

EXECUTIVE SUMMARY

1. Introduction

M/s. Biotech Engineering Industries has proposed to set up a Common Bio-Medical Waste Treatment Facility (CBWTF) at Survey No: 17/7, Pisanathur Village, Gandarvakkottai taluk, Pudukkottai District, TamilNadu. The bio-medical wastes generated from healthcare units including veterinary institutions, animal house, pathological Laboratory, Blood Bank etc. from parts of in and around Pudukkottai, Tiruchirappalli, Thanjavur, Sivagangai, Nagapattinam, Thiruvavur, Perambalur district will be suitably collected & treated to reduce the possible adverse effects.

The proposed establishment of common bio-medical waste treatment and disposal facility is covered under activity 7 [d (a)] and Category B1 of “Bio-medical Waste Treatment Facilities” as per the EIA Notification dated 14th September, 2006 and amendment no. S.O 1142 (E) dated 17th April 2015. The proposed project requires prior Environmental Clearance from SEIAA, Tamil Nadu.

Application seeking ToR was made with Form 1 & Pre-feasibility report to SEIAA, Tamil Nadu vide proposal no. SIA/TN/INFRA2/494961/2024 and File no. 11227. SEAC in its 501th meeting held on 27th September 2024 appraised the project. The Terms of Reference (ToR) for the study and preparation of EIA report, with identification no. TO24B3301TN5162069N was issued on 22.10.2024 by the SEIAA-TN.

2. Project Details

Table 1 – Details of the Project

Project Name	Proposed Common Bio Medical Waste Treatment Facility
Capacity	10 TPD
Project Site	Survey No: 17/7, Pisanathur Village, Gandarvakkottai taluk, Pudukkottai District, Tamil Nadu
Proposal Number	SIA/TN/INFRA2/494961/2024 (from Parivesh Portal)
Geo Co-ordinates of site	10° 35' 28.64" N 79° 02' 08.45" E
Project Land Area	Total plot area - 1.55 acres (6250 Sq.m)
Project Cost	Rs. 2.83 Crores

Table 2 – Environmental Setting of the Project

Feature	Details		
Village, Taluk, District, State	Pisanathur Village, Gandarvakkottai Taluk, Pudukkottai District, Tamil Nadu		
District head quarters	Pudukkottai - 30.3 Km - SW		
Max./Min Temp	39.70°C / 17.80°C		
Relative Humidity	59-85%		
Annual rainfall	857.80 mm		
Topography/ Soil Type	Ferruginous Lateritic soil		
Terrain, level with respect to MSL	Flat terrain and lies at an altitude of 100 m MSL		
Nearest Habitation	Pisannathur	0.77 Km	S
	Pudunagar	2.76 Km	N
	Veeradipatti	4.14 Km	SE
	Palaya Gandarvakottai	1.34 Km	W
Nearest Major City	Thanjavur	20 km	NE
Nearest Air port	Tiruchirappalli International Airport	59 km	NW
Nearest Sea port	V. O. Chidambaranar Port	223 km	S
Nearest Railway Station	Thanjavur Railway station	24 Km	NW
Nearest Highway	(SH - 99) Thurukattupalli - Sengipatti- Pattukottai Road	2.45 km	S
	(NH- 36) Pudukkottai- Tanjore Road	1.28 km	N
Nearest Water Bodies	Pisanathur Village Pond	0.65 km	S
	Sivan Koil Kulam	2.53 km	SW
	Veeradipatti Vadaku Kulam	4 km	E
	Pudunagar Pond	2.5 km	N
	Mattangal pond	2 km	S
	Kovilur Pond	2.5 km	S
	Gandarvakottai Lake	2.8 km	W
Nearest Forest	NIL		
Historical places	None within 10 km radius		
Interstate boundary	NIL		
Source: *DCHB Pudukkottai 2011			

Table 3 – List of Equipments

S.No.	Equipment	Installed Capacity	Numbers
1	Static Incinerator	200 Kg Per Hour	1
2	Static Incinerator	100 Kg Per Hour	1
3	Autoclave	1220 litre Per Hour	1
4	Shredder	200 Kg Per Hour	1
5	Effluent Treatment Plant	25 KLD	1
6	Air Pollution Control Devices – Quencher (Spray cooler), Venturi Scrubber, Flue Gas Wet Scrubber, Droplet Separator and stack.		
7	Continuous Emission Monitoring System (CEMS)		

The total water requirement is estimated to be 19 KLD, of which 8 KLD will be sourced by local body and the remaining 11 KLD will be met through treated water from the proposed Effluent Treatment Plant (ETP).

