnosis

#### **ii. Impacts due to possible accidents**

The possible accidents that can occur during construction and operation phase in the Project area is due to;

- Unsafe condition
- Unsafe Work Practices
- Not using the PPE
- Not following Standard Operating Procedures
- Poor/non-standard quality of tools and equipment
- Non availability of relevant PPE



**Table 4.7 - Mitigation measures for Potential Accidents**

<b>Sl. No.</b>	<b>Reason for Potential Accident</b>	<b>Mitigation Measure</b>
<b>1</b>	Unsafe condition	<ul style="list-style-type: none"> <li>• A mechanism will be set up for identifying and eliminating unsafe condition and unsafe act by conducting safety tour of the plant on a fixed frequency by all the top management staff.</li> <li>• The safety system would also include implementing hierarchy of controls with first priority on eliminating the source of Hazard</li> <li>• The system would encompass conducting Safety Trainings, Mock drills and other related activities</li> <li>• The top management will lead by example in adhering to safe work practices</li> <li>• Workmen not following safe practices, not using PPE, not following Standard Operating Procedures will be counseled for adhering to safe work culture</li> <li>• Practice of “Tool Box” talk will be initiated before any work is taken up, to identify the possible hazards and actions to be taken to prevent the hazard</li> </ul>
<b>2</b>	Unsafe Work Practices	
<b>3</b>	Not using the PPE	
<b>4</b>	Not following Standard Operating Procedures	
<b>5</b>	Poor/non-standard quality of tools and equipment	All resources will be provided to procure Standard Tools and Equipment, Relevant PPE and ensure their usage
<b>6</b>	Non availability of relevant PPE	

**. Following safety measures will be implemented-**

➤ **Personal Safety (PPE)**

The following Personal Protection Equipment (PPE) are proposed to be provided-

1. Helmet
2. Goggles
3. Nose masks
4. Uniform
5. Aprons
6. Hand gloves
7. Safety shoes
8. Sanitizers

➤ **Plant Safety**

The following measures and initiatives are proposed to ensure plant safety

- 1) Safety manual
- 2) Onsite emergency plan
  - Fire extinguishers
  - Flame-proof fittings
  - Emergency Contact numbers
- 3) Insurance coverage in case of fire
- 4) Electric safety audit.

Continuous training and mock drills are conducted for onsite and offsite operations

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## **CHAPTER V**

### **ANALYSIS OF ALTERNATIVES**

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#### **5.0 INTRODUCTION**

Alternative sites and design process should be critically examined to maintain the positive environmental impact, socio-economic benefits & profitability and minimize the temporary adverse impact. Normally, the extent of displacement of people, the loss of agricultural land, relocation of flora & fauna and irreversible loss of natural resources permanently, will be deciding factors in selection/rejection of site. Project planning and the design process need to be flexible enough to adopt the modified basic project alternatives. The following steps will help in this process.

#### **5.1 ANALYSIS OF ALTERNATIVE SITE**

The site chosen in the existing premises is most suitable and the project site is in accordance with MoEF&CC guidelines.

- Muthuvayal Village at a distance of 2 km from the Treatment facility.
- There are no National Parks, Wild life Sanctuaries and Bird Sanctuaries within 10 Km radius.
- No forest land is involved in the plant.
- There are no Reserve Forests within 10 km radius.

Hence there is no alternative site considered.

Location criteria In the context of these guidelines, buffer zone represents a separation distance between the source of pollution in CBWTF and the receptor - following the principle that the degree of impact reduces with increased distance. The following parameters may be considered for ascertaining buffer distance on case-to-case basis:

- (i) Potential for spread of infection from wastes stored in the premises.
- (ii) Applicable standards for pollution control and the relative efficiency of the existing incinerators and emission control systems,
- (iii) Potential of fugitive dust emission from incinerators,
- (iv) Potential for discharge of wastewater
- (v) The potential for odour production,
- (vi) The potential for noise pollution,
- (vii) The risk posed to human health and safety due to exposure to emissions from incinerator,
- (viii) The risk of fire and
- (ix) Significance of the residual impacts such as bottom ash and fly ash.

As far as possible, the CBWTF shall be located near to its area of operation in order to minimize the transportation distance in waste collection, thus enhancing its operational flexibility as well as for ensuring compliance to the time limit for treatment and disposal of bio-medical waste as stipulated under the BMW Rules (i.e., within 48 hours).

Also, the location of the CBWTF should be in conformity to the CRZ Norms and other provisions notified under the Environment (Protection) Act, 1986. The location shall be decided in consultation with the State Pollution Control Board (SPCB)/ Pollution Control Committee (PCC). The location criteria for development of a CBWTF are as follows:

- a) A CBWTF shall preferably be developed in a notified industrial area without any requirement of buffer zone (or)
- b) A CBWTF can be located at a place reasonably far away from notified residential and sensitive areas and should have a buffer distance of preferably 500 m so that it shall Revised Guidelines for CBMWTF have minimal impact on these areas.

In case of non-availability of such a land, the buffer zone distance from the notified residential area may be reduced to less than 500 m by SPCB/PCC without referring the matter to CPCB by prescribing additional control measures such as

- (i) Adoption of best available technologies (BAT) by the proponent of CBWTF;
- (ii) Prescribing stringent standards for operation of the CBWTF by the SPCB/PCC;
- (iii) Adoption of zero liquid discharge by the CBWTF and
- (iv) In case of any complaints from the public, then CBWTF should prove that the facility is not causing any adverse impact on environment and habitation in the vicinity.

If SPCB/PCC is not in a position to resolve the issue relating to buffer zone while selecting the site for CBWTFs, in such a case, SPCBs/ PCCs may refer the matter to CPCB. The CBWTF can also be developed as an integral part of the Hazardous Waste Treatment Storage and Disposal Facility (TSDF) subject to obtaining of necessary approvals from the authorities concerned including 'environmental clearance' as per Environmental Impact Assessment 2006 and further amendments notified under the Environment (Protection) Act, 1986, provided there is no CBWTF exist within 150 Km distance from the existing TSDF.

Land requirement Sufficient land shall be allocated to the CBWTF to provide all requisite systems which include dedicated space for storage of waste (both treated and untreated), waste treatment equipment, vehicle washing bay, vehicle parking space, ETP, incineration ash storage provision, administrative room, space for DG Set etc.,.

- (a) Preferably, a CBWTF shall be set up on a plot size of not less than one acre in all the areas. However, a CBWTF can be developed in adjacent plots but cannot be set up in two or more different plots located in different areas. Separate plots can be permitted only for vehicle parking if located in the close vicinity of the proposed CBWTFs or the existing CBWTFs.
- (b) In case of upcoming or new CBWTFs (both in municipal limits with population more than 25 lakhs or in rural areas), the land area requirement may be relaxed (but in any case not less than 0.5 acre) by the SPCB/PCC, with additional control measures such as ZLD, increase in stack height, stringent emission norms, odour control measures or any other measures felt necessary by the prescribed authority on case-to-case basis, only in consultation with CPCB.

## **5.2 ANALYSIS OF ALTERNATIVE TECHNOLOGIES**

Incineration and Autoclaving are well proven technologies all over the world. Hence no technological failures are anticipated. Hence no alternative technologies are considered. Incineration/Plasma Pyrolysis Incineration is a controlled combustion process where waste is completely oxidized and harmful microorganisms present in it are destroyed/denatured under high temperature. The guidelines for "Design & Construction Requirements of Bio-medical Waste Incinerators" by CPCB from time to time shall be followed for selecting/or augmenting the incinerator.

Revised Guidelines for CBMWTF 11 Plasma Pyrolysis is an alternate to incinerator, Plasma Pyrolysis treatment technology can be installed for disposal of bio-medical waste categories as per BMW Rules wherein destruction of bio-medical waste is similar to incineration can be achieved. In case of plasma pyrolysis, waste is treated at high temperature under controlled condition to form gases like methane, hydrogen and carbon monoxide which are subjected to combustion (oxidation) in secondary chamber. In the plasma pyrolysis process waste is converted into small clinker which can be disposed in secured landfills.

Further, the available different technologies are;

- **Thermal: Autoclaves: Steam treatment technologies:**

Thermal: Autoclaves: Steam treatment technologies

➤ **Microwave treatment technologies**

Microwave treatment technologies

Dry heat treatment technologies

➤ **Dry heat treatment technologies**

Sodium hypochlorite (NaOCl, 1-12%)

➤ **Sodium hypochlorite (NaOCl, 1-12%):**

Incineration

➤ **Incineration:**

Encapsulation and inertisation

**Emerging technologies:**

Emerging technologies include plasma pyrolysis, alkaline hydrolysis, superheated steam, ozone and promession. Plasma pyrolysis makes use of an ionised gas in the plasma state to convert electrical energy to temperatures of several thousand degrees using plasma torches or electrodes with minimal or no air. It is used to break down pathological waste, infectious, plastic, hazardous chemical or pharmaceutical wastes. The out put from this destruction is production of carbonaceous matter, methane, carbon monoxide, hydrogen, carbon dioxide and water molecules.

It is safe, eco-friendly, has energy recovery and has negligible harmful emissions of dioxins and furans. Production of clean alloyed slag which could be used in construction material and value-added products such as metals. Its disadvantages include large initial investment costs, carbon dioxide pollution, large electrical energy input, highly corrosive plasma flame leading to frequent maintenance.

The disadvantage is that it is an emerging technology, requires electrical energy continuously, operating cost is high and not suited for the capacity of 500 kg/h plant.

**Ozone (O<sub>3</sub>)** can be used for especially pharmaceutical waste, water and air treatment. It is a strong oxidizer and breaks down to a more stable form (O<sub>2</sub>). Ozone systems require shredders and mixers to expose the waste to the bactericidal agent. Regular tests should be conducted to ensure that the microbial inactivation standard is met. Not suited for BMW

**Promession:**

It includes freeze-drying using liquid nitrogen and mechanical vibration to disintegrate cadavers into powder before burial. The process speeds up decomposition, reduces

both mass and volume and allows the recovery of metal parts. Not a viable technology for small plants. It requires high skilled professionals.

**Alkaline hydrolysis:**

It is a process that converts body parts, specimens and cadavers into a decontaminated aqueous solution and destroys fixatives, hazardous chemicals and waste contaminated by prion. After the waste is loaded in the basket and into the hermetically sealed tank, alkali is added along with water at temperature of 127°C or higher and stirred. After digestion time of 6–8 h, by-products include mineral constituents of bones and teeth, solution of amino acids, sugars, soaps and salts. It can also destroy chemotherapeutic or cytotoxic agents and aldehydes (such as formaldehyde and glutaraldehyde) commonly used in hospitals. Not a viable technology for small plants. It requires high skilled professionals.

**Nanotechnology:**

It is used to cleanse environmental air to improve indoor quality air and includes a photo catalyst with wide spectrum of light and is bactericidal and fungicidal. It utilises the energy from light to generate hydroxyl species and superoxide anion (O<sub>2</sub><sup>-</sup>) which decompose and oxidise toxic pollutants to carbon dioxide and water. Not a viable technology for small plants. It requires high skilled professionals.

## **CHAPTER VI**

### **ENVIRONMENTAL MONITORING PROGRAM**

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#### **6.1 Technical aspects of monitoring the effectiveness of mitigation measures (including measurement methodologies, frequency, location, data analysis, reporting schedules, emergency procedures, detailed budget & procurement schedules)**

This chapter contains technical aspects of monitoring the effectiveness of mitigation measures. It ensures the smooth execution of EMP.

Monitoring program includes the environmental aspects viz., ambient air quality, emissions from the air pollution sources, effluent quantity and quality monitoring, soil quality analysis, ground water monitoring and noise level. The monitoring programme also includes the parameters to be monitored for the various environmental components mentioned above, sampling location and the frequency. It includes laboratory and other allied facilities. The capital cost of monitoring is also worked out and presented this will enable to budget the requirement every year.

##### **6.1.1 Purpose and Objective of Environmental Monitoring**

Monitoring is an essential component for sustainability of any project and it is an integral part of environmental assessment process. This will ensure that there is consistent compliance to the regulatory requirement. It also helps in understanding potential deviations. The timely action based on this monitoring would help to comply with the regulatory requirements and sustainability of the project. It also ensures cordial relation with the community around. It is important to predict with present and post-project environmental scenarios. Hence, monitoring of critical parameters is essential.

The aim of monitoring is to provide information that will aid impact management and to achieve a better understanding of cause effect relationships and to improve EIA prediction and mitigation methods. Both immediate and long-term benefits by undertaking monitoring as part of EIA are widely recognized.

The following are the main objectives of the environmental monitoring program:

- Ensure day to day operational activities are conducted in a manner in compliance with the regulatory requirements, approvals by various Statutory Agencies and industry standards.
- Evaluate the adequacy of mitigation and pollution control measures implemented for reducing the adverse impacts caused during the operation stage and suggest additional mitigation measures, if appropriate, in the light of the results.
- Encourage good environmental management practices through planning,



commitment and continuous improvement.

- Develop well defined structure designed to assess the nature and extent of environmental impacts of the proposed operations and progressively refine such programs against the targets.
- To comply with all regulations stipulated by the TSPCB related to air emission and liquid effluent discharge as per Consent to be accorded under the Air and the Water Act and the standards prescribed in the Environment Protection Rules.
- Review, improve and update environmental management procedures and standards
- Establish response procedures for actual/potential environmental impacts including community complaints and ensure corrective action is taken.

### **6.1.2 Applicable Environmental Regulatory Framework**

The proposed project will abide by the following Acts, Rules & Notifications issued by the Government of India to protect the environment and development in sustainable way.

1. The Water (Prevention & Control of Pollution) Act, 1974
2. The Air (Prevention & Control of Pollution) Act, 1981
3. The Environmental (Protection) Act, 1986
4. The EIA Notification dated 14<sup>th</sup> September 2006 and subsequent amendments
5. The Bio Medical Waste Management Rules, 2016 and amendment 2018
6. The Hazardous and other Wastes (Management and Transboundary Movement) Rules, 2016
7. The Noise Pollution (Regulation and Control) Rules, 2000 and its amendments
8. The Plastic Waste Management (Amendment) Rules, 2022

### **6.2 Measurement Methodology**

Ambient air, stack emissions, ambient noise, water, soil and wastewater are to be monitored on regular basis. Monitoring of all environmental samples shall be done as per the guidelines provided by MoEF & CC/ CPCB/ SPCB. The method followed shall be recommended / standard method approved / recommended by MoEF & CC / CPCB and the standards procedures as appropriate for parameters not covered by MoEF & CC / CPCB. The monitoring is required during;

- a. Construction phase
- b. Operation phase
- c. Post operation phase

#### **a. Construction Phase-**

The construction activities are expected to last only for few months, say five to six months. The main impact will be on the air quality during the construction. If the work is

spill over to rainy season, there will be carryover of slit from site. The equipment used during the construction, some amount of noise during the construction is also expected at the site and in the immediate neighborhood. Therefore, the ambient air quality monitoring, noise level monitoring and surface water quality monitoring to be carried out. The contractor and the project team will monitor by visual inspection the compliance with the mitigation measures proposed during the construction phase impacts. The monitoring system during construction phase is given in Table 6.1.

**Table 6.1 – Environmental monitoring program during construction phase**

Sl. No.	Environment aspect to be monitored	Parameters	Frequency of monitoring
1.	Ambient air quality	PM <sub>10</sub> , PM <sub>2.5</sub> , SO <sub>2</sub> , CO, NO <sub>x</sub>	Once in a month at project site and in the down wind direction
2.	Noise	Sound level	Once in a month at the boundary

**b. Operation Phase-**

Ambient air, stack emissions (including Dioxins and Furans), ambient noise, water, ground water quality around landfill cells, solid waste characterization (incinerator ash and ETP sludge), soil and wastewater, flora and fauna are to be monitored on regular basis. Monitoring of all environmental samples will be done as per the guidelines / protocols in the “Guidelines for Management of Healthcare Waste as per Biomedical Waste Management Rules, 2016” Ministry of health and family welfare, MoEF & CC and CPCB. Also, the “Guidelines for Handling of Biomedical Waste for Utilization” published by CPCB.

**Air environment**

It is observed from studies related to prediction of Environment Impacts that potential impact on Air Environment is a significant one. Monitoring shall be done as per the guidelines provided by MoEF & CC / CPCB / SPCB. The method followed shall be standard method approved / recommended by MoEF & CC / CPCB. Ambient air and stack emissions are to be monitored on regular basis as indicated in the table 6.1. The monitoring shall be carried out through NABL / MoEF recognized laboratory.

**i. Monitoring of point sources of emission:**

Incinerator and the DG set are the two sources of emissions. The incinerator emissions need to be monitored for parameters stipulated in the Environment (Protection) Rules 1986 and the BMW rules 2016. Apart from the manual monitoring the emissions are also required to be monitored by installing online continuous monitors and to connect to

the portals of TNPCB and SPCB for the parameters stipulated and connected to the respective portals.

- The online monitoring systems attached with the incinerators require periodic calibration
- Sampling platform shall be provided as per CPCB norms to collect stack samples from the chimney for monitoring the air pollutants, as and when required. Holes need to be provided on chimney as per standard CPCB norms, following diametric calculations
- Frequency of monitoring for various parameters is given below in Table 6.2

#### **ii. Monitoring of Dioxins and Furans from incinerator:**

Polychlorinated dibenzo-para-dioxins (dioxins) and polychlorinated dibenzofurans (furans) are two groups of planar tricyclic compounds that have very similar chemical structures and properties. They are generally very insoluble in water, are lipophilic and are very persistent. Dioxins and furans have been detected in emissions from the incineration of hazardous waste.

The monitoring of these two parameters will be outsourced to NABL accredited/ MOEF & CC registered laboratory. Frequency of monitoring will be twice a year.

#### **Sampling method of PCDD/F:**

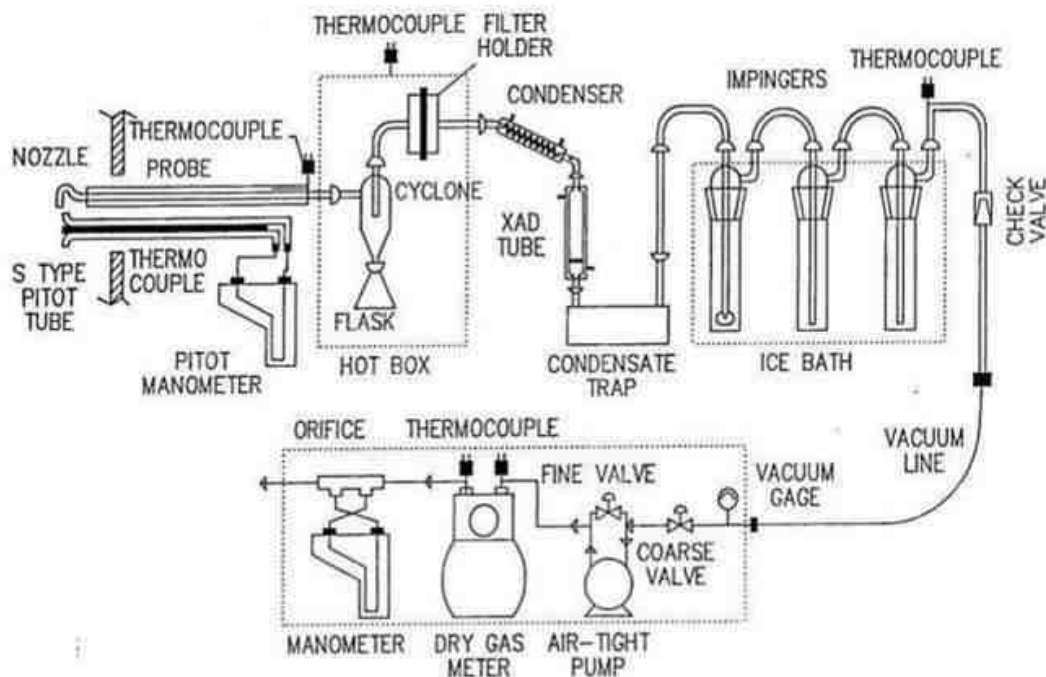
Gas being exhausted is sampled by extracting a portion of the flow stream isokinetically; filtering the extract to concentrate the species of interest; and, recovering the concentrated sample from the sampling system so the laboratory analysis can be completed using HRGC/HRMS techniques are the basic steps in all methods i.e.,

- Sample collection and recovery;
- Sample extraction and cleanup; and
- Identification and quantification of samples

Stack/Source Monitoring for emission monitoring of dioxin and furan, an intricate flue gas sampling train and procedures are followed as mentioned in CPCB manual. The integrated stack gas sample is iso-kinetically withdrawn from selected traverse points along the stack cross-section. Semi-volatile organic compounds associated with particular matter are collected in the front-half components of the sampling train. Semi-volatile organic compounds not collected by high efficiency glass or quartz fiber are absorbed on porous, polymeric resin, Amberlite XAD-2. The borosilicate or quartz liner, encased in a stainless-steel tube is required to perform stack monitoring. This stainless-steel tube is capable of maintaining the exit gas temperature at  $120 \pm 14^{\circ}\text{C}$  or at required temperature necessary to prevent condensation during sampling. The

internationally accepted flue gas source emission sampling train used for monitoring of source emission of Dioxin, Furan and other semi-volatile is diagrammatically depicted in Figure 6.1.

**Figure 6.1 – Typical flue gas sampling train for monitoring of source emissions of dioxins and furans**



Liquid samples should be collected in narrow-mouth amber glass bottles.

- The level of the liquid in bottle should be marked just after collection to allow for assessment of possible loss during shipment.
- Liquid samples should be processed as a whole, no sub-sampling is recommended.
- Representative Solid samples should be collected in wide-mouth amber glass bottles.
- Care should be taken to exclude as much water as possible.
- Air samples (filter papers, Thimbles, PUFs and XAD-2 Adsorbent) should be wrapped with aluminum foil and kept in dark cool place at 1 – 5°C in dark from all the samples (except tissues) must be maintained at 1 – 5°C the time of collection till extraction. Tissue samples should be kept frozen during shipment.

## **B. Noise environment**

Though noise level impact is not significant the same need to be monitored to prevent increase in noise levels due to poor maintenance of equipment and machinery which generate noise. Standard Noise Level Meter to be used for noise monitoring.

Sound Level meter should be placed-at 3 m distance from source and monitored and also monitoring to be carried out at the boundary of the plant to ensure the limits does not exceed the limits for industrial zone.

