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BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL,
PRINCIPAL BENCH, NEW DELHI
Original Application No. 172/2021

In the matter of:

Poonam Yadav

Applicant

Vs.

M/s Ecogreen Energy Private Limited & Ors.

Respondents

WITH

Original Application No. 109/2022

(I.A. No. 757/2023)

Vivek Kamboj

Applicant

Versus

Union of India & Ors.

Respondent(s)

WITH

Original Application No. 221/2025

News Item titled "Gurugram: 3rd Bandhwari fire in April spark concerns of foul play" appearing in The Hindustan Times dated 22.04.2025.

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**Filed by Adv. Srinivas Vishven
On behalf of Central Pollution Control Board**

Place: Delhi

Dated:09.03.2026

Report of Central Pollution Control Board (CPCB) in compliance to Hon'ble NGT Order dated 16/12/2025 in the matter in Original Application (O.A) No. 172/2021; Poonam Yadav Versus M/s Ecogreen Energy Private Limited & Ors with O.A. No. 109/2022 (I.A. No. 757/2023); Vivek Kamboj Versus Union of India & Ors. with O.A No. 221/2025; News Item titled "Gurugram: 3rd Bandhwari fire in April spark concerns of foul play" appearing in The Hindustan Times dated 22.04.2025.

1. Background

The Hon'ble National Green Tribunal (NGT) has taken suo-moto cognizance of the matter in Original Application (O.A.) No.221/2025 based on a News item titled "Gurugram: 3rd Bandhwari fire in April spark concerns of foul play ' published in the Hindustan Times dated 22.4.2025. The reply dated 15/12/2025, filed on behalf of Respondent No. 1 - Commissioner, Municipal Corporation, Gurugram, regarding measures taken to prevent fire incidents at the Bandhwari landfill, was considered by the Hon'ble NGT during hearing held on 16/12/2025. The directions given by Hon'ble NGT at Para No. 13 of the Order dated 16/12/2025 (**Annexure-1**), is as follows:

Para 13: *"Learned Counsel for Central Pollution Control Board (CPCB) has submitted that guidelines to be followed by landfill sites have been issued by the CPCB. Hence, CPCB is directed to carry out the inspection of Bandhwari Landfill Site and find out if those guidelines are complied with as also the measures taken by municipal corporation to prevent the fire in landfill site and its adequacy to combat off-site and on-site management plans."*

2. Compliance Report to the orders of Hon'ble NGT

The Hon'ble NGT directed the CPCB to conduct an inspection of the Bhandwari dumpsite to verify the following aspects:

1. The compliance of the Guidelines issued by CPCB;
2. The measures taken by Municipal Corporation to prevent fire and
3. Adequacy of the measures taken by MC, Gurugram to combat off-site and on-site management plans.

In view of the above directions issued by the Hon'ble NGT, the status of compliance with respect to inspection and verification of the Bandhwari dumpsite is discussed below:

2.1. Guidelines and Directions issued by CPCB:

CPCB has issued the following the guidelines and the directions:

- A. The CPCB has issued “*Guidelines for Disposal of Legacy Waste (Old Municipal Solid Waste)*” in February, 2019. The Section 4.4.3 of the guidelines is with respect to the aspect of “*Fire Control and Safety*”, preventive and remedial measures to address fire hazards. A copy of the same is given as **Annexure-2**.
- B. The CPCB issued the directions under Section 5 of the Environment (Protection) Act, 1986, on May 26, 2022, to all SPCBs/PCCs for effective management of fire hazards at dumpsites, including Haryana State Pollution Control Board:
 - i. To provide updated information w.r.t. CPCB directions dated 27.1.2021 regarding bio mining of legacy waste. It is to be ensured that updated information w.r.t. at least all metro cities is provided in accordance with NGT Directions.
 - ii. Direction to State UDDs to conduct comprehensive risk assessment studies and accordingly prepare detailed On-site Emergency Plan for each dumpsite located in their jurisdiction to address the following issues:
 - a) The onsite emergency plan to cover potential risks/ emergencies due to fire, obnoxious/ flammable emissions, odour, vector borne diseases, rodents, bird nuisance, seasonal affects i.e. summer/ winter/ monsoon (rainy seasons) and all other potential risks at the dumpsites.
 - b) The onsite emergency plans to address the worst possible case scenarios preferably using appropriate risk assessment software covering any or all of the potential emergency issues/ scenarios cited above.
 - c) The on-site emergency management plan to cover likely affect geographical area including population, flora and fauna in and around the dumpsites.
 - d) The on-site emergency plan to contain detailed remedial measures both hardware and software based for mitigating various emergency situations, which should finally be available with respective control rooms and on-site emergency notice boards.
 - iii. To direct District Collector or District Emergency Authority designated by the State Government for integrating such (dumpsites) On-site Emergency Plans with the existing Off-site District Disaster Management Plans in their respective Districts, prepared by the Local Authorities in compliance with Rule 14 of the Manufacture, Storage and Import of Hazardous Chemical Rules, 1989.

- iv. The State/ UT Authorities to prepare the on-site and off-site (or update off-site) emergency management plans preferable through an expert agency on the subject.
- v. The following interim measures to be implemented on priority till the time On-site/ Off-site Emergency Plans are prepared and implemented:
 - a. **Disposal of waste:** Fresh waste not to be disposed at the dumpsite where bio-remediation is being undertaken. Organic waste from slaughter house, fish market, etc not to be disposed of in dumpsite. It is to be further ensured that industrial waste/E-Waste / lithium battery is not dumped at the site. Waste that is being unloaded at the site should be examined visually for potential fire sources; fire sources when located should be neutralized with cover material immediately. Emergency tipping area to be provided to set aside from the immediate working area where incoming loads of material known to be on fire or suspected of being so can be deposited, inspected and dealt with. Adequate compacting of waste to be done to minimize formation of air or methane pockets which can lead to subsurface fire at site.
 - b. **Monitoring at dumpsites:** Methane Gas Detectors (on downwind side to be installed at site so that area with high methane concentration can be identified and preventive actions be undertaken. Further temperature at windrows to be monitored with non-contact infrared thermometer (as used for monitoring human body temperature under COVID circumstances) and records be maintained for any major deviations. The temperature is to be in the range of 35°C to 59°C. Treated leachate / water to be sprayed on the waste when rise in temperature is observed.
 - c. **Arrangements for Fire Extinguishing:** Arrangements for adequate storage of sand / chemical fire extinguishing medias such as foam or powder at site to be made to douse fire in case a fire incident is reported. Usage of water for dousing fire to be avoided. Isolation and allowing rapid natural burnout or smothering with soil to be done for dousing dumpsite fires. Dedicated fire tenders (preferably chemical extinguishing media) and adequate fire safety measures are to be deputed, specifically during summer season when dumpsites fire is more likely to take place. All mobile equipment or vehicles should be fitted with fire extinguisher and spark arrester.
 - d. **Health & Safety of Workers:** Fire protection measures and safety equipment to be provided to all workers at the site and checked before entry to the dumpsite. Workers to be trained for detection of fire and necessary action to be taken in case of fire.

Periodic training of workers be conducted in Safe handling of Waste, PPE's, Health & Safety issues etc.

- e. **Mock Drills & safety audits:** Periodic mock drills to be conducted to prevent fire accidents at dumpsites. Quarterly, Fire Safety and Hazardous Emissions Audits to be conducted.

A copy of the directions issued by CPCB regarding management of fire hazard in dumpsites is provided as **Annexure-3**.

2.2. Compliance of the Guidelines & Directions of CPCB regarding management of fire hazard at Bandhwari Dumsite by MC, Gurugram

A Team of Officials from the CPCB Regional Directorate, Chandigarh comprising of Dr. Narender Sharma, Scientist 'F' & Regional Director and Er. Shubham Kumar, Project Assistant (Scientific), inspected the site on 17/02/2026 to verify the compliance of the guidelines and the Directions issued by CPCB for prevention of fire hazards at municipal solid waste dumpsite. Officials of Municipal Corporation, Gurugram (MCG) and Haryana State Pollution Control Board (HSPCB) Regional Office, Gurugram were also associated during the inspection.

During the inspection conducted on 17.02.2026, the CPCB team made the following observations with regard to compliance of the Guidelines and Directions on fire hazard management at the Bandhwari Dumpsite:

- i. The Municipal Corporation, Gurugram has not conducted any risk assessment studies to identify the potential hazards at dumpsite.
- ii. **A detailed On-site Emergency Plan has not been prepared and implemented.**
As per CPCB directions, such plan is required to:
 - To cover potential risks/ emergencies due to fire, obnoxious/ flammable emissions, odour, vector borne diseases, rodents, bird nuisance, seasonal affects i.e. summer/ winter/ monsoon (rainy seasons) and all other potential risks at the dumpsites;
 - To address the worst possible case scenarios preferably using appropriate risk assessment softwares covering any or all of the potential emergency issues/ scenarios cited above;

- To cover likely affect geographical area including population, flora and fauna in and around the dumpsites and
 - To contain detailed remedial measures both hardware and software based for mitigating various emergency situations, which should finally be finally be *available with respective control rooms and on-site emergency notice boards.*
- iii. Since on-site emergency plan has not been prepared, its integration with the existing Off-site District Disaster Management Plans has not been done.
- iv. The CPCB has also issued directions to implement interim measures as listed in Section ii (b) of its directions dated 26.05.2023, untill the onsite emergency plan is prepared and implemented.

