EXECUTIVE SUMMARY

FOR

PROPOSED WASTE TO ENERGY PROJECT (30 MW)
AT
DSIIDC INDUSTRIAL AREA, SECTOR-5, BAWANA, DELHI- 110039.

CATEGORY 'A' SCHEDULE 1 (D) AS PER EIA NOTIFICATION, 2006 AND AMENDMENTS THEREOF

(TOR issued: 10.01.2024, File No: J-13012/04/2023-IA.I (T);
TOR Identification No.: TO23A0603DL5223800N)

PROJECT PROPONENT

M/s JINDAL URBAN WASTE MANAGEMENT (BAWANA) LIMITED

(Baseline Study Period: March to May, 2023)

MCPL/EIA/THE/2022 -23/14/00/ September, 2024

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1. Introduction

The rapid industrialization, urbanization and population growth have significantly increased municipal waste generation in India. This waste, generated from households, agriculture and industries, is closely linked to population growth and rising GDP. The massive amounts of waste disposed off in dumps and open pits have become a major environmental issue. The most common method for municipal solid waste (MSW) disposal is sanitary landfilling, which has several detrimental environmental effects, including land degradation, greenhouse gas emissions, groundwater pollution, odors and visual blight. Overfilled landfills have even collapsed, leading to severe consequences. Waste-to-Energy (WtE) is an environmentally friendly alternative for managing MSW, as it reduces landfill use and harnesses the energy contained in waste to produce electricity.

WtE processes convert waste into renewable energy, contributing to energy optimization and meeting the increasing demand for renewable energy in a carbon-constrained world. The main objectives of this project are:

1. Integrate Waste to Energy into Green Energy Initiatives.
2. Address unprocessed waste disposal problems at landfills and align with Swachh Bharat Abhiyan (SBA) goals.
3. Reduce MSW load on landfills by generating electricity.
4. Utilize reclaimed refuse-derived fuel (RDF) from sanitary landfill facilities (SLFs).

North West Delhi has experienced rapid urbanization and industrialization in the past decade. Jindal Urban Waste Management (Bawana) Limited has proposed a 30 MW Waste to Energy Project at Bawana, Delhi, to handle 3000Tons per day (TPD) of waste. This project is an initiative by the Municipal Corporation of Delhi (MCD). The Ministry of Environment, Forest and Climate Change (MoEF&CC) approved the Terms of Reference (ToR) for the Environmental Impact Assessment (EIA) vide letter no. J-13012/04/2023-IA.I (T) dated 10/01/2024. The EIA report follows the approved ToR and the structure outlined in the EIA Notification, 2006.

The EIA study includes:

- Compilation of baseline environmental and social scenarios within a 10 km radius around the project site, conducting field studies and using secondary data from authorized sources.
- Identification, prediction and evaluation of potential environmental impacts during construction and operation phases.
- Preparation of mitigation measures, an Environmental Management Plan (EMP) and a Monitoring Program for implementation during the construction and operation phases.

The work of Environmental Clearance was awarded to M/s Mantec Consultants Pvt. Ltd, Noida, a QCI/NABET accredited EIA Consultancy.

2. Project Description

The Waste to Energy Project is located at DSIIDC Industrial Area, Sector-5, Bawana, Delhi-110039. The vicinity map depicting the 10 km radius study area is provided in **Figure 1**. M/s Jindal Urban Waste Management (Bawana) Limited will implement the project. The salient features of the project are detailed in **Table 1**.