### C. Water environment

It is observed from studies related to prediction of Environment impacts that potential impact on water environment due to effluents from washing of floors, vehicles, and equipments etc., the effluents will be collected and treated in-situ and reused for scrubbing. The parameters prescribed in the BMW Rules to be monitored once in a month.

A 'magnetic flow meter' and pH meter will be fitted to the treated effluent recycle/ extraction points from the outlet of ETP to know the total wastewater treated and pH for further end use in compliance with the guidelines.

### 6.3 Measurement methodology and frequency

Environmental Attributes, Frequency and Parameters are in table 6.2. Test Procedures and the Budget is in table 6.4 and Locations where online monitoring required is given in table 6.5 below and are analyzed for the indicated parameters by following standard analysis procedure. Record all the analysis data and initiate corrective and preventive action whenever there is abnormality related to project activity is noticed.

**Table 6.2 – Environmental monitoring program during Operation phase**

Sl. No.	Particulars	Frequency of monitoring, duration and parameters	Cost of monitoring	Cost per annum in Rs.
1	Ambient Air quality at project site	Once in a month for 24 hours PM <sub>10</sub> , PM <sub>2.5</sub> , NO <sub>x</sub> , SO <sub>2</sub> , CO, NH <sub>3</sub> ,	Rs. 15300/Sample  Total samples – 12 Nos./ annum	183600/-
2	Stack monitoring from Incinerator	<b>Once in a months</b> For parameters Particulate matter, NO <sub>x</sub> , HCl, Hg and its compounds  Once a year Total	Rs. 17800 Per stack 12 samples in a year	213600 /-  55000 /-

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		Dioxins and Furans	Rs.55000	
3	Operation of DG set,	Monitoring not needed as the capacity of DG is small (62.5 kVA & 125 kVA).		
4	Treated effluent	Once in a month Grab sample  pH, TSS, TDS, COD.	Rs. 1200 per sample  12 Samples in a year	14400/-
5	Groundwater quality	Twice a year post monsoon and pre monsoon.  pH, Color, Turbidity, EC, TOC, TSS, TDS, BOD, COD, Heavy metals, Fe, CN, F, As and Mn, Cl, NO <sub>3</sub> , SO <sub>4</sub> , TKN, Total Alkalinity, Total Hardness	Rs. 5000 /Sample  2 samples in a year	10000/-
6	Soil environment within project premises at the old landfill facility	Once in a year Composite sample  pH, EC, Colour, TDS, TOC, PAH, Heavy metals, CN, F, As and Mn	Rs. 2000 per sample	2000/-
7	Occupational Health screening	Once in a year for 15 no. of employees	Rs. 3000 per employee	45000/-
8	Calibration of online monitor	Once a year	-	10000/-
<b>Total cost of monitoring</b>				<b>488600/- or say 5,00,000/-</b>

**Note:** The monitoring cost may vary with the requirement as per the stipulation in the consent and Environmental Clearance

### **6.3.1 Monitoring system**

#### **Liquid effluent:**

Parameters such as pH, Suspended Solids, Oil & Grease, BOD, COD, Bio-assay for treated liquid effluent from the ETP will be monitored as per the Consent conditions or once in a quarter and such records maintained and submitted to SPCB/PCC.

#### **Stack emission monitoring:**

Sampling platform shall be provided as per CPCB norms to collect stack samples from the chimney for monitoring the air pollutants. Port Holes need to be provided on chimney as per standard CPCB norms

The Stack Emission shall be monitored (under optimum capacity) for parameters such as Particulate Matter, HCl, NO<sub>x</sub>, Hg & compounds and combustion efficiency once in three months as required under schedule II of the Bio-medical Waste Management Rules 2016 (All monitored values shall be corrected to 11% Oxygen on dry basis).

In case of dioxins and furans, monitoring should be done once in a year (monitored values shall be corrected to 11% Oxygen on dry basis).

#### **Online Continuous Monitoring:**

Monitoring provision for continuous monitoring of the incinerator stack emission will be installed by the CBWTF for the flue gas parameters such as CO<sub>2</sub>, O<sub>2</sub>, CO and PM as well as primary & secondary chamber temperatures, and records maintained. The continuous emission monitoring system for stack emission should be installed as per the guidelines issued by SPCB/CPCB. Also, the real time continuous stack emission Revised Guidelines for Common Bio-medical Waste Treatment Facilities monitoring data is also required to be transmitted to the servers of the respective SPCB as well as CPCB. The online monitoring systems attached with the incinerators require periodic calibration

Access shall be provided online, to see the continuous monitoring data by the local regulatory Board/Committee and annual environmental report giving complete details of operation and compliance with regulatory requirements. These details need to be published and made available to the public in company website.

#### **Frequency of monitoring:**

The CBWTF shall carry out prescribed tests through a NABL approved laboratory or a laboratory approved under the Environment (Protection) Act, 1986, once three months

as per the frequency stipulated under the BMWM Rules or as prescribed by the SPCB and record of such analysis results shall be maintained and submitted to TNPCB.

### 6.3.2 Documentation and Reporting

Methodology of monitoring (sampling and analysis) will be prepared as separate documents as SOP (Standard Operating Procedure) wherever required. The records of the monitoring will be documented. Immediately upon the completion of monitoring as per the planned schedule, report will be forwarded to the concerned regulatory agencies viz TNPCB and its offices and half yearly to the SEIAA Tamil Nadu as per the EIA Notification along with the EC compliance report.

### 6.3.3 Details Budget & Procurement Schedules

Regular record review for change in financial requirement of environmental management will be done and appropriate budgetary provisions will be made along with other budget, budgets for environmental management is prepared and revised regularly up on requirement. The budget will include provisions for:

- A) Environmental Monitoring Program
- B) Operation & Maintenance of environmental technologies/equipments
- C) Laboratory works for Environmental management activities
- D) Emergency Purchase of necessary material, Equipments, tools, services, PPEs

Detailed budgetary provisions for monitoring program is detailed in the following Table 6.3

**Table 6.3 – Financial allocation/budgetary provision for EMP**

<b>S. No.</b>	<b>Particulars</b>	<b>Capital Expenditure (Rs. In Lacs)</b>	<b>Recurring Expenditure (Rs. In Lacs/year)</b>
1	Landscaping/ Plantation	3.00	0.20
2	Solid Waste Management	4.00	0.55
3	Waste Water Management/ETP	7.00	0.75
4	APCS Management	9.50	2.5
5	Environment Monitoring	0.75	0.35
6	Miscellaneous	1.00	0.5
<b>Total</b>		<b>25.25</b>	<b>4.85</b>



#### **6.4 Environmental Monitoring Cell**

A Centralized environmental monitoring cell will be established for monitoring of important and crucial environmental parameters which are of immense importance to assess the status of environment during Plant operation. With the knowledge of baseline conditions, the monitoring program can serve as an indicator for any deterioration in environmental conditions due to operation of the plant, and helps in planning suitable mitigatory steps that of control of pollution since the efficiency of control measures can only be determined by monitoring. The following routine monitoring program will be implemented under the post-project monitoring in the proposed plant. The Monitoring program proposed to be implemented is given below.

#### **6.5 Environmental Management Reviews**

The senior management shall periodically review the Environmental Management System (EMS) to ensure its suitability and effectiveness. The need for possible changes in the environmental policy and objectives for continuous improvement shall be ascertained and revisions made accordingly.

#### **6.6 Environment Audit**

Annual Environment Audit shall be conducted to check the compliance of environmental conditions. Form V statement and report shall be submitted to MoEF&CC.

## **CHAPTER VII ADDITIONAL STUDIES**

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### **7.1 Introduction**

The process activities are associated with certain risks. Therefore, Hazop analysis and risk assessment are addressed in detail as additional studies.

### **7.2 Public Hearing**

The draft EIA report along with all the supporting documents pertaining to the project will be submitted to Tamil Nadu State Pollution Control Board and requesting for conducting the Public Hearing as per EIA notification 2006. This is in line with the ToR issued by SEIAA, Tamil Nadu.

The final EIA will be prepared duly considering the views expressed by the public, the company will respond and same will be included in Final EIA report.

### **7.3 Risk Assessment**

Hazard analysis primarily involves identification and quantification of the various hazards. On the other hand, risk analysis deals with identification and computation of risks. The equipment in the plant and personnel are prone to accidents resulting from the likely hazards present in the plant.

Risk analysis follows an extensive hazard analysis. It involves the identification and assessment of risks to the people working at the facility and the immediate neighboring populations as a result of risks from the hazards present. This requires a thorough knowledge of probability of failure, credible accident scenario, vulnerable areas of exposure etc. Much of this information is difficult to get or generate. Consequently, the risk analysis is often confined to maximum credible accident studies. It provides basis for preparation of on-site and off-site emergency plan and also to incorporate safety measures.

#### **7.3.2 Approach to the Study**

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 area
- Identification of representative failure cases
- Visualization of the resulting scenarios in terms of fire and explosion
- Assess the overall damage potential of the identified hazardous events and the impact zones from the accidental scenarios

- Furnish the recommendations on the minimization of the worst accident possibilities
- Preparation of Disaster Management Plan
- Emergency Plan, which includes Occupational and Health Safety Plan

Environmental risk analysis deals with the identification and quantification of risks, the equipment and personnel are exposed to, from the hazards present in the area in particular and the environment at large.

### 7.3.3 Risk Assessment & Management Plan

The extent of the consequences of an accident in a Bio medical waste treatment/incinerating plant installation depends on type and quantity of the BMW stored, handled, disinfected, mode of containment, and external factors like location, density of population in the surrounding area, etc. In many cases realization of hazard and its potential also is depended on prevailing meteorological conditions and availability of ignition source.

### 7.3.4 Plant Vulnerability to Hazards

**Table - 7.1 Vulnerability Analysis**

S. No	Hazards	Severity (1-5)	Likelihood (1-5)	Severity x Likelihood (1- 25)	During Construction/ Installation Phase	During Operation Phase
<b>Natural hazard</b>						
1	Earth quake	5	1	5	For immediate areas of construction	For the complete Unit
2	Flood	5	1	5	For immediate areas of construction	For the complete Unit
<b>Man-made hazard</b>						
1	During construction & erection	3	2	6	For immediate areas of construction	
2	Fire & explosion	5	3	15	For all Working Area	Fuel storage area Office area Boiler area Incinerators Electrical Room

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3	Chemical and Hazardous Materials handled	3	2	6	Storage area	Chemical, Hazardous Materials storage area, Process area & DG set area
4	Electrical	3	2	6	For entire Working Area	For all the machineries installed and used at the premises
4	Mechanical Accident	4	4	16	Entire equipment	Process area Material, Handling area and Transportation

**7.3.5 Hazardous Substances and Chemicals stored, handled and processed**  
**List of Hazardous Material Storage, Hazard & Control**

S. No.	Name of Hazardous substances	Place of storage	State and operating pressure & Temp.	Type of hazards possible	Control Measures Provided
1	Yellow Category waste (Human anatomical waste, animal waste, soiled waste, etc.)	Red storage room (plant area)	Ambient Condition	Fire, Infection	1] Fire Extinguisher (CO <sub>2</sub> , DCP) 2] PPE 3] Sand Bucket 4] Emergency provision for Fire Brigade from an outside source. 5] PPE shall be provided.
2	Red category waste (microbiology & Bio - technology waste, tubing, catheters, intravenous sets etc.)	Yellow storage room (plant Area)	Ambient Condition	Fire, Infection	1] Fire Extinguisher (CO <sub>2</sub> , DCP) 2] PPE 3] Sand Bucket 4] Emergency Provision for Fire Brigade from outside source 5] PPE shall be provided

3	Diesel	D.G. Room & Process Room	Ambient Condition	Fire	Fire Extinguisher (Foam), DCP and Sand Buckets
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### 7.3.6 List of Process Hazards & Preventive Measures envisaged

Sl. No	Name of Plant	Hazardous Process and Operation	Materials In The Process/ Operation with Their Quantity	Name of The Vessel and Its Location	Operating Parameters	Type of Hazards Possible	Control Measures Provided
1	Incineration Plant	Incineration	Yellow category waste	Primary chamber and secondary chamber, Incineration area	Temperature - 850 °C –primary chamber and 1050 °C -secondary chamber	Fire, Explosion, Burn	1] Fully Automatic 2] Emergency Local Stop 3] Fire Extinguisher (CO <sub>2</sub> ) 4] PPE Emergency provision for Fire Brigade from an outside source.
2	Autoclave	Sterilization	Red category waste	Autoclave	Temp. around 135 °C & 2.2 kg./sq.cm pressure.	Fire, Health Hazard	1. Fully Automatic Computer based automation 2. Emergency Local Stop 3. PPE

### 7.3.7 Risks and mitigation measures envisaged

#### A. Construction Phase

The proposed project involves construction activities such as construction of shed for housing the incinerator and additional storage sheds for the waste for receipt and segregation before treatment and disposal. Hence, the hazard is minor or minimum. The probable hazard associated with construction is detailed in Table 7.1;

**Table 7.2 Risks inter-alia Mitigation Measures**

Sl. No.	Potential	Mitigation
1	Fall of objects, stepping or striking against objects	Use of apt personal protection equipment -helmets, gloves masks, safety shoes and goggles.
2	Working at heights	Protection to prevent fall with lifelines, safety belts, helmets, gloves and safety nets.
3	Accidents from equipment used at the construction site	Periodical testing and examinations from the competent person. Scheduling periodical and predictive maintenance to ensure its sound construction and safe working conditions.
4	Electrical mishap	Ensuring the electrical harnesses, wirings, installations in accordance with rules and standards.

**B. Operation Phase**

Potential risks involved during operation phase are handling of biomedical wastes, operating of incinerator, autoclave, ETP and majorly while handling bio-medical waste. Workers handling and disposing biomedical waste are at potential risk of exposure to infection from contaminated materials like cotton, bandages, sharps, air borne microbes and pathogens, leak in containers transporting the waste, or spills of waste materials, sharp objects, needles contaminated with blood of the patient, loading of the wastes to incinerator etc. are the potential risk areas to the work men in the facility. The mitigation or safety measures to be considered to reduce the risk of exposure. The prominent measures are as follows:

**1. Safety measures for handling of biomedical waste:**

- To collect the BMW only through the HCEs having authorization and following the procedure for segregation of waste at source, collection in stipulated colour bags and secures storage at identified premises. The wastes collected are secured with identified protocol measures and disinfected with sodium hypochlorite solution.
- To ensure there is no pilferage of recyclables.
- The waste collection from HECs should be done during the day time only.
- Waste is transported in the designated vehicle of the facility following the protocol for secured transportation. The vehicle should be fitted with GPS to track the movement. The transport vehicle should be sanitized after unloading the waste.
- Ensure no stray animal enters the CBMWTF premises. To avoid the facility shall have cattle traps at the entrance of the facility.

- To ensure protection measures against the likely pests attack on regular basis.
- To provide personal protective equipment to waste handling personals to protect from physical, chemical or infectious risks. Personal protective equipment includes cut proof gloves, gowns, masks, safety glasses, protective footwear etc.
- The area should be decontaminated with an appropriate disinfectant like sodium hypochlorite
- The workers in the facility before leaving the premises should have showers at strategic locations and sanitize their body thoroughly.
- To follow employer's standard operating procedures (SOPs) and supervisor's instructions about reporting and handling medical wastes in case of any additional advice.
- Only a trained and qualified personal to be allowed for handling of biomedical waste with competent supervisory staff.
- To place contaminated PPE's in closable, leak proof bags or containers for disposal or decontamination.
- To provide first aid room for administration of first aid in case of exposure to biohazards.
- Regular induction and orientation training programme to all the persons working in the premises on the hazards inter-alia safety measures to be followed.

## **2. Safety measures while using Incinerators:**

- To provide eye protection and to wear face mask when opening loading door or visually checking the unit to protect against exploding ampoules and glass bottles.
- To wear heavy-duty gloves, masks and apron when handling health-care waste.
- Ash to be removed using mechanical equipment and not to be handled by hand. An adequate cool-down period of 3 to 5 hrs to be provided before ash removal.
- To carry out visual inspections of the facility for corrosion, leaks, mortar and seal failures, etc. on a periodic basis.
- To maintain records of maintenance activities to prevent premature failure, increase life and track performance of incinerator.
- Only a trained and qualified operator to operate or supervise the incineration process.
- Review manuals for Specific instructions for correct operation and maintenance schedule.
- Seriatim actions for Start-up and shutdown procedures to operate incinerator to be followed without any excuses.

**3. Safety measures during operation & maintenance of ETP:**

- To wear personal protective equipment and chemical resistant clothing to avoid exposure of skin or eyes to corrosive and/or polluted solids, liquids, gases or vapors
- ETP operator to undergo routine health checking to reveal early symptoms of chronic effects or allergies
- To obey all safety-instructions regarding the storage, transport, handling or pouring of chemicals as per standard protocol.
- Not to smoke, eat or drink in areas where chemical or biological contamination may be expected.

**4. Safety measures during operation & maintenance of Autoclave:**

- To inspect the door gasket (seal) for any cracks or bulges.
- To clean the drain screen of debris if necessary.
- Autoclave to be turned on and allow time for the jacket to reach sufficient temperature and pressure.
- Not to autoclave flammable, combustible, reactive, corrosive, toxic, or radioactive materials.
- Items to be placed in an autoclave tub on rack. Never to place items directly on the autoclave bottom or floor.
- To use personal protective equipment (PPE) such as lab coat and heat-resistant gloves to prevent burns from heat and steam while using an autoclave.
- Autoclave and the safety gadgets mounted on the equipment shall be lined up for periodical tests and examinations to ensure its soundness and safe working conditions.



**Table 7.3 Risk Impact Matrix**

ENVIRONMENTAL ATTRIBUTE	PARAMETERS	PROJECT ACTIVITIES																				
		Pre-construction phase			During construction Phase							Operation & Maintenance										
		Change in land topography	Land acquisition	Clearing vegetation	Civil works such as excavation, building of structures etc.	Construction equipment operation	Generation and disposal of construction debris	Generation of Sewage	Influx of construction workers	Movement of vehicles	Waste material storage	Movement of vehicles	Incineration of biomedical waste	Operation of Autoclave	Operation of Shredder	Operation of ETP	Generation & disposal of Sewage	Generation & disposal of solid waste	Generation and disposal of Hazardous waste such as Incinerator ash, ETP sludge	Shutdown of plant	Influx of workers during plant operation	Greenbelt development
<b>Air &amp; Noise Environment</b>	Ambient air quality	-	-	-	C	-	-	-	-	C	C	D	F	-	-	-	-	-	-	-	-	A
	Indoor air quality	-	-	-	C	-	-	-	-	C	-	C	D	-	C	-	-	-	-	-	-	A
	Noise	-	-	-	D	D	-	-	-	-	-	D	C	-	D	C	-	-	-	-	-	A
	Odor	-	-	-	-	-	-	-	-	-	F	C	D	-	C	C	C	D	D	-	-	A
<b>Water Environment</b>	Surface water resources	-	-	-	-	-	-	C	-	-	-	-	-	-	-	-	-	-	-	-	C	-
	Surface water quality	-	-	-	-	-	-	-	-	-	-	-	C	-	-	C	-	-	-	-	-	-
	Ground water Resources	-	-	-	-	-	-	-	-	-	D	-	C	C	-	C	C	-	-	-	-	-
	Ground water quality	-	-	-	-	-	-	-	-	-	D	-	C	-	C	C	D	-	-	-	-	-
<b>Land Environment</b>	Soil erosion	-	-	C	C	-	-	-	-	-	-	C	-	-	-	-	-	-	-	-	-	A
	Soil Quality	-	-	-	C	-	-	-	-	-	-	-	-	-	-	D	D	-	-	-	-	A
<b>Ecology &amp;</b>	Flora	-	-	C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	A

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<b>biodiversity</b>	Fauna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	A
	Crop yields in the surrounding area	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Socio Economics</b>	Employment Opportunities	-	-	B	B	B	-	-	-	-	-	A	A	B	B	B	-	-	B	D	-	-	-
	New infrastructure developments	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	B	-	-	-	-
	Political conflicts	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Occupational Health &amp; Safety</b>	Acute	-	-	C	-	C	-	-	-	-	C	C	-	-	C	C	C	C	-	-	-	-	A
	Chronic	-	-	-	C	-	-	-	-	-	-	-	C	C	-	-	-	-	-	-	-	-	-
	Fatal	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

- A: Strongly beneficial (positive) impact
- B: Low beneficial impact
- C: Low adverse impact (localized in nature)
- D: Moderate adverse (negative) impact
- E: Strong adverse (negative) impact
- : No conceivable impacts on environment

#### **7.4 Accident Reporting (Source: Guidelines for Management of Healthcare Waste as per Bio-Medical Waste Management Rules, 2016)**

Any accident occur during the handling of Bio Medical Waste in the healthcare facility is having potential to either harm the environment or safety of the human health must be recorded. As per the Bio Medical Waste Management Rules, 2016, the accidents are classified into-

##### **a. Major Accidents**

Major accidents include but not limited to following

- i. Toppling of the truck carrying bio-medical waste
- ii. Accidental release of bio-medical waste in any water body

It is mandatory under BMWM Rules 2016, for health care facilities to report each/any major accidents, to the respective State Pollution Control Board/Pollution Control Committee, occurred during the handling of BMW along with the records of remedial actions taken including corrective and preventive actions.

The Accident Report is needed to be forwarded in written to the respective SPCB/PCC within 24hrs of accident. The reporting should be done on the prescribed Form 1 given in BMWM Rules 2016.

##### **b. Minor Accidents**

Minor accidents include but not limited to following;

- Needle stick injuries,
- Splash exposure or
- Spillage of mercury / chemicals etc.,

Such minor accidents need not to be immediately reported to the State Pollution Control Board but is required to be recorded by the facility and appropriate remedial actions must be taken by health care facility.

Facility also needs to submit consolidated report on accidents both major and minor, along with the number of persons affected, remedial actions taken and number of fatalities, along with the annual report (for the preceding calendar year) to be submitted to SPCB / PCC, on or before 30<sup>th</sup> June of every year.

#### **7.5 Occupational Safety**

It is the responsibility of in charge of the facility to ensure the occupational safety of the workers and other staff involved in handling of Bio medical waste in the CBMWTF.