The status of compliance as on 27.02.2026 with interim measures, as directed by CPCB under its order dated 26/05/2026, by the Municipal Corporation Gurugram (MCG) is tabulated at **Table 1** below:

Table 1: Status of implementation of interim measures as on 27/02/2026

S. No.	Interim measures as per CPCB's Directions dated May 26, 2022	Status of Compliance
Disposal of Waste		
i	Fresh waste not to be disposed at the dumpsite where bio-remediation is being undertaken	<p>Not Complying. The fresh waste is being dumped at site. As per information provided by representative of MCG, approx. 2200 MT/day fresh waste is being dumped at this legacy waste site.</p> <p>It was informed by the representative that the tenders for the processing of daily generated municipal solid waste had been invited on three occasions; however, no agency participated in the tendering process.</p> <p>Further, the MCG representative stated that a revised proposal for the processing</p>

		of daily generated waste has now been prepared. Upon obtaining the necessary revised administrative approval, MCG will re-float the tender. Upon successful allotment of the work, the MCG will undertake the processing of the daily incoming waste.
ii	Organic waste from slaughter house, fish market, etc. not to be disposed of in dumpsite. It is to be further ensured that industrial waste/E-Waste / lithium battery is not dumped at the site. Adequate compacting of waste to be done to minimize formation of air or methane pockets which can lead to subsurface fire at site	Industrial waste was found dumped at site. In this regard, it was informed by the representative of the MCG that one illegal truck carrying industrial waste was forcefully dumped at site. Acting upon the incident, the MCG has issued a letter to the SHO for lodging an FIR against the violators and for impounding the said vehicle.
iii	Waste that is being unloaded at the site should be examined visually for potential fire sources; fire sources when located should be neutralized with cover material immediately.	As informed by the by the representative of the MCG, that although the system is in place for monitoring and management of fire sources; no records were made available to the CPCB inspection team for verification..
iv	Adequate compacting of waste to be done to minimize formation of air or methane pockets which can lead to subsurface fire at site	Being done.
v	Emergency tipping area to be provided to set aside from the immediate working area where incoming loads of material known to be on fire or suspected of being so can be deposited, inspected and dealt with.	Emergency tipping area not provided.
Monitoring at Dumpsite		
vi	Methane Gas Detectors (on downwind side to be installed at site so that area with high methane concentration can be identified and preventive actions be undertaken.	Methane detectors have not been installed at site. However, 04 No. portable methane detectors are available at site, for manual monitoring.

vii	Further temperature at windrows to be monitored with non-contact infrared thermometer (as used for monitoring human body temperature under COVID circumstances) and records be maintained for any major deviations. The temperature is to be in the range of 35°C to 59°C.	No such records were shared with the CPCB team.
viii	Treated leachate / water to be sprayed on the waste when rise in temperature is observed at Bioremediation Site.	MCG is using untreated leachate and water for spraying.
ix	Installation of CCTV Cameras as Site.	29 CCTV cameras have been installed.
x	Provision of fencing and frequent patrolling to be done for unauthorized entry at dump site.	Fencing has been provided along the front side facing the road; however, no fencing has been provided on the rear side adjoining the forest area.
Arrangements for fire extinguishing		
xi	Arrangements for adequate storage of sand / chemical fire extinguishing medias such as foam or powder at site to be made to douse fire in case a fire incident is reported.	A total of 40 hand-held fire extinguishers and 6 CO ₂ cylinders have been provided and placed at two locations. No arrangement for storage of sand made at site.
xii	Usage of water for dousing fire to be avoided.	As informed during the inspection, the MCG is primarily dependent on water as fire extinguishing medium. As per CPCB Guidelines “ Adding water increases the generation of both methane and leachate and is counter-productive, not a long-term solution ”.
xiii	Dedicated fire tenders (Preferably chemical extinguishing media) and adequate fire safety measures adopted, specifically during summer season, when dumpsites fire is more likely to take place.	Two fire tenders of Department of Fire services were observed at site with water as extinguishing medium.
xiv	All mobile equipment or vehicles to be fitted with fire extinguisher and spark arrester.	Not Complying. Mobile equipment and vehicles operating at the time of

		inspection were not found to be fitted with spark arresters.
Mock Drills and Safety Audits		
xv	Periodic Mock Drills to be conducted to prevent fire accidents at dumpsites.	MCG representative informed that Mock drills are being conducted through Department of Fire Services. However, no records were shared,
xvi	Quarterly Fire Safety and Hazardous Emissions Audits to be conducted.	Not Complying. Quarterly Fire Safety and Hazardous Emissions Audits are not being conducted.

2.3. Measures taken by MCG to prevent fire:

As per information shared by the representative of MCG and the observations made by the CPCB team, the following measures have been taken at the Bhandwari dumpsite:

- i. Two fire tenders from the Department of Fire Services at the site.
- ii. A copy of letter No. EE-SBM/MCG/2025/ dated 30.04.2025, addressed to the District Fire Officer (DFO) requesting deputation of two fire tenders at the Bhandwari site, was shared. A copy of the same is given as **Annexure-4**.
- iii. Four portable methane gas detectors have been provided for manual detection of methane emissions.
- iv. 29 CCTV cameras and high mast lights have been installed at Site.
- v. The leachate generated at site is being sprinkled on the waste through tankers/pipelines to prevent risk of fire and utilization of leachate. However, ***CPCB team observed that untreated leachate is being used for sprinkling, whereas directions mandate the use of treated leachate.***
- vi. A total of 40 hand-held fire extinguishers and 6 CO₂ cylinders, placed at two designated locations.

The photographs taken by CPCB Team during inspection are attached as **Annexure-5**

2.4. Adequacy of the measures taken by MCG to combat off-site and on-site management plans:

As per information made available to CPCB Team by MCG, the following is submitted:

- As of 31/01/2026, **a total of 16.60 lakh MT of legacy waste** is lying at the Bhandwari dumpsite. In addition, **fresh waste at a rate of about 2,200 MT per day** (1200 TPD from Gurugram and 1,000 TPD from Fariadabad) is also being dumped at the site.

- **The arrangements for processing the fresh waste are yet to be finalised.** It was informed by the representative that the MCG that the tenders for the processing of daily generated municipal solid waste had been invited on three occasions; however, no agency participated in the tendering process. Further, the MCG representative stated that a revised proposal for the processing of daily generated waste has now been prepared. Upon obtaining the necessary revised administrative approval, MCG will re-float the tender. Upon successful allotment of the work, the MCG will undertake the processing of the daily incoming waste.
- **The processing of 16.60 lakh MT of legacy waste has not yet commenced.** The MCG has engaged two agencies namely M/s MKG Green Energy Private Ltd and M/s Daya Charan and Company for a period of 12 months to process 14 lakh MT of waste. The copies of the Award Letters to the agencies is attached as **Annexure 6 & 7 respectively**. Installation of equipment at the site is currently in progress, which was also observed by the CPCB team.

In view of the above and the fact that:

- i. Risk assessment studies of Bhandwari dumpsite have not been carried out by MCG.
- ii. An on-site Emergency Plan has not been prepared and implemented, contrary to CPCB directions.
- iii. In the absence of On-site Emergency Plan, integration with the Off-site District Disaster Management Plans has not been done.
- iv. CPCB directions for implementation interim measures until the onsite emergency plan is prepared have not been fully complied with, as summarized in **Table 1**.
- v. MCG is primarily depending on water as fire extinguishing medium, Whereas, CPCB Guidelines clearly states that “adding water increases the generation of both methane and leachate and is counter-productive, not a long-term solution”.

The measures taken by the MCG to prevent fire are not adequate to address both on-site and off-site emergency requirements, particularly during the peak summer season when the risk of fire incidents is higher.

3. Recommendations for Remedial Action:

CPCB’s guidelines clearly mention that “it is important to conduct a risk assessment and keep an onsite emergency plan in place prior to the commencement of dumpsite bio-remediation and bio-mining.” Accordingly, it is recommended that the MCG:

- i. Undertake a comprehensive risk assessment study of the Bandhwari dumpsite on an immediate basis;
- ii. Prepare a detailed onsite emergency management plan through an expert agency;
- iii. Implement and integrate the onsite emergency plan with Off-site District Disaster Management Plan prepared by the Local Authorities, to prevent the recurrence of dumpsite fire incidents in future.

Further, Ministry of Environment, Forest and Climate Change has notified the Solid Waste Management (SWM) Rules, 2026 under Environmental (Protection) Act, 1986 Vide Notification No. S.O. 388(E) dated 27 January 2026 which shall come into effect from 1 April 2026, in supersession of the Solid Waste Management Rules, 2016 to ensure environmentally sound management of solid waste across the country. The Schedule-IV of the said rules specifies measures for fire prevention and management at Waste Dumpsites.

- iv. The concerned local authority i.e. MCG is required to take action to implement the aforesaid provisions in accordance with the SWM Rules, 2026.

4. Prayer:

The above report, covering CPCB Guidelines and Directions issued for managing fire hazards at dumpsites; the compliance status of MCG with respect to the Bandhwari dumpsite, the measures taken by MCG and their adequacy in addressing on-site and off-site emergency requirements, particularly during high risk period, is respectfully submitted for the consideration of Hon'ble NGT.

The CPCB affirms its commitment to comply with any further directions that may be issued by the Hon'ble NGT in this matter.



(G. Thirumurthy)
Scientist 'F'

Central Pollution Control Board
09.03.2026.

Annexure-1

Item No. 03, 04 & 17

Court No. 1

**BEFORE NATIONAL GREEN TRIBUNAL
PRINCIPAL BENCH, NEW DELHI**

Original Application No. 172/2021

Poonam Yadav

Applicant

Versus

M/s Ecogreen Energy Private Limited & Ors.

Respondent(s)

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WITH

Original Application No. 221/2025

News Item titled "Gurugram: 3rd Bandhwari fire in April spark concerns of foul play" appearing in The Hindustan Times dates 22.04.2025.

