

Executive Summary

1.0 Introduction

The National Capital Territory of Delhi (NCT) is the largest metropolis by area and the second largest metropolis by population in India. The NCT of Delhi with an area of 1483 sq. km is surrounded by 3 sides by Haryana and to the east, across the river Yamuna, by Uttar Pradesh. The altitude of Delhi ranges from 213 m to 305 m above mean sea level. The ministry of Urban Development has notified the master plan for Delhi 2021 (MPD 2021) in 2007 in which issue related to industrial growth in Delhi has been extensively debated for non-polluting industrial sectors. There are many effluent treatment plants in operation for various industries in and around NCT, Delhi and disposal of ETP sludge poses a critical issue in disposing the same in an environmental friendly manner.

2.0 Project details

This Project is in accordance with the notification issued by the Ministry of Environment and Forests, Climate Change (MoEF&CC) S.O.1533, dated 14.09.2006 and its subsequent amendments, the proposed project falls under Category "A" & Project Activity 7(d) & 7 (da) Common Hazardous Waste Treatment, Storage and Disposal Facility (TSDF) with all proposed integrated facility with Incinerator.

In Delhi there are about 1123 existing industrial units which are expected to generate hazardous waste during day to day operations. These process units are presently storing the hazardous waste in their premises or stored at CETP sites. In addition to this around 21,000 MT of hazardous waste/ sludge are stored at various CETPs in Delhi. The total hazardous waste generated in and around Delhi is approximately 4197.76 TPA out of which around 2318 TPA is generated from 1123 industrial units and the rest of 1880 TPA is generated from 13 CETPs existing in Delhi region. In addition to this, around 20466 MT of hazardous waste stock is piled up in 13 CETP sections (This data is sourced from the DSIIDC's Delhi TSDF RFP, Dec 2018)

Current data provided by DSIIDC in Jan 2020 are follows:

- A. Stock Piled Hazardous Waste up to July 2016
 - 1. CETP = 25,000 MT
 - 2. Industries = 20,000 MT
 - Total = 45,000 MT
- B. Hazardous Waste generated in 3.5 years (Aug 2016 to December 2020) considering generation @ 4200 MT/A = 14,700 MT
- C. Total Hazardous Waste till December, 2019 (A+B) Approx. = 59,700 MT

All these need to be properly collected treated and finally disposed in environmentally safe manner as per the Rules issued by the Ministry of Environment and Forest, Climate Change

and the Guidelines, MoMs & SoPs issued by Central Pollution Control Board from time to time for disposal all kind of Hazardous waste in TSDF.

Considering the waste generation scenario with reference to ETP sludge and all types of hazardous waste and spent/used oil in Delhi, there is a need to establish a treatment, storage and disposal facility (TSDF) to accommodate all the quantities of hazardous waste for Delhi industrial growth centre in a scientific manner, meeting the rules for hazardous waste disposal, guidelines, MoM and SoP issued time to time by MOEF&CC and CPCB. The proposed TSDF facility will reduce the gap in the demand and availability of hazardous waste management facilities in Delhi and this will help in addressing the real challenge of management of Hazardous waste in Delhi, which is a matter of concern.

Delhi State Industrial and Infrastructure Development Corporation Ltd. (DSIIDC) have initiated the process of establishing a TSDF on the advice of NGT and ensured to complete the same by June 2020. DSIIDC had floated a tender for the above work and based on the evaluation of the bids received, M/s TamilNadu Waste Management Limited was selected for the development of Treatment, Storage and Disposal Facility (TSDF) at 14 acres of land, earmarked "ABCD" of size (515*110) sq m measuring 14 acres (5.66 Ha) area out of 67.9112 Ha earmarked as "abcdefgh" as Secured Land Fill (SLF) site at Bawana, Delhi.

3.0 Project capacity

The Treatment, Storage and Disposal Facility has three principal waste disposal/ recycling or recovery units such as facilities for the treatment of all kind of hazardous waste i.e. Hazardous in Nature/Contaminated with Hazardous Waste/Waste which can be dispose through TSDF as per the rules, guidelines issued by MoEFCC, CPCB/Domestic Hazardous Waste/Liquid Hazardous Waste, used oil, paper and plastic and Alternative Fuel and Raw Material recovery. The details of the proposed project capacities are given below in **Table 1**.