As per Bio Medical Waste Management Rules, 2016 occupational safety of the staff has to be ensured in following methods:

- Providing adequate and appropriate Personal Protective Equipment (PPEs) to the staff handling Bio Medical Waste. Use of PPE while handling of Bio Medical Waste must be insisted and must be supervised regularly to ensure occupational safety of staff.
- Personal Protective Equipment (PPE) includes:
  1. Heavy Duty Gloves (Workman's Gloves)
  2. Gum Boots or safety shoes for waste collectors
  3. Face mask
  4. Head Cap
  5. Splash Proof Gowns or aprons etc.
  6. Disposal gloves for waste handlers
  7. Conducting health check-up of all the employees at the time of induction and also at least once in a year.
  8. Ensuring that all the staff involved in handling of BMW is immunized against the Hepatitis B and Tetanus.
  9. Investigation of accidents to find out unsafe acts and unsafe conditions. Take remedial steps/ corrective and preventive actions against any accident occurred to avoid reoccurrence.

### **7.6 Employee Health Check Up**

As per Bio Medical Waste Management Rules, 2016, every CBMTF must ensure that a comprehensive health check-up of each employee and other staff involved in BMW handling is carried out at the time of induction and also as a mandatory procedure to be followed for each year. Comprehensive Health Check-up includes following but not limited to;

1. Present Complaints (If any), with duration
2. Vaccination History (especially with respect to Hepatitis B and Tetanus Thyroid)
3. Past Medical History
4. Past Surgical History
5. General Physical Examination
6. Dental Examination
7. Systemic Examination including Cardiovascular System, Respiratory System, Central Nervous System, Gastrointestinal System, Uro Genital System, Gynae and Obstet. (in case of females), Musco-skeleton System, EYE and ENT.
8. Lab Investigations including: Hb, TLC, DLC, RBS, Blood Urea, S. Creatinine, Urine, Stool etc.
9. Radiological Investigations: Chest X ray, USG (If needed), CT or MRI (if needed)
10. Inference with Diagnosis

Health Check-up records of all the employees are needed to be maintained in their respective personal record of each employee for proving compliance. The formats prescribed in the guidelines to be followed.

### **7.7 Immunization**

All the staff involved in handling of Bio Medical Waste in the health care facility must be immunized against the communicable diseases especially against COVID, Hepatitis B and Tetanus. Evaluation of immunization status of the staff must be included in the annual health check-up. Hospital needs to maintain the immunization records of all the staff with dates of immunization and due date of first dose, Second Dose and Booster Dose.

### **7.8 Training of Healthcare Workers**

As per Bio Medical Waste Management Rules, 2016, it is mandatory for all the employee of the healthcare facility to be trained on handling of biomedical waste management and handling.

### **7.9 Disaster Management**

Disaster is an unexpected event due to sudden failure of the system, external threats, internal disturbances, earthquakes, fire and manmade accidents. Following subsection describes the measures to be undertaken by the project proponent to prevent / minimize risk of unexpected event.

The details of disaster management system are discussed in the following section.  
Defining the Nature of Emergency

#### **7.9.1 Introduction**

An Emergency can be defined as an “Occurrence of such magnitude so as to create a situation in which normal pattern of life within a facility is suddenly disrupted, adversely affecting not only the personnel and property within the facility, but also in its vicinity”. Such an occurrence may result in On Site implication.

#### **7.9.2 Potential / Actual Emergency**

The following maximum credible accident scenarios may occur in a CBWTF

1. Failure of equipment in facility
2. Water accumulation at facility due to heavy rain
3. Road accident during transportation of bio-medical waste

##### **1. Failure of equipment in facility:**

To mitigate failure of equipment operating for treatment of bio-medical waste at the

facility the following measures should be considered-

- a. Periodical review to ascertain the integrity of the equipment
- b. Regular/periodical maintenance of equipment
- c. To ensure proper operating conditions such as temperature, pressure etc., for different equipment
- d. Regular monitoring must be carried out to check the efficiency of equipment

## **2. Water accumulation at facility due to heavy rain:**

In event of such situation at the facility, necessary precautions must be implemented as quickly as possible such as-

- a. Incoming waste to be stopped
- b. Relocation and covering of existing bio-medical waste
- c. Mitigation work to be done round the clock
- d. To keep a note on how much waste is moved or has the movement been stopped
- e. To ensure people handling the situation the persons are equipped with PPE's
- f. Augmenting the tools and tackles to address the emergency

## **3. Road accident during transportation of bio-medical waste:**

- a. Transportation of waste only in authorized vehicles
- b. Drivers must have thorough knowledge in driving, contents being transported and its associated hazards
- c. To follow road safety measures to prevent accidents
- d. Vehicle is equipped with MSDS of any specific vehicle transported and TREM (Transport Emergency Card) for ready reference in the event of any emergency

Emergency prevention through good design, operation, maintenance and inspection are essential to reduce the probability of occurrence and consequential effect of any eventuality. However, it is not possible to eliminate totally such eventualities and random failures of equipment or human errors due to their unconscious movements just cannot be ruled out. An essential part of major hazard control is therefore, concerns with mitigating the effects of such emergency and restoration of normalcy at the earliest. The overall objective of a disaster management plan is to make use of the combined resources at the site and outside services to achieve the following:

- a. To localize the emergency and if possible, eliminate it;
- b. To minimize the effects of the accident on people and property;
- c. Effect the rescue and line up for apt medical treatment of casualties;
- d. To ensure appropriate capacity building for mitigation

- e. To ensure right protocol in the event of any emergency without any panicky
- f. To enhance morale of the persons working inside the plant.
- g. To avoid emergency becoming off site inter-alia avoiding scare to the immediate surrounding
- h. Evacuate people to safe areas;
- i. Informing and collaboration with statutory authorities.
- j. Provide authoritative information to news media;
- k. Initially contain and ultimately bring the incident under control;
- l. Preserve relevant records and equipment for the subsequent enquiry into the cause and circumstances of the emergency;
- m. Investigating and taking steps to prevent reoccurrence

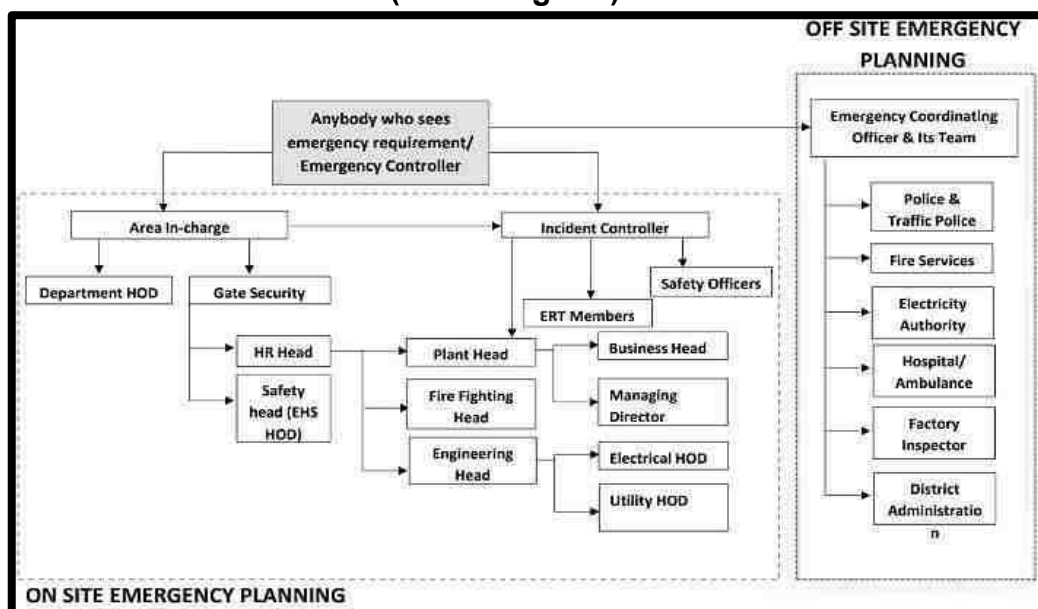
The DMP therefore relates to the identification of sources, from which hazards can arise and the maximum credible loss scenario that can take place in the concerned area. The management plan takes into account the maximum credible loss scenario – actions that can successfully mitigate the effects of losses/ emergency needs to be in a well-planned manner so that the requirement of efforts to be put in is least.

### 7.10 Onsite Emergency Plan

Any emergency starts as a small incident that may become a major accident, if not controlled in time. The activities related to emergency shall be divided into two parts namely-

- 4. Pre-emergency activities
- 5. Post –emergency activities

### General network matrix of DMP (Flow Diagram)



**1. Pre-emergency activities-**

These activities are to be carried out before an emergency occurs. The following are the activities to be considered-

**a. Fire System Testing-** To prepare schedule for testing all the fire-fighting equipment and check its operability, strength and weakness. Maintain the record of all testing and carry out repairs or replacement of defective equipment.

**b. Mutual Aid Scheme-** To prepare mutual aid scheme and enter into agreement with the neighboring units for getting help in case of emergency. Reviewing of scheme once in a year w.r.t scope of help, type of aid, contact person etc.,

**c. Mock-Drills-** To conduct mock drills to train employees about their role/duties during an emergency and to enhance their ability, skill and knowledge.

**d. Safety Training-** To organize both induction and orientation programme for the employees for swift and right handling of equipment, usage of PPE's, first aid etc., by aligning with internal / external faculties

**e. Personal Protective Equipment-** To procure adequate number of personal protective equipment such as hand gloves, safety goggles, helmets. masks etc., Also, a proper record of usage and disposal of used PPE's must be maintained.

**f. Emergency power supply-** To maintain DG set as stand-by incase of power failure and augment the infrastructures required.

**g. Emergency assembly points -** To fix assembly points on the site for the persons who are not associated with handling of emergency/ visitors in case of an emergency.

**h. Hospital Facility-** To keep liaison with local hospitals in the area and keep all the health records of all employees for proper and immediate first-aid and medicine facility.

**i. Fire Prevention plan and statutory information-** To prepare a list of major work-place emergencies and the safety measures to be incorporated. Information about the chemicals or equipment handled at the onsite and methodology scheduled to mitigate emergency shall be given to workers, public and neighboring units.



## **2. post-emergency activities**

These activities are to be carried out after an emergency is over so as to know the cause of occurrence of the emergency and establish measures to prevent its re-occurrence. The activities are-

- a. Collection of records of accident, injury, damage to property, buildings, equipment, material and loss of production.
- b. Collection of contaminated fire water and send for treatment and final disposal.
- c. Conducting enquiries and concluding preventive measures.
- d. Making insurance claim for the materialistic loss /damage.
- e. Implementation of enquiry report's recommendations.
- f. Rehabilitation of affected persons within and outside the plant.
- g. Restarting the plant and normalizing the operations.

## **7.11 Reporting to State Pollution Control Board or Pollution Control Committee**

### **7.11.1 Annual Reporting**

As per the Bio Medical Waste Management Rules, 2016, the proponent of the facility is required to submit the Annual Report to the SPCB/ PCC on or before 30<sup>th</sup> June every year, for the period from January to December of the preceding calendar year.

- a. The annual report should be filled in the prescribed format as per the Form - IV prescribed under BMW Management Rules, 2016.
- b. The annual report contains details of following:
  - i. Particulars of Occupier/ HCF
  - ii. Quantity of waste generated in kg/annum
  - iii. Details of storage, treatment, transportation, processing and disposal facility
  - iv. Details of training conducted on Bio Medical Waste Management
  - v. Details of accident Occurred
  - vi. Details Emission and Effluent testing
  - vii. Annual Report submitted to the State Pollution Control Board

## CHAPTER VIII PROJECT BENEFITS

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### 8.0 Introduction

The common bio-medical waste treatment facility of **M/s. Ramnad Doctors Association, Keelakottai Group, Muthuvayal Village, Paramakudi Taluk, Ramanathapuram District, Tamil Nadu.** will have the following advantages:

- The proposed project facilitates better management and disposal of bio-medical waste generated from HCEs located at Ramnad and part of Sivagangai Districts.
- This CBMWTF will have the treatment and process facilities i.e. Incineration, autoclaving & shredding in accordance with the BMW Rules and the Guidelines Published by Ministry health and Family welfare, Ministry of Environment Forest and Climate Change and Central Pollution Control Board.
- The facility will work on no loss no profit basis hence it will be beneficial to the HCEs to meet the regulatory requirement as well as to ensure that the BMW generated do not create nuisance in the neighborhood of the HCEs.
- This facility will avoid the transportation of BMW to the existing facility at Virudhunagar. The facility avoids movement of bio-medical waste for longer distances for secure treatment and disposal.
- As there are no CBWTF within 70 km radial distance from the project site, the proposed expansion will help in meeting the demand for treatment and disposal of bio-medical waste from health care facilities.
- The proposed project can collect and treat BMW from HCE's, thereby easing the pressure on the CBMWTF at Virudhunagar.
- Because of Covid-19 situation, there is increase in the generation of bio-medical waste and demand for accepting higher quantity of waste for treatment and disposal. Thus, the proposed expansion helps in meeting the demand.

Other general benefits from the proposed CBWTF facility are-

- Reduced risk of spread of disease carrying vector and environmental liability due to captive storage of bio-medical waste in the HCE's
- Helps HCE's in timely disposal of bio-medical waste and eases the pressure
- Scientific treatment and disposal of bio-medical waste
- Generation of organized employment for locals
- Management of waste is easier and economically viable at common treatment facility
- Cost of environmental monitoring is less at common facility
- It will augment organized common Biomedical Waste Treatment in the Districts.

## **CHAPTER IX ENVIRONMENTAL COST BENEFIT ANALYSIS**

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### **9.0 Environmental Cost Benefit Analysis**

As per EIA Notification dated 14th September, 2006 as amended from time to time; the chapter on “Environmental Cost Benefit Analysis” is applicable only, if the same is recommended at the Scoping Stage.

As per the ToR issued by SEIAA for the project, vide letter No. SEIAA-TN/F.No.8781/SEAC/ToR-1217/2022 dated 26.07.2022; the Environmental Cost Benefit Analysis is not required.

## **CHAPTER X ENVIRONMENT MANAGEMENT PLAN**

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### **10.0 Introduction**

The Environment Management Plan (EMP) is required to ensure sustainable development in the area of the proposed project. EMP aims at not only to meet the regulatory requirements but also to ensure the conservation measures with respect to natural resources.

Impact mitigation measures at the source level are planned to ensure that the recipient environment is least affected and an overall management plan is developed for sustainable development. EMP also ensures that project implementation is carried out in accordance with design by taking appropriate mitigation measures to minimize the impacts on the environment during construction and operational phase.

EMP helps in measuring the effectiveness of the mitigation measures and to improve upon the plan if the desired results are not attained. The proposed project of the CBWTF is a project for environmental and social betterment and for scientific collection, transportation, storage, treatment and disposal of bio-medical waste at a common facility.

Chapter 4 of this EIA report under the caption “Anticipated Environmental Impact and Mitigation Measures” is dealt in detail. Similarly, in Chapter 6 of this report, environment monitoring methodology, frequency, location of monitoring, budgeting of EMP etc., is dealt.

In this chapter emphasis on the EMP is made on the following:

- Mitigation measures for each of the activities causing environmental impact;
- Monitoring plans for checking activities and environmental parameters and monitoring responsibilities
- Defining roles and responsibilities and resource allocation for monitoring

A structure of this plan and hierarchy of process flow chart for environmental management is prepared. Prajwal BMW Management system has adopted this structure and hierarchy, which is akin to principles and practice. Further, the administrative aspects of the environment management, green belt and rainwater harvesting are also dealt.

The success of implementation of the EMP lies in;

- Management support
- Efficiency of the environment management cell and
- Acceptability of resulting environmental quality, both by regulatory body and by public
- 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

### **10.1 Objectives of Environmental Management Plan**

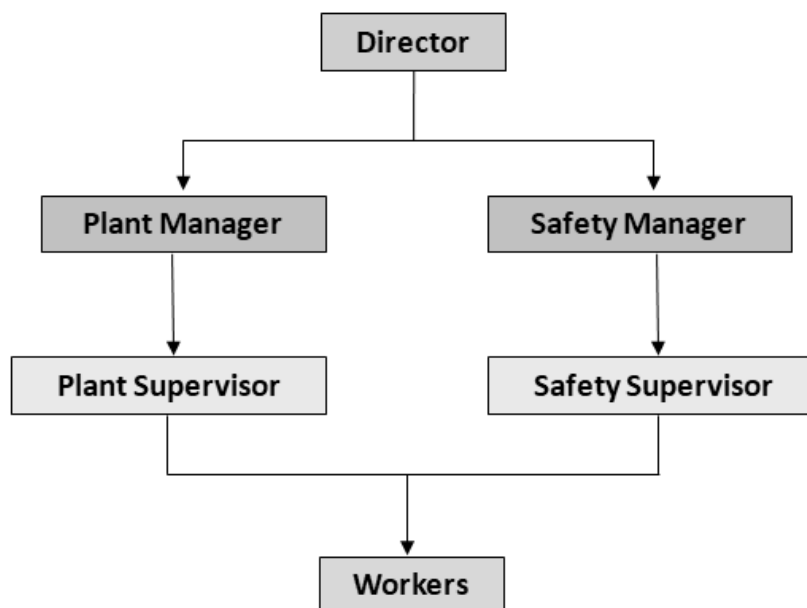
The Environmental Management action plan aims at controlling pollution at the source level at the extent possible. Objectives of EMP are summarized as under:

- The mitigation measures are implemented to protect the environment from the operational impacts and to comply with all legal requirements so as to meet the social obligation
- Systems and procedures are established for implementing mitigation measures to;
  - a. Treat and dispose the pollutants related to air, liquid, solid/hazardous waste and to control noise
  - b. To take up greenbelt development
  - c. Practice rainwater harvesting
  - d. Give emphasis on resource conservation, recycle and reuse
  - e. Ensure good working conditions for employees
- Monitor the effectiveness of mitigation measures and correct and upgrade the systems to meet the regulatory norms
- Take necessary prompt action when unforeseen impacts occurrence due to accidents and any other unforeseen conditions.

### **10.2 Environmental Management Cell (EMC)**

An Environmental Management Cell (EMC) is established for implementation and monitoring of EMP. The EMC is having technical personnel with required expertise and with clearly defined responsibilities and authority for effective implementation of EMP. A typical structure of EMC is presented in the form of an Organogram below in Figure 10.1.

**Figure 10.1 – Schematic Representation of organizational structure of environment management**



**Responsibilities of Environmental management cell**

- To implement & monitor the Environmental Management Plan
- To inculcate Safety culture by regular training
- Report timely compliance to the regulatory authorities as stipulated
- Monitor the wastewater for flow of effluent, operation of online monitors, analysis of critical parameters as per the SOPs for the unit operation of ETP and as enumerated in Chapter 6 of the EIA report
- Monitor efficiency of all pollution control equipment regularly
- Maintain online monitoring system attached to emission from incinerator
- Develop a strong Management Information System or Standard Operating Procedure to disseminate information to top management and concerned personnel on-
  - a. Compliances
  - b. Non-compliances
  - c. Efficiency of operation of pollution control equipment and pre-treatment facilities
  - d. Alert the top management on potential non-compliances
- To ensure that Environment Performance is one of the important agenda points in the Monthly Progress Review by top management
- Look for improvement opportunities to down size carbon footprint and to reduce emissions to environment

### **10.3 EMP for Construction stage**

Construction phase impacts and mitigation measures;

There will be no major construction except construction of shed of dimension L 12 m X B 15 m X H 7.5 m. The existing three building will be taken up for maintenance and used for receipt and sorting of waste and for housing the autoclave and shredder which are already existing as a part of old facility. The contractors deployed for construction work are mandated to implement recommendations of the EMP to:

- Ensure compliance with the EMP at all times during construction
- Maintain an environmental register which keeps a record of all incidents which occur on the site during construction

These incidents include:

- Public involvement/complaints
- Health and safety incidents
- Incidents involving construction materials stored on-site

The construction for proposed expansion involves construction of incinerator shed of small-scale industry standards. The impacts are minor within the plant premises and reversible.

#### **i. Responsibilities of Environmental Management Cell during construction**

The following are the responsibilities of Environmental Management Cell. Unless otherwise stated the EMP will be adhered to as follows:

1. The EMC will monitor the construction phase implementation of EMP by contractors
2. The Environmental Engineer will inspect the site periodically depending on the stage of the project
3. The inspection will include a review of records that will be kept on-site by the site engineer
4. The project proponent will bear ultimate responsibility for environmental management

#### **ii. Environmental monitoring during construction**

Since, there will be no deep excavation and cut and fill activity, monitoring during construction phase is not required.