Date of hearing: 16.12.2025

**CORAM: HON'BLE MR. JUSTICE PRAKASH SHRIVASTAVA, CHAIRPERSON
HON'BLE DR. A. SENTHIL VEL, EXPERT MEMBER**

Applicant: Mr. Rahul Choudhary & Ms. Itisha Awasthi, Advs. for Applicant in OA 109/2022

Respondents: Mr. Lokesh Sinhal, Sr. AAG with Ms. Aakanksha, Adv. for the State of Haryana & HSPCB with Mr. Sudhir Rajpal (Through VC), ACS, Environment Deptt., Haryana
Mr. Rahul Khurana, Adv. for MCG & MCF with Mr. Preetpal Singh, Joint Commissioner, SBM, Mr. Sumit, AE, Mr. Sunil, JE & Mr. Sandeep Sihag, EE, MCG
Mr. Anuj Bhandari & Ms. Jahanvi Bhardwaj, Advs. for CPCB in OA 172/2021
Mr. Srinivas Vishven, Advocate for respondent no.3-CPCB in OA 221/2025 (Through VC)
Mr. Mahesh Thakur & Mr. Siddhartha Sati, Advocates for respondent no.4-MoEF&CC in OA 221/2025

ORDER

1. In the Original Application No.172/2021 and Original Application No.109/2022, Tribunal is considering the issue relating to mismanaged Bandhwari Landfill Site at Gurugram and, therefore, incidental issue of solid waste management in Gurugram and Faridabad arises and it has been pointed out that part of solid waste generated ~~in~~ by Municipal Corporations, Gurugram and Faridabad is transported to the Bandhwari Landfill Site.

2. Tribunal in the proceedings dated 27.10.2025 had considered the report of the joint inspection and had also found that earlier direction of the Tribunal to respondent no.2 and 3 for filing the compliance affidavit was not complied with and action concerning the management of leachate was not taken and accordingly a cost of Rs. 50,000/- was imposed while allowing the prayer made by the State for further time to file the affidavit. It has been pointed out that above cost has been deposited.

3. Mr. Sudhir Rajpal, ACS, Environment Deptt., State of Haryana has appeared virtually in compliance of the earlier order of the Tribunal.

4. Status report dated 15.12.2025 has been filed by Commissioner, Municipal Corporation, Gurugram. It is submitted by Learned Counsel for Municipal Corporation, Gurugram that steps have been taken for treatment of the legacy waste as also for the treatment of daily generated waste within the Municipal Corporation, Gurugram. The disclosure so made in the report dated 15.12.2025 is as under:

“7. Thereafter, Municipal Corporation Gurugram initiated the tendering process of treatment of legacy waste and 3 nos. of tenders were invited on 09.09.2025 for 15 lakh MT (5 lakh MT each) with closing date 30.09.2025 but only one bid was received in only one tender and no bid was received in remaining two tenders. Thereafter, 2 nos. of tenders for treatment of waste were again re-invited with 7.5 Lakh MT quantity in each tender on 16.10.2025 with opening date on 07.11.2025 and project completion timelines of 12 months. On 07.11.2025, tenders were opened and only single bid was received in each tender. Consequently, tenders were again re-

invited on 08.11.2025 and same were opened on 02.12.2025. The financial bids were opened on 05.12.2025 and on same day, case for approval of rates from High Power Works Committee (HPWC) headed by Hon'ble Chief Minister, Haryana was sent to Directorate, Urban Local Bodies, Panchkula. The case was taken up by the HPWC in its meeting dated 09.12.2025 and the work of Bioremediation of legacy waste at Bandhwari has been approved by Committee. The LOI will be issued shortly after receiving of communication from DULB. The work will commence tentatively in the 1st week of March, 2026. The details and summary of the tenders invited by the MCG are as under:

Table-4

	Particular	Detail
1	Submission of Fresh Admin Approval for amounting Rs. 89.88 Cr.	01.08.2025
2	Admin Approval Granted by DULB	27.08.2025
3	3 Separate Tender Called for quantity of 5 MT Each (Total Quantity 15 Lakh MT)	06.09.2025
4	Date of opening of bids	30.09.2025
5	Bid Received	No bids received in 2 Tenders and only single bid received in 1 tender

- Thereafter, tenders were re-invited for the 2nd time on 16.10.2025. The details are as under: -

	Particular	Date
1	Tender re-invited for 7.5 Lakh MT Each (Total Quantity 15 Lakh MT)	16.10.2025
2	Date of opening of bids	07.11.2025
3	Bid Received	Single Bid received in both tenders

- Thereafter, tenders were again re-invited for 3rd time on 08.11.2025. The details and Action Plan is as under:-

Action Plan for Legacy Waste		
Sr. No.	Particular	Date
1	Tenders Recalled 3 rd Time	08.11.2025
2	Openings of Bids	02.12.2025 Bids opened: 3 bids have been received in 1 tender, and 2 bids have been received in 2 nd tender. The bids have been opened and the

		<i>case for approval of rates was sent to DULB on 05.12.2025.</i>
3	<i>Technical Evaluation</i>	<i>05.12.2025</i>
5	<i>Proposal sent to Head quarters</i>	<i>05.12.2025</i>
6	<i>Expected Approval From HQ</i>	<i>20.12.2025</i>
7	<i>LOI Issue</i>	<i>25.12.2025</i>
8	<i>Deposit of Bank Guarantee</i>	<i>05.01.2026</i>
9	<i>Signing of Agreement</i>	<i>10.01.2026</i>
10	<i>Work Start</i>	<i>10.03.2026</i>
11	<i>Completion</i>	<i>March-2027</i>

The above timelines are as per Model RFP circulated and approved by Department of Urban Local Bodies, Haryana but MCG will make efforts to get the work started in the month of February, 2026 by expediting the process.

Status of Fresh Waste Management:

8. *At present fresh waste of Municipal Corporation, Gurugram and Municipal Corporation, Faridabad is being received at Bandhwari Landfill Site. MCG has requested to Commissioner of Municipal Corporation, Faridabad to stop the dumping of waste at Bandhwari Landfill Site by 23.10.2025 vide letter no. MCG/CMC/2025/24141 dated 16.09.2025 in order to further reduce the incoming of fresh waste at Bandhwari Landfill Site. The authorities assured that the requisite action will be taken very soon.*
9. *Besides above, for processing of fresh MSW (for a period of 10 years) at Bandhwari Landfill Site Municipal Corporation, Gurugram sought an administrative approval and sent the estimate amounting to Rs. 171.71 Cr. to DULB vide letter no. MCG/EE-SBM/2025/12078 dated 16.05.2025. The administrative approval to the tune of Rs. 27.22 cr. has been received from DULB with a processing period of three years. The tender for processing of fresh MSW has also been invited. The timelines for the same are given as under:-*

Sr. No.	Particular	Date
1	<i>Date of publishing of tender</i>	<i>15.12.2025</i>
2	<i>Date of closing of tender</i>	<i>06.01.2026</i>
3	<i>Date of opening of tender</i>	<i>07.01.2026</i>
4	<i>Time of technical evaluation</i>	<i>Upto 17.01.2026</i>
5	<i>Opening of financial bid</i>	<i>Upto 20.01.2026</i>
6	<i>Approval of rates from Competent Authority</i>	<i>Upto 20.02.2026</i>
7	<i>Allotment of tender</i>	<i>Upto 28.02.2026</i>

8	Issuance of LoI	Upto 05.03.2026
9	Signing of contract agreement	Upto 20.03.2026
10	Commercial operation date	Upto 20.07.2026

The above timelines are as per Model RFP circulated and approved by Department of Urban Local Bodies, Haryana but MCG will make efforts to get the work started from first week of May, 2026 by expediting the process.

10. *It is pertinent to mention here that there is no alternate site with MCG for management of fresh waste other than Bandhwari Landfill Site. Therefore, Municipal Corporation, Gurugram has invited the tender for creation of space to manage/receive the fresh waste by shifting of already dumped legacy waste on the same site i.e. Bandhwari Landfill Site. This pocket of land will be utilized for processing of fresh MSW after onboarding of Agency for processing of fresh waste. As per the contour survey a patch of approximately 05 acres has been identified which can be utilized for the above said purpose. Municipal Corporation, Gurugram has allotted the tender to the Agency for shifting of approximately 1.70 lakh MT of waste. The work is in progress and till date approximately 1 lakh MT waste has been shifted within the landfill site and 2.5-acre land has been vacated. The work will be completed by 15th of January, 2026. In this way, there will be two separate patches of land separated by a GI sheet for managing and processing of legacy and fresh waste separately.”*

5. Mr. Sudhir Rajpal, ACS, Environment Deptt., State of Haryana appearing virtually has not disputed that so far as Municipal Corporation, Gurugram is concerned as on today there is no facility available for treating the daily generated waste within the Municipal Corporation, Gurugram and from Municipal Corporation, Faridabad, and both the Corporations jointly generates 2200 TPD of solid waste. It has also been submitted that generation of solid waste in Municipal Corporation, Gurugram is 1200 TPD whereas the treatment facility which is going to be created is of 948 TPD, therefore, gap of 252 TPD still exists in the treatment of daily generated waste in Gurugram. The Municipal Corporation, Gurugram will explain the nature/type of processing facility which will be established and the further

time-bound plan for filling up this gap and for achieving the target of 100% treatment of daily generated waste.

6. As per MCF, estimated waste generation is 1000 TPD and processing facilities exist for only 385 TPD and unprocessed waste is transported to Bandhwari Landfill Site.

7. We also find that though treatment facility for daily generated waste is not available in Municipal Corporation, Gurugram since July 2025 but tender has been published on 15.12.2025 inviting bids for treatment of daily generated waste. If the facility was not existing, authorities were required to take prompt action to ensure that tender was published immediately inviting the bid. The delay in floating the tender has further aggravated the problem.

8. In the earlier order of the Tribunal, issue of flowing of leachate after the previous monsoon was also reflected. Though in the current report the steps which have been taken for treatment of leachate have been mentioned but, it has been submitted by Counsel for the applicant that the leachate which had flown during the previous monsoon is required to be lifted/managed. Hence, Municipal Corporation, Gurugram is directed to ensure that leachate which had flown out during the previous monsoon is promptly lifted and brought to the proper Leachate Treatment Plant (LTP) as the same results in contamination of soil and ground water.