The industrial water requirement is 15 KLD, and the evaporation loss is estimated to be 3.75 KLD.

The wastewater generated will be treated in the proposed ETP, and the treated water will be reused for industrial purposes within the facility. Domestic wastewater generation is estimated at 1.5 KLD, which is further categorized into grey water and black water. Grey water, amounting to 1.2 KLD, will be treated in the Grey Water Treatment Plant (GWTP), and the treated water will be reused for gardening. Black water, estimated at 0.3 KLD, will be directed to a septic tank followed by a soak pit.

The total power required for the facility is estimated to be around 120 KW, which will be sourced from TANGEDCO and 1 X 120 kVA DG set will be used for power backup.

Table 4 – The fuel required for the operation is given in table below.

S.No.	Components	Fuel Required
1	Incinerator- 200 kg/hr	35-37 Lt/hr
2	Incinerator – 100 kg/hr	25-27 Lt /hr
3	DG set – 120 KVA	16 Lt /hr

In proposed project, the solid and hazardous waste generation during wastewater treatment & treatment of common bio-medical waste will be disposed to TSDF. The collected BMW is estimated to be 60% of incinerable waste and 40% of the sterilization waste (including autoclave and sharps/metallic body in plants). Approximately 250 kg/day of incineration ash and ETP sludge will be sent to TSDF for safe disposal. Municipal solid waste generated onsite will be disposed of daily in the nearest municipal bins, while waste oil from the DG set will be sent to an authorized oil recovery facility.

The proposed facility will have an employment of around 30 nos. The direct and indirect employment is envisaged for both skilled and unskilled.

3. Baseline Environmental Status

The baseline data study has been carried out during the period of 13th Jan, 2025 to 03rd April, 2025 (summer season). The baseline information on ambient air quality, water quality, noise levels, soil quality, ecology & biodiversity and socio-economic are given below.

Air Quality

Ambient Air quality was monitored at 8 locations within the study area of the project site. The locations were identified in downwind, cross wind and up wind directions. The air pollutants monitored are Particulate Matter (PM), Sulphur dioxide (SO₂), Oxides of nitrogen (NO_x), Carbon monoxide (CO) and Ozone (O₃) as per the standard MoEF&CC guidelines and results were compared with stipulated standards of CPCB.

Table 5 – Air Pollutants Monitoring Values

S. No	Parameters	Range	LIMIT AS PER NAAQS
1.	PM ₁₀	40.85 – 56.55	100
2.	PM _{2.5}	21.33 – 56.55	60
3.	SO _x	0.00 – 14.97	80
4.	NO _x	3.50 – 16.17	80
5.	CO	Below Detection Limit (BDL)	4.0
6.	O ₃	Below Detection Limit (BDL)	180

Water quality monitoring

The ground and surface water samples were collected from different sources within the study area and analysed for all important physio-chemical and biological parameters to establish quality of water prevailing in the project surroundings.

Around 5 ground water and 5 surface water samples were collected. The ground water is collected from Pisanathur, Sundampatti, Gandarvakottai, Turusupatti & Kallukaranpatti.

The analysis of **Ground water samples** collected from various locations within the study area indicates that the **pH values** are within the acceptable range specified by CPCB guidelines.

Table 6 – Ground Water Monitoring Values

S. No	Parameters	Range (mg/L)	PERMISSIBLE LIMIT AS PER IS 10500-2012 Amendment 2018
1.	Total Hardness	26 -220	600
2.	Total Dissolved Solids (TDS)	172 -530	2000
3.	Chlorides	21.2 -75.2	1000
4.	Nitrates	3.5 – 12.2	45
5.	Magnesium	2.4 – 25.2	Not Specified
6.	Potassium	3.0 - 172	Not Specified

The **surface water** was collected from Pisanathur Pond, Sundampati, Viralippatti, Pudunagar Pond & Gandarvakottai Lake.

The **Surface water samples** collected from selected locations within the study area were analyzed for various physico-chemical and biological parameters. The **pH values** of the samples were found to be within the acceptable range as per CPCB guidelines, indicating a neutral to slightly alkaline nature.