#### **10.4 EMP for Operation stage**

The impacts on the various environmental attributes are mitigated by taking appropriate pollution control measures. The Environment Management action plan aims at controlling pollution at the source level to the extent possible, with the available and affordable technology, followed by the treatment measures before they are discharged to the environment. The mitigation measures to prevent adverse impact during the operation phase of the project focus on the following;

- a) Air quality management
- b) Water environment
- c) Transportation
- d) Noise environment
- e) Socio-economic environment
- f) Treatment and disposal of Hazardous waste

#### **A) Air quality management**

- Maintaining proper air circulation in the storage/sorting shed
- Quick treatment and disposal of odorous and infectious bio-medical waste without storing the same for longer period of time
- The emissions from incinerator shall be scrubbed, ensure quick scrubbing of gases to reduce /control the Dioxin and Furon
- To provide the chimney of 30 m height as per the BMW Rules.
- To ensure that the emission levels are well within the stipulated standards
- The incinerator ash generated shall securely stored and disposed through TSDF
- The periodic monitoring of emission sources and ambient air quality is ensured as per the Environmental Monitoring Program. To carryout monitoring as detailed in Chapter 6
- The operational maintenance of air pollution control equipment and online monitoring system is carried out as per schedule prescribed by the suppliers

#### **B) Wastewater management**

- The bio-medical waste received at site will be stored/sorted in the storage sheds with proper impervious flooring and lining.
- Quick treatment of bio-medical waste stored at storage shed to prevent spillage or generation of leachate
- The spillages if any during unloading of waste will be immediately collected by mopping using mop or cotton, which shall be collected and taken for incineration along with bio-medical waste
- To ensure that the surface runoff will not enter the storage shed area
- Continuous operation and maintenance of effluent treatment plant



- Liquid effluent will be treated to the stipulated standards
- No untreated effluent is discharged on land or outside the facility
- The treated effluent will be reused in scrubbing

### **c) Transportation**

Vehicle incorporated for transportation of bio-medical waste must satisfy the following specifications-

- The vehicle carrying bio-medical waste must have separate cabins for driver/staff and for bio-medical waste
- The base of the waste cabin of vehicle is leak proof and easy to wash.
- The inner surface of the waste cabin is made of smooth surface to minimize water retention.
- The vehicles are properly labeled with the symbol of Biohazard as per schedule III of the BMW Rules, 2016 and display the name, address and telephone number of the company.
- The waste cabin will have sufficient opening from rear so that Bio Medical waste can be easily loaded and unloaded.
- The vehicles are provided with the First Aid Kit to handle emergency situations.
- Mobile phones are given at all the vehicles for effective supervision and monitoring of collection and transportation work
- Vehicle is also fitted with GPS tracking system as per the directive of the KSPCB.
- After unloading the waste, vehicles should be washed in the wash area to be provided and the wash water taken to the ETP

### **D) Noise Management**

- The noise levels shall be monitored as detailed in Chapter 6
- Any change in noise levels shall be addressed immediately
- The noise control enclosure incorporation
- Employees using PPEs in case of high noise
- Occupational Health related issues of the work force is monitored and corrective actions are initiated if any deviation is noticed

### **E) Socio-economic management**

- Job opportunities to local residents during construction and operation phase
- Avenue plantations improve aesthetics
- Providing drinking water facility as a part of CER activity to nearby village
- To maintain good public relation with the community
- Helps in preventing the spread of disease vector by securely treating and disposing bio-medical waste

### **F) Biological environment management**

- Develop green belt of 33% of the total plot area of facility
- Existing trees at periphery shall not be cut down
- Planting of native species and healthy seedlings
- To plant shrubs or grass to prevent erosion of top soil in small open spaces

### **10.5 Leachate Generation and Management**

Leachate is a liquid waste generated from waste decomposition. In the project, leachate can be generated from storing of BMW on-site and neglecting its treatment even after 48 hours of receiving and storage.

The BMW waste will be securely stored and disposed of on the same day of receipt to prevent generation of leachate. Leachate can be generated from on-site CBWTF through incinerated ash and ETP sludge, therefore it is to be stored in a secured manner inside a shed.

Hence, it is necessary to prevent generation leachate and if generated shall be immediately mopped and incinerated. The following are the measures to be taken for prevention and management of leachate:

- To ensure the flooring of storage area storing bio-medical waste in the CBWTF is impervious
- To prevent storm water to mix with the stored bio-medical waste by directing the water into storm water drains
- To ensure the bio-medical waste received are treated/incinerated within 48 hours
- To dispose ETP sludge and incinerated ash generated on-site through authorized TSDF
- Proper cleaning and maintenance of ETP and incinerator

### **10.6 Post Closure Management Plan**

The existing common bio-medical waste treatment facility consists of sheds (existing and proposed) built using G.I. sheets with M.S. pillars supported by cement blocks and impervious flooring. The facility will also consist of impermeable ETP and equipments for treatment of bio-medical waste.

In the present the CBWTF operated by M/s Neat and Clean Service Squad has followed the deep burial of the BMW as per the provisions in the BMW Rules. There are two pits of deep burial these are now closed with fresh earth. As per the monitoring carried out there is no contamination in the adjacent areas and in the ground water due to the deep buried waste as the waste is disposed using lime layer and fresh earth layer after each day's burial.

### 10.7 Greenbelt management

Green belt planning shall be done as per guidelines laid by CPCB. This will help in increasing the aesthetic effect of the environment. Green belt will be developed along most of the periphery of the project area as well as along roads.

The main objective of green belt development around the facility is to:

- Mitigation of impacts due to fugitive emissions
- Attenuation of noise levels
- Odor control
- Ecological restoration
- Improvement in aesthetic environment quality
- Soil erosion prevention
- It acts as an indicator to the quality of the environment by observing its health

Total 2524.02 (33% of plot area) shall be developed as green area. Any sapling that does not survive will be replaced. Ornamental trees will also be planted to improve the aesthetic looks of the project area. The following characteristics have been taken into consideration while selecting plant species for green belt development and tree plantation.

- They shall be fast growing and tall trees.
- They shall be perennial and evergreen.
- They shall have thick canopy cover.
- They shall have a large leaf area index.

Since tree trunks are devoid of foliage, scrub should form there to give coverage to the trunks. The trees will maintain regional ecological balance and conform to soil and hydrological conditions. Indigenous species would be preferred. Before planting trees, seedlings, saplings, grass species, shrubs, soil preparation, soil amendments etc. are to be undertaken well in advance. For proper survival and healthy growth of plant species a nursery is also maintained at the site. It is ensured that proper density of plants is maintained at site. Post plantation care is also necessary and maintained in a planned and scientific manner.

**Table 10.1 List of Trees in the Greenbelt Development**

S. No.	Botanical Name	Common Name	Site	No.
1	<i>Acacia auriculiformis Benth</i>	Earleaf Acacia	A1	100
2	<i>Azadirachta indica A.Juss.</i>	Neem	A1	150
3	<i>Terminalia catappa L.</i>	Baadam Tree	A2	50
4	<i>Mimusops elangi L</i>	Spanish Cherry	A3	50
5	<i>Tectona grandis L.f.</i>	Teak Tree	A1	40
6	<i>Derris indica (Lam.) Bennett</i>	Pongam Oil Tree	A2	100
7	<i>Ficus benjamina L</i>	Weeping Fig	A3	60
8	<i>Caesalpinia pulcherrima L Swartz</i>	Peacock Flower	A3	80
<b>Total</b>				<b>630</b>

### **10.8 Odour Control**

1. As per BMW Rules the waste should be treated within 48 hrs. of its generation.
2. Daily washing of waste collecting containers, vehicle compartment and floor of store room.
3. Closed cabin vehicles shall be used for the collection and transportation of bio-medical wastes.
4. Masks shall be provided to workers to avoid health issues due to odour.
5. Hygienic conditions shall be maintained.
6. Green Belt/Plantation will be maintained across the project site to check odour within the premises.
7. Dilution of odorant by odour counteraction or neutralize by spraying Ecosorb (organic and biodegradable chemical) around odour generation areas at regular intervals.
8. Area will be properly ventilated

### **10.9 Rainwater Harvest Design**

#### **10.9.1 Rain water collection system**

Rainwater may affect the recipient environment if not properly collected and discharged. The rain water from the roof top shall be collected in collection tank. The size and the locations of rainwater harvesting pits will be decided during detailed engineering of the project. The collected water shall be transferred to main water tank and used for scrubber and other uses.

The factors influencing surface runoff at any place is as follows:

- Intensity of rainfall
- Soil moisture condition
- Type of soil in the catchment
- Type of the vegetative cover and interception by vegetation
- Slope and orientation of the catchment
- Amount of infiltration and evaporation

The annual volume of runoff is computed by using the formula  $Q = kAP$

Q = runoff;

k= runoff co-efficient depending upon the surface of the drain area (0.36-0.95);

A=catchment area;

P=Annual rainfall.

#### **Design Guidelines**

- i) Recharge shafts may be dug manually in non-caving strata. For construction of deeper shafts, drilling by direct rotary or reverse circulation may be required.
- ii) The shafts may be about 2 m in diameter at the bottom if manually dug. In case

- of drilled shafts, the diameter may not exceed 1m.
- iii) The shaft should reach the permeable strata by penetrating the overlying low permeable layer, but need not necessarily touch the water table.
  - iv) Unlined shafts may be back-filled with an inverse filter, comprising boulders/cobbles at the bottom, followed by gravel and sand. The upper sand layer may be replaced periodically. Shafts getting clogged due to biotic growth are difficult to be revitalized and may have to be abandoned.

The effective catchment area after applying the runoff coefficient is calculated for the design. Surface run off can be used to recharge the ground water. This is achieved by recharge wells and/or direct tube-well recharge. The run-off from the previous area will be routed directly to the rainwater harvesting structures constructed at suitable locations as per the contours. For augmenting the ground water resources in the plant premises, number of rainwaters harvesting pits will be constructed and the internal drains where excess rain water flowing in drain will be diverted to these pits. These structures will facilitate percolation of water into the ground and thus augmenting the groundwater sources.

The storage of rain water on surface is a traditional techniques and structures used were underground tanks, ponds, check dams, weirs etc. Recharge to ground water is a new concept of rain water harvesting and the structures generally used are,

#### Pits Size

- Percolation Pits - 2 nos (1.2 m x 1.2 m x 1.2 m)
- Percolation Pits - 1 no (1 m x 1 m x 1 m)

The incinerated ash and the ETP sludge are the Hazardous waste generated. The generation of incineration ash will be about 0.3 kg/d and the same will be handed over to TSDF. ETP sludge is also handed over to Authorized recycler.

- Plastic wastes are disinfected, disintegrated/shredded and handed over to recyclers
- Sharps are disinfected, shredded and encapsulated
- Glass waste will be disinfected and handed over to recyclers

Domestic solid waste generated is minimal say 1.0 kg/day, of which 60% (0.6 kg/day) is organic and 40% (0.4 kg/day) is inorganic waste, which will be segregated at source, collected in bins and disposed.

## **10.10 Management of COVID-19 Waste**

### **COVID-19 Isolation Wards**

1. Healthcare facilities having isolation wards for COVID-19 patients need to follow these steps for ensure safe handling and disposal of biomedical waste generated during treatment:
2. Keep separate colour coded bins/ bags containers in wards and maintain proper segregation of waste as per BMWM Rules, 2016 and amended and CPCB guidelines for implementation of BMW Management Rules.
3. As precaution double layered bags (using 2 bags) should be used for collection of waste from COVID-19 isolation wards so as to ensure adequate strength and no-leaks.
4. Collect and store biomedical waste separately prior to handling over the same CBWTF. Use a dedicated collection bin labeled as “COVID-19” waste and keep separately in temporary storage prior to handling over to authorize staff of CBWTF. Biomedical waste collected in such isolation wards can also be lifted directly from the ward into the CBWTF collection van.
5. In addition to mandatory labeling, bags/containers used for collecting biomedical waste from COVID-19 wards, should be labeled as “COVID-19 Waste”. This marking would enable CBWTF to identify easily to priority treatment and disposal immediately upon receipt.
6. General waste not having contamination should be disposed as Solid Waste as per SWM Rules, 2016.
7. Maintain a separate record of waste generated from COVID-19 isolation wards.
8. Use dedicated trolleys and collection bins in COVID-19 isolation wards. A label “COVID-19 Waste” to be pasted on these items also.
9. The (inner and outer) surface of containers/bins/trolleys used for storage of COVID- 19 waste should be disinfected with 1% sodium hypochlorite solution.
10. Report opening or operation of COVID-19 ward to SPCBs.
11. Depute dedicated sanitation workers separately for BMW and general solid waste so that waste can be collected and transferred timely to temporary waste storage areas.

### **Duties of Common Biomedical Waste Treatment Facility (CBWTF):**

1. Report to SPCBs/PCCs about receiving of waste from COVID-19 isolation wards / Quarantine camps/ quarantined homes/ COVID-19 testing centers.
2. Operators of CBWTF shall ensure regular sanitization of workers involved in handling and collection of biomedical waste.
3. Workers shall be provided with adequate PPEs including three layers masks, splash proof aprons/gowns, nitrile gloves, gumboots and safety goggles.

4. Vehicles should be sanitized with sodium hypochlorite or any appropriate chemical disinfectant after every trip.
5. COVID-19 waste should be disposed off immediately upon receipt at the facility.
6. In case it is required to treat and dispose of more quantities of biomedical waste generated from COVID-19 treatment, CBWTF may operate their facilities for extra hours, by giving information to SPCBs/PCCs.
7. Operators of CBWTF shall maintain separate records for collection, treatment and disposal of COVID-19 waste.

#### **10.11 Noise Management**

To reduce Ambient Noise level the following measures will be adopted,

1. Equipment will be of standard make and will be equipped with a silencer. The equipment will be in good working conditions, properly lubricated and will be maintained to keep noise within permissible limits.
2. High noise zones will be marked and earplugs will be given to workmen near noise producing equipment.
3. Proper shifting arrangement will be made to prevent over exposure to noise and vibration. Cabin will be fitted with a glass window constructed for the workmen for protection against the noise.
4. Tall trees with heavy foliage will be planted along the boundary of the factory, which will act as a natural barrier to propagating noise.
5. Speed limits will be enforced on vehicles.
6. Use of horns / sirens will be prohibited.
7. Noise monitoring will also be carried out to check the compliance with prevailing rules.

#### **10.12 Parking Provision**

There will be use of approx. 10 four wheelers and 10 two wheelers daily for transportation purposes. These vehicles are for collection of bio medical waste from various medical establishments. About 122.35 Sq.m is allotted for parking space, so there is enough space available within the premises to park these vehicles.

### 10.13 Costs for Environment Management Plan

**Table 10.2 EMP Budget**

<b>S. No.</b>	<b>Particulars</b>	<b>Capital Expenditure (Rs. In Lacs)</b>	<b>Recurring Expenditure (Rs. In Lacs/year)</b>
1	Landscaping/ Plantation	3.00	0.20
2	Solid Waste Management	4.00	0.55
3	Waste Water Management/ETP	7.00	0.75
4	APCS Management	9.50	2.5
5	Environment Monitoring	0.75	0.35
6	Miscellaneous	1.00	0.5
<b>Total</b>		<b>25.25</b>	<b>4.85</b>

### 10.14 Corporate Environment Responsibility (CER)

M/s. Ramnad Doctors Association is committed to undertake CER activities for the welfare of surrounding villages as per the commitment made while seeking initial prior Environmental Clearance. Budgetary allocations of Rs. 20 lakhs are made which will be spent in 5 years.

**Table 10.3 CER Costs**

<b>Sl. No.</b>	<b>Activity</b>	<b>Fund allocated (Rupees in Lakhs)</b>
1.	Health and Education to nearby villages	2.5
2.	Electrification including solar power	0.5
3.	Toilet facility to nearby government school	2.0
4.	Supporting the nearby village panchayat to erect an electric crematorium	15.0
<b>Total</b>		<b>20.00</b>



## CHAPTER XI SUMMARY AND CONCLUSION

### 11.0 Introduction

M/s. Ramnad Doctors Association has proposed a Common Bio-medical Waste Treatment Facility at S.F. No. 249/3, Keelakottai Group, Muthuvayal Village, Paramakudi Taluk, Ramanathapuram District. Common Bio-Medical Waste Treatment Facility is proposed to install a 500 kg/hr incinerator and other allied facilities for disposal of BMW. It is proposed to cover about 1,800 numbers of Health Care Establishments (HCE) and total bed strength will be 3,500 numbers. The quantum of bio-medical waste generating is about 3500 kg/day.

The area of operation is Ramanathapuram district and part of Sivagangai District.

The project falls under Category B1 schedule 7 (da) as per the MoEF&CC Notification dated 17th April, 2015 issued under the EIA Notification 2006. Project falls under Red category as per the categorization of Industry of CPCB/TNPCB.

### 11.1 Project Details

Bio-medical waste is generated from all HCEs like clinics, hospitals, nursing homes, veterinary institutions, animal houses, pathological laboratories, blood banks etc., The proposed project is a CBMWTF will have facilities as per the CPCB guidelines for collection, treatment and safe disposal of Bio-medical waste generated from these HCEs as per BMWM rules, 2016.

**Table 11.1 Project Overview**

S. No.	Parameters	Description						
1	Name of the project and location	M/s. Ramnad Doctors Association – BMW Plant located at S.F. No. 249/3, Keelakottai Group, Muthuvayal Village, Paramakudi Taluk, Ramanathapuram District.						
2	Project Activity Schedule, Category as per EIA Notification 2006 & amendment	The project falls under Category B, schedule 7 (da) as per the MoEF & CC Notification No. S.O 1142 (E) dated 17 <sup>th</sup> April, 2015. The Proposed Common Bio-Medical Waste Treatment Facility (CBMWTF) attracts obtaining of the Environmental Clearance.						
3	Plant Capacity	Capacity of CBMWF <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <thead> <tr> <th style="text-align: center;">Equipment</th> <th style="text-align: center;">No.s</th> <th style="text-align: center;">Capacity</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Incinerator</td> <td style="text-align: center;">1</td> <td style="text-align: center;">500 kg/hr</td> </tr> </tbody> </table>	Equipment	No.s	Capacity	Incinerator	1	500 kg/hr
Equipment	No.s	Capacity						
Incinerator	1	500 kg/hr						

M/s. Ramnad Doctors Association – BMW Plant

		Autoclave	1	600 Lit./cycle
		Shredder	1	200 kg/h
		Sharp pit	1	5cum
		Effluent Treatment Plant	1	10 KLD
4	Number of HCE's and beds to be covered	1800 numbers. Number of beds 3500 numbers.		
5	Total Plot Area	1.89 Acres (7648.56 sq.m)		
6	Area of operation	HCEs in Ramnad District & Sivagangai District		
7	Source of Water	Local Panchayat Water		
8	Water Requirement	Total Water requirement – 9 KLD		
9	Wastewater generation & mode of treatment	7.78 KLD Effluent – 7.5 KLD will be treated in 10 KLD ETP. Wastewater generated from the treatment of Bio-medical waste during autoclaving, washing of machines, vehicles and floors etc., will be treated in Effluent Treatment Plant and the plant will be operated on the principle of zero liquid discharge. Sewage – 0.28 KLD will be treated in septic tank followed by soak pit.		
10	Air Pollution Sources & control measures	DG set of 62.5 kVA with 3m stack height and acoustic enclosure will be provided.		
11	Hazardous & Solid waste generation	Organic solid waste – 0.6 kg/day Inorganic solid waste – 0.4 kg/day Ash from the incinerator: 150 kg/d Disposed to TSDF.		
12	Man power	15 numbers		
13	Electricity/Power requirement	Power of 90 kW is supplied from TNEB.		
14	Land form, Land use and Land ownership	Unclassified Area		
15	Estimated Cost	<b>Description</b>	<b>Cost (lakhs)</b>	
		Land Cost	20	
		Construction Cost	25	
		Plant & Machinery	102	
		<b>Total</b>	<b>147</b>	

## 11.2 Land Area Details

**Table 11.2 Area Breakup Details**

Sl. No.	Description	Area in sq.m	Area in Acres	%
1.	Total plot area	7648.56	1.89	100
2.	Ground Coverage area	271.23	0.067	3.53
3.	Hard paved area including roads	390	0.096	5.07
4.	Greenbelt area	2529.28	0.625	33.06
5.	Parking	122.35	0.030	1.59
6.	Vacant & Others	4342.27	1.073	56.75

## 11.3 Environment Setting

**Study Period** - Monitoring was carried out from April, 2022 - June, 2022. The results have been summarized below:

### Air Quality

**Particulate Matter (PM10)** -The study reveals that maximum concentration was observed to be 33µg/m<sup>3</sup>. The highest 24-hourly concentration was recorded at Keelakottai location. The average concentration of PM10 can be said to be ranged between 22.5-40.5 µg/m<sup>3</sup>.

**Particulate Matter (PM2.5)** - The maximum of PM2.5 (23.2 µg/m<sup>3</sup>) during the study period was recorded at Keelakottai, whereas the minimum value (7.9 µg/m<sup>3</sup>) concentration was recorded at Palankulam.

**Sulphur Dioxide (SO<sub>2</sub>)** - The ambient air monitoring results indicate that the lowest concentration of SO<sub>2</sub> is experienced at Palankulam (1.3 µg/m<sup>3</sup>). The average concentration of SOX recorded during the study period ranged between 2.1-4.2 µg/m<sup>3</sup> respectively.

**Oxides of Nitrogen (NO<sub>x</sub>)** - The highest value of NO<sub>x</sub> during the monitoring period was observed at Ulaiyur (1.85 µg/m<sup>3</sup>) while the minimum value was recorded at Palankulam (0.65 µg/m<sup>3</sup>). The average concentrations were in the range of 1.05-2.25 µg/m<sup>3</sup>.

### Noise Levels

**Project Site** - The ambient noise level at the project site during day is 42.8 dB (A) which is within the standard limit of industrial area 75 dB (A). During the night time, the noise level is 33.7 dB (A) which is also within the standard limit of industrial area 70 dB (A).

**Locations within 5km Radius (N4, N6, N8)** - The ambient noise levels at the following locations during day time vary from 28.6 to 39.3 dB (A) which is within the standard limit of residential area 55 dB (A). During the night time, the noise level ranges from 16.3 to 22.8 dB (A) which is also within the standard limit of residential area 45 dB (A).

**Locations above 10km Radius (N2, N3, N5, N7)** - The ambient noise levels at the following locations during day time vary from 25.6 to 29.3 dB (A) which is within the standard limit of residential area 55 dB (A). During the night time, the noise level ranges from 16.4 to 23.8 dB (A) which is also within the standard limit of residential area 45 dB (A).

### **Water Quality**

**Analysis results of ground water reveal the following,**

- pH varies from to 7.1 to 7.6
- Electrical Conductivity ranged from 1114 to 1970  $\mu\text{S}/\text{Cm}$
- Total Hardness varies from 304 to 604 mg/L.
- Total Dissolved Solids varies from 724 to 1300 mg/L.
- Chlorides varies from 51 to 138 mg/L
- Fluorides are in Below Detection Limit

**Analysis results of surface water reveal the following,**

- pH varies from to 7.1 to 7.3
- BOD varies from 5.24 to 11.00 mg/L.
- COD varies from 17 to 42 mg/L.
- DO varies from 4.3 - 4.4 mg/L/
- Total Coliforms varies from 1200 - 1300 MPN/100ml
- Fecal Coliforms carries from 800 - 900 MPN/100ml

### **Soil Quality**

- The analysis results show that soil is Slight to Moderate Alkaline in nature as pH value ranges from 6.3 to 6.9.
- The Nitrogen concentration was ranged between of 217.5 to 313.8 Kg/ha indicating that the soils have good to better quantity of Nitrogen.
- The concentration of Phosphorus is recorded in the range of 11.4 to 18 Kg/ha. indicating the soils have less to medium quantity of Phosphorus.
- The concentration of Potassium is recorded in the range of 96.4 to 168 Kg/ha which shows that the soils have medium to better quantity of potassium.