9. Haryana State Pollution Control Board(HSPCB) is also required to take action for imposition of environmental compensation for aggravating the situation by inaction/improper action by the concerned authorities in not complying with Solid Waste Management Rules and environmental damages caused.

10. HSPCB will get the sample of ground water of surrounding area of the landfill site collected and analyzed and submit the report before the Tribunal by providing a copy thereof to Counsel for Municipal Corporation, Gurugram. The Municipal Corporation, Gurugram on receipts of the said report will ensure the safe drinking water supply in the areas which are affected on account of contamination of ground water due to leachate flowing.

11. OA No.221/2025 has been taken up in suo-moto exercise of power on account of spark in the landfill site in the month of April 2025.

12. The reply on behalf of respondent no.1-Commissioner, Municipal Corporation, Gurugram dated 15.12.2025 has been filed stating that following measures have been taken to prevent the fire in the landfill site:-

“4. That answering respondent in compliance of CPCB guidelines and CAQM directions, has taken various steps to prevent fire incident and to control immediately in case same occurred. The compliance report/action taken report were submitted to the HSPCB also vide letter dated 05.09.2025. The measures being taken at site by the answering respondent are summarized as under:-

- i. Initially hotspots are being identified with the help of portable methane gas detectors. MCG has arranged four nos. of portable methane gas detector at Bandhwari Landfill Site. The initial identification of hotspots helps in taking precautionary measures to mitigate the risk of fire.*
- ii. After identification of hotspots, the same are excavated with the help of JCB and Excavator so as to release methane gas trapped in the voids thereby reducing the risk of fire.*
- iii. MCG ensures to time to step cutting of waste to release the methane which consequently decreases the temperature and risk of fire.*
- iv. MCG ensures deployment of fire tenders (24x7) during the peak summer months when the risk of fire is highest.*
- v. MCG also adopts the technique compacting of waste in order to ensure that methane may not be stored in the voids. Thus, reducing the risk of fire incidents.*
- vi. MCG has deployed 04 supervisors for round the clock monitoring of landfill site. Besides above, 29 CCTV cameras and high mast lights have been also been installed.*
- vii. As the temperature during summer increases the risk of fire, therefore, in order to maintain the temperature, the leachate generated at site is sprinkled on the waste through*

tankers/pipelines. Thus, in this way, the risk of fire decreases and the leachate generated is also utilized.

5. *The details of fire equipments and their installations*
 - i. *Municipal Corporation, Gurugram has installed 04 nos. of portable methane detectors which are being monitored regularly.*
 - ii. *Temperature of windrows has been monitored through 02 nos. portable infra-red thermometers.*
 - iii. *40 nos. hand-held fire extinguishers and 6 nos. CO2 type of cylinders are also placed there.*
 - iv. *02 nos. of fire-tenders have also been deployed 24x7 during the peak months.*
 - v. *For 24x7 vigilance at the landfill site, 29 nos. of CCTV cameras have been installed and all are connected with central servers of ICC (GMDA).*
 - vi. *For clear vision at night, high-mast lights are also installed at the site.*

It is further submitted that no fire incident has been reported at the site after April, 2025.”

13. Learned Counsel for Central Pollution Control Board (CPCB) has submitted that guidelines to be followed by landfill sites have been issued by the CPCB. Hence, CPCB is directed to carry out the inspection of Bandhwari Landfill Site and find out if those guidelines are complied with as also the measures taken by municipal corporation to prevent the fire in landfill site and its adequacy to combat off-site and on-site management plans and submit the report atleast one week before the next date of hearing.

14. The Municipal Corporation, Gurugram is directed to file the status report and HSPCB is directed to file the action taken report atleast one week before the next date of hearing.

15. List on 11.03.2026.

Prakash Shrivastava, CP

Dr. A. Senthil Vel, EM

December 16, 2025
Original Application No. 172/2021,
Original Application No. 109/2022
(I.A. No. 757/2023) & Original Application No. 221/2025
JG.

Guidelines for Disposal of Legacy Waste (Old Municipal Solid Waste)



CENTRAL POLLUTION CONTROL BOARD

(Ministry of Environment, Forest and Climate Change, Government of India)

'Pariveshh Bhawan' C.B.D. Cum-Office Complex,

East Arjun Nagar, Shahdara, Delhi-110032

(February, 2019)

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BACKGROUND

Until the 1970s, there were few dumpsites exists in India. Since Vedic times, household discards mostly food waste, which went back to the soil along with stable wastes via compost pits. Urban discards were collected by farmers, they converts it into compost and utilize it in farming and bring their produce to town/city. With the introduction of plastic in the seventies the composition of city waste started changing and people started discarded plastic along with kitchen wastes. These plastics blanketed the fields and made them infertile, as less rain could enter and few seeds could germinated, So farmers stopped collecting urban mixed wastes and cities were left with an unexpected burden. Initially most towns and cities in India started dumping all this unwanted waste outside city limits, along roadsides which are unsupervised and where dumped in no-mans-land. Uncontrolled and continuous dumping of municipal solid waste lead to mountains of legacy waste .

After three decades of neglection these open dumps have grown larger and higher, becoming point sources of pollution. Waste rotting in these airless heaps produces leachate, a foul dark liquid that kills vegetation around dumps and irreversibly pollutes groundwater due to leachate generation. The heaps of garbage also produce methane, a greenhouse gas that causes 21 times more global warming than carbon dioxide. Besides, contaminating air quality, which further, worsens due to frequent fire incidences.

Recently, Hon'ble NGT alarmed that due to incremental growth of Municipal Solid Waste (MSW), these MSW dumps are converting into virtual mountains. Hon'ble NGT further directed that every city/town should adhere to clause 'J' of Schedule-I of SWM Rules, 2016. Finally, Hon'ble NGT directed CPCB to propose Standard Operating Processing (SOP) for implementation of Bio-mining and Bio-remediation of legacy solid waste.

These guidelines are very useful to Municipal Corporations, Councils & Waste Management Agencies. The Contribution given by Mrs. Almitra Patel (Member, Hon'ble Supreme Court Committee for SWM & National Expert, Swachh Bharat Mission), Shri Snehal Jariwala (PRO) & Sh. Asad Warsi (Consultant, Indore Municipal Corporation) are highly appreciated. These guidelines have been edited by Dr. S.K. Nigam, Addl. Director (CPCB) and compiled by Ms. Gudiya Jaiswal (SA).

1.0 Present Status of Legacy Waste & its impact on Environment:

There are two major challenges of solid waste management in our cities/towns:

- (1) managing the continuous flow of solid waste on a daily basis, and
- (2) dealing with the legacy of neglect which has resulted in garbage heaps having been built up at dumpsites that were meant for waste processing and landfills.

The sites for landfills were originally located outside of the cities, but as the cities have expanded the dumpsites are now almost in the cities. Delhi's open dumps at Ghazipur (69 metres high), Okhla (55 metres high) and Bhalswa (56 metres high), for example, are all much higher than the permissible height limit of up to 20 metres, and way past their capacity of holding waste for which they were set up. It is estimated that more than 10,000 hectares of urban land is locked in these dumpsites in India. In the absence of exposure to air, the high-rises of rotting mixed waste on these sites generate methane (a greenhouse gas) and other landfill gases, which contribute to global warming. They also produce leachate (liquid generated by airless waste) which pollutes groundwater. Frequent outbreaks of fire at the dumpsites lead to air pollution. What is more, the presence of these dumps encourages further dumping at these sites, even though they are filled beyond capacity to take any more waste. Many municipal authorities across the country are opting for "capping" as a solution to the legacy of mixed waste, which is not the first option in the order of priority for environmentally save legacy waste management as per **Clause 'J' of Schedule-I** of the SWM Rules, 2016.



The methane produced at solid waste disposal sites contributes approximately 3 to 4 percent to the annual global anthropogenic greenhouse gas emissions (IPCC, 2001). Clearing these mounds of years-old waste, called legacy waste, is the easiest and fastest way to reduce our national emissions, and save surrounding villages from polluted water sources, smoke, , flies and stench.

Over the years, generation of dry waste, especially plastic waste and packaging, has increased at a tremendous rate. This is because of:

- i. Rapid increase in e-commerce industry from shopping to ordering food.
- ii. Many brand owners have shifted from larger SKU (Stock Keeping Unit) size to smaller SKU size due to changing market scenario.
- iii. Shifting of public consumer preferences to daily use plastic products like bottles, food containers, etc.
- iv. GST on recyclables making it uneconomical for waste-pickers and kabadiwalas to collect low-value waste.

These reasons have contributed to ever-growing dumping grounds. Some waste materials may or may not be recyclable and others might be too small to recover. Since 2016, MoEF & CC has transferred this downstream responsibility of collection and sustainable end disposal for plastic packaging through EPR as per Plastic Waste Management Rules, 2016. Now it is time to introduce upstream EPR also. The downstream EPR majorly focuses on managing a products disposal whereas upstream EPR stimulates product design for environment, reducing use of resources and reducing its adverse environmental and health impacts via use of materials that can be disposed of in a sustainable manner. Under upstream EPR, Producers, Importers and Brand Owners will have to Eco-Design their product packaging and design it considering its collection, recovery and end-of-life sustainable disposal to avoid formation of future legacy wastes. This means that the packaging should be made of eco-friendly material or can be recovered easily and have an established value chain to reduce the burden on ever-growing dumpsites.

Local Bodies also need to ensure that the upcoming infrastructure is designed to handle and store unmixed wastes separately. Government bodies should also create infrastructure for collection, handling, sorting, processing and sustainable end disposal infrastructure for all types of waste.