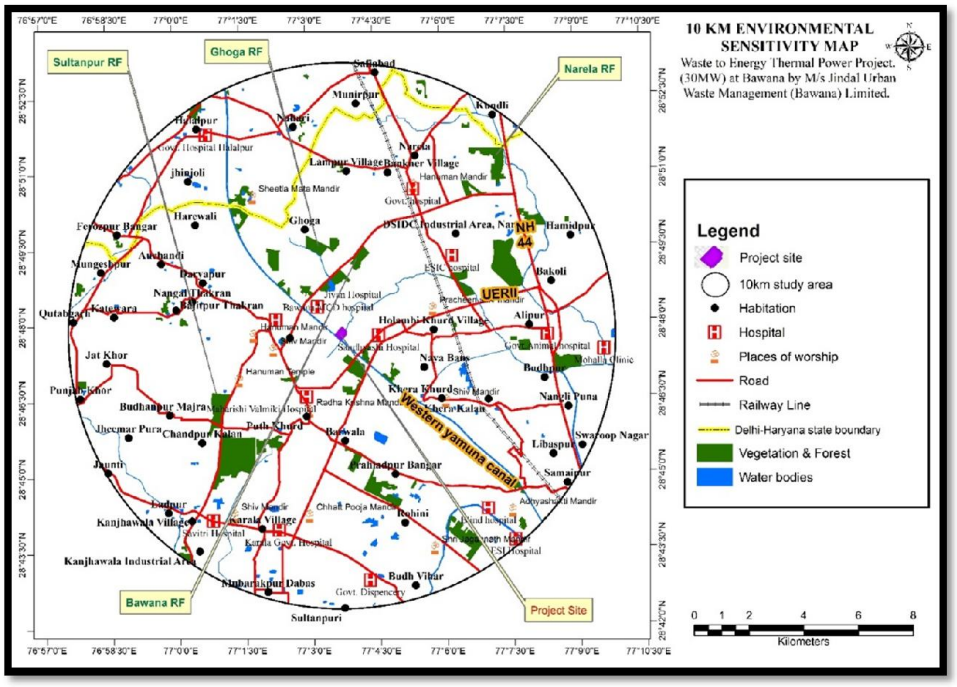

Figure 1: Sensitivity Map of 10 km area for Waste to Energy Plant, Bawana

Table 1: Salient Features of the Project

S. No.	Information	Details
1	Project name	Proposed Waste to Energy Project (30 MW) at DSIIDC Industrial Area, Sector-5, Bawana, Delhi.
2	Name of project Proponent	M/s Jindal Urban Waste Management (Bawana) Limited.
3	Capacity	30 MW
4	General Conditions	Delhi-Haryana State boundary is located at 4.48 Km in NNW direction.
5	Site Location:	
(a)	Village	Bawana
(b)	District	North Delhi
(c)	State	Delhi
6	Land Requirement	15 Acres
7	Fuel (MSW)	3000 TPD of MSW
8	Water Requirement:	
(a)	Construction phase	40 KLD industrial water from Pragati Power Corporation Limited (PPCL) or treated sewage from Delhi Jal Board.
(b)	Operation phase	625 KLD industrial water from PPCL or treated sewage from Delhi Jal Board.
(c)	Domestic water	Approx. 10 KLD during construction and 7 KLD during operation, supplied by DJB.
9	Construction Power Supply and its Source	Nearest source is Tata Power Delhi Distribution Limited (TPDDL). No DG set during construction. A 750 kVA DG set will be used during operation only in case of grid failure.
10	Employment opportunities:	
(a)	Construction phase	570 contract positions and 60 on-roll positions, totaling 630.

S. No.	Information	Details
(b)	Operational phase	156 contract positions and 86 on-roll positions, totaling 242.
11	Nearest Railway Station	Narela Railway Station ~6.06 Km in NE direction.
12	Nearest Airport	Indira Gandhi Airport ~26.81 Km in South direction.
13	Project Cost	Estimated at Rs 660.00 Crore.

The proposed fuel is refuse-derived fuel prepared from MSW. The technology includes reverse reciprocating with forward feed inclined grate type boiler and a steam turbo-generator for power generation (Rankine cycle). The design capacity of the MSW fuel preparation is 3000 TPD.

3. Environmental Sensitivity

The brief site and surrounding area details, including connectivity, are given in **Table 2.** The site has good connectivity with various transport facilities.

Table 2: Environmental Sensitivity around 10 km Area

PARTICULARS		DETAILS
Inter-State Boundary of Haryana		Delhi-Haryana border approx. 4.48 km in NNW direction.
Nearest State Highway/ National Highway:		
(a)	NH-44	~7.33 Km in East direction
(b)	SH-18	~4.64 Km in East direction
(c)	UER-II	~1.39 Km in SE direction
Seismic Zone		Zone-IV (As per IS 1893:2002)
Water Body		Western Yamuna Canal is approx. 32 meters from the project site in SW direction
Ecological Sensitive Areas:		
(a)	Ghoga RF	3.12 Km in North direction

PARTICULARS		DETAILS
(b)	Bawana RF	1.70 km in North direction
(c)	Sultanpur RF	4.29 km in SW direction
(d)	Narela RF	9.01 km in NE direction
(e)	National Park, Wildlife Sanctuary etc.	None within 10 km radius.
Sensitive Manmade Land Uses:		
(a)	Sandhyashi Hospital	1.26 Km in East direction
(b)	Jivan Hospital	1.32 Km in NW direction
(c)	Bawana MCD Hospital	2.46 Km in WNW direction
(d)	Siddhartha Hospital	2.1 Km in W direction
(e)	St. Omina Public School	1.26 Km in East direction
(e)	Rana Public School	7.35 Km in SE direction

4. Baseline Environmental Condition

The baseline environmental condition within the 10 km study area was monitored for meteorology, ambient air quality, noise levels, water quality, soil quality, biological environment and socioeconomic conditions.

