

EXECUTIVE SUMMARY

1. Introduction

Medicare Environmental Management Private Limited (MEMPL), currently operating around 24 CBWTFs in all over India, proposed to establish a Common Bio-Medical Waste Treatment Facility (CBWTF) at Plot No.C-6, SIPCOT Industrial park, Seikalathur Village, Manamadurai Taluk, Sivagangai District, Tamil Nadu All the HealthCare Establishments (HCEs) are required by law to put in place the mechanisms for proper segregation and scientific disposal of Bio-Medical Waste (BMW) to minimize adverse impacts on health care workers and on the environment. However, installation of individual treatment facilities by HCEs requires significant capital investment and trained manpower for proper operation and maintenance of treatment systems.

Common Bio-Medical Waste Treatment Facilities (CBWTFs) offer huge advantage to health care establishments through more efficient treatment and disposal of bio medical waste and through 'Economies of Scale' (significant decrease in cost of treatment per kilogram).

Ministry of Environment, Forest & Climate Change (MoEF&CC) has notified an amendment to the EIA Notification 2006 published vide S.O. 1142 (E) dated 17th April, 2015. According to this notification, the BMW Treatment facility is categorized under the Item 7 (da) – Category B1 in the schedule, requiring 'Environmental clearance' from the State Environment Impact Assessment Authority (SEIAA)/ State Expert Appraisal Committee (SEAC).

2. Project details

The proposed facility will be developed in an area of 14569.00 Sq. m (3.60 ac) with all associated auxiliary units. Geographical location of project site is Latitude 09°43'9.20"N, Longitude 78°28'29.05"E. The proposed CBWTF has been designed to treat up to 5.5 TPD of BMW with 2 X 250 kg/hr incinerators, Autoclave – 1275 litres/batch, Shredder – 250 kg/hr, ETP – 8 KLD.

The site is situated in notified SIPCOT Industrial Park, Seikalathur (V), Manamadurai (T), Sivagangai (D), Tamil Nadu and is well connected by village & industrial roads. National Highway NH-36 is located 1.31 km (E) from the site. Seikalathur village is located 1.0 km (SW) from the site. The nearest town is Manamadurai town 2.0 km (SW). The nearest railway

station is Manamadurai railway station at a distance of 3.2 km (SW). The nearest airport is Madurai Airport 42.5 - km (NW) from the site.

Total water requirement is estimated to be 35 KLD, which will be sourced from SIPCOT/ water tankers. The wastewater generated will be treated in the proposed ETP and the treated wastewater shall be reused within the proposed facility. The total power required for the facility is estimated to be around 150 kVA, which will be sourced from SIPCOT and 1 X 150 kVA DG set will be used for power backup.

In proposed project, the solid / hazardous waste generated will be from incineration of biomedical waste. The ash from incinerator is around 170 kg/day will be sent to CHWTSDF. The municipal solid waste will be daily disposed to nearest municipal bins. The waste oil from DG set of 2LPD will be sent to oil recovery facility.

The proposed facility will have an employment of around 50 no's. 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 June, 2023 to August, 2023 (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 10 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.

The minimum and maximum levels of PM_{2.5} are recorded in the range of 22.6 µg/m³ to 33.8 µg/m³, whereas the PM₁₀ are in the range of 39.8 µg/m³ to 54.1 µg/m³.

The sulphur dioxide concentrations within the study are observed are in the range of 8.8 µg/m³ to 15.3 µg/m³ and the oxides of nitrogen observed are in the range of 15.4 to 25.3 µg/m³. The observed pollutant levels were compared with CPCB Standards for PM_{2.5} (60

$\mu\text{g}/\text{m}^3$), PM_{10} ($100 \mu\text{g}/\text{m}^3$) and SO_2 & NO_x ($80 \mu\text{g}/\text{m}^3$) and found to be well within the limits indicating that the baseline environmental status in terms of air pollution is better with as all pollutants are within the limits. The CO recorded within the study area was in the range of BDL to $580 \mu\text{g}/\text{m}^3$ and O_3 concentrations were also monitored in the study area and are found to be Below Detection Limit (BDL).

Water quality monitoring

The ground and surface water samples were collected from different sources within the study area and analyzed for all important physico-chemical and biological parameters to establish quality of water prevailing in the project surroundings. Around 10 ground water and 2 surface water samples were collected. The ground water is mainly from bore wells used by the villagers for domestic purposes. The surface water were collected from Mel Konnakulam Pond and Vaigai River. The pH of ground water observed is from 6.68 to 7.63 and in surface water it is from 7.46 & 8.10, the TDS level of GW is from 267 to 1170 mg/l, whereas in surface water the levels are 545 & 709 mg/l. The Chloride concentrations in GW is between 58 to 420 mg/l. The Hardness observed in ground water is 144 to 600 mg/l, Fluoride concentrations observed in GW is in the range of 0.39 to 0.85 mg/l. All the sample analysis of ground and surface water found to be fit for human use purpose.