2.0 Key Definitions:

Some of the important keywords are explained below:

- i. **"aerobic composting"** means a controlled process involving microbial decomposition of organic matter in the presence of oxygen;
- ii. **"biodegradable waste"** means any organic material that can be degraded by micro-organisms into simpler stable compounds;
- iii. **"combustible waste"** means non-biodegradable, non-recyclable, non-reusable, non-hazardous solid waste having minimum calorific value exceeding 1500 kcal/kg and excluding chlorinated materials like PVC plastic, woody waste etc.;
- iv. **"composting"** means a controlled process involving microbial decomposition of organic matter;
- v. **"contractor"** means a person or agency that undertakes a contract to provide materials or labor to perform a service or do a job for a service-providing authority;
- vi. **"co-processing"** means use of combustible waste as raw material or as a source of energy or both to replace or supplement fossil fuels in industrial processes;
- vii. **"disposal"** means the final and safe disposal of post -processed residual solid waste and inert street sweepings and silt from surface drains on land as specified in Schedule I of SWM Rules, 2016 to prevent contamination of ground water, surface water, ambient air and attraction of animals or birds;
- viii. **"dry waste"** means waste other than bio-degradable waste and inerts and includes recyclable and non-recyclable waste, combustible waste and sanitary napkin and diapers, etc.;
- ix. **"dump sites"** means a land utilized by local body for open dumping to dispose of untreated solid waste without following the principles of sanitary land filling;
- x. **"extended producer responsibility" (EPR)** means responsibility of any producer and/or brand manager of packaging products such as plastic, tin, glass and corrugated boxes, etc., for environmentally sound management, till end-of-life of the packaging products;
- xi. **"inerts"** means wastes which are not bio-degradable, recyclable or combustible and include debris, construction and demolition wastes, street sweepings or dust and silt removed from the surface drains;
- xii. **"informal waste collector"** includes individuals, associations, waste traders or agency involved in collection, sorting, sale and purchase of waste and/or recyclable materials without valid authorization from respective urban local body or pollution control board to comply with guidelines issued by MoEF&CC under Environment (Protection) Act for waste handling, management, and disposal;

- xiii. **"leachate"** means the dark smelly liquid that seeps through or is generated within solid waste and has extracts of dissolved or suspended material from it;
- xiv. **"local body"** for the purpose of these rules means and includes the municipal corporation, nagar nigam, municipal council, nagarpalika, nagar palika parishad, municipal board, nagar panchayat and town panchayat, census towns, notified areas and notified industrial townships by whatever name they are called in different States and union territories in India;
- xv. **"materials recovery facility" (MRF, pronounced Merf)** means a facility where non-compostable solid waste can be temporarily stored by the local body or any other entity mentioned in rule 2 or any person or agency authorized by any of them to facilitate segregation, sorting, recycling and/or recovery of recyclables from various components of waste by authorized informal sector of waste pickers, informal recyclers or any other work force engaged by the local body or entity mentioned in rule 2 for the purpose before the waste is delivered or taken up for its processing or disposal;
- xvi. **"non-biodegradable waste"** means any waste that cannot be degraded by microorganisms into simpler stable compounds;
- xvii. **"processing"** means any scientific process by which segregated solid waste is handled for the purpose of reuse, recycling or transformation into new products;
- xviii. **"recycling"** means the process of transforming segregated non-biodegradable, recyclable solid waste into new material or product or as raw material for producing new products which may or may not be similar to the original products;
- xix. **"refuse derived fuel"(RDF)** means fuel derived from the combustible waste fraction of solid waste like plastic, woody waste or organic waste, other than chlorinated materials, in the form of pellets or fluff produced by drying, shredding and compacting of solid waste;
- xx. **"residual solid waste"** means and includes the waste and rejects from solid waste processing facilities which are not suitable for recycling or further processing or use;
- xxi. **"sanitary land filling "** means the final and safe disposal of residual solid waste and inert wastes on land in a facility designed with protective measures against pollution of ground water, surface water and fugitive air dust, wind-blown litter, bad odor, fire hazard, animal menace, bird menace, pests or rodents, greenhouse gas emissions, persistent organic pollutants, slope instability and erosion;
- xxii. **"segregation"** means the unmixed and separate storage and management of various components of solid waste namely biodegradable wastes including garden or agriculture and dairy waste, non-biodegradable wastes including recyclable waste, non-recyclable combustible waste, sanitary waste and non-recyclable inert waste, domestic hazardous wastes, and construction and demolition wastes;
- xxiii. **"solid waste"** means and includes solid or semi-solid domestic waste, sanitary

waste, commercial waste, institutional waste, catering and market waste and other non-residential wastes, street sweepings, silt removed or collected from the surface drains, horticulture waste, agriculture and dairy waste, treated bio-medical waste excluding hospital or industrial waste, e-waste, battery waste, hazardous and radioactive waste generated in the area under the local authorities and other entities mentioned in rule 2;

- xxiv. **"sorting"** means separating various components and categories of recyclables such as paper, plastic, card-board, metal, glass, etc., from mixed waste as may be appropriate to facilitate recycling and recovery;
- xxv. **"stabilizing"** means the biological decomposition of biodegradable wastes to a stable state where it generates no leachate or offensive odors/gases or fire and is fit for application to farm land, soil erosion control and soil remediation;
- xxvi. **"transportation"** means conveyance of solid waste, either treated, partly treated or untreated from a location to another location in an environmentally sound manner through specially designed and covered transport system so as to prevent foul odor, littering, leachate dripping and unsightly conditions;
- xxvii. **"treatment"** means the method, technique or process designed to modify physical, chemical or biological characteristics or composition of any waste so as to reduce its volume and potential to cause harm;
- xxviii. **"waste hierarchy"** means the priority order in which the solid waste should be managed by giving emphasis to waste prevention, reduction, reuse, recycling, recovery and disposal, with prevention being the most preferred option and disposal at the landfill being the least preferred;
- xxix. **"waste picker"** means a person or groups of persons informally engaged in collection and recovery of reusable and/or recyclable solid waste from the source of waste generation or from streets, bins, material recovery facilities, processing and waste disposal facilities for sale to recyclers directly or through intermediaries to earn their livelihood.

3.0 Provisions of SWM Rules, 2016:

The Government of India has notified the Solid Waste Management Rules (SWM) Rules, 2016 for proper and effective management of municipal solid waste (MSW). Under the SWM Rules, 2016, following provisions have been made to manage old dumps of MSW.

3.1 Rule 15 - Duties and responsibilities of local authorities and village Panchayats of census towns and urban agglomerations. - The local authorities and Panchayats shall,-

(zj) investigate and analyze all old open dumpsites and existing operational dumpsites for their potential of bio-mining and bio-remediation and wheresoever feasible, take necessary actions to bio-mine or bio-remediate the sites;

(zk) in absence of the potential of bio-mining and bio-remediation of dumpsite, it shall be scientifically capped as per landfill capping norms to prevent further damage to the environment.

The by-laws shall apply to every urban local body, outgrowths in urban agglomerations, Cantonment boards, Panchayat, Industrial and Institutional Townships, railways and defence establishments

Further, provisions under Schedule I (j) are given below:-

3.2 Schedule-I (j) - Closure and Rehabilitation of Old Dumps- Solid waste dumps which have reached their full capacity or those which will not receive additional waste after setting up of new and properly designed landfills should be closed and rehabilitated by examining the following options:

- (i) Reduction of waste by bio-mining and waste processing followed by placement of residues in new landfills or capping as in (ii) below.
- (ii) Capping with solid waste cover or solid waste cover enhanced with geomembrane to enable collection and flaring / utilisation of greenhouse gases.
- (iii) Capping as in (ii) above with additional measures (in alluvial and other coarse grained soils) such as cut-off walls and extraction wells for pumping and treating contaminated ground water.
- (iv) Any other method suitable for reducing environmental impact to acceptable level.

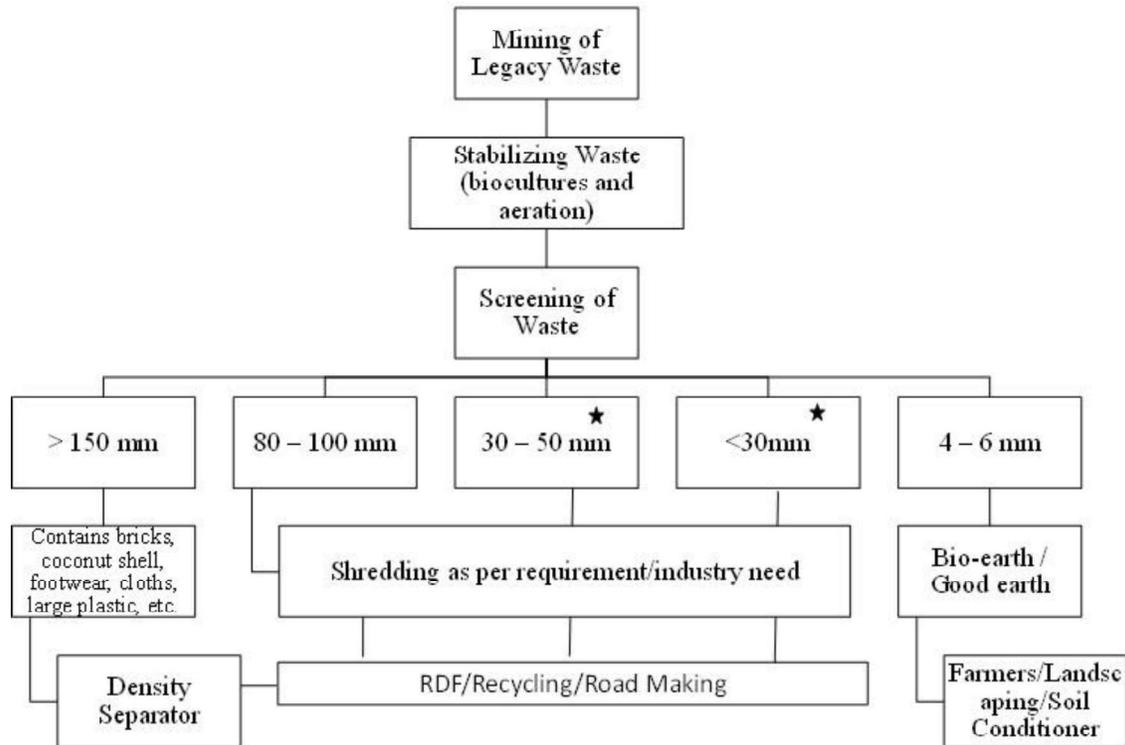
4.0 Methodology:

The treatment & disposal of Legacy MSW can be done by Bio-remediation and Bio-mining. A total station survey or drone mapping of any landfill/dumping site must be done prior to start of the project. Hence, it is suggested to ensure precursor study with history of the site, compositional analysis of waste. Site environment parameters such as baseline study of heavy metals in surface and subsurface soils and water, rainfall, soil type, surface hydrology, topography, wind direction etc. shall be studied before and after bio-mining. Periodic study should also to be carried out after completion of biomining to check for any adverse effects in the surrounding area.