4.1 Meteorology

Delhi's climate is influenced by its inland position, characterized by extreme dryness with intensely hot summers and cold winters. The mean maximum annual temperature is 44.2°C, and the lowest mean temperature is 3.5°C. The average annual mean humidity is 64%. The mean maximum wind speed is 25 km/h, and the mean minimum wind speed is 18 km/h. The maximum relative humidity is 66%, and the minimum relative humidity is 18.5%.

4.2 Ambient Air Quality

Ambient air quality monitoring across eight stations indicated varying pollutant concentrations. PM_{10} levels ranged from 77.0 µg/m³ to 380.0 µg/m³, while $PM_{2.5}$ levels varied between 46.0 µg/m³ and 228.0 µg/m³. Both $PM_{2.5}$ (228.0 µg/m³) and PM_{10} (380.0 µg/m³) were highest at AAQ3 (Near Vaishno Devi Mandir Khera Kalan, Delhi). Gaseous pollutants,

including SO_2, NO_2, and CO, remained within permissible limits set by the National Ambient Air Quality (NAAQ) Standards for residential and rural areas. NO_2 concentrations ranged from 14.0 µg/m³ to 32.0 µg/m³, SO_2 from 5.0 µg/m³ to 18.0 µg/m³, and CO from 0.52 mg/m³ to 0.84 mg/m³. Mercury (Hg) levels were below the detection limit, posing no significant risk to human health or ecosystems.

4.3 Noise Environment

Noise levels were monitored at eight locations. Daytime noise levels ranged from 42.6 to 54.8 decibels (dB), while nighttime noise levels ranged from 36.2 to 42.6 dB. Higher daytime levels are attributed to construction, operations, and vehicular movements, which are more active during the day. Conversely, nighttime noise is lower due to reduced activity during those hours.

4.4 Water Environment

4.4.1 Ground Water Quality

Groundwater samples from eight locations revealed pH values ranging from 6.94 to 7.58. Total dissolved solids (TDS) ranged from 232 mg/L to 698 mg/L, falling within the permissible limit. Hardness values ranged from 134 mg/L to 250 mg/L, also within the permissible limit. Chloride and fluoride concentrations were 62 mg/L to 84 mg/L and 0.36 mg/L to 1.02 mg/L, respectively, within the permissible limit. Heavy metals such as zinc (Zn), iron (Fe), cadmium (Cd), chromium (Cr), lead (Pb), nickel (Ni), and mercury (Hg) were either absent or within permissible limits. No bacterial contamination was detected, indicating safe groundwater for drinking and domestic purposes.

4.4.2 Surface Water Quality

Surface water samples from eight locations revealed pH values ranging from 7.02 to 7.34, within the permissible limit. Total dissolved solids (TDS) ranged from 278 mg/L to 311 mg/L, within the permissible limit. Biological oxygen demand (BOD) values ranged from 10 mg/L to 20 mg/L, also within the permissible limit. Heavy metals such as zinc (Zn), iron (Fe), cadmium (Cd), chromium (Cr), lead (Pb), nickel (Ni), and mercury (Hg) were either absent or within permissible limits. No bacterial contamination was detected, indicating safe surface water for various uses.

4.5 Soil Quality

Soil samples from eight locations showed a pH range of 6.22 to 7.66. Organic carbon content ranged from 1.23% to 1.74%, and available nitrogen ranged from 1311.58 kg/ha to 366.46 kg/ha, indicating moderate fertility. Available phosphorus ranged from 13.89 kg/ha to 19.94 kg/ha, while potassium levels varied from 191.74 kg/ha to 231.62 kg/ha. Heavy metals such as zinc (Zn), iron (Fe), cadmium (Cd), chromium (Cr), lead (Pb), nickel (Ni), and mercury (Hg) were either absent or within permissible limits, indicating no significant contamination.

4.6 Biological Environment

The study area comprises a mix of natural and modified habitats, including agricultural fields, plantations, and urban settings. No critical habitats or endangered species were observed. Common fauna included birds, mammals, reptiles, and amphibians adapted to human presence and agricultural activities.

4.7 Socio-economic Conditions

The study area includes urban, suburban, and rural settlements with a mixed socioeconomic profile. Agriculture is a major occupation, along with trade, services, and small-scale industries. Basic amenities such as education, healthcare, water supply, and sanitation are generally accessible. However, infrastructure development and urbanization have increased pressure on existing services.