## **11.4 Anticipated Impacts & Mitigation Measures**

### **Ambient Air**

During the installation phase, impacts on ambient air would be mainly due to dust emissions and movement of vehicles. However, these impacts would be short term in nature and limited only to the construction period. Dust suppression systems (water spray) will be used. Construction materials shall be fully covered during transportation to the project site by road.

During the operational phase, APC devices will be installed for final flue gasses trapping. To control emissions from incinerators of 500 kg/hr shall be provided. Chimney (30 m AGL) will be provided from the incineration process. Stack monitoring shall be done on a regular basis for NO<sub>x</sub>, SO<sub>2</sub> and PM parameters. For mitigation of impacts of air pollution, stack height of 4 m above roof level shall be provided for proposed D.G. set of 62.5 kVA capacity.

### **Water Environment**

Total fresh water requirement for proposed is 4.5 KLD, will be sourced from Local Panchayat Water Supply. Total waste water generated in the project will be 7.78 KLD which will be treated in ETP with a capacity of 10 KLD. All the treated water will be used in the process; no untreated/treated water will be discharged. It will be a ZLD project. Collection of effluent will be done properly and safely.

### **Land Environment**

Presently, the land is vacant. The site falls under Unclassified Area. The land area has been given purchased by M/s. Ramnad Doctors Association. The excavated soil from excavation will be used for backfilling and excess will be sent to the landfill site. During the operational phase, procedures for the maintenance of equipment would ensure that this risk is minimized and clean-up response is rapid if any spill occurs. During spillage if any occurs, the spills will be collected and properly disposed. In case of spills of chemicals, dry adsorbents /cotton should be used for cleaning instead of water. Spillage will be managed by detection of leaks in the first place from structures or vessels.

### **Noise Levels**

Some amount of noise will be generated from vehicular movement in the installation/ construction. Greenbelt developed at the periphery of the project site will act as a barrier to noise. Machines having high standards shall be deployed so that minimum levels of noise & vibrations are produced during the construction work with excavators having vibration isolators. Silencers provided in the machines to modulate the noise generated by machines will be regularly checked for its effectiveness. For noise pollution control, the D.G. set will be kept in acoustically treated room though the DG set will be used as

standby only. Noise generating units like machinery area, canteen etc. are well insulated with enclosed doors. Earmuffs will be used while in high noise areas. Stationary machineries and equipment will be properly enclosed by enclosures and will be provided with dampeners for minimizing noise generated due to vibration of machineries

### **Solid Waste Management**

During the construction, whatever quantity of construction waste generated shall be stacked and disposed at the designated disposal site, care shall take to ensure for temporary stacking, and transportation shall not cause any disturbance to the surrounding environment. Approx. 4 kg/day of solid waste will be generated and shall be disposed of at Solid waste Disposal Site.

During Operation, the incinerated ash and the ETP sludge are the Hazardous waste generated. The generation of incineration ash will be about 0.3 kg/d and the same will be handed over to TSDF. ETP sludge is also handed over to Authorized recycler.

- Plastic wastes are disinfected, disintegrated/shredded and handed over to recyclers
- Sharps are disinfected, shredded and encapsulated
- Glass waste will be disinfected and handed over to recyclers

Domestic solid waste generated is minimal say 1.0 kg/day of which 60% (0.6 kg/day) is organic and 40% (0.4 kg/day) is inorganic waste, which will be segregated at source, collected in bins and disposed.

### **Socio-Economic Environment**

No rehabilitation and resettlement are required for the proposed project. Employment opportunities will be generated for the local population during the construction/installation phase. Approx. 15 labors shall be deployed during the installation phase. During Operation phase, there will be an employment of 15 skilled & unskilled personnel.

The nearest village is Keelakottai village at 1.1 Km towards South from the site as such the impact due to the operation on the industry is not foreseen.

### **11.5 Risk Assessment**

The project is situated in the Seismic zone-II area. Special attention has been given to the structural design of foundation, elements of masonry, timber, plain concrete, reinforced concrete, pre-stressed concrete, and structural steel. All applicable guidelines have been followed in this regard to ensure the safety of the building. To

avoid flooding or water logging in the area due to the existing nearby canal & lake, proper designing of drainage system for storm water shall be done. All the rainwater will be diverted to rain water storm water drain and extra water will be diverted in the storm line of the area after collecting the rain water in the collection tank. The roof top rainwater will be collected in the fresh water sump and reused.

### **General Safety Measures**

1. Occupational health surveillance programme shall be done six monthly & and their records shall be maintained.
2. Company will take reasonable steps to reduce the risk of exposure to infection by establishing written policies and procedures based upon the currently accepted clinical and occupational health and safety information in consultation with workers, handling and disposing of biomedical waste. These policies and procedures will be reviewed and updated regularly, with compliance to their requirements verified as necessary.
3. The workers will be provided with necessary PPEs viz., masks, hand gloves, helmets, boot, ear
4. Regular assessment of waste management procedures shall be done to assure compliance with applicable standards
5. A written procedure to handle and report needle stick injuries and other waste-handling incidents shall be there. Injuries caused by needle sticks and sharp instruments will be documented, reviewed, and changes implemented to prevent similar incidents in the future;
6. Emphasize the need for point of generation segregation so that waste shall be placed within an appropriate waste container.
7. Type and quality of waste containers will be reviewed regularly, if necessary, it will be upgraded to more suitable container;
8. Handling practices will be reviewed regularly to determine problems of inappropriate handling. If so, modify the handling techniques. At the project site in case of emergency First Aid facility shall be provided.
9. Health check-up camps shall be organized on a regular basis at company dispensary / nearby locations.

### **11.6 Project Benefits**

- M/s. Ramnad Doctors Association will provide services to 1800 healthcare units.
- Installation of individual treatment facilities by small healthcare establishments requires comparatively high capital investment. In addition, it requires separate manpower and infrastructure development for the proper operations and maintenance of treatment systems. The Centralized system of waste

management is the best method in terms of cost reduction and minimizes legal and ethical hassles of health care staff authority

- It will attract people to develop organized common Biomedical Waste Treatment.
- Organized methods for Bio-medical Waste Treatment i.e. Incineration, autoclaving & shredding shall be adopted. A complete bio medical waste disposal solution using the best technology methods shall be provided.
- The project will create direct and indirect employment for local people for which skilled and unskilled manpower will be needed. About 15 people will be deployed temporarily during construction/installation of the project and about 15 people will be employed during the operational stage of the project.
- The waste product obtained from shredder shall be sold to authorized recyclers which shall be reused.

### **11.7 Conclusion**

This project is an upgradation of the old BMW deep burial facility which is closed down by TNPCB with a direction to provide a scientific treatment and disposal facility of BMW. The doctor's association IMA is taking up the project to operate on no profit no loss basis.

Thus, it can be concluded on a positive note that after the implementation of the mitigation measures and Environmental Management Plan, the operation of the project will have no major impact on the environment.



## **CHAPTER XII DISCLOSURE OF CONSULTANTS**

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### **12.0 The Names of the Consultants Engaged With their Brief Resume & Nature of Consultancy Rendered**

Address: M/s SAMRAKSHAN

F- 4, I Floor, Swastik Manandi Arcade,

S C Road, Sheshadripuram,

Bangalore - 560 020

Ph.: 080-41466009

E mail id – info@samrakshan.co.in, samrakshanblr@gmail.com

**SAMRAKSHAN** is an Environmental Engineering Consultancy Company based at Bangalore, Karnataka. We are leading B2B solution providers in the field of Environment. SAMRAKSHAN is a specialized solution provider for Infrastructure projects, Area Development Projects, Industrial activities such as Distillery, Sugar, Fertilizers, Drugs and Pharmaceuticals, Chemical industries, Power sectors, Common Waste Disposal facilities – Hazardous waste, Bio-medical waste, CETPs, Isolated storage facilities, etc., SAMRAKSHAN also undertakes Professional services in Environmental aspects.

#### **Quality Policy of SAMRAKSHAN**

*“We at SAMRAKSHAN, a professional environmental technical consultancy company are committed to provide highest quality environmental management associated services within timeframe with highest degree of integrity, knowledge and technical know-how in sync with the norms that consistently conform and fulfil our customer expectations and achieve customer satisfaction in statutory and regulatory requirements.*

*SAMRAKSHAN shall become a Leading and Trustworthy Business Partner to all our Customers. We will achieve this by providing strategic direction to our business, setting up quality objectives which are regularly reviewed and evaluated. We shall strive continually to improve our Quality Management Systems and at the same time create an environment of team work among all our people with motivational programs”.*

**12.1 Declaration for Involvement in EIA Study**

<b>Project details</b>	
Name and address	M/s. RAMNAD DOCTORS ASSOCIATION At Keelakottai Group, Muthuvayal Village, Paramakudi Taluk, Ramanathapuram District, Tamil Nadu
Status	Establishment
Type	Greenfield project
Category as per EMP Notification	Schedule 7 (da), and category “B” as per Gazette Amendment to the EIA Notification vide No. S.O. 1142(E) dated 17th April, 2015
NABET sector	32 A
<b>EMP consultants’ details</b>	
Name & address	SAMRAKSHAN F- 4, I Floor, Swastik Manandi Arcade, S C Road, Sheshadripuram, Bangalore - 560 020.
Status	NABET Accredited Environmental Consultants NABET SI. No. NABET/EIA/2225/RA 0265 valid up to July 25, 2025
<b>Baseline monitoring</b>	
NABL Accredited Lab	M/s. Enviro Care India Private Limited, Madurai, NABL Accredited Lab

**EXECUTIVE SUMMARY**  
**OF**  
**ENVIRONMENTAL IMPACT ASSESSMENT**  
**REPORT**

**For The Proposed Common Bio-Medical Waste  
Treatment Facility**

*Promoted By*

**M/s. RAMNAD DOCTORS ASSOCIATION**

**At**

**Keelakottai Group, Muthuvayal Village,  
Paramakudi Taluk ,  
Ramanathapuram District,  
Tamil Nadu.**

## 1. PROJECT DESCRIPTION

### 1.1 Introduction

M/s. Ramnad Doctors Association has proposed a Common Bio-medical Waste Treatment Facility at S.F. No. 249/3, Keelakottai Group, Muthuvayal Village, Paramakudi Taluk, Ramanathapuram District. Common Bio-Medical Waste Treatment Facility is proposed to install a 500 kg/hr incinerator and other allied facilities for disposal of BMW. It is proposed to cover about 1,800 numbers of Health Care Establishments (HCE) and total bed strength will be 3,500 numbers. The quantum of bio-medical waste generating is about 3500 kg/day. The area of operation is Ramanathapuram district and part of Sivagangai District. The project falls under Category B1 schedule 7 (da) as per the MoEF & CC Notification dated 17th April, 2015 issued under the EIA Notification 2006. Project falls under Red category as per the categorization of Industry of CPCB/TNPCB.

### 1.2 Project Location

The plant is located in Unclassified Area of S.F. No. 249/3, Keelakottai Group, Muthuvayal Village, Paramakudi Taluk, Ramanathapuram District.

### Connectivity

S. No.	Description	Details
1.	Nearest Highway	Paramakudi - Ramnad, NH- 49 at a distance of 0.5 km
2.	Nearest Railway Station	Sathirakudi Railway Station at 8.0 km from site
3.	Nearest Airport	Madurai International Airport at 130 km from project site
4.	Nearest Major City	Ramanathapuram – 18 km
5.	Nearest Village	Keelakottai Village – 0.7 km

### 1.3 Project Details

Bio-medical waste is generated from all Health Care Establishments (HCEs) like clinics, hospitals, nursing homes, veterinary institutions, animal houses, pathological laboratories, blood banks etc., The proposed project is a Common Bio-medical Waste

M/s. Ramnad Doctors Association – BMW Plant

Treatment Facility will have facilities as per the CPCB guidelines for collection, treatment and safe disposal of Bio-medical waste generated from these HCEs as per BMWM rules, 2016.

**Project Overview**

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1	Name of the project and location	M/s. Ramnad Doctors Association – BMW Plant located at S.F. No. 249/3, Keelakottai Group, Muthuvayal Village, Paramakudi Taluk, Ramanathapuram District.																		
2	Project Activity Schedule, Category as per EIA Notification 2006 & amendment	The project falls under Category B, schedule 7 (da) as per the MEF & CC Notification No. S.O 1142 (E) dated 17 <sup>th</sup> April, 2015. The Proposed Common Bio-Medical Waste Treatment Facility (CBMWF) attracts obtaining of the Environmental Clearance.																		
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4	Number of HCE's covered	1800 numbers. Number of beds covered 3500 numbers.																		
5	Total Plot Area	1.89 Acres (7648.56 sq.m)																		
6	Area of operation	HCEs in Ramnad District & Sivagangai District																		
7	Source of Water	Local Panchayat Water Supply																		
8	Water Requirement	Source: Local Panchayat Water Supply Total Water requirement – 9 KLD																		
9	Wastewater generation & mode of treatment	7.78 KLD Effluent – 7.5 KLD will be treated in 10 KLD ETP. Wastewater generated from the treatment of Bio-medical waste during autoclaving, washing of machines, vehicles and floors etc., will be treated in Effluent Treatment Plant and the plant will be operated on the principle of zero liquid discharge. Sewage – 0.28 KLD will be treated in septic tank followed by soak pit.																		
10	Air Pollution Sources & control	DG set of 62.5 kVA with 3m stack height and acoustic enclosure will be provided.																		

	measures		
11	Hazardous & Solid waste generation	Organic solid waste – 0.6 kg/day Inorganic solid waste – 0.4 kg/day. Ash from the incinerator: 150 kg/d Disposed to TSDF.	
12	Man power	19 numbers	
13	Electricity/Power requirement	Power of 90 kW is supplied from TNEB.	
14	Land form, Land use and Land ownership	Unclassified Area	
15	Estimated Cost	<b>Description</b>	<b>Cost (lakhs)</b>
		Land Cost	20
		Construction Cost	25
		Plant & Machinery	102
		<b>Total</b>	<b>147</b>

#### 1.4 Raw Material Requirement

The proposed project is a Common Bio-medical Waste Treatment Facility (CBWTF) which caters handling and treatment of bio-medical waste. There is no production or manufacture of any products. Thus, there will be requirement of color-coded trolleys & bags, PPE's for workers, Diesel for operation of DG sets and incinerator, Necessary chemicals for Treatment etc., as raw material. Material Required for Treatment Facility is given in following table.

#### Material Requirement

S. No.	Particulars	Source	Quantity
1	Color Coded Trolley	Locally	Based on requirement
2	Non-chlorinated color-coded bags	Locally	Based on requirement
3	Diesel	Petrol bunk dealers	Based on requirement
4	Chemicals - Sodium hypochlorite, Caustic soda, Lime, Alum & Disinfectant	Locally	Based on requirement
5	Personal Protection Equipment (PPE's)	Locally from manufacturers	Based on requirement

### 1.5. Land Area Details

S. No.	Description	Area in sq.m	%
1.	Total plot area	7648.56	100
2.	Ground Coverage area	271.23	3.53
3.	Hard paved area including roads	390	5.07
4.	Greenbelt area	2524.02	32.83
5.	Parking	122.35	1.59
6.	Vacant & Others	4381.4	56.98

### 1.6 Plant Capacity

#### Proposed Treatment Plant Capacities

Equipment	Capacity	Number of equipment
Incinerator	500 kg/hr	1
Autoclave	600 Lit./cycle	1
Shredder	200 kg/h	1
Sharp pit	5 Cu.m	1
Effluent Treatment Plant	10 KLD	1

### 1.7 Power Requirement

Total power requirement to the industry will be 90 kW, sourced from TNEB. DG set of 62.5 KVA will be installed at the site as power backup with adequate stack height and acoustic enclosures.

### 1.8 Existing Infrastructure

**Roads:** Ramanathapuram town is in south east Tamil Nadu and connected by NH 49 to Madurai from Rameswaram. East Coast Road is the major coastal road in east Tamil Nadu which connects the state capital Chennai and Ramanathapuram; this road also connects Ramanathapuram with Pondicherry, Tuticorin and Kanyakumari.

M/s. Ramnad Doctors Association – BMW Plant

**Port:** Rameswaram Port is in Rameswaram Island of Ramanathapuram District. Pamban Port is an ancient Port in Ramanathapuram district, which connects East and West Coast of Indian Ocean borne via Pamban Channel (Pamban Pass). The port is located 109 km from the project site.

**Railway Station:** Ramanathapuram district has 2 railway stations namely Ramanathapuram railway station and Rameswaram railway station which a railway station is serving the town of Rameswaram located on the Rameswaram Island in the district. It is belonging to the Madurai railway division and is an important terminal of the Southern Railway zone.

**Power** This region is all set to emerge as one of the top power producers in the State with the establishment of a 4,000-MW thermal power plant in Kadaladi. Adani Green Energy (Tamil Nadu) Ltd unveiled the World's largest solar power plant at a single location of 648 megawatts (MW) at Kamuthi, Ramanathapuram in Tamil Nadu. The Tamil Nadu Generation and Distribution Corporation (TANGEDCO) have also started work for setting up a 1,600-MW coal-based thermal power plant at Uppur near Thiruvadanai.

**Communications:** There are 300 post offices in the district. As per 2011 census, the percentage of people using mobile phones in the district was 66.07% and the percentage of people using land lines were 5.59%. All the major telecom service providers provide telephone and cellular phone services throughout the District.

**Financial Institutions:** Ramanathapuram district is well served by a network of 209 banks. They include 88 nationalized banks, 21 Scheduled banks, 28 Grama banks, 58 Agricultural banks and 14 Mortgage banks.



## 2. DESCRIPTION OF ENVIRONMENT

**Study Period** - Monitoring was carried out from April, 2022 - June, 2022. The results have been summarized below:

### 2.1 Air Quality

**Particulate Matter (PM10)** -The study reveals that maximum concentration was observed to be 33µg/m<sup>3</sup>. The highest 24-hourly concentration was recorded at Keelakottai location. The average concentration of PM10 can be said to be ranged between 22.5-40.5 µg/m<sup>3</sup>.

**Particulate Matter (PM2.5)** - The maximum of PM2.5 (23.2 µg/m<sup>3</sup>) during the study period was recorded at Keelakottai, whereas the minimum value (7.9 µg/m<sup>3</sup>) concentration was recorded at Palankulam.

**Sulphur Dioxide (SO<sub>2</sub>)** - The ambient air monitoring results indicates that the lowest concentration of SO<sub>2</sub> is experienced at Palankulam (1.3µg/m<sup>3</sup>). The average concentration of SO<sub>x</sub> recorded during the study period ranged between 2.1-4.2 µg/m<sup>3</sup> respectively.

**Oxides of Nitrogen (NO<sub>x</sub>)** - The highest value of NO<sub>x</sub> during the monitoring period was observed at Ulaiyur (1.85 µg/m<sup>3</sup>) while the minimum value was recorded at Palankulam (0.65 µg/m<sup>3</sup>). The average concentrations were in the range of 1.05-2.25 µg/m<sup>3</sup>.

### 2.2 Noise Levels

**Project Site** - The ambient noise level at the project site during day is 42.8 dB (A) which is within the standard limit of industrial area 75 dB (A). During the night time, the noise level is 33.7 dB (A) which is also within the standard limit of industrial area 70 dB (A).

**Locations within 5km Radius (N4, N6, N8)** - The ambient noise levels at the following locations during day time vary from 28.6 to 39.3 dB (A) which is within the standard limit of residential area 55 dB (A). During the night time, the noise level ranges from 16.3 to 22.8 dB (A) which is also within the standard limit of residential area 45 dB (A).

**Locations above 10km Radius (N2, N3, N5, N7)** - The ambient noise levels at the following locations during day time vary from 25.6 to 29.3 dB (A) which is within the

standard limit of residential area 55 dB (A). During the night time, the noise level ranges from 16.4 to 23.8 dB (A) which is also within the standard limit of residential area 45 dB (A).

### **2.3 Water Quality**

**Analysis results of ground water reveal the following,**

- pH varies from to 7.1 to 7.6
- Electrical Conductivity ranged from 1114 to 1970  $\mu\text{S}/\text{Cm}$
- Total Hardness varies from 304 to 604 mg/L.
- Total Dissolved Solids varies from 724 to 1300 mg/L.
- Chlorides varies from 51 to 138 mg/L
- Fluorides are in Below Detection Limit

**Analysis results of surface water reveal the following,**

- pH varies from to 7.1 to 7.3
- BOD varies from 5.24 to 11.00 mg/L
- COD varies from 17 to 42 mg/L
- DO varies from 4.3 - 4.4 mg/L
- Total Coliforms varies from 1200 - 1300 MPN/100ml
- Fecal Coliforms varies from 800 - 900 MPN/100ml

### **2.4 Soil Quality**

- The analysis results show that soil is Slight to Moderate Alkaline in nature as pH value ranges from 6.3 to 6.9.
- The Nitrogen concentration was ranged between of 217.5 to 313.8 Kg/ha indicating that the soils have good to better quantity of Nitrogen.
- The concentration of Phosphorus is recorded in the range of 11.4 to 18 Kg/ha. indicating the soils have less to medium quantity of Phosphorus.
- The concentration of Potassium is recorded in the range of 96.4 to 168 Kg/ha which shows that the soils have medium to better quantity of potassium.

## 2.5 Ecology

The site is proposed in a remote dry agricultural and predominantly barren lands covered with some thorny bushes in patches. There is no tree cutting or removal of plantations is anticipated. There is no forest land is involved. There is no Wild Life Sanctuary or National Park or Biosphere or Hotspots within the study area of 10 km.

## 2.6 Land Use Classification

S. No	Classification	Area (Ha)	
		2005-06	2019-20
1	Geographical Area	408957	
2	Forests	4488	4488
3	Barren & Uncultivable Lands	4591	4457
4	Land put to non-agricultural uses	84483	91106
5	Cultivable Waste Lands	4245	3360
6	Permanent Pastures & other grazing lands	154	154
7	Groves not included in the area sown	41210	30957
8	Current Fallows	27784	51507
9	Other Fallow Lands	56439	45124
10	Net Area sown	185563	182261

## 3. ANTICIPATED IMPACTS & MITIGATION MEASURES

### 3.1 Ambient Air

During the installation phase, impacts on ambient air would be mainly due to dust emissions and movement of vehicles. However, these impacts would be short term in nature and limited only to the construction period. Dust suppression systems (water spray) will be used. Construction materials shall be fully covered during transportation to the project site by road.