4.1 Bio-remediation & Bio-mining of Old Municipal Dumpsites:

It refers to the excavation of old dumped waste and make windrow of legacy waste thereafter stabilization of the waste through bio-remediation i.e. exposure of all the waste to air along with use of composting bio-cultures, i.e. screening of the stabilized waste to recover all

valuable resources (like organic fines, bricks, stones, plastics, metals, clothes, rags etc.) followed by its sustainable management through recycling, co-processing, road making etc.



★ In Case of RDF (With Size Up to 50mm) shredding is not required

Fig. 1. Overview of Bio-remediation and Bio-mining of Legacy Waste

The first step is to excavate legacy waste, loosen it and make windrows so as the leachate can be dried of through solar exposure and all the entrapped methane is removed from the heap. All biodegradable waste, like discarded food, fruit, flower and garden waste, needs air to decompose it in an odourless way without producing leachate. So the first step in stabilizing and bringing down airless legacy waste is to expose as much of it as possible to air (Fig. 1).

Addition of composting bio-cultures speeds up decomposition and rapidly creates biological heat within the waste that helps to dry it out and reduce its volume by 35-40%. This happens through loss of moisture and by decomposition of some of the aerated waste to carbon dioxide and water vapour. This is called **bio-remediation** and makes the waste dry enough for screening. Waste is called stabilized when there is no more generation of heat or landfill gas or leachate, and seeds are able to germinate in it.

It means the screening of such stabilized waste into different size fractions that can be usefully used off-site or disposed of without affecting the environment. Screen sizes commonly used are one or more of the following: 150 mm, 80 to 100 mm, 24 to 50mm, 12-16 mm and 4-6 .The finest fraction is called bio-earth or good earth. It contains a mixture of humus-rich organics which improve soil fertility along with a high proportion of soil or sand, which is why it cannot meet FCO standards for compost. The coarsest fraction contains bricks, stones, coconut shells, footwear, cloth and larger plastics. Density separation helps recover combustibles which can be used (usually up to 5-10%) as fuel replacement after supplying it to customer requirements.

The lighter mid-fractions are mostly plastics and can be shredded as per industry requirement for use in bitumen hot-mix plants to make so-called Plastic Roads or as refuse derived fuel



for co-processing in cement kilns. Fractions up to 50mm do not require shredding for use as RDF. The heavier mid-fractions are mostly stony inert which can be used in the lowest layers of road-making or plinth-filling or in low-lying areas, but should not contain more than 3-5%



plastics by weight. Less than 10% of the original waste remains as totally unusable residual

rejects and may remain onsite, either in a small heap or spread to raise the ground level by a couple of meters.

The land which was hosting waste dumps is now fully recovered for alternate uses. Bio-mining and Bio-remediation processes should be adopted as early as possible to ensure holistic solid waste management.

4.1.2 Process of Bio-remediation and Bio-mining:

Exposing the legacy waste to air to stabilize it has been done since 1998 in many ways. Almost all of them involve forming the waste into long low heaps of about 2 meter height called wind-rows, to get maximum surface area to volume. Repeated turning is necessary to ensure that the innermost waste in wind-rows also gets exposed to air. Usually 3-4 turnings of legacy waste are necessary to stabilize it.

1. Use a tractor-tiller to repeatedly loosen the topmost 150 mm layer of legacy waste. Mist-spray the waste lightly with bio-cultures to control odour and get the decomposing microbes dispersed into the waste. Hand-pick out large objects like rocks or coconut-shells or long pieces of cloth. Form the waste into wind-rows using a Bob-cat or JCB or similar earth-moving equipment. Turn these wind-rows every 5 days. After 2-3 weeks when the heaps are free-flowing enough for screening, move the material to multi-deck vibrating screens or to trommels (rotating cylinders with different size perforations) to get fractions of different size and weight.

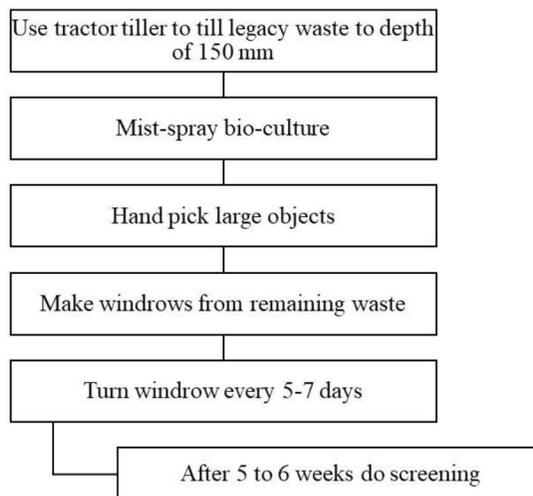


Fig. 2. Schematic representation of Bio-mining through Tractor Tiller by Windrows

2. Use a JCB to dig 2-2.5 meter deep trenches downwards from the top of a legacy waste heap at 1.5 to 2 meter intervals. This is a rapid and cost-effective way to slice the uppermost layer into in-situ wind-rows. Mist-spray the sides of the

trenches to get microbes to reach exposed waste surfaces. Bring down these slices to form terraces and turn one aerated windrow onto another weekly before repeating the process until almost ground level is reached. Start screening when waste moisture is low enough.

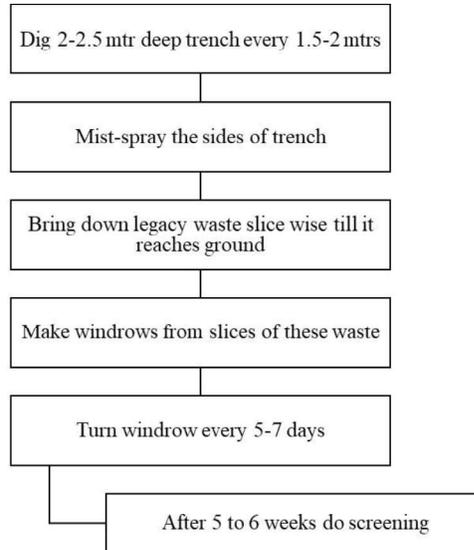


Fig. 3. Schematic representation of Bio-mining through Trench Method

- Use a JCB to lift legacy waste off the top of a heap and drop it from a height to aerate and loosen the waste and form 2-3 meter high cones. Mist-spray bio culture on the cones. Every day or 2-3 days use the JCB to lift waste from the cones and drop it back to the same or a nearby location, to aerate the waste. This is rather fuel-intensive.

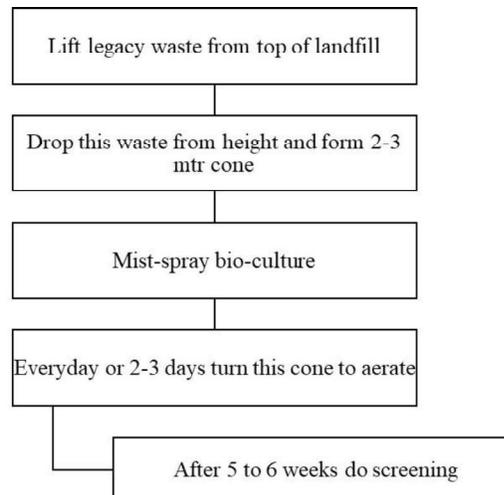


Fig. 4. Schematic representation of Bio-mining through Cone Method

- Where space permits, move the waste to form several long parallel windrows. Turn these weekly with a JCB. Often at the second or third turning, one heap can be

combined with a second one as their volumes decrease. Windrows can be aerated either by moving all the waste to form a new parallel windrow, with the innermost waste on the outside for aeration, or by moving all the waste forward in small steps while dropping it from a height for aeration.

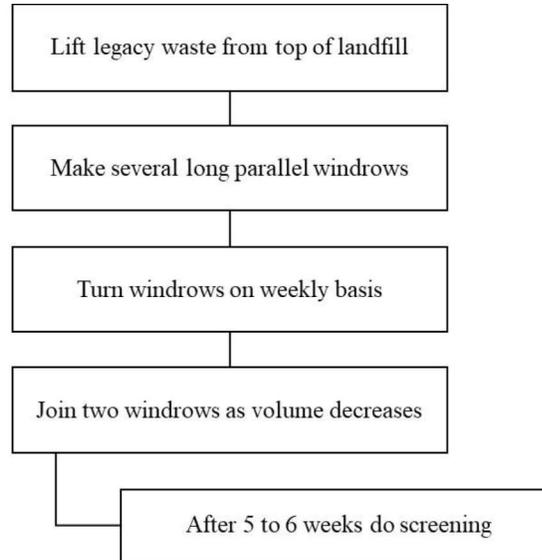


Fig. 5. Schematic representation of Bio-mining through Windrow Method for Spacious Landfill Sites

5. If waste needs to be moved from one location to another part of the same site, usually the perimeter, place it in thin 150 mm layers and mist-spray bio cultures. Allow 5 days to aerate one layer before adding the next one and mist-spraying bio cultures on that also. Turning may not be necessary when waste is spread thin like this, to decompose like leaves on a forest floor.