5. Sampling of pond & ground water (Hotspots) within 2km radius from plant boundary

5.1 Ground water

The groundwater quality at 8 locations was assessed across several parameters. pH levels were measured between 7.16 to 7.52, well within the specified standard range of 6.5 to 8.5, indicating neutral to slightly alkaline conditions. Total Dissolved Solids (TDS) ranged from 366 to 445 mg/L, Chloride levels from 64 to 78 mg/L, Sulphate concentrations from 30 to 48 mg/L, and Total Hardness from 194 to 226 mg/L as $CaCO_3$. Iron content was found to be less than 0.3 mg/L.

5.2 Pond water

The results of the Waste to Energy Bawana Project Hot Spot Pond near JJ Colony Bus Stand indicate generally favorable water quality conditions suitable for various environmental parameters. The water appears clear with a low turbidity of 3.5 NTU and a pH of 7.37, indicating near-neutral acidity. Temperature is recorded at 21°C. The water shows acceptable levels of conductivity (807 µmhos/cm)

and alkalinity (208 mg/l as $CaCO_3$). These results were compared against the Central Pollution Control Board (CPCB) water quality criteria, suggesting that all parameters measured fall within permissible limits as per CPCB standards. This indicates that the groundwater quality at the monitored locations meets the regulatory requirements for safe consumption and use.

6. Environmental Impact Assessment & Mitigation Measures

The potential impacts of the proposed Waste to Energy Project during construction and operation phases were assessed, and mitigation measures were recommended.

6.1 Air Quality

Potential impacts on air quality during construction include dust emissions from site preparation, material handling, and vehicular movements. During operation, emissions from the WtE plant, including PM, SO_2, NO_2, CO, and trace metals, may affect air quality. Mitigation measures include dust suppression, emission control systems, and regular monitoring.

6.2 Noise Environment

Construction activities and machinery operation may increase noise levels temporarily. Operational noise sources include plant machinery, vehicular traffic, and power generation equipment. Mitigation measures include noise barriers, proper maintenance of machinery, and adherence to noise regulations.

6.3 Water Environment

Potential impacts on water quality include runoff from construction sites and wastewater discharge during operation. Mitigation measures include proper drainage systems, wastewater treatment, and regular monitoring of water quality.

6.4 Soil Quality

Construction activities may lead to soil erosion and contamination. Operational impacts include ash disposal and potential leachate generation. Mitigation measures include soil stabilization, proper ash management, and monitoring of soil quality.

6.5 Biological Environment

Habitat disturbance and wildlife displacement may occur during construction. Operational impacts include potential pollution and habitat alteration. Mitigation measures include habitat restoration, pollution control, and monitoring of biodiversity.

6.6 Socio-Economic Conditions

The converting of waste to energy through WtE plant, substantially reduces the amount of waste entering landfills and degrading the living environment. The proposed project activity would be providing employment opportunities and the benefits of employment to the job seekers are expected to include, at a household and individual level with improvement in their living condition. The activities of the present project would result in an increase in local skill levels through exposure to site activities and technology. The proposed project activities do not involve loss or disturbance to sensitive areas and cultural heritage or religious places of importance. The welfare activities that will be carried out under Corporate Environment Responsibility for the development of the area by the project proponent will further enhance the quality of life of inhabitants of the study area.

7. Environmental Management Plan (EMP)

The EMP includes detailed plans for mitigation, monitoring, and management of environmental impacts during construction and operation phases. Key components include:

1. **Air Quality Management:** Dust control, emission reduction, and regular monitoring.
2. **Noise Management:** Noise barriers, machinery maintenance, and adherence to noise standards.
3. **Water Quality Management:** Proper drainage, wastewater treatment, and regular monitoring.
4. **Soil Management:** Soil stabilization, ash management, and monitoring.
5. **Biodiversity Management:** Habitat restoration and pollution control.
6. **Socioeconomic Management:** Compensation, community engagement, and job creation.

8. Environmental Monitoring Program

Environmental monitoring is crucial for assessing the performance of pollution control equipment installed during the operational phase. The sampling and analysis of

environmental parameters will adhere to CPCB guidelines. The following attributes will be monitored as per SPCB stipulations:

1. Stack Emission
2. Ambient Air Quality
3. Water and Wastewater Quality
4. Noise Levels
5. Occupational Health Survey

9. Risk Assessment and Disaster Management Studies

Risk is generally defined as a measure of potential economic loss or human injury, encompassing two variables: the magnitude of consequences and the probability of occurrence. Key hazards and their mitigation measures include:

9.1 Vehicular Movement Hazard

Vehicles used during project construction and operation may be involved in accidents due to various reasons.

Mitigation Measure:

- All vehicles will be of high quality and maintained by trained drivers under the supervision of managers.