During the operational phase, Air Pollution Control devices will be installed for final flue gasses trapping. To control emissions from incinerators of 500 kg/hr shall be provided. Chimney (30 m above ground level) will be provided from the incineration process. Stack monitoring shall be done on a regular basis for NOX, SO<sub>2</sub> and PM parameters.

For mitigation of impacts of air pollution, stack height of 4 m above roof level shall be provided for proposed D.G. sets of capacity 1 x 62.5 kVA.

### **3.2 Water Environment**

Total water requirement for proposed is 9.0 KLD. Source of fresh water will be sourced from Local Panchayat supply and onsite bore well in case of emergency. Total waste water generated in the project will be 7.78 KLD which will be treated in ETP with a capacity of 10.0 KLD. All the treated wastewater will be recycled; no untreated/treated water will be discharged. It will be a zero liquid discharge project. Collection of effluent will be done properly and safely. It will be a zero liquid discharge unit. Waste water generated will be treated in ETP. All the treated water will be used in the process; no untreated/treated water will be discharged.

### **3.3 Land Environment**

Presently, the land is vacant. The site falls under Unclassified Area. The land area has been given purchased by M/s. Ramnad Doctors Association. The excavated soil from excavation will be used for backfilling and excess will be sent to the landfill site. During the operational phase, procedures for the maintenance of equipment would ensure that this risk is minimized and clean-up response is rapid if any spill occurs. During spillage if any occurs, the spill will be collected and disposed off properly. In case of spills of chemicals, dry adsorbents/cotton should be used for cleaning instead of water. Spillage will be managed by detection of leaks in the first place from structures or vessels.

### **3.4 Noise Levels**

Some amount of noise will be generated from vehicular movement in the installation/construction. Green belt developed at the periphery of the project site will act as a barrier to noise. Machines having high standards shall be deployed so that minimum levels of noise & vibrations are produced during the construction work with excavators having vibration isolators. Silencers provided in the machines to modulate the noise generated by machines will be regularly checked for its effectiveness. For noise pollution control, the D.G. sets will be kept in acoustically treated room though the DG sets are used as standby only. Noise generating units like machinery area, canteen

etc. are well insulated with enclosed doors. Earmuffs will be used while in high noise areas. Stationary machineries and equipment will be properly enclosed by enclosures and will be provided with dampeners for minimizing noise generated due to vibration of machineries

### **3.5 Solid Waste Management**

During the construction, whatever quantity of construction waste is generated shall be stacked and disposed off at the designated disposal site and care shall be taken to ensure that temporary stacking and transportation shall not cause any disturbance to the surrounding environment. Approx. 4 kg/day of solid waste will be generated and shall be disposed off at Solid waste Disposal Site.

During Operation, the incinerated ash and the ETP sludge are the Hazardous waste generated. The generation of incineration ash will be about 0.3 kg/d and the same will be handed over to TSDF. ETP sludge is also handed over to Authorized recycler.

- Plastic wastes are disinfected, disintegrated/shredded and handed over to recyclers
- Sharps are disinfected, shredded and encapsulated
- Glass waste will be disinfected and handed over to recyclers

Domestic solid waste generated is minimal say 1.0 kg/day (for 7 number of employees) of which 60% (0.6 kg/day) is organic and 40% (0.4 kg/day) is inorganic waste, which will be segregated at source, collected in bins and disposed.

### **3.6 Socio-Economic Environment**

No rehabilitation and resettlement is required for the proposed project. Employment opportunities will be generated for the local population during the construction/installation phase. Approx. 40 labors shall be deployed during the installation phase. During Operation phase, there will be an employment of approximately 19 skilled & unskilled personnel.

#### 4. ENVIRONMENTAL MANAGEMENT PLAN

##### 4.1 Water Consumption & Wastewater Generation

Total water requirement for proposed is 9.0 KLD. Source of fresh water will be sourced from Local Panchayat supply and onsite bore well in case of emergency.

Sl. No.	Purpose	Water requirement KLD	Wastewater generation KLD	Mode of Treatment
1.	Domestic	0.35	0.28	The wastewater from process will be treated in ETP of 10 KLD and reused for scrubber. Hence, following Zero Liquid Discharge system. The sewage water will be treated in septic tank followed by soak pit.
2.	Scrubber	3.50	3.50	
3.	Washing	2.00	2.00	
4.	Vehicle washing	2.00	2.00	
5.	Gardening	1.15	-	
<b>Total</b>		<b>9.00</b>	<b>7.78</b>	

##### 4.2 Air Pollution Control Measures

Stack attached to	Capacity	Fuel HSD Quantity l/h	Stack Height AGL - m	APC Measures	Emissions
Incinerators	500 kg/hr	80	30	Venturi Scrubber	PM, NO <sub>2</sub> , HCL Hg and its compounds Total dioxins and Furans
DG sets	62.5 KVA	27	4	Acoustic Enclosure	SO <sub>2</sub> , NO <sub>x</sub>

##### 4.3 Solid & Hazardous Waste Management

The incinerated ash and the ETP sludge are the Hazardous waste generated. The generation of incineration ash will be about 0.3 kg/d and the same will be handed over to TSDF. ETP sludge is also handed over to Authorized recycler.

- Plastic wastes are disinfected, disintegrated/shredded and handed over to recyclers
- Sharps are disinfected, shredded and encapsulated

- Glass waste will be disinfected and handed over to recyclers

Domestic solid waste generated is minimal say 1.0 kg/day (for 7 number of employees) of which 60% (0.6 kg/day) is organic and 40% (0.4 kg/day) is inorganic waste, which will be segregated at source, collected in bins and disposed.

#### 4.4 Greenbelt Development

Green belt planning shall be done as per guidelines laid by CPCB. This will help in increasing the aesthetic effect of the environment. Green belt/greenery will be developed along most of the periphery of the project area as well as along roads.

Total 2524.02 (32.83% of plot area) shall be developed as green area. Any sapling that does not survive will be replaced.

S. No.	Botanical Name	Common Name	Site	No.
1	<i>Acacia auriculiformis Benth</i>	Earleaf Acacia	A1	100
2	<i>Azadirachta indica A.Juss.</i>	Neem	A1	150
3	<i>Terminalia catappa L.</i>	Baadam Tree	A2	50
4	<i>Mimusops elangi L</i>	Spanish Cherry	A3	50
5	<i>Tectona grandis L.f.</i>	Teak Tree	A1	40
6	<i>Derris indica (Lam.) Bennett</i>	Pongam Oil Tree	A2	100
7	<i>Ficus benjamina L</i>	Weeping Fig	A3	60
8	<i>Caesalpinia pulcherrima L</i> Swartz	Peacock Flower	A3	80
<b>Total</b>				<b>630</b>

## 5. ENVIRONMENTAL MONITORING PROGRAMME

### 5.1. Environmental Monitoring

Environmental policy at Industry level is yet to be defined formally. Standards are stipulated by various regulatory agencies to limit the emission of pollutants in air and water. Similarly, a mandatory practice is recommended for preparing an Environment Statement each year in order to encourage the industries to allow efficient use of resources in their production processed and reduce the quantities of waste per unit of product. This in itself is not sufficient since this does not provide an assurance that its Environmental performance not only meets, will continue to meet, legislative and policy requirements.

### 5.2 Environmental Monitoring Plan during Construction Phase

S. No.	Type of Monitoring	Frequency of Monitoring	Parameter	Location
1	Ambient Air Quality	Monthly	Particulate Matter (PM <sub>2.5</sub> ) Particulate Matter (PM <sub>10</sub> ) Sulphur Dioxide (SO <sub>2</sub> ) Nitrogen Oxides (NO <sub>2</sub> )	Four Locations in and around the project site
2	Stack	Monthly	Particulate Matter, Sulphur Dioxide (SO <sub>2</sub> ), Nitrogen Oxides (NO <sub>x</sub> )	DG sets of 1x 62.5kVA
3	Water Quality drinking water	Monthly	All parameters mentioned In IS:10500	One drinking water sample
4	Water Quality for Construction purpose	Monthly	All parameters mentioned in IS:456	One construction water sample
5	Ambient Noise Level	Monthly	Day and Night noise level	Two locations
6	Noise Level	Monthly	Leq Day & Night	DG set of 1x 62.5 kVA
7	Soil Quality	Monthly	All parameters to check soil Fertility	Four Locations in and around the project site



**5.3 Environmental Monitoring Plan during Operation Phase**

S. No.	Type of Monitoring	Frequency of Monitoring	Parameter	Location
1	Ambient Air Quality	Monthly	Particulate Matter (PM <sub>2.5</sub> ), Particulate Matter (PM <sub>10</sub> ), Sulphur Dioxide (SO <sub>2</sub> ), Nitrogen Oxides (NO <sub>2</sub> ), Carbon Monoxide (CO)	Four Locations around project site
2	Work Area-Air Monitoring	Monthly	HCl, Dioxins & Furans	Plant & machinery area
3	Stack	Monthly Monthly	Particulate Matter, Sulphur Dioxide (SO <sub>2</sub> ), Nitrogen Oxides (NO <sub>2</sub> ) Incinerators, boiler & DG Sets HCl, Dioxins & Furans Incinerators	Boiler Stack DG sets of 1×62.5kVA and Incinerators Stack
4	Water Quality for drinking water	Monthly	All parameters mentioned in IS:10500	One drinking water sample
5	Effluent Treatment Plant or other treatment	Monthly	pH, BOD, COD, TDS, TSS, Chloride, Sulphate, Total Hardness, Oil and Grease, Zinc.	Inlet and Outlet of ETP
6	Ambient Noise Level	Monthly	Day and Night noise level	Two locations
7	Work Area-Noise Monitoring	Monthly	Leq Day & Night	Boiler, Plant & machinery area (Incinerators, Autoclave & Shredder) One monitoring at every place
8	DG Set Room	Monthly	Leq Day & Night	DG sets of 1×62.5kVA
9	Soil Quality	Monthly	All parameters to check soil Fertility	Four Locations in and around project site

#### **5.4 Risk Assessment**

The project is situated in the Seismic zone-II area. Special attention has been given to the structural design of foundation, elements of masonry, timber, plain concrete, reinforced concrete, pre-stressed concrete, and structural steel. All applicable guidelines have been followed in this regard to ensure the safety of the building. To avoid flooding or water logging in the area due to the existing nearby canal & lake, proper designing of drainage system for storm water shall be done. All the rainwater will be diverted to rain water storm water drain and extra water will be diverted in the storm line of the area.

#### **General Safety Measures**

- a. Occupational health surveillance programme shall be done six monthly & and their records shall be maintained.
- b. Company will take reasonable steps to reduce the risk of exposure to infection by establishing written policies and procedures based upon the currently accepted clinical and occupational health and safety information in consultation with workers, handling and disposing of biomedical waste. These policies and procedures will be reviewed and updated regularly, with compliance to their requirements verified as necessary.
- c. Regular assessment of waste management procedures shall be done to assure compliance with applicable standards
- d. A written procedure to handle and report needle stick injuries and other waste-handling incidents shall be there. Injuries caused by needle sticks and sharp instruments will be documented, reviewed, and changes implemented to prevent similar incidents in the future;
- e. Emphasize the need for point of generation segregation so that waste shall be placed within an appropriate waste container.
- f. Type and quality of waste containers will be reviewed regularly, if necessary it will be upgraded to more suitable container;

- g. Handling practices will be reviewed regularly to determine problems of inappropriate handling. If so, modify the handling techniques. At the project site in case of emergency First Aid facility shall be provided.
- h. Health check-up camps shall be organized on a regular basis at company dispensary / nearby locations.




#### 5.5. Budget Allocation for Environmental Management Programme

S. No.	Particulars	Capital Expenditure (Rs. In Lacs)	Recurring Expenditure (Rs. In Lacs/year)
1	Landscaping/ Plantation	3.00	0.20
2	Solid Waste Management	4.00	0.55
3	Waste Water Management/ETP	7.00	0.75
4	APCS Management	9.50	2.5
5	Environment Monitoring	0.75	0.35
6	Miscellaneous	1.00	0.5
<b>Total</b>		<b>25.25</b>	<b>4.85</b>

#### 5.6. Budget Allocation for CER Activities

Sl. No.	Activity	Fund allocated (Rupees in Lakhs)
1.	Health and Education to nearby villages	2.5
2.	Electrification including solar power	0.5
3.	Toilet facility to nearby government school	2.0
4.	Supporting the nearby village panchayat to erect an electric crematorium	15.0
<b>Total</b>		<b>20.00</b>


**ANNEXURE – I  
NABET ACCREDITATION CERTIFICATE**

	 <b>QUALITY COUNCIL OF INDIA</b> <small>Champion of Excellence for Quality</small>			
<b>National Accreditation Board for Education and Training</b>				
<b>Certificate of Accreditation</b>				
<u>Samrakshan, Bangalore</u>				
Swastik Manandi Arcade, F-4, 1st Floor, S.C. Road, Sheshadripuram, (Opp. Police Station & above Planet Honda showroom), Bangalore, Karnataka				
The organization is accredited as <b>Category-A</b> , under the QCI-NABET Scheme for Accreditation of EIA Consultant Organization, Version 3, for preparing EIA-EMF reports in the following Sectors –				
S. No	Sector Description	Sector (as per)		Cat.
		NABET	MoEFCC	
1	Thermal power plants	4	1 (d)	A
2	Cement plants	9	3 (b)	B
3	Synthetic organic chemicals industry	21	5 (f)	A
4	Distilleries	22	5 (g)	A
5	Sugar Industry	25	5 (j)	B
6	Common hazardous waste treatment, storage and disposal facilities (TSDFs)	32	7 (d)	A
7	Bio-medical waste treatment facilities	32A	7 (d a)	B
8	Common Effluent Treatment Plants (CETPs)	36	7 (h)	B
9	Building and construction projects	38	8 (a)	B
10	Townships and Area development projects	39	8 (b)	B

*Note: Names of approved EIA Coordinators and Functional Area Experts are mentioned in EAAC minutes dated October 12, 2022 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/ACC/22/2399 dated Dec 06, 2022. The accreditation needs to be renewed before the expiry date by Samrakshan, Bangalore following due process of assessment.





Valid up to  
July 25, 2025

Sr. Director, NABET  
Dated: Dec 06, 2022

Certificate No.  
NABET/EIA/2225/RA 0265

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

**ANNEXURE – II  
COVERING LETTER**

	<b>RAMNAD DOCTORS ASSOCIATION</b> <b>RAMANATHAPURAM BRANCH</b> RAMNAD MRI & CT SCANS, 53/6, 1 <sup>ST</sup> MAIN ROAD R.R.SETHUPATHY NAGAR RAMANATHAPURAM - 623501 Mobile : <b>9842422776</b> E-mail: <a href="mailto:ramnaddoctorsassociation@gmail.com">ramnaddoctorsassociation@gmail.com</a> / <a href="mailto:imaramnadbranch@yahoo.com">imaramnadbranch@yahoo.com</a>	
<b>Dr. T. Aravindaraj</b> President	<b>Dr. A. KalilurRahman</b> Hony.Secretary (9842422776)	<b>Dr.T. Ananda Chokkalingam</b> Finance Secretary(9843448618)
<b>EXECUTIVE COMMITTEE MEMBERS</b> <b>Dr.M.Senthilnayagam</b> <b>Dr. A. Kesavan</b> <b>Dr. G. Subramanian</b> <b>Dr. C.Thirumalaivelu</b> <b>Dr. K.JosephRajan</b> <b>Dr. A.Chinnadurai Abdullah</b> <b>Dr. M.Ravirajendran</b> <b>Dr. S. Sivakumar</b> <b>Dr. B.Gopi</b>	<p style="text-align: right;">Date: 27.08.21</p> <p><b>To</b> <b>The Member Secretary,</b> <b>STATE LEVEL ENVIRONMENTAL IMPACT ASSESSMENT AUTHORITY</b> <b>4-D, Panagal Maligai,</b> <b>No.1, Jeenis Road, Saidapet,</b> <b>Chennai – 600 015</b></p> <p><b>Dear Sir,</b></p> <p><b>Sub: Ramnad Doctors Association - BMW plant located at S.F.No. 249/3, Keelakottal village, Paramakudi Taluk, Ramanathapuram District is a common bio-medical waste treatment facility (CBMWTF) – Application – Environmental Clearance – Reg</b></p> <p>This is to inform you that we propose to install a Common Bio-Medical Waste Treatment Facility 500 kg/hr located at <b>S.F.No. 249/3, Keelakottal village, Paramakudi Taluk, Ramanathapuram District, Tamil Nadu</b>. In this regard, we are submitting our application with the following files towards getting Environmental clearance for your kind perusal.</p> <ol style="list-style-type: none"><li><b>1. Form – I</b></li><li><b>2. Pre-Feasibility report</b></li><li><b>3. Demand Draft for Rs. 1,00,000/- (Bearing No.628163 dated 27.08.2021)</b></li></ol> <p>With the above, we request your good selves to consider our case.</p> <p>Thanking You</p> <p><b>Yours faithfully,</b> <b>For Ramnad Doctors Association - BMW plant</b> <b>RAMNAD DOCTORS ASSOCIATION(RADA)</b> <b>RAMANATHAPURAM</b> Authorized Signatory <b>PRESIDENT</b></p>	

M/s. Ramnad Doctors Association – BMW Plant

		रामनाथपुरम् - 623 501 RAMANATHAPURAM - 623 501 (2000) 028063019234 628163		Valid for three months only from the date of instrument CB <input type="checkbox"/> 27082021 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
मुलाने पर On Demand Pay		MEMBER SECRETARY SHAN		कौ या उनके आवेन पर Or Order प्राप्त मूल्य के लिए	
रुपये Rupees		ONE LAKH ONLY			
		अवै कर For Value Received		₹ ***1,00,000.00	
केलरा बैंक Canara Bank		Purchaser Name: RADA RAMANATHAPURAM *****NOT OVER Rs.1,00,000.00		मुले केलरा बैंक For Canara Bank	
CHENNAI ACCOUNTS SECTION(1760) 20CTDNR DRAWEE BRANCH, CCP CODE		K. Sai Malli 295 AUTH SIGNATORY NAME DESIGNATION S.P.N.		CMY Demand Draft of ₹ 1 Lakh and above require signature of two authorized signatories. Please sign above.	
@ 6 28 16 3 @ 0000 150000 : 052808 @ 16					

**ANNEXURE – III**  
**Memoradum of Understanding**

**भारतीय गैर न्यायिक**

बीस रुपये **Rs.20**

**रु.20** **TWENTY RUPEES**

**INDIA NON JUDICIAL**

தமிழ்நாடு தமில்நாடு TAMIL NADU 55AB 639887

13369 12/7/18

Regnno. 82/2018. RAMNAD DOCTORS ASSOCIATION (RADA) RAMANATHAPURAM.

1-வதுதரம் திருத்தம்

82/18

82/2018

2009  
11th JUNE 2009

FORM No. 1  
(See Rule 7 of the Tamil Nadu Societies Registration Rules, 1978)

Application for the issue of certificate of Registration under Section 10 of the Tamil Nadu Societies Registration Act, 1975. (Tamil Nadu Act 27 of 1975)

FORM:

Dr.T.ARAVINDA RAJ  
President (RADA)  
Ramnad Doctors' Association(RADA),Ramanathapuram,  
No. 53/6, 1st Main Road,  
R.R.Sethupathy Nagar,  
Ramanathapuram

500/-  
சங்க பதிவாளர்  
நாள் - 8.6.18  
82/18

To  
The Registrar of societies,  
RAMANATHAPURAM  
(Station)

Sirs,

A society by Name RAMNAD DOCTORS' ASSOCIATION (RADA),  
RAMANATHAPURAM Door No.53/6, 1st Main Road, R.R.Sethupathy Nagar,  
Ramanathapuram has been formed on 14.05.2018

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1. I enclosed herewith the memorandum and Bye-Laws of the said society.
2. I remit herewith a sum of Rs.5,100/- being the fee for the registration of the society.
3. I am a member of the Committee of the society.
4. I have been duly authorized in this behalf by the Committee of the Society.
5. The society may be registered and the Certificate of Registration issued.

Place:  
Date:

Signature of the Applicant

T. Aravindra  
President/ Secretary

2 வகுதாளர் திருத்தம் சிவராஜ்

Dr. T. ARAVINDRAJ, M.D.,  
Hony. President,  
INDIAN MEDICAL ASSOCIATION,  
RAMANATHAPURAM BRANCH,  
RAMANATHAPURAM - 623 001.



M/s. Ramnad Doctors Association – BMW Plant

FORM NO.VII

(See Sub-rule (2) of rule 17 of the Tamil Nadu Societies Registration Rules, 1978)

Form of notice of change among the members of the society or of the Committee to be filled with the Registrar under sub-section (1) and (2) of section 15 of the Tamil Nadu Societies Registration Act, 1975.

(Tamil Nadu Act 27 of 1975.)

1. Name of the Society: **RAMNAD DOCTORS' ASSOCIATION, RAMANATHAPURAM** (RADA)
2. Date of Registration:
3. The registration Number and year of registration :
4. Details of change:

S.NO	NAME	DESIGNATION	ADDRESS	SIGNATURE
1.	Dr.T.Aravindaraj	President	S/o, Thiruvannamalai, 23/16-C-5, R.R.Sethupathy nagar, Ramanathapuram	
2.	Dr.A.Kalilurrahman	Hony.Secretary	S/o,Abdul Salam, V.O.C. Nagar, Railway gate near, Ramanathapuram	
3.	Dr.Anandachokkaligam	Financial Secretary	S/o, Dr.Thirumalaivelu, 19,Leboms bangle Road, Ramanathapuram	
4.	Dr.M.Senthilnayagam	Executive Member	S/o Muthiah, 5/73, DD Main Road, GHopp. R.S.Mangalam, Ramanathapuram	
5.	Dr.G.Subramaniam	Executive Member	S/o Ganapathy, 43, South muniasamy koil at,Ramanathapuram	
6.	Dr.A.Sivakumar	Executive Member	S/o Angappa Surya, Hospital, Darai raj chattri st, Ramanathapuram	
7.	Dr.K.Josephrajan	Executive Member	S/o,Karuppasamy, 27,Brindhavan Illam RR.Sethupathy Nagar, Ramanathapuram	
8.	Dr.A.Kesavan	Executive Member	S/o, Alagu ambalam, 56 K, Yanakkul st, Ramanathapuram	
9.	Dr.Thirumalaivelu	Executive Member	S/o, chokkaligam, 19,Leboms bangle Road, Ramanathapuram	
10.	Dr.Ravirajendran	Executive Member	S/o ,Mayalagu, 76-F,Local Fund Road, Ramanathapuram	
11.	Dr. chinnadurai Abdullah	Executive Member	S/o Dr E.M.Abdullah, 60, Local Fund Road, Ramanathapuram.	
12.	Dr.B.Gopi	Executive Member	S/o,Balakrishnan, 28,R R Sethupathy Nagar 2 <sup>nd</sup> Cross St, Ramanathapuram.	