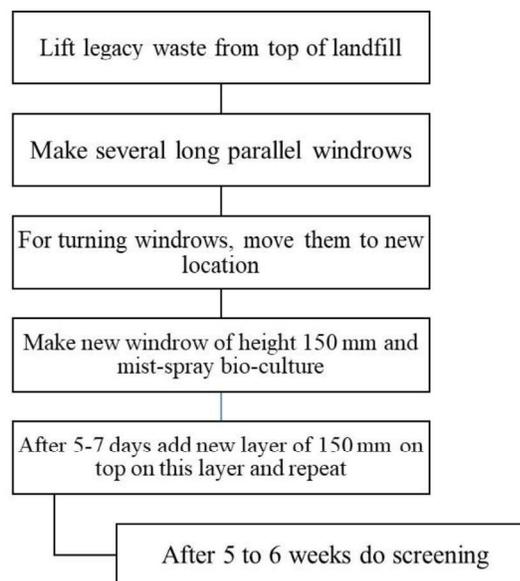


Fig. 6. Schematic representation of Bio-mining through Thin Layer Spreading Method

6. This is a constantly-evolving field. Hence other cost effective and space effective methods can also be applied.

4.1.3 Processing Equipment's for Processing of Legacy Waste:

The major equipment that would come in use would fall under the following heads of processes like excavation, shredding, screening, air classification and ferrous separation. As per suitability and requirement the appropriate choices should be made.

Screening

- Trommel
- Vibrating Screen
- Disc/ Star

Handling Equipment

- Loader (Front Load)
- Conveyers
- Fork Lifts

Screening

- Trommel
- Vibrating Screen
- Disc/ Star

Handling Equipment

- Loader (Front Load)
- Conveyers
- Fork Lifts

4.2 Treatment Process:

Processing of accumulated waste shall be done in following manner as given below:

1. Local Body (LB) shall make a time bound plan to execute the bio-mining process to clear the old waste.
2. Volume of waste to be determined through contour survey (Total Station Survey) and site measurements. Drone mapping of heap volumes at different stages is most cost-effective and fast. Weighment of heaps is difficult and problematic as payment would be collected for heavy fractions, leaving behind the more pollution-prone lighter fractions.
3. Initial Contour level survey of the site shall be done on start of work and Final Contour level survey shall be done on final completion of the work.
- 4 Do an initial baseline survey of surface and subsurface soils and waters and also leachate present, to check for heavy metals and toxics if any. Samples should be drawn by an NABL

or MOEF certified lab, also at the final stage. During operations, the operator should collect and keep daily samples of the finest fractions, to be pooled and analysed monthly or at random by an NABL lab. This is to ensure that unsterilized rotted waste is not simply moved from one location to another by mining without bioremediation.

4. Sprinkle the newly exposed surfaces with a composting bio culture solution or a dilute solution of 5% fresh cow dung in water. This will control smell and speed up decomposition. With the help of Back Hoe loader, the waste in the demarcated area should be loosened up.

5. Usually the top layer has several materials in the active biological state. This layer shall be stabilised through composting bio-cultures, as well as herbal/biological sanitizers if found necessary for odour control.

6. Raking of garbage layers by a long spike harrow operating in cross directions may be done as needed to pull out large rags, plastic, rubber, textiles etc.

7. Waste pickers or labour should manually pick out bulky waste like coconut shells, banana stems, tyres and rocks prior to screening for bio-mining. Store in separate heaps for sale or use.

8. Turn these windrow heaps once a week until no more volume reduction is observed in the heaps and no more heat is generated. If the garbage is stabilized, there will be no smell or leachate formation and the material will be dry enough for sieving.

9. LB or its agency may deploy Trommels and/or Horizontal Screens or other types of screens for the purpose of screening. Screen the stabilized waste in a rotary screen or gravity screens of different size openings, preferably 35mm and 8mm. A fan can blow out the plastic fraction for use by recyclers. Compost

10. Appropriate numbers of excavators, back hoe loaders and workers will be required to execute the work.

11. The recyclables recovered from the bio-mining process should be sent for recycling as per the quality of the material, which should also be randomly sampled by an NABL lab and tested for heavy metals, salinity/electrical conductivity and leachability to ensure no environmental harm during use. FCO standards for pH and contaminants could be provisionally used as a benchmark.. Non-Recyclable plastic material shall be sent for road making or to RDF units or cement plants. Initial cleaning of recyclable waste shall be done before it is transported for sale or disposal.

12. The recovered earthy fines shall preferably be used for landscaping or gardening or road medians within the Local Body or the site. The recovered soil can also be used as “Soil enricher” to develop green areas or by farmers.

13. The recyclables like plastic, glass, metals, rags and cloth recovered from the waste during screening shall be sorted out and preferably cleaned before sending to recycling industries or as RDF.

14. The heavy fractions may be sand and gravel usable for road shoulders or for plinth filling. Stones and concrete if any can be used for road sub-grade, or for crushing, recycling and reuse in the construction industry. The recovered construction and demolition waste recovered from the bio-mining process may be sent to a C&D processing facility if suitable for production of building materials.

15. In very old garbage layers with high debris content, most of the organic matter may have already been decomposed. Do a seed germination test to ensure it is stabilised. Add biocultures to fully stabilise it if heat is still generated in windrow heaps or volume reduction is observed. After 7-10 days of stabilization the waste can be taken up for screening.

16. Usually the finest fraction will be organic matter plus fine soil, called 'bio-earth', which can be used as soil improver, especially for restoring alkaline or saline soils to fertility, or to grow some vegetation for erosion control. It is also useful as a lawn subgrade cum drainage layer, or it can be used as organic manure in tree pits. . The next coarser fraction will be gravel and coarse organics, which can be used for road and railway embankments the coarsest fraction may have a lot of combustibles (cloth etc.) which can be baled and supplied as Alternate Fuel Resources in cement kilns or boilers.

17. There may be some (maximum 5-10% of total) left over waste including lumps of heterogeneous nature. The waste may be soaked with leachate or hard and difficult to disintegrate. This waste can be sent to scientific landfill for disposal (near zero residues).

18. The recovered land from the bio-mining process shall be utilized for any purpose deemed appropriate. Ideally reclaimed space should be reused for waste processing, otherwise for alternate non-habitation uses.



4.3 Use of Screened Fractions:

When planning for bio-remediation and bio-mining, it is important at the same time to identify where the screened fractions will go, in order to bring down the heap of mixed waste to fractions that would each have been usable if unmixed. None of these fractions will bring in income. In fact, their transport offsite is a cost to be budgeted for. Look for the nearest industries using solid fuel. Look for the nearest bitumen hot-mix plants and also specify Plastic Roads in road tenders to ensure offtake of the thin-film plastic fractions. Start a dialogue with all kabadiwalas within the local body to see who will be willing to pick up or accept which items. Plan for offsite aggregation space for different fractions and types of waste that will result from screening. Identify aggregation and storage sheds for use by waste-picker groups or kabadiwalas. Identify transporters who can transport different fractions out on their return trips.

For the bio-earth or good earth finest fraction, test periodically for heavy metals, then look for farmers willing to accept it. It is excellent for reclaiming salt-affected soils and for restoration of mining overburden areas if any are nearby. There is a cess for restoration of mined areas, which is normally unspent as forest departments are supposed to revegetate them. But this is unviable in barren rocky soil by planting and watering saplings. Revegetation is instead possible and effective by mixing grass seed with the good earth fraction and spreading it on the overburden to start a natural succession of grasses, herbs and shrubs.

4.4 Process Management:

There are several factors that must be kept in mind during implementation of the project.

4.4.1 Space Management:

For all waste-stabilising methods, management of space is the biggest challenge, as aeration, stabilizing and screening mostly needs to be done within the boundaries of an already overloaded dumpsite. This is achieved mainly by experience and creative common-sense. Onsite earth-mover operators often come up with the best solutions, so seek their opinions. Every dumpsite poses a case-by-case challenge, but there is no above-ground dump that cannot be successfully bio-remediated and bio-mined.



Fig. 7. Illustration of Trench Bio-mining at existing landfill site

Keep safety in mind. Always try to work downward from the top surface. Do not think of slicing waste from the top down along one side of the heap unless you can ensure leaving a stable wall of waste with a safe slope of 25 - 30 degrees while you work. Leaving a vertical wall of waste during operations can cause a dangerous landslide of disturbed waste.

4.4.2 Leachate Management:

Most high heaps of legacy waste are water-logged with leachate even near the topmost layers and all the way to the bottom, like a dhokla. This is not just from rainwater entering the heap but is produced by airless rotting within the entire waste heap. So when legacy waste heaps are opened up, some leachate almost always trickles out. This is not produced by the formation of wind-rows or cones, which in fact help to dry out the waste by aerated decomposition.

Channels must be created to lead the oozing leachate rivulets to a lined depression or pond for treatment or for leachate recirculation onto wind-rows as a type of bioculture. (test to see if heaps generate enough heat with its use). Leachate can also be treated in collection ponds by underwater composting. Bio-cultures that have been proved successful at other locations can be sprinkled onto the leachate pools. But intermittent aeration is a must, using small compressor pumps or aerators or airlift aeration or even simple manual or mechanical agitation. Aeration is necessary for the added microbes to do their work of digesting the polluting solids suspended in the dark and turbid leachate. Success is noticed by a progressive change in colour from dark to light, by reduction or absence of odour and by fine bubbles rising to the surface from digested solids.

4.4.3 Fire Control and Safety:

Most large dumpsites are smouldering from hidden fires. Methane itself is flammable with a blue flame, and supports the yellow-flame burning of combustible plastics, cloth and oily rags. Sometimes flammable industrial waste find its way onto dumpsites, aggravating the problem.