9.2 Health Hazards for Employees/Workers at the MSW Site

Direct handling of municipal solid waste (MSW) can lead to health issues.

Mitigation Measures:

- There will be no direct human contact with incoming MSW.
- All employees will be trained and provided with adequate personal protective equipment (PPE) to mitigate health risks.

9.3 Hazards during Storage of MSW at the Site

9.3.1 Fire

An adequate firefighting system will be implemented. The details of the same has been incorporated in the EIA report.

9.3.2 Electrical Hazards during Power Generation

Workers and employees may face electrical shocks during the construction and operation phases.

Mitigation Measures:

- Safe design and construction practices will be followed throughout the project.
- All workers will be trained and equipped with appropriate PPE for electrical tasks.

9.4 Disaster Management Plan

A comprehensive Disaster Management Plan will be implemented to address emergencies.

10. Environmental Management Plan (EMP)

A comprehensive Environmental Management Plan (EMP) will be implemented to mitigate various impacts. This includes air and water pollution control equipment, odor management, occupational health measures, green belt development, and wildlife conservation. The total estimated budget for EMP activities (includes Capital and recurring cost) is **₹ 99.2** Crore.

An extensive Environmental Monitoring Program for the construction and operation phases has been established. An Environment Management Cell (EMC) comprising trained and qualified staff will be set up to implement and monitor all environmental activities. The EMC will also oversee the implementation and monitoring of Corporate Environmental Responsibility (CER) activities.

11. Corporate Social Responsibility (CSR) Policy

The proposed green field project will be implemented by M/s Jindal Urban Waste Management (Bawana) Limited, subsidiary company of Jindal Saw Limited. The Jindal Saw Limited is having a Corporate Social Responsibility (CSR) Policy and same will be adopted by M/s Jindal Urban Waste Management (Bawana) Limited. The Corporate Social Responsibility is strongly connected with the principles of sustainability. Therefore, it is the core corporate responsibility of Jindal SAW Limited to practice its corporate values through its commitment to grow in a socially and environmentally responsible way. The company is committed to undertake activities such as free medical check-up camps for nearby local population, Vocational training (Skill Development) to women, local villagers &rag pickers on Developing packaging & other products from recyclables/reusable, Books/Stationary distribution in nearby schools, plantation of Medicinal and Fragrance Trees in Nearby Localities in the surrounding areas. The CSR activities will be dovetailed with government schemes. The CSR activities will be monitored by an independent cell comprising of higher officials after project completion.

12. Conclusion

The proposed Waste to Energy (WtE) Project at Bawana, Delhi, represents a significant stride towards sustainable waste management and renewable energy generation. With India's rapid industrialization, urbanization and population growth, the generation of municipal solid waste (MSW) has surged, presenting substantial environmental challenges. Traditional disposal methods, particularly sanitary landfilling, have led to land degradation, greenhouse gas emissions, groundwater pollution and other adverse effects. The WtE project aims to mitigate these issues by converting waste into renewable energy, thus reducing the burden on landfills and contributing to the nation's green energy goals.

The Environmental Impact Assessment (EIA) study conducted for this project adheres to the guidelines set forth by the Ministry of Environment, Forest and Climate Change (MoEF&CC). It includes a thorough analysis of the baseline environmental conditions, potential impacts during the construction and operational phases and corresponding mitigation measures. Key environmental aspects such as air and water quality, noise levels, soil quality, biodiversity and socioeconomic conditions were meticulously evaluated.

The Environmental Management Plan (EMP) and Environmental Monitoring Program outlined in the EIA report will ensure that all environmental impacts are effectively managed and mitigated. The establishment of an Environment Management Cell (EMC) demonstrates the project's commitment to continuous environmental monitoring and compliance.

Additionally, the project's Risk Assessment and Disaster Management Studies provide comprehensive strategies to address potential hazards, ensuring the safety of workers and the surrounding community.

The project's Corporate Social Responsibility (CSR) initiatives reflect a commitment to the well-being of the local community, with plans for medical camps, vocational training, and educational support and plantation activities. These initiatives will be aligned with government schemes and monitored by an independent cell post-project completion.

In conclusion, the proposed 30 MW Waste to Energy (WtE) Project by Jindal Urban Waste Management (Bawana) Limited is poised to play a crucial role in addressing the environmental challenges posed by MSW in North West Delhi. By integrating waste management with renewable energy production, the project aligns with national sustainability goals and the Swachh Bharat Abhiyan (SBA) mission. Through meticulous planning, robust

environmental management and a strong focus on community welfare, the project sets a benchmark for future WtE initiatives in India.