Table 1: Proposed project details and capacities

S. No	Name of the Facility	Proposed capacity
1	Secured landfill (DLF)	A. 65000 MTA for 1 st Year
2	Treatment/Stabilization (LAT)	B. 20000 MTA from 2 nd Year Onward till 25 th Year
3	Incineration (INC)- All Hazardous & Other Waste as prescribed by MoEFCC, CPCB & other Statuary Bodies	Scalable up to 1.5 T/hr.
4	Alternative Fuel and Raw Material (AFRF)	10000 TPA
5	E waste (Domestic Hazardous Waste)	2000 TPA
6	Used Oil (Hazardous in Nature/Contaminated with Hazardous Waste) Recycling	1000 KLPA which will be scalable up to 10000 KLPA

7	BMW (Domestic Hazardous Waste)	40 TPD
8	Paper (Hazardous in Nature/Contaminated with Hazardous Waste) Recycling	1000 TPA
9	Plastic (Hazardous in Nature/Contaminated with Hazardous Waste) Recycling	1000 TPA
10	Drum (Hazardous in Nature/Contaminated with Hazardous Waste) Recycling	200 /day

Note: All Recycled Material will be sent to Authorized Recycler

All proposed activities of recycle, reuse recovery, decontamination, disinfection, preprocessing and utilization before any waste goes for scientific disposal and landfill in line with Hazardous And Other Wastes (Management and Transboundary Movement) Rules, 2016 and its amendments, guidelines and directions from various statutory bodies. The above is also in line with various provisions/clauses of the Concession Agreement signed between DSIIDC & TNWML and Proposal submitted to DSIIDC by M/s. TNWML. It is pertinent to state that intention is to maximize the usage of all waste and minimize the disposal so that 14 acres of land is fully utilized and last for longer period of the project period.

Recycling Facilities like Plastic, Paper, Drum and Liquid Hazardous waste (oil recycling and other recycling units are ancillary activities to TSDF and are either are a part of or integral with generation, storage or packing material of any hazardous waste. Hence when the waste comes for disposal facilities for decontamination, disinfection, shredding granulation, bailing, treatment are required before going for any disposal is also required and hence the facilities are proposed.

The facility for treatment of BMW & E Waste Recycling is proposed because the concession agreement calls for disposal of Domestic Hazardous waste. The domestic hazardous waste means discarded paint drums, pesticide cans, CFL bulbs, tube lights, expired medicines, broken mercury thermometers, used batteries, used needles and syringes and contaminated gauge, etc., generated at the household level; Such waste mainly needs treatment which are similar to BMW facility & E Waste Recycling facility and hence it is proposed.

4. Land area details

The facilities proposed for the treatment of all types of Hazardous waste/domestic Hazardous waste/contaminated with hazardous waste/Rules having the option to get it disposed through Hazardous waste TSDF recycling of used oil, paper, plastic, and Alternative fuel and raw material recovery. The project is proposed in an area of 14 acres, with sufficient green belt and the details of land area breakup are presented in **Table 2**.

Table 2: Land area breakup

Description	Area (Sq. m)	Area (Acres)
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Landfill	18,325	4.52
Facilities	5175	1.28
Roads	4578	1.13
Open space/ Green belt/mis	28430	7.03
Parking	150	0.04
Total	56658	14.00
A sufficient green belt will be developed within the proposed project site		

5. Water requirement

The present water requirement for TSDF operations will be met from PPCL (Pragati Power Corporation Ltd.). Treated cooling tower blow down water will be recycled and used. Groundwater from tankers will be used for drinking purpose. However, water required up to 100 KLD will be drawn from PPCL if needed in future TSDF operations. The details of the water requirement are given in **Table 3**.

Table 3: Water requirement

Description	Water requirement (KLD)
Secured landfill	5
AFRF facility	-
Incinerator (common for all HW & other wastes)	20
E- waste recycling facility	1
Paper recycling facility	-
Plastic recycling facility	2
Waste/used oil recovery facility	15
Floor Washing, wheel wash	5
Greenbelt	3
Domestic - drinking water (will be sourced from tankers/ adjacent DMSWL)	2
Total	53
The present water requirement for TSDF operations will be met from PPCL (Pragati Power Corporation Ltd.). Treated cooling tower blow down water will be recycled and used. Groundwater from tankers will be used for drinking purpose. However, water required upto 100KLD will be drawn from PPCL if needed in future TSDF operations.	

6. Power and fuel requirement

The details of the power required for operation of the facility and fuel required for running DG sets for emergency use during power failure are given in **Table 4**.

Table 4: Power and fuel requirement

Details	KvA	Remarks
Power required	500	First Phase will apply for 200 KVA Second Phase will apply for 300 KVA Sourced from Tata Power Delhi Distribution Ltd. (Formerly - North Delhi Power Ltd.)
DG set	1 x 200	Used only for emergency power backup

	1 x 300	
HSD Fuel for DG set/Incinerator	30 Lts/hr	Purchased from local dealers

7. Required manpower

The details of skilled and unskilled manpower required for the proposed project are given below in **Table 5**.