It is difficult to begin bio-remediation work on a smoking dump. Sometimes digging into the dump awakens hidden fires. So fire control is important. Adding water increases the generation of both methane and leachate and is counter-productive, not a long-term solution, Adding soil cover to smother the flames adds more material to a heap that one is trying to bring down.

There is a better way, again requiring creative common-sense and experience and training of earth-mover drivers. Most fires within heaps have a point source – a bag of textile discards or plastic waste or a ball of oily rags. Earthmover drivers must learn to dig in and pluck out these burning balls of fire. These should be laid nearby on the surface of the dump and then rubbed out with the back of the excavator shovel to extinguish the flames and smoke. Wet soil should be kept handy to immediately plug the excavated hole. Adding composting bio-cultures can be tried, to counter the anaerobic conditions around the burning spots. Smoking points must be tackled patiently and systematically, one by one, till the dump is smoke-free to begin stabilizing operations by bio-remediation.

It is important to do the risk assessment and an onsite emergency plan should be kept handy prior to commencement of dumpsite bio-remediation & bio-mining.

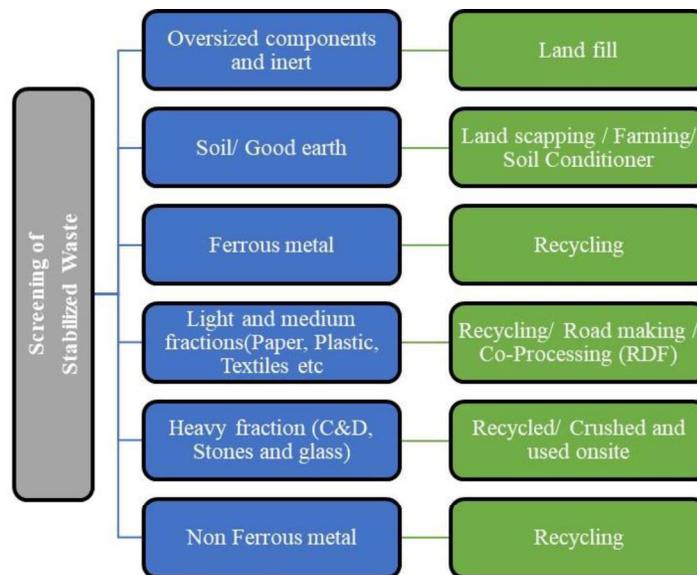


Fig.8: Schematic representation of screen components and its sustainable disposable

4.4.4 Use of Recovered Space :

The benefit of bio-mining lies in abatement of ongoing and future pollution and ill health and in the recovery and re-use of valuable space. This is ideally for continued long-term waste management since public consent for new waste sites is increasingly difficult because of earlier visible mis-management of a virgin site. Ensure advance demarcation and declaration of a buffer zone of no new habitation for upto 500 meters around the cleared site to prevent real-estate activity from encroaching the buffer as soon as the dump is removed.

If a dump is engulfed within a growing city and its continued use for waste management is unsuitable, identify in advance the planned future use of that site and put up a signboard indicating that use, to ensure public acceptance of the biomining operations which will be temporarily noisy and dusty. This will also protect the site from land-grabbers.

Cleared dumps are not permitted for habitation for at least 15 years (SWM Rules Schedule I, H (2)). This is because of unhealthy leachate below the site and formation of flammable and offensive landfill gases from waste pockets that may remain unexcavated.

Permissible options are reuse for SWM, open stadia, sports grounds, parks and gardens, parking lots, container yards, warehouses of non-flammables and similar facilities where people are not living or working all day and night.

4.5 Bio-mining Below-Ground Waste:

Many cities and towns chose abandoned quarry-pits to dump untreated waste, without realizing the permanently harmful effects of this. Leachate oozing out at the bottom of the pit cannot be seen or captured or treated and enters both shallow and deep groundwater through fissures in the rock. The hydrostatic pressure in deep quarries, as divers experience at increasing depths, forces the leachate even more forcefully into the cracks. Dark and smelly

water pollution begins to show up in nearby wells and bore wells after a year or further away even after 3-4 years, after which the damage is irreversible.

But leachate in an airless rotting mass continues to form for up to 30 years, so further damage can be prevented by bio-mining the quarry-pits. This has also been ordered by the NGT (in OA 179 of 2017). The waste needs to be excavated in descending layers like any open-cast mining and unloaded on the surface in windrows or conical heaps which can be turned weekly for 5-6 weeks before screening. Use of bio cultures is most important here, to control odour and the leachate which will run out while placing excavated material. Adding bio-cultures into the pit without excavation will not give the waste and the digesting microbes the air needed for stabilising the waste.

Immediate stoppage of further quarry-dumping of untreated waste is the most important action. The excavated quarry-pit, or any other quarry-pits that are planned for waste disposal, must first be filled to ground level with only debris and construction and demolition waste up to slightly above surrounding ground level. The newly-created space can then be used for waste stabilizing by unloading fresh waste in windrows here and turning them regularly. Any small quantity of leachate produced will be visible as it runs out from the edges of the heaps.

Bio-mining /screening may have to be interrupted during monsoons, both above grounds and below ground.

4.6 Engineered Landfill and Capping:

Capping, in developed countries, is the preferred means of closure of scientifically engineered landfills with bottom and side liners. These lines as well as drainage layers and leachate and gas collection pipes are installed even before using the site for waste placement. Their capping is meant to keep out rain from the landfill so as not to add to the internally generated leachate which is continually pumped out through pipes and drainage layers for treatment. Landfill gas captured through pipes is generally flared, as generating power from its combustion is always loss-making.

The dumping of mixed MSW begins in low-lying areas without any prior waterproofing layers to protect groundwater or prevent landfill gas migration. Capping of unlined dumps is in fact dangerous as it makes the waste even more airless, generating more leachate and also more methane and landfill gas, which leaks out below the edges of the capping. This created a disaster at the Mindspace IT complex, constructed next to a capped landfill at Malad in Mumbai. The landfill gases entered the Mindspace basement where the central air-conditioning circulated it to every floor in the building, causing regular frequent failure of

every type of electronic equipment. Probably sulphur in the hydrogen sulphide gas made the circuit-board connections non-conducting. The problem is still unsolved. Another capping failure is at Bagalur in Bangalore, where leachate extraction wells were placed in a partly lined quarry pit before waste placement. A garden was constructed over the filled pit, with lawn sprinklers adding to the moisture in the waste through tears in the capping plastic. Now landfill gas and methane can be seen and even heard, vigorously bubbling up in every unemptied leachate-extraction well.

Capping should only be considered for the maximum 10% residual rejects after bio-mining (screening) of stabilized waste. The SWM Rules 2016 in Rule 15 (zk) permit it only where bio-mining and bio-remediation is not possible. Perhaps the only places where this is not possible are in steep inaccessible ravines and narrow valleys in mountainous regions.

4.7 Clearing vs. Capping of Legacy Waste:

The SWM Rules 2016 clearly mandate clearing of sites as a first option, by bio-mining and bio-remediation. Still, capping is often proposed or considered an option in India merely because it is done in the West. But clearing a dumpsite almost to ground level rather than capping it is a far better option for permanent pollution prevention, as well as for the following additional reasons:

Clearing by bio-mining recovers the entire base area of a dump at almost ground level. Capping gives only one-third of the base area as usable area at an inconvenient height for future use.

Cleared sites require no after-care. Capping requires at least 15 years of continuous leachate pump-out and treatment in a dedicated effluent treatment plant nearby. Gas extraction is very difficult and inefficient when attempts are made to insert suction pipes into dumped waste instead of before dumping begins. Poor success at Gorai capping led to the forced refund by Mumbai city of Rs 15 crore advance carbon credits.

Capping of open dumps (wrongly called SLFs or Sanitary Landfills) requires intake of fresh waste to be stopped and permanently diverted to a fresh site before capping begins. With increasing protests against fresh waste disposal sites, getting started elsewhere can often delay capping plans indefinitely. Bio-remediation and Bio-mining to clear a site can start

immediately at one part of an actively used dump while fresh waste continues to be received and stabilized at another part. Clearing can be done in phases to match available funds.

In the USA, only grass is permitted to be grown on the soil cover of a capped site. It must be regularly mowed for 15 years to prevent the growth of herbs or shrubs or trees whose roots may penetrate the plastic layer below the soil cover. If trees are planted over soil capping, they die in a few years as soon as their roots enter the hot airless waste below. Capped sites are closed to the public for 15 years. But if a dump is cleared to near ground level, it can be easily converted to a public tree park or garden if desired, unless below-ground waste remains untreated on the site.

Thus capping of dumpsites is not advisable. However, if any scientific landfill site for municipal waste is present which has been constructed as per the norms and guidelines of MoEF&CC and has been filled to its maximum level, possibility of capping can be explored.

5.0 Costs:

Operation & Maintenance Cost for Bio-remediation and Bio-mining :

Operational Expenditure of the project would depend on the size of dumpsite. The onsite bioremediation cum biomining cost ranges between Rs 400 to 700 per cubic meter, irrespective of capital cost. The case by case cost of moving screened fractions offsite will be extra and variable, depending on distance to farmers, cement plants etc.

Case Studies :

Clearing of large dumps has been effectively done since at least 1998, at over 20 documented sites and perhaps other informally undocumented ones. Sites have been effectively reused for waste disposal or for parks and sports grounds and open maidans for periodic events.

There are at most five capped dumps to date in India, all with problems. Pune capped its old waste to create an impervious base for windrow composting, but instead dumped more waste which is now a stinking hill above it. Landfill gas leakage at Malad (Mumbai) and unsuccessful gas capture at Gorai (Mumbai) and Bagalur (Bangalore) have been described above. Case studies such as capping of legacy waste at Jawaharnagar in Hyderabad reveal issues of cost over-runs. . The dump contains 12 million tons of the city's waste accumulated till 2012. Every monsoon, leachate from the legacy dump seeps into the ground