Noise Levels

Noise was monitored at 10 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, schools, bus stands etc. Noise levels during day time are monitored 6 AM to 10 PM and in night during 10 PM to 6 AM. The noise levels during the day are ranging between 50.0 dB (A) to 54.3 dB (A), whereas in night it is ranging between 40.1 dB (A) to 44.4 dB (A). The noise levels were monitored as per ambient noise standards and are observed to be within the standards. The National Highway NH-36 is located 1.31 km (E) from the site. The traffic survey was carried out near site. It was found that the highest peak (worst case) was observed 630 PCU/hr during 10 to 11 am near site 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 10 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. The pH values in the study area are varying from 6.27 to 7.42, electrical conductivity is observed to be in the range of 234 to 461 $\mu\text{Mhos/cm}$, organic carbon is varying from 0.5 to 1.1 %, available Nitrogen is varying from 43 to 89 kg/ha, available phosphorus is varying from 71 to 90 kg/ha, and available potassium is varying between 296 to 355 kg/ha.

Ecological Environment

A detailed study was done within 10 km radius area of the project site. Primary data has been collected using standard procedure from core as well buffer zone. Primary data has been verified and crossed checked from secondary data available. The species has been classified in to tree, shrubs, herbs (in case of Flora species) and Fishes Reptile, Amphibians, Birds and Mammals species (In case of Fauna species). Conservation status has been verified using with IUCN Red Data List and IWPA, 1972 Schedule. Being located within the Notified Industrial area the plot (core zone) is having some seasonal ground flora, bushes and few trees. None of the species is falling in any conservation category. Most of the species are widely distributed in the area and locally available. There is no species falling within the endangered category as per IUCN, March 2019. No Schedule-I species as per IWPA, 1972 found or reported at the area. No National Park, Wildlife Sanctuary, Tiger Reserve, Biosphere Reserve present within 10 km radius study area. Katturani RF present in NW direction and Sattarasankottai RF present in NE direction from the project site.

Socio-Economic Environment

The socio-economic study covers villages within 10 km radius from the periphery of the proposed project site. The primary data was collected through a range of research techniques and tools, like a transactional walk, a structured questionnaire, focus group discussions, observations, and key stakeholder interactions. Secondary data was collected from district census statistics for 2011. The socio-economic study observed that 20% of people belong to scheduled category, in which 19.9% belongs to Scheduled Castes (SC) and 0.1% belongs to Scheduled Tribes (ST). Males and females constitute 50.02% and 49.98%, respectively, and

the number of females per 1000 males is 999. According to Census data of 2011, the study area had an average family size of 4 persons per household. This represents moderately high family size and also in similarity with other parts of the district. The literacy levels in selected villages of study area, reveals that the male literacy comprises of 55.5%, whereas literacy rate among women, which is an important indicator for social change, is estimated to be 44.5%. As per 2011 census, there are a total of 29% main workers in the study area. The marginal workers and non-workers constitute to 17% and 55% of the total population respectively. Therefore, non-workers are predominant in that of workers by occupation.

4. Anticipated environmental impacts and mitigation measures

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

- a. During Construction phase
- b. 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 AIRMOD 7.6.1 model results

shows very negligible incremental rise in all these air quality parameters with an overall air quality scenario in worst case for PM ($54.15 \mu\text{g}/\text{m}^3$), SO_2 ($15.5 \mu\text{g}/\text{m}^3$) and NO_x ($25.7 \mu\text{g}/\text{m}^3$) 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 water quality impacts mainly arises from site formation, which may produce large quantities of run-off with high-suspended solids, and the wastewater generated during the bio medical waste treatment operations. The 35 KLD of water is required for industrial purposes, floor wash & vehicle washes, domestic and for green belt purposes. The total wastewater of 6 KLD is treated in Effluent treatment plant of capacity 8 KLD and the treated water of 5 KLD is reused in the process and other uses whereas around 1 kg of sludge generated is sent to nearest TSDF, thus the impacts arising from water and wastewater is negligible.

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 reused 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

5. Environmental management plan

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.4.96 Crores. The capital cost allocated for EMP is around Rs.49.6 Lakhs with a recurring cost of Rs.4.96 Lakhs per annum.

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 from 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. Ash generated from the incineration and sludge generated from the ETP shall be stored temporarily with proper lining and impervious flooring and eventually will be sent to CHWTSDf.

6. 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: (i) continuous online monitoring of the incinerators stack emission for flue gas parameters, (ii) incinerators stack emission monitoring to ensure compliance with emission standards, (iii) ambient air quality monitoring, (iv) analysis of treated wastewater, especially in case of discharge, (v) periodic monitoring of incineration ash and ETP sludge, (vi) other parameters as prescribed in Consent for Operation (CFO) etc.

7. 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.

8. 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.

9. 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.