Table 5: Manpower details

S.No	Description	Permanent	Remarks
1	Administrative	5	Indirect employment during operation will be around 40 persons During construction period, around 50 persons will be required
2	Skilled Manpower	15	
3	Unskilled Manpower	20	
Total		40	

8. Baseline environmental status

The baseline monitoring studies have been carried out during September to November, 2019. The predominant wind direction during study period was W to E.

Air quality

The ambient air quality was monitored at 8 locations. The minimum and maximum 98th percentile values of pollutants are shown in **Table 6**.

Table 6: Results of ambient air quality ($\mu\text{g}/\text{m}^3$)

Details	PM ₁₀	PM _{2.5}	SO ₂	NO _x	O ₃	CO	C ₆ H ₆	NH ₃
Minimum In 98 th Percentile	81.1	53.5	19.8	28.9	28.8	980	0.51	24.5
Maximum In 98 th Percentile	171	84.3	25.5	36.3	44.5	1354	0.65	41.2
NAAQ Standards 2009	100	60	80	80	100 (8 hourly)	2000 (8 hourly)	5	400

Ground and surface water quality

Ground and surface water samples in the study area were collected from ten ground and three surface water bodies respectively. The samples were analyzed for various physical and chemical characteristics, the results of which are given in **Table 7** and **Table 8** respectively.

Table 7: Results of ground water analysis

Parameters	Units	Minimum	Maximum	Drinking water Standards IS:10500:2012	
				Acc'ble	Per'ble
pH	-	7.2	8.4	6.5-8.5	No Relaxation
TDS	mg/l	560	1505	500	2000
Chlorides	mg/l	68	480	250	1000
Hardness	mg/l	193	545	200	600

Fluorides	mg/l	0.98	1.43	1.0	1.5
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Table 8 Results of surface water analysis

Parameters	Units	SW1	SW2	SW3	CPCB water quality criteria as updated on 11 th September, 2017				
					A	B	C	D	E
pH	-	8.2	7.5	7.9	6.5-8.5		6-9	6.5-8.5	6-8.5
EC	µS/cm	1375	886	1020	-	-	-	-	2250
DO	mg/l	2.8	5.2	4.8	6	5	4	4	-
BOD	mg/l	26	18	22	2	3	3	-	-
Total coliform	MPN/100ml	>1600	>1600	>1600	50	500	5000	-	-

Noise quality

Baseline noise levels have been monitored at nine locations within the study zone, using a continuous noise measurement device. The results are presented in **Table 9**. The day equivalents during the study period ranged between **53.3 to 68.3 dB (A)** whereas the night equivalents were in the range of **43.8 to 54.5 dB (A)**. It was observed that the day equivalents and the night equivalents were within the AAQ standards in respect of Noise SO 123 (E) dt. 14th Feb 2000 for Residential and Commercial area. From the results it can be seen that the day equivalents and night equivalents were within the specified standards except day equivalent observed within site (62.5), which was above the standards of residential area but within the commercial area standards.

Table 9: Noise levels – dB (A)

Parameters	Minimum	Maximum	Standards	
			Residential	Commercial
Day Equivalent (L _{Day})	53.3	68.3	55	65
Night Equivalent (L _{Night})	43.8	54.5	45	55

Soil quality

To determine the impact of proposed activity on soil and agricultural productivity soil samples were collected at ten locations. The results are summarized in **Table 10**.

Table 10: Soil quality in the study area

Parameters	Minimum	Maximum	Standard Soil Classification – (Indian Council of Agricultural Research, New Delhi)
pH	7.7	8.4	Acidic < 6.0, Normal to Saline 6.0-8.5, Tending to become Alkaline 8.6 to 9.0, Alkaline above 9.
EC (µS/cm)	386	480	Normal < 1000, Critical for germination 1000-2000, Critical for growing 2000 - 4000, Injurious to most crops > 4000
Organic carbon (%)	0.18	0.55	Low < 0.5, Medium 0.5 – 0.75, High > 0.75
Nitrogen (kg/Ha)	101	175	Low below 280, Medium 280-560, High above 560

Parameters	Minimum	Maximum	Standard Soil Classification – (Indian Council of Agricultural Research, New Delhi)
Phosphorous (kg/Ha)	6	14	Low below 10, Medium 10-25, High above 25
Potassium (kg/Ha)	161	325	Low below 110, Medium 110-280 High above 280

9. Anticipated impacts

Construction phase works include site clearance, site preparation, building works, infrastructure provision and activities. The impacts due to construction activities are short term and are limited to construction phase. The impacts will be mainly on air, water and soil quality, landuse and socio-economics conditions. The major sources of air pollution are as follows:

1. Area source emissions from Landfill operations
2. Point source emissions from Incinerator, DG set.
3. Boilers for used oil recycling facility

The area source emissions and line source emissions will be within the plant premises, whereas point source emissions expected from the proposed project and predicted GLCs are given in **Table 11**.