Table 7 – Surface Water Monitoring Values

S. No	Parameters	Range (mg/L)	PERMISSIBLE LIMIT AS PER IS 10500-2012 Amendment 2018
1.	Total Hardness	56 - 210	600
2.	Total Dissolved Solids (TDS)	90 - 364	2000
3.	Chlorides	40 – 104.9	1000
4.	Nitrates	2.32 – 12.2	45
5.	Magnesium	22 – 102	Not Specified
6.	Potassium	02 - 172	Not Specified
7.	Chemical Oxygen Demand	2.9 - 6.9	250
8.	BOD	BDL	30

In conclusion, all tested parameters of the surface water sample and ground water samples were found to be within the permissible limits set by the **Central Pollution Control Board (CPCB)**, indicating that the water in the area is of good quality and suitable for various uses.

Noise Levels

Noise was monitored at 8 locations within the study area of project site. The locations were identified based on existing noise level status, keeping in view of land use pattern, residential areas in villages, nearby hospitals, bus stands etc.

In the study area, noise levels during the daytime ranged from 45.8 dB(A) to 56.3 dB(A), while night time levels varied between 40.6 dB(A) and 48.8 dB(A). These measurements are well within the permissible limits prescribed by the Central Pollution Control Board (CPCB), which are 55 dB(A) for daytime and 45 dB(A) for night time in residential areas, and 75 dB(A) for daytime and 70 dB(A) for night time in industrial areas. Additionally, the hourly equivalent continuous noise levels (Leq) recorded at various monitoring locations across the study area complied with the applicable CPCB standards for both time periods and land use categories.

The traffic survey was carried out near site. It was found that the highest peak (worst case) was observed 3600 PCU/hr during 08:00 to 09:00 AM near pisanathur toll road. It is observed that the existing level of service of site access road is good as per the IRC; 106-1990 (PCU's per hour) and implies that traffic will not have a major impact due to the proposed project.

Soil quality

Soil quality was monitored at 8 locations within the study area of project site. Locations were selected to assess existing soil conditions representing various land use and geological features. The important physical, chemical parameters concentrations were determined from all samples. Soil samples collected from various locations within the study area were analysed to assess their physical and chemical characteristics. From the analysis reports it has been observed that

- **pH** of the soil samples ranged from 4.36 to 6.80
- **Electrical Conductivity (EC)** was found to range between 20 and 780 μ S/cm, suggesting moderate/minimal salinity levels.
- **Organic Matter Content** varied between 0.12% and 1.0%, indicating the fertility status of the soil.
- **Total Nitrogen, Phosphorus (P), and Potassium (K)** contents were observed in the range of 134 Kg/ha – 352.7 Kg/ha, 10.4 Kg/ha – 28.1 Kg/ha, and 280 mg/kg- 426 mg/Kg respectively, showing the nutrient availability for plant growth.
- **Heavy metals** such as lead, cadmium, chromium, and arsenic were either absent or detected below permissible limits, indicating minimal contamination risk.

- The **Soil texture** analysis for the study area has been given as Ferruginous Lateritic soil.

The nutrient levels and pH are within acceptable limits for agricultural and no significant presence of hazardous element elements was observed.

Ecological Environment

The study of biological environment in the study area near the projects site of the proposed CBWTF in Pisanathur Village was conducted in compliance to ToR. The data of the flora and fauna in the study area is collected by conducting field survey in the area, examination of floral and faunal records in published reports in Government websites, standard books, research publications etc. The data was analyzed to comprehend the probable impact of the establishment of the proposed facility in the surrounding environment with specific reference to ecology. In Pudukkottai District, four major rivers namely, Vellar, Agniyar, Pambar and Kundar are flowing.

In the study area of 10 km radius, there are no reported rare or endangered species of birds and animals have been reported from the industry area and also, there are no National Parks, Wildlife Sanctuary etc found within 10 km radius of the project site.

Pudukkottai District is predominantly an agricultural district. Paddy, groundnut, sugarcane, maize and cashewnuts are the major crops grown in this district. Gandarvakottai taluk in the Pudukkottai district primarily has red ferruginous lateritic soils. The soil is mostly fertile and has soil seed banks. The soil microflora is generally, bacteria, fungi, algae, protozoa and the soil micro fauna are nematodes and protozoa from the soil organic matter. There is a diverse range of plant species, including those found in vegetable fields. Fauna diversity includes a variety of insect species, ants, and other invertebrates, along with birds, reptiles, and mammals. The principal crops of Pudukkottai district are Paddy (Rice), Chola (Jowar), Maize, Black gram, Gingelly, Groundnut, Coconut, Sugarcane, Mango, Banana, Cashewnut etc

Socio-Economic Environment

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 socioeconomic 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 the study area has been done through primary household survey and through the analysis of secondary data available for study area. Anticipated environmental impacts and mitigation measures

The proposed project may cause impact on the environment in two phases:

1. During Construction phase
2. During Operation phase

a. Impacts during construction phase:

Construction phase works include site clearance, site formation, building works, infrastructure provision and any other infrastructure activities. The impacts due to construction activities are short term and are limited to the construction phase.

b. Impacts during operation phase:

Impact on Air Quality

The potential dust sources associated with operation activities are loading and unloading of the materials, travel over unpaved roads and wind erosion etc. The construction works associated with the proposed development are given below.

- The main air pollutant expected from line sources are dust generation from the movement incoming & outgoing vehicle.
- Point source emissions from Incinerator, DG set
- Dust generation due to the movement of vehicles on unpaved roads
- Unloading of raw materials and removal of unwanted waste material

The anticipated air emissions from incinerator, DG set and Stacks are estimated and emission rates were calculated based on the outlet emission standards provided for PM, SO₂ and NO_x (50 mg/m³, 200 mg/Nm³ and 400 mg/ Nm³ respectively)

The AERMOD view 12.0.0 model results shows very negligible incremental rise in all these air quality parameters with an overall air quality scenario in worst case for PM (5 µg/m³), SO₂ (0.60 µg/m³) and NO_x (3.0 µg/m³) respectively.

Mitigation Measures - Air Quality

- To minimize the impact from line source, black carpeted road will be maintained properly to reduce the dust generation.
- Regular water sprinkling on main haul roads in the project area, this activity will be carried out at least twice a day.
- Greenbelt will be provided along the boundary and along the road and DG set will be used only

during power failure for emergency requirements.

- The duration of stockpiling will be as short as possible as most of the material will be used as backfill material for the open cut trenches for road development.
- Temporary tin sheets of sufficient height (3m) will be erected around the site of dust generation or all around the project site as barrier for dust control.

Impact on Water quality

The operation of a Common Biomedical Waste Treatment Facility (CBWTF) may pose potential risks to the water environment through wastewater generation, accidental spills, and surface runoff from the site. The primary sources of water pollution include effluents from waste treatment processes, washing of vehicles, and leachate from waste storage areas. If not managed properly, these discharges can lead to contamination of groundwater and nearby water bodies, affecting both water quality and aquatic ecosystems.

Mitigations Measures - Water quality

During site development necessary precautions will be taken, so that the runoff water from the site gets collected to working pit and if any over flow is, will be diverted to nearby greenbelt/ plantation area. Wastewater including vehicle and container washing, floor washing, domestic water shall be treated in ETP for safe guard of water environment. The treated waste water shall be used for greenbelt, floor/vehicle washing etc.

Impact on Noise Levels

The major source of noise in proposed project will be from unloading of bio-medical waste and use of Incinerator, DG set, pumps, motors etc.

Mitigation measures – Noise Levels

- Providing suitable enclosures (adequate insulation) to minimize the impact of high noise generating sources.
- Employees will be provided with PPE like earplugs, helmets, safety shoes, etc.
- Development of greenbelt all along the boundary and along the roads within the project

4. Environmental Monitoring Program

Environmental monitoring program describes the processes and activities that need to take place to characterize and monitor the quality of environment. Different activities involved in proposed project and their impact on various environmental attributes have been taken into account while designing a detailed environmental monitoring program.

Environmental monitoring program has been prepared for the proposed project for assessing the efficiency of implementation of Environment Management Plan and to take corrective measures in case of any degradation in the surrounding environment. Results of monitoring will be reviewed, analyzed statistically and submitted to concerned authorities.

Environmental Monitoring Program includes:

- Continuous online monitoring of the incinerators stack emission for flue gas parameters
- Incinerators stack emission monitoring to ensure compliance with emission standards
- Ambient air quality monitoring
- Analysis of treated wastewater, especially in case of discharge
- Periodic monitoring of incineration ash and ETP sludge

5. Risk analysis

Risk assessment was carried out to identify and quantify major hazards and risk associated with various operations of proposed project that may lead to an emergency situation which affect public safety and health. A systematic analysis of chemicals and their quantities of storage have been carried out to determine threshold quantities as notified in MSIHC Rules, 1989 and amended in 2000.

All necessary measures to minimize the risk due to the proposed project will be taken during design stage and operation period viz., fire and safety control measures, emergency preparedness plan, disaster management plan etc.

6. Project Benefits

The contribution of proposed facility to health care establishments in their BMW Management is expected to be significant. Expected project benefits include:

- (i) Better management of bio-medical waste
- (ii) Reduction of pollution load on environment
- (iii) Ensure compliance with applicable rules (Bio-Medical Waste Management Rules, 2016),
- (iv) Reduced environmental liability for health care establishments
- (v) Employment opportunities etc.

7. Environmental management plan

The Environmental Management Plan (EMP) is designed to ensure the sustainable development of the proposed plant and its surrounding environment. The primary objective of the EMP is to minimize pollution at the source using best available and affordable technologies, followed by appropriate treatment methods prior to discharge or disposal, in compliance with regulatory standards.

The Environmental Management Plan (EMP) is required to ensure sustainable development of the plant

area and the surroundings. The EMP aims to control pollution at the source level to the possible extent with the available and affordable technology followed by the standard treatments before getting discharged. The capital cost for the proposed project is estimated to be around Rs.2.83 Crores. The capital cost allocated for EMP is around Rs.142 Lakhs with a recurring cost of Rs.8 Lakhs per annum. The fund allocation for the CER Greenfield Project is 2.0% of Capital investment for industries having capital amount ≤ 100 crores. The details of planned CER activities for Rs.5.66 lakhs.

The proposed incinerators shall be equipped with all necessary Air Pollution Control Devices (APCDs) to comply with prescribed emission norms. Necessary precautions shall be taken to minimize odour and noise. Wastewater generated from the floor washing/vehicle and container washing shall be treated in Effluent Treatment Plant (ETP). Treated wastewater shall be reused for floor/vehicle washing, greenbelt etc.

The 4R strategy—Reduce, Reuse, Recycle, and Recover—forms the foundation of an effective solid waste management approach. It aims to minimize waste generation and reduce the burden on landfills through sustainable practices.

In the proposed CBWTF, biomedical waste generated from Health Care Facilities (HCFs), which includes hazardous waste, will be treated primarily through incineration. The incineration ash and Effluent Treatment Plant (ETP) sludge will be collected separately and disposed of at an authorized TSDF in compliance with regulatory norms.

Recyclable biomedical waste such as plastics and glass will undergo autoclaving for sterilization, followed by shredding to ensure safe handling and prevent reuse. It is emphasized that recyclable waste must never be mixed with general dry waste and shall be disposed of exclusively through authorized or registered recyclers, in accordance with the Biomedical Waste Management Rules, 2016.

To manage storm water and promote groundwater recharge, 8 rainwater harvesting pits of size 1 m $\times$ 1 m $\times$ 2 m depth will be constructed across the plot area. The excess rainwater will be directed Rainwater harvesting pond, ensuring no waterlogging or flooding within the site. The water collected in the pits will facilitate groundwater recharge.

In the initial phase of operation, solar panels will be installed to meet 25% of the facility's energy demand, remaining demand will be met out on subsequent phase

To mitigate environmental impacts and enhance the ecological and aesthetic value of the proposed CBWTF, a thick greenbelt will be developed along the periphery of the site. Native tree species that are well-suited to the local climatic and soil conditions will be selected, with a preference for evergreen

varieties with dense canopies to maximize attenuation of dust and noise arising from plant operations and vehicular movement.

The greenbelt will act as an effective buffer zone, helping to reduce airborne particulates, absorb gaseous pollutants, and minimize vehicular noise. The species selection is based on CPCB recommendations and includes trees known for their dust-trapping efficiency, high foliage density, and resilience to industrial environments.

8. Conclusion

Baseline data was collected for various environmental components and an overall assessment was made on the potential environmental impacts likely to arise from the CBWTF. Necessary pollution control measures (along with monitoring plan) were proposed to ensure minimal impact on the environment. The facility offers huge advantage to HCEs through efficient treatment and disposal of BMW at a lower cost and minimizes adverse impacts on environment.

The CBWTF also reduces the stress of individual HCEs to have their captive treatment facilities to comply with regulatory norms. The facility also improves prevailing environmental conditions of all HCEs avoiding any kind of long-term storage of BMW within their premises as the scope of common facility includes daily waste collection mechanism to avoid unwanted storage and reduce its effects on the human population as well as surrounding environment.