3 வதுதரம் திருத்தம் செய்யப்பட்டுள்ளது

**MEMORANDUM OF THE ASSOCIATION**

OF

**RAMNAD DOCTORS' ASSOCIATION (RADA)  
RAMANATHAPURAM**

**PART - I**

- I. NAME
- II. SHORT TITLE
- III. OBJECTS
- IV. JURISDICTION
- V. OFFICE

**I. NAME**

The Name of the Association shall be "RAMNAD DOCTORS' ASSOCIATION (RADA), RAMANATHAPURAM" dated on 14<sup>th</sup> January 2018.

**II. SHORT TITLE**

The Ramnad Doctors' Association, here in after called "RADA"

**III. OBJECTS**

The object of the Association is:

1. - To promote and advance Medical and Allied Science in all their different branches and to promote the improvement of Public Health and medical education in and around Ramanathapuram.
2. To uphold Medical Ethics and code of conduct to maintain and to protect the honour and dignity and to uphold to interests of the Medical profession and to promote fellowship and Co-operation amongst the member thereof.

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3. Hold periodical meetings and Continuing Medical Education Programmes, Conference Lectures, discussion demonstration etc., of the medical and allied sciences.
4. Conduct Educational campaign amongst the people in the matter of Public Health and Hygiene by Co-operating. Whenever necessary, with different apex bodies working within the object.
5. Organize Medical Camps for providing Medical Relief during epidemics and in times of emergency and disaster.
6. Purchase , take lease of or otherwise acquire, hold, manage, let, sell, exchange, mortgage, or otherwise dispose of movable or immovable property of every description and all rights of privileges necessary or convenient for the purpose of the Association and in particular any land, building, furniture, household or other effects, utensils, books, news papers, periodicals, instruments, fitting, appliances, apparatus, transport vehicles and buildings for accommodation as and when deemed necessary or desirable in the interest of the Association.
7. Erect, maintain, lets, improve or repair any buildings for purpose of the association.
8. Borrow or raise money in such manner as may deem necessary and think fit and collect donations for the purpose of the association. To collect subscription
9. Invest any money of the Association not immediately required for any of its objects in such a manner as may from time to time be determenes by the Association. (RADA)
10. Assist to or Co-operat with any other public body whether incorporated, registered or not, and having altogether or in part, objects similar to those of the Association.

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[Signature]

11. To Co-Operate and participate actively in implementing and executing Public Health Projects sponsored by State and Central Government, WHO, UNICEF and other service organizations.
12. Do all such other things, as are cognate to the objects of the above objects.
13. To establish and run institutions for training Nursing and Para Medical Workers.

#### IV. AREA OF JURISDICTIONS

The Ramnad Doctors' Association shall have its areas of jurisdictions in the Ramanathapuram District, Ramanathapuram Joint I Sub-Registrar Office Ramanathapuram

#### V. OFFICE



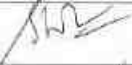


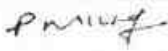

"RAMNAD DOCTORS' ASSOCIATION (RADA), RAMANATHAPURAM"

Door No.53/6, 1st Main Road, R.R.Sethupathy Nagar, Ramanathapuram.

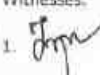

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T. S. S.

M/s. Ramnad Doctors Association – BMW Plant

S.No	NAME	ADDRESS	OCCUPATION	SIGNATURE
1	Dr.Syed Ibrahim	S/o,Mogaldeen, 19/47, R R Sethupathy Nagar 4 <sup>th</sup> Cross St, Ramanathapuram.	Doctor	
2	Dr.J.Mansoor	S/o Dr.E.M.Ibrahim, 19/1, Magar nonbu pottal Road, Ramanathapuram.	Doctor	
3	Dr.Sharithkumar	W/o,Reihinam, 8, RR.Sethupathy Nagar, Ramanathapuram.	Doctor	
4	Dr.R.Fathima Dina Begam	W/o Dr. Chinnadurai Abdullah, 60, Local Fund Road, Ramanathapuram.	Doctor	
5	Dr.U.Govindaraj	S/o Udaiyan, 3/357,Rani indra devi nachiyar nagar,2 <sup>nd</sup> st Ramanathapuram.	Doctor	
6	Dr.T.Gnanakumar	S/o Thirupathy, 20, Sigil raja veethi Kenikarai, Ramanathapuram.	Doctor	
7	Dr.K.R.Srinivasan	S/oRamaiah, 55, R R Sethupathy Nagar 4 <sup>th</sup> Cross St, Ramanathapuram.	Doctor	

Witnesses:

-  (M. Pravin Kumar) S/o V. Marathan, 27 - KAYARAI AMMAN KOUR STREET,  
RAMANATHAPURAM.
-  (N. BALAMURUGAN) S/o S. NATARAJAN,  
53 - NAGANATHAPURAM, VELIPPATTINAM, RAMNAD.

  
7 மதுகாள் சீருத்தம்பிளி, டீர்

PART - I

RULES & BYE - LAWS OF THE ASSOCIATION

DEFINITIONS OF WORDS AND TERMS.

**DEFINITIONS OF WORDS and TERMS** used Rules & Bye - Laws unless of Context otherwise requires:-

1. "ASSOCIATION" means the RAMNAD DOCTORS' ASSOCIATION, RAMANATHAPURAM. (abbreviated as " RADA")
2. "ASSOCIATION PRESIDENT" means the President of the RAMNAD DOCTORS' ASSOCIATION (RADA), RAMANATHAPURAM
3. "HONORARY SECRETARY" means the Honorary Secretary of the RAMNAD DOCTORS' ASSOCIATION (RADA), RAMANATHAPURAM
4. "YEAR" means the Association and Financial year of RAMNAD DOCTORS' ASSOCIATION (RADA) RAMANATHAPURAM shall be:-  
Financial year :- 1st April to March 31<sup>st</sup>
5. "HEAD QUARTERS" means the HEADQUARTERS OFFICE of the RAMNAD DOCTORS' ASSOCIATION (RADA) Ramanathapuram.
6. "RULES AND BYE-LAWS" means Rules & Bye-laws of RAMNAD DOCTORS' ASSOCIATION (RADA) Ramanathapuram.

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T. சுவாமிநாதன்  
திருநெல்வேலி

**MEMORANDUM OF THE ASSOCIATION**

**PART - IV  
OFFICE**

1. **Eligibility of Membership**
2. **Register of Members**
3. **Privileges of Membership**
4. **Termination of Membership**
5. **Re-Admission of Suspended Member.**
6. **Association Year**
7. **Compilation of list of valid members for the year.**

**1. ELIGIBILITY OF MEMBERSHIP**

Any person duly qualified Modern Medicine and got registered as a Medical Practitioners with the Tamil Nadu State Medical Council or any other State Medical Council under the Indian Medical Council Act., Practicing / Working in Ramanathapuram District may be enrolled as a member of the

**RAMNAD DOCTORS' ASSOCIATION (RADA), RAMANATHAPURAM**

**2. REGISTER OF MEMBERS**

There shall be a Register of Member in which the Names of all the members of the **RAMNAD DOCTORS' ASSOCIATION (RADA), RAMANATHAPURAM** shall be entered with their Qualification and Address kept upto date. The Register shall be maintained by office.

**3. LIFE MEMBERS**

Any person eligible for Membership in RADA so desire to become a life member shall do so by paying the prescribed amount of subscription as fixed by the Rules from time to time. Here Membership fees are Rs.2000/- Only.

  
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**4. PRIVILEGES OF MEMBERS**

1. All members shall have the right to attend and part take part in discussion at all General and Clinical Meetings, Lectures and Demonstration organization by the RADA.
2. All Members will have the right to participate in the Election. Exercise franchise, Contest in the Election for any post in RADA and hold Office of the post for which the member is qualified to contest as per the Rules and Bye - Laws of the Association.
3. All members shall enjoy any other privilege that may herein after he conferred by the Association.

**5. TERMINATION OF MEMBERSHIP**

1. Membership may be terminated by resignation. A member may at any rime resign his membership by giving due notice to the President of the Association, in writing after paying his dues if any.
2. Membership may be terminated by removal of name on account of non-payment of subscription after due notice.
3. Membership may be terminated by removal of name on the ground of undesirable conduct and anti Association activities.
4. By removal of one's name by Tamil Nadu Medical Council on the ground of conviction in a court of justice (Law).
5. On terminment of Membership a person shall automatically cease to hold such office or appointment as he may be holding in the Association or in a Branch or in any Body as Association's nominee.

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[Handwritten signature]



PART - V  
OFFICE

1. SUBSCRIPTIONS

The Members of the Association shall pay Life Subscription or Annual as fixed by the office (RADA)

2. PRESIDENT

3. HONY. SECRETARY

4. FINANCE SECRETARY

5. TERM OF OFFICE

1. President - Three Year
2. Hony. Secretary - Three Years
3. Finance Secretary - Three Years

No member shall hold the office of the president for more than three year.

No member shall hold office as Hony. Secretary for more than three years.

No member shall hold office as Finance Secretary for more than three years.

1. Management and Administration:-

All the activities of the RADA shall be planned, executed, administered, managed and controlled by the Executive Committee consisting of not less than eleven members and not more than thirty-one members, including co-opted members.

- i) The Managing Committee can co-opt maximum five members in the Executive Committee.
- ii) Any vacancy in the Executive Committee due to death, resignation, termination of membership or removal of committee member can be filled up any time by the remaining members of the Managing Committee.
- iii) The tenure of the Executive Committee shall be three years.

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iv) The Elected Members shall elect out of them the following office bearers as

Managing Committee:

- a) Chariman
- b) Vice-Chairman
- c) General Secretary
- d) Secretary
- e) Treasurer
- f) Convener

No member can hold the above post for more than two consecutive terms.

v) To conduct certain specific activities, the managing committee may nominate any of its members or other members to form a Sub-Committee. The Chairman and General Secretary of the Committee shall always be the ex-officio members of such Sub-Committee.

vi) Between the period from the date of the registration and till the date of the first election, all the affairs of the RADA shall be looked after by the proposed Executive Committee and its office-bearers referred herein.

**7. Cessation of Office-bearers:-**

An Office-bearer shall cease to be an office-bearer:

- a) If he/she resigns and his/her resignation is accepted.
- b) If he/she ceases to be a member as referred to in CI.4.
- c) If he/she is terminated by a resolution passed in special meeting of members.

**8. Affiliation:-**

The Managing Committee of the RADA can grant application for setting up any branch/unit of the RADA which conforms the Rules and Regulations and the Memorandum of Association of this RADA. The approved branch/unit shall work independent of this RADA. The branch/unit shall pay affiliation fee of Rs.2,000/- annually or any other amount as decided by the Managing Committee from time to time.

This RADA will not be responsible in any way about their liabilities so incurred during their period of existence.

**9. Election:-**

- a) Election of the Managing Committee will be held by the elected Members of the executive committee and it will be by show of hands. If need arises the Managing Committee may decide to suggest other methods of holding the election.
- b) The Managing Committee shall be elected from and out of the elected members of the executive committee within a period of 15 days from the date of election for the Executive Committee members or in extended time as decided by the Executive Committee.

**10. Eligibility to contest the Election:-**

a) Executive Committee member:

The members who are having the experience of more than 5 years in the profession and 3 years membership in the RADA alone are eligible to contest.

The membership of 3 years will be raised by 3 years in every election and the maximum period of membership in the RADA will be of 20 years for contesting in the election.

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12/11/2019

b) Managing Committee member:

The members who are having the experience of more than 20 years in the profession and 3 years membership in the RADA alone are eligible to contest the post of Chairman, Vice Chairman, General Secretary and the Secretary.

The members who are having the experience of more than 15 years in the profession and 3 years membership in the RADA alone are eligible to contest the post of the Treasurer and the Convener.

11. Meetings:-

A) **General Meeting:** - A General Meeting of the RADA shall be held every year within six months from the expiry of its financial year. However, not more than fifteen months shall elapse between two succeeding Annual General Meetings or at such time as may be determined by the Managing Committee. At the office or places as may be determined by the Managing Committee. Such meetings shall be called as the Annual General Meeting of the RADA.

The following business shall be transacted in Annual General Meeting.

- i) To confirm the minutes of the last Annual General Meeting.
- ii) To elect members of the Executive Committee and the Managing Committee, if the election shall fall due.
- iii) To Receive and consider the audited accounts and the reports of the Managing Committee and the auditors and approve the same.
- iv) To Appoint Auditor(s) and to fix his/her their remuneration.
- v) To transact any other business which under these rules ought to be transacted at a general meeting.

The quorum of the Annual General Meeting will be minimum  $\frac{2}{3}$  of the total members present in person. However, if the quorum is not complete but the members present in person are not less than 10%, the meeting can be held after a relaxation of 30 minutes. If the meeting is adjourned for want of quorum as aforesaid, the next meeting shall be held on the same day next week at the same place and timing with same agenda and the members present shall form the quorum.

B) **Executive Committee Meeting:** - Such meeting shall be held at least in every two calendar months. The quorum shall be  $\frac{1}{3}$  persons presents.

C) **Managing Committee Meeting:** - Such meeting shall be held at least in every 5 calendar months. The quorum shall be  $\frac{1}{3}$  persons presents.

D) **Special Meeting:-**

I. Notwithstanding anything contrary contained herein, a special meeting of the members of the RADA may be called by the Secretary in the following events.

- i) If it is directed by the Managing Committee, or
- ii) If a written requisition is received signed by not less than fifty percent of the members.

II. The General Secretary will give at least 21 days clear notice of such meeting either through messenger or by post or by courier or direct call over phone or email or short messaging service containing agenda, date, place and time of the meeting. Such meetings will be called to conduct the following business:

- i) To terminate the membership of a member.
- ii) To remove a member or members of the Executive Committee.
- iii) To sell immovable properties by passing a special resolution.

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- iv) To frame, alter, modify and/or amend Rules and Regulations of the RADA under these rules if the same are recommended by the Managing Committee.
- v) To amalgamate or merger the RADA with any other institution by passing a special resolution.

III. The Quorum of the meeting will be minimum fifty percent of the total members present in person or by proxy, except in case of item (iv) above relating to Rules and Regulations, in which case the quorum will be 2/3<sup>rd</sup> members present in person.

IV.No business other than included in the agenda of the notice can be conducted in the meeting.

**12. Rights of the Members:** - Every member shall be entitled to all rights and privileges of membership under the Rules and Regulations of the RADA. Which comprises the following:-

- i) To attend General Meeting and Vote for all the matter transacted in General Meeting.
- ii) To elect members of the Executive Committee under these rules.
- iii) To inspect the Register of members by prior request in writing.
- iv) To make written requisition for calling special meeting. However, such requisition will be effective provided 50% members have signed the requisition.
- vi) To approve the audited accounts placed in the Annual General Meeting.

**13. Rights, Duties and Responsibilities of the Executive Committee**

- i) To elect amongst themselves the Managing Committee as mentioned in these rules.
- ii) To delegate powers to the members by forming Sub-Committee(s) in furtherance of the objects subject to such Rules and Regulations as the Managing Committee may decide.
- iii) To preserve, maintain and develop the immovable properties and funds of the RADA.
- iv) To Plan, discuss and approve the master Budget, Annual Budgets and Periodical Budgets.
- vi) To incur, disburse or reimburse the funds, according to the Budget passed.
- vii) To incur any expenses in general and necessary to execute, administer, manage or supervise all the activities of the RADA.
- viii) To purchase, take on lease/hire or acquire or accept the right of use in any immovable property/properties.
- ix) To grant donations, charities and gifts to fulfill the objects of the RADA.
- x) To accept donations and gifts of any property. Movable or immovable.
- xi) To frame Rules and Regulations and issue directions in connection with the use and enjoyment of the immovable properties.
- xii) To exercise control over the books of the RADA, discuss and approve the accounts placed before the Managing Committee by the General Secretary.
- xiii) To open Bank Account or Accounts in the Name of the Samaj and to deposit the funds of the RADA with Bank (s) and withdraw the same as and when required.
- xiv) To exercise over-all control in connection with all the matters relating to the management and organization of the RADA. In addition to the powers and authorities given by these presents or otherwise expressly conferred upon it, the Managing Committee may exercise all such powers and do all such acts and things as may be exercised or done by the RADA which are not hereby or

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F. Jay  
[Signature]

by statute expressly directed or required to be exercised and done by the RADA in the general meetings or special meeting.

- xv) To spend any portion of the corpus or the income of the RADA for purchasing any land and/or building and/or contracting any building for and in the name of the RADA for the purpose of carrying out, promoting and executing the objects of the RADA.
- xvi) To sell, exchange or transfer any property of the RADA in its best interest with prior approval in special meeting by passing a special resolution.
- xvii) To withdraw funds from one investment and re-invest the same in any other assets.
- xviii) To make proper arrangement for proper custody, upkeep, repair and maintenance of the properties and assets of the RADA.
- xix) To arrange for and/or authorize the signing or execution of any agreement, contract, instrument, document or any other paper or writing required to be signed or executed on behalf of the RADA by the office-bearers to be nominated in this behalf by the Managing Committee and to make the same effective and binding as if the said agreement, contract, instrument or document or paper or writing were signed by all the members.
- xx) To institute, conduct, defend, compound or abandon any legal proceedings by or against the RADA or its office-bearers or otherwise concerned to the affairs of the RADA and also to compound and allow time for payment and satisfaction of any debts due to and/or any claim or demands by or against the RADA to arbitration and to observe and perform the awards.
- xxi) To decide on all the matters pertaining to or in connection with the administration of the Sub-Committee and the successful performance of their aims and purposes.
- xxii) To call Special Meetings.

**14. Rights and duties of the Chairman:-**

- i) To devise means and act for the progress of the RADA and fulfillment of its objects.
- ii) To give proper interpretation to the rules and regulations of the RADA.
- iii) To put up before the annual General Meeting of the RADA the audited annual accounts along with the Auditor's Report.
- iv) To see that, all necessary papers, minute books, registers and books of account connected with the business of the RADA are properly filed, maintained and preserved.
- v) To appoint and depute, subject to approval of the Executive Committee, paid employees on such terms and conditions as may be thought fit and dismiss discharge or remove or suspend them and institute any enquiry against them to demand proper security form them, if necessary.
- vi) To appear for/or on behalf of the RADA and transact all business in the Registration offices as directed by the Executive Committee and to appear in the office of the Registrar of Societies or Income-Tax officers or any other Government Authorities or Tribunal or in any other public or private office or department or authority on behalf of the "RADA".
- vii) To do all such acts, deeds and things as may be authorized by the Executive Committee.

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**17. Rights and Duties of the Secretary (ies)**

- a) To do all such acts, deeds and things as may be authorized by the Executive Committee.
- b) To operate Bank Account(s) under these rules.
- c) To attend all the meetings of the Sub-Committees as ex-officio member.
- d) To help and assist the Chairman to look after the entire affairs of the RADA.
- e) To supervise the scheme of collections and/or donations, contributions, disbursements and reimbursements under overall control of the Managing Committee.
- f) To incur expenses and issue directions for a payment in connection with and to conduct and manage all the activities of the RADA under these rules as per directions of the Executive Committee.
- g) To sign all the receipts, letters correspondence, notes, statements, schedules details and all other documents necessary to be signed by and on behalf of the RADA.
- h) To conduct correspondence on behalf of the RADA and to sign letters and papers on its behalf and to see that necessary registers and minutes of the RADA are properly kept and maintained.

**18. Rights and Duties of the Treasurer**

- a) To take care of the funds of the RADA not otherwise vested with the Managing Committee.
- b) To prepare master budget and periodical budgets and place the same before the Managing Committee for approval.
- c) To prepare or get prepared accounts, statements, details and schedules and annual reports of the RADA and to place them before the Managing Committee for getting the same approved by the Managing Committee.
- d) To manage collection, disbursement and reimbursements and keep proper accounts for the same.
- e) To open and operate Bank Account(s) of the RADA and sign all cheques jointly with the General Secretary or the chairman or with any of Vice-Chairman's as may be authorized by the Managing Committee.
- f) To follow and carry out directions of the Managing Committee in connection with financial affairs of the RADA.
- g) To sign on behalf of the RADA on any receipts as may be directed by the Managing Committee.
- h) To preserve and maintain in good condition all accounts books, supporting statements, memorandum books and/or other records along with all the valuable documents.
- i) To look after the properties of the RADA and make proper and sufficient arrangement for maintenance and upkeep thereof.
- j) To sign plaints, written statements and petitions etc. and to engage lawyers/pleaders on behalf of the RADA for any purpose.
- k) To prepare before announcing of the date of election and the Annual General Meeting the list of all the members corrected up-to-date and to place it before the Executive Committee.
- l) To publish the annual report and audited income and expenditure account and balance-sheet of the RADA along with the report of the auditor(s) and to circulate the same among the members.

T. Jey  
16 வதுதாள் திருத்தம் இரண்டாம் பக்கம்

**19. Accounts and Audit:**

- a) The RADA shall maintain proper accounts and other relevant records and prepare an annual statement of accounts under the supervision and directions of Secretary and Treasurer under the overall control of Managing Committee.
- b) The said Books of Accounts shall be open to inspections of members at such time and place as the Managing Committee directs on a written request made by any member.
- c) All the account books, statements and details shall be kept at the office of the RADA.
- d) The accounts of the RADA shall be audited by a Chartered accountant and any expenditure incurred for the audit of accounts of the RADA shall be paid by the RADA.

**20. Operation of Bank Accounts:** - Bank account(s) of the RADA shall be opened in any scheduled bank(s) in the name of the RADA and shall be operated upon as under:

- a) Secretary and Treasures shall be the signatories for the operation of the Bank Accounts.
- b) The account shall be operated jointly by secretary and treasurers out of the above three.
- c) In case the above signatories are not available for any reason, they said accounts can be operated by a nominator appointed by the 2/3<sup>rd</sup> majority members in a special meeting.

**21. Seal:** - The Common Seal of the RADA shall be kept in safe custody of the General Secretary and shall be affixed wherever it is required with the consent of the Managing Committee.

**22. Minutes:** - There shall be kept minutes of the proceedings of the Executive Committee Meeting, Annual General Meeting and Special Meeting of the RADA.

**23. Suits:** - All legal actions, suits or proceedings by or against the RADA shall be conducted on its behalf by the Chairman or the General Secretary or any other person authorized by the Managing Committee.

**24. Amendments:** - The Rules and Regulations of the RADA may be amended, altered, modified inserted or deleted in a Special Meeting of the members by majority of members present and voting except C1.3 regarding class of members which can be done by a Special Resolution only. The quorum of meeting shall be 2/3<sup>rd</sup> members present in person. The notice of such meeting along with proposed amendment or alteration must be given at least 15 days before the date of the meeting to its members. Such amendment or amendments shall come into force after the same having been approved by the members in above meeting of the RADA subject to approval of Registrar of Societies, Tamilnadu.

In addition to the above, all the amendments or alterations etc., shall be made in due observance of the provisions of the Tamilnadu Societies Registration Act, 1975.

We, the several persons whose names are subscribed hereto, certify that the above are true copy of the Rules and Regulations of RADA.

Witness








*T. S. S.*  
*T. S. S.*

Signature

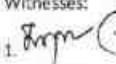
17 வதுநாள் திருத்தம் *[Handwritten Signature]*


With address and occupations

M/s. Ramnad Doctors Association – BMW Plant

S.No	NAME	ADDRESS	OCCUPATION	SIGNATURE
1	Dr.Syed Ibrahim	S/o,Mugaideen, 19/47, R R Sethupathy Nager 4 <sup>th</sup> Cross St, Ramanathapuram.	Doctor	
2	Dr.I.Mansoor	S/o Dr.E.M.Ibrahim, 19/1, Magar nonbu potral Road, Ramanathapuram.	Doctor	
3	Dr.Shanthakumari	W/o,Rethinam, 8, R.R.Sethupathy Nagar, Ramanathapuram.	Doctor	
4	Dr.R.Fathima Dina Begam	W/o Dr. Chinnadurai Abdullah, 60, Local Fund Road, Ramanathapuram.	Doctor	
5	Dr.U.Govindaraj	S/o Udalyan, 3/357,Rani indra devi nachiyar nagar, 2 <sup>nd</sup> st Ramanathapuram.	Doctor	
6	Dr.T.Gnanakumar	S/o Thirpathy, 20, Sigil raja veethi Kenikarai, Ramanathapuram.	Doctor	
7	Dr.R.R.Srinivasan	S/o Ramaiah, 56, R R Sethupathy Nagar 4 <sup>th</sup> Cross St, Ramanathapuram.	Doctor	

Witnesses:

1.  (N. Pravin Kumar) S/o V. Mavalur, 27, Kayakkasi Amman Kovil St.,  
Ramanathapuram.

2.  (N. Balamurugan) S/o S. NATARAJAN,  
53, NAGANATHAPURAM, VELIPPATTINAM, RAMNAD

18 வது நாள் இருந்தது  T. S. Srinivasan



FORM No. V

(See Rule 15 of the Tamil Nadu Societies Registration Rules, 1978)

Notice of Situation / Change of situation of the registered office of the Society under  
sub-section (1) of section 13 of the Tamil Nadu Societies Registration Act, 1975,  
(Tamil Nadu Act, 27 of 1975)

1. Name of the society: Ramnad Doctors' Association (RADA), Ramanathapuram.
2. Date of Registration:
3. The Registration No. &  
Year of Registration:
4. Presented By:

To  
The Registrar of Societies,

.....(Station).

Sir,

"We Ramnad Doctors' Association (RADA), Ramanathapuram" hereby given  
you notice under sub-section (1) of section 13 of the Tamil Nadu Societies Registration  
Act, 1975 (Tamil Nadu Act 27 of 1975) that the Registered office of the society,

Situated at No. 53/6, 1st Main Road, R.R.Sethupathy Nagar, Ramanathapuram  
On the \_\_\_\_\_ day of \_\_\_\_\_.

Signature

Dated:

*J. Jay*  
President/ Secretary,  
Designation or Position

19 வது திசம்பர் 2020 In Relation to the Society Place:

M/s. Ramnad Doctors Association – BMW Plant

FORM NO. VI

(See Rule 16 of the Tamil Nadu Societies Registration Rules 1978)

Register of Members to be maintained under sub-section (1) of Section 14 of the Tamil Nadu Societies Registration Act, 1975.

(Tamil Nadu Act 27 of 1975)

REGISTER OF MEMBERS

1. Name and address of the society: **RAMNAD DOCTORS' ASSOCIATION (RADA), RAMANATHAPURAM**  
Door No. 53/6, 1st Main Road, R.R.Sethupathy Nagar, Ramanathapuram

2. Date of Registration:

3. The Registration Number and Year of registration:

S.No	NAME	ADDRESS	OCCUPATION	DATE OF JOINING	DATE OF RESIGNATION
1	Dr.T.Aravindaraj	S/o. Thiruvannamalai, 23/16-C-5, R.R.Sethupathy nagar, Ramanathapuram	Doctor	14-MAY- 2018	
2	Dr.A.Kallurrahman	S/o.Abdul Salam, V.O.C. Nagar, Railway gate near, Ramanathapuram	Doctor	14-MAY- 2018	
3	Dr.Anando chokkalingam	S/o, Dr.Thirumalaivelu, 19,Lethoms bangle Road, Ramanathapuram	Doctor	14-MAY- 2018	
4	Dr.M.Senthinayagam	S/o Muthiah, 5/73, DD Main Road, GHopp. R.S.Mangalam, Ramanathapuram	Doctor	14-MAY- 2018	
5	Dr.G.Subramaniam	S/o Ganapathy, 43, South muniyasamy koll st,Ramanathapuram	Doctor	14-MAY- 2018	
6	Dr.A.Sivakumar	S/o Angappan Surya, Hospital, Durai raj chattra st, Ramanathapuram	Doctor	14-MAY- 2018	
7	Dr.K.JosephraMAY	S/o,Karuppasamy, 27,Brindhavan Illam RR.Sethupathy Nagar, Ramanathapuram	Doctor	14-MAY- 2018	
8	Dr.A.Kesavan	S/o, Alagu ambalam, 56 k, Yanaikkal st, Ramanathapuram	Doctor	14-MAY- 2018	
9	Dr.Thirumalaivelu	S/o, chokkalingam, 19,Lethoms bangle Road, Ramanathapuram	Doctor	14-MAY- 2018	
10	Dr.Ravirajendran	S/o ,Mayaiaagu, 76-F ,Local Fund Road, Ramanathapuram	Doctor	14-MAY- 2018	

2018 மார்ச் 14  
T. Jay  
DR

M/s. Ramnad Doctors Association – BMW Plant

S.No	NAME	ADDRESS	OCCUPATION	DATE OF JOINING	DATE OF RESIGNATION
11	Dr. chinnadural Abdullah	S/o Dr.E.M.Abdullah, 60, Local Fund Road, Ramanathapuram.	Doctor	14-MAY- 2018	
12	Dr.B.Gopi	S/o,Balakrishnan, 28,R.R.Sethupathy Nagar 2 <sup>nd</sup> Cross St, Ramanathapuram.	Doctor	14-MAY- 2018	
13	Dr.Syed Ibrahim	S/o,Mugaldeen, 19/47, R R Sethupathy Nagar 4 <sup>th</sup> Cross St, Ramanathapuram.	Doctor	14-MAY- 2018	
14	Dr.J.Mansoor	S/o Dr.E.M.Ibrahim, 19/1, Magar nonbu pottal Road, Ramanathapuram.	Doctor	14-MAY- 2018	
15	Dr.K.Patninathan	S/oKathiresan, 25.Railway line pathai, Sokkalingapuram, Ramanathapuram.	Doctor	14-MAY- 2018	
16	Dr.K.R.Srinivasan	S/oRamalen, 56, R R Sethupathy Nagar 4 <sup>th</sup> Cross St, Ramanathapuram.	Doctor	14-MAY- 2018	
17	Dr.Vinyagamoorthi	S/o,Sivasubramanian, 19/52,Lethoms banglow Road,Ramanathapuram.	Doctor	14-MAY- 2018	
18	Dr.Madhuram	W/o, Dr.T.Aravindaraj, 23/16-C-5, R R.Sethupathy nagar, Ramanathapuram.	Doctor	14-MAY- 2018	
19	Dr.Jayabalin	S/o,Pannaiyadiyan, 1/583,Nehru Nagar 10 <sup>th</sup> st Ramanathapuram.	Doctor	14-MAY- 2018	
20	Dr.k.Rajamohamed	S/o,Kadar kanni, 4-2-5,D.T.Main Road, R.S.Mangalam, Ramanathapuram.	Doctor	14-MAY- 2018	

2) வருநாளி திருத்தம்  


M/s. Ramnad Doctors Association – BMW Plant

S.No	NAME	ADDRESS	OCCUPATION	DATE OF JOINING	DATE OF RESIGNATION
21	Dr. Shanthakumari	W/o, Rethinam, 8, RR, Sethupathy Nagar, Ramanathapuram.	Doctor	14-MAY- 2018	
22	Dr. M. Faruk	S/o Mohideen, 31, Dural raj chattrra st, Velipattinam, Ramanathapuram.	Doctor	14-MAY- 2018	
23	Dr. R. Fathima Dina Begam	W/o Dr. Chinnadural Abdulleh, 60, Local Fund Road, Ramanathapuram.	Doctor	14-MAY- 2018	
24	Dr. S.P. Agnela Jospine Therasa	W/o Athisaya Babu, 9/17C, Annal lllam, Singarathoppu Ramanathapuram.	Doctor	14-MAY- 2018	
25	Dr. A. Sakaya Stephen Raj	S/o Asirvatham, 28, Railway line st Chokkalingam, Ramanathapuram.	Doctor	14-MAY- 2018	
26	Dr. U. Govindaraj	S/o Udaiyan, 3/352, Rani Indra devl nachiyar nagar, 2 <sup>nd</sup> st Ramanathapuram.	Doctor	14-MAY- 2018	
27	Dr. S. Sumathi	W/o Sakaya Stephen raj, 28, Railway line st Chokkalingam, Ramanathapuram.	Doctor	14-MAY- 2018	
28	Dr. A. Krishnamoorthi	S/o Andy, 78/2, Faizal nagar, Kenikaral Ramanathapuram.	Doctor	14-MAY- 2018	
29	Dr. R. Malaisarasu	Vel Hospital, Thiruvalluvar Street, Kenikkaral, Ramanathapuram	Doctor	14-MAY- 2018	
30	Dr. T. Ganakumar	S/o. Thirpathy, 20, Sigil raja veethi Kenikaral, Ramanathapuram.	Doctor	14-MAY- 2018	

22 வதுதாள் திருத்தம்  
T. S. S. S.

M/s. Ramnad Doctors Association – BMW Plant

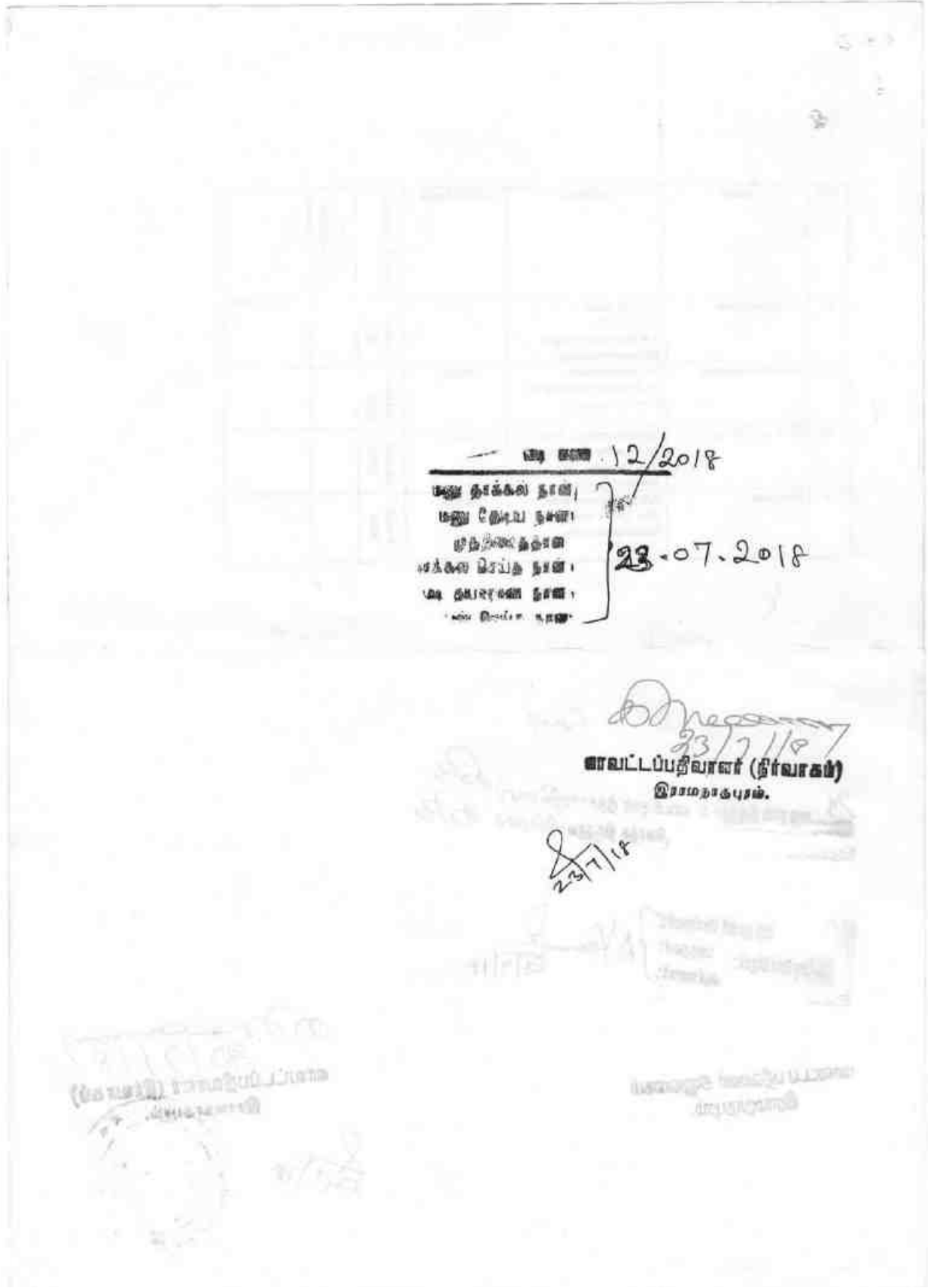
S.No	NAME	ADDRESS	OCCUPATION	DATE OF JOINING	DATE OF RESIGNATION
31	Dr.A.Kanagapriya	W/o, Dr.Balraj, 23/16-C-5, R.R.Sethupathy nagar, Ramanathapuram.	Doctor	14-MAY-2018	
32	Dr.R.Bharanikumar	S/o,Ramanathan, 36,Sivankoil north car st Ramanathapuram.	Doctor	14-MAY-2018	
33	Dr.M.Asik ameen	S/oMohamed all Jinnah, 29,Durai raj chattrra st, Velipattinam, Ramanathapuram.	Doctor	14-MAY-2018	
34	Dr.R.Jona	D/o Dr.Ravirajendran, 75-F,Local Fund Road, Ramanathapuram	Doctor	14-MAY-2018	

23  
 உறுப்பினர் பட்டியல் & கடைசி தரன் தீர்மானம்  
 மொத்த சிபிஎம்: சிபிஎம்

உறுப்பினர் பெயர்: }  
 மத்திய: }  
 உயர்வை: }  
 23/7/18

மாண்புமிகு பதிவாளர் அலுவலகம்  
 கோயமுத்தூர்.

23/7/18  
 மாண்புமிகு பதிவாளர் (நிர்வாகம்)  
 கோயமுத்தூர்.



12/2018  
மனு தாக்கல் நாள்,  
மனு தீர்மான நாள்,  
முடிவடைந்த நாள்,  
சர்க்கல செய்த நாள்,  
மா துயரண நாள்,  
மா துயரண நாள்

23-07-2018

23/7/18  
எவட்டப்பதிவாளர் (நிர்வாகம்)  
இராமநாதபுரம்.

23/7/18

23/7/18  
மா துயரண நாள்  
மா துயரண நாள்

மா துயரண நாள்  
மா துயரண நாள்

**ANNEXURE – IV**  
**NO OBJECTION CERTIFICATE**

பொதுப்பணித்துறை (நிலநீர்)

அனுப்பநர்  
S.பிரதீப், M.Sc., M.Phil.,  
உதவி இயக்குநர், (நி),  
நிலவியல் உபகோட்டம், (கூ./பொ)  
காரைக்குடி.

பெறுநர்  
M/s. RADA BMW PLANT,  
Ramnad MRI & CT scans,  
53/6, R.R. Sethupathy Nagar,  
1 st Main Road ,  
Ramanathapuram – 623501.

கடிதஎண் /உ.இ(நி)/NOC/நி.உ.கோ/காரை/ 2022/நாள் .2022

அம்மையர்,

பொருள்: இராமநாதபுரம் மாவட்டம் - நிலத்தடி நீர் தடையின்மை சான்று (NOC)  
RADA BWM PLANT - கள ஆய்வு ஏற்பாடு மற்றும் விடுபட்ட ஆவணங்கள்  
சமர்ப்பிக்க கோருதல் தொடர்பாக.

- பார்வை: 1. தலைமைப்பொறியாளர், நீவது, மாநில நில மற்றும் மேற்பரப்பு நீர்வள  
ஆதார விவர குறிப்பு மையம், தரமணி, சென்னை அவர்களின் கடித  
எண் 221DD(G)/AG-VI/Fresh NOC/2021 dt: 26.11.2021.
2. செயற்பொறியாளர், நிலநீர் கோட்டம், காரைக்குடி அவர்களின்  
க.எண் :259 S/கோ 15/நிஉ/காரை/2021/நாள் : 22.12.2021.

பார்வையில் 2 ல் கண்ட செயற்பொறியாளர் அவர்களின் கடிதத்தின் இணைப்பாக  
பெறப்பட்ட M/s. RADA BMW PLANT நிறுவனத்திற்கு நிலத்தடி நீரை எடுத்து பயன்படுத்த  
தடையின்மை சான்று கோரி தலைமைப்பொறியாளர், நீவது, மாநில நில மற்றும் மேற்பரப்பு நீர்வள  
ஆதார விவர குறிப்பு மையம், தரமணி, சென்னை அவர்களுக்கு விண்ணப்பித்த விண்ணப்பம்  
இவ்வலுவலகத்திற்கு 28.12.2021 அன்று கிடைக்கப்பெற்றது.

நிலத்தடி நீர் தடையின்மைச்சான்று வழங்க களஆய்வு மற்றும் நீர் இறவை  
சோதனை செய்வதற்கு பலமுறை தொலைபேசியில் தொடர்பு கொண்டும், இதுநாள்வரை  
இவ்வலுவலகத்தை தொடர்பு கொண்டு விடுபட்ட ஆவணங்கள் சமர்ப்பிக்கப்படவில்லை எனவே,  
தாங்கள் தங்கள் நிறுவனத்தினுடைய, விண்ணப்பம் அது தொடர்பான ஆவணங்கள் மற்றும்  
பின் இணைப்பு (Annexure) ஆகியவற்றுடன் 22.04.2022 க்குள் இவ்வலுவலகத்தில்  
சமர்ப்பிக்கவும், கள ஆய்வு மற்றும் நீர் இறவை சோதனைக்கு ஏற்பாடு செய்யக்  
கேட்டுக்கொள்ளப்படுகிறது. தவறும்பட்சத்தில் தங்களது விண்ணப்பம் நிராகரிக்க பரிந்துரை  
செய்யப்படும் என்பதை தெரிவித்துக்கொள்ளப்படுகிறது.

  
உதவி இயக்குநர், (நி),  
நிலவியல் உபகோட்டம், (கூ./பொ)  
காரைக்குடி

ஓ.மு.(அ1)/7012/2021

வட்டாட்சியர் அலுவலகம்,  
பரமக்குடி.  
நாள்: 09.05.2022.

மேலெழுத்து

பொருள்: தடையின்மைச் சான்று - பரமக்குடி வட்டம் - கீழ்க்கோட்டை குருப் - முத்துவயல் கிராமம் - புல எண்.249/13- ஆழ்துளை கிணறு நீர் பயன்படுத்த தடையின்மை சான்று கோரியது - தொடர்பாக.

பார்வை: இராமநாடு மருத்துவர்கள் சங்கம், இராமநாதபுரம் கிளை கடிதம், நாள்: 16.08.2021.

<><>

பரமக்குடி வட்டம், கீழ்க்கோட்டை குருப், முத்துவயல் கிராமம், புல எண்.249/3-ல் தனியார் மருத்துவமனைகளில் சேகரிக்கப்படும் மருத்துவக் கழிவுகளை புதைக்க, மேம்படுத்தப்பட்ட கருவிகள் பயன்படுத்துவதற்கு தேவையான தண்ணீரை அங்குள்ள ஆழ்துளை கிணற்றில் இருந்து பயன்படுத்த பொதுப்பணித் துறையில் தடையின்மைச் சான்று பெற வருவாய் ஆய்வாளர் சான்று வழங்குமாறு பார்வையில் காணும் கடிதத்தில் கேட்டுக்கொள்ளப்பட்டுள்ளது.

2) மேற்படி கடிதத்துடன் பொதுப்பணித் துறையில் பெறப்பட வேண்டிய தடையின்மைச் சான்று படிவம் இணைக்கப்படவில்லை. எனவே, வருவாய் ஆய்வாளர் சான்றளிக்க வேண்டிய படிவத்துடன் விண்ணப்பம் அளிக்குமாறு கேட்டுக்கொள்ளப்படுகிறது.

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வட்டாட்சியர்,  
பரமக்குடி.

/உத்தரவுப்படி/

தலைவரின் துணை  
வட்டாட்சியர்,  
பரமக்குடி.

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