Table 11: Post project scenario (units in $\mu\text{g}/\text{m}^3$)

Particulars	Particulate Matter (PM)	Sulphur Dioxide (SO ₂)	Oxides of Nitrogen (NO _x)
Baseline Scenario (Max)	171	25.5	36.3
Predicted GLC (Max)	0.65	2.9	4.8
Overall Scenario (Worst Case)	171.65	28.4	41.1
CPCB Standards	100	80	80

10. Environmental management plan

The Environmental Management Plan (EMP) is required to ensure sustainable development in the area of the proposed project site. The purpose of the EMP is to minimize the potential environmental impacts from the project and to mitigate the adverse impacts. Details of EMP are given in **Table 12**.

Table 12: Mitigation measures proposed during operation phase

Air Quality Management	Incinerator and Boiler will be provided with APCD with a stack height meeting MoEF&CC Guidelines, Spray dryer, Multi cyclone, Bag house, Wet scrubber
	DG set will be provided with a stack height meeting MoEF&CC Guidelines or 1 m above the tallest structure in the project area for proper dispersion of sulfur dioxide and oxides of nitrogen.
	Internal roads will be concreted / asphalted to reduce dust emissions
	Speed restriction will be followed within the project and speed breakers will be provided at entry and exit points
	Gas management system in secured landfill will be provided

	Sufficient green belt will be provided
Odour Control	Dilution of odorant by odour counteraction or neutralize by spraying Ecosorb (organic and biodegradable chemical) around odour generation areas at regular intervals.
	Covering the landfill area under operation daily with layer of earth, clay or a similar material
Gas Management	To minimize the gas generation in the landfill, the organic based waste will be diverted to incineration
	To manage the gas generated a venting system with flaring arrangement will be provided.
Water Quality Mitigation Measures	The leachate generated from landfill will be collected into leachate collection ponds.
	The leachate collected will be sent in to spray drier of incinerator (during phase I) and a part is sprayed back onto landfill for dust suppression, stabilization of hazardous waste, etc.
	The domestic wastewater will be collected and treated in septic tank/soak pit or portable STP and reused for greenbelt
	The effluent from floor washings, workshop etc., will be collected, treated for oil and suspended solids by skimming and settling in settling tank and recycle for washing and for dust suppression, etc.,
	The waste water from BMW sections will collected, disinfected and after necessary treatment reused for dust suppression and on landfill area
Noise Mitigation Measures	Proper enclosures as per CPCB guidelines will be provided for all the high noise generating equipment
	All the design/installation precautions as specified by the manufacturers with respect to noise control are strictly adhered to
	Major noise generating sources are insulated adequately by providing suitable enclosures
	Other than the regular maintenance of the various equipment, ear plugs are provided to the personnel close to the noise generating units;
	All the openings like covers, partitions are designed properly.
Solid Waste Mitigation Measures	The ash coming from incineration plant area will be used as daily cover in secured landfill
	The sludge generated in the leachate pond will be sent to secured land fill
Occupational Health & Safety	Periodic health checkup for early detection and control of communicable Diseases
	Will provide preventive measures for potential fire hazards with requisite fire detection, firefighting facilities and adequate water storage, etc.
	Provide regular training for workers with respect to OHS/EHS etc.

11. Project Budget

The total cost of the project is around **Rs. 23.40 Crores**. The EMP cost of the project is estimated to be **2 Crores**. The CER fund shall be allotted as per the MoEF&CC office memorandum F.no.22-65/2017-IA.III dated, 1st May, 2018, which is around **Rs. 0.48 Crores** and shall be utilized over a period of 3 years. The CSR budget will be allocated as per rule prescribed by the Government of India / Companies Act 2013.

12. Project benefits

The main benefits of the proposed project are:

- The huge quantum of hazardous waste lying in the premises of industries and CETPs of Delhi will be treated and disposed in scientifically and environmentally safe manner
- Other wastes generated from existing industries will also be addressed in a better and environmentally safe way.
- It provides a one stop solution for the management of various types of wastes such as all kind of hazardous waste which includes Hazardous Recycling Facilities and domestic hazardous waste etc.
- Minimizes pollution load on environment with an additional benefit of green and clean surroundings.
- Possibility for recovery of materials thereby conserving the natural resources
- Management of wastes is relatively easier and economically viable at a common facility
- Most viable option in the absence or availability of expertise.
- Reduced environmental liability due to captive storage of hazardous waste in the premises of industries
- Prevention of natural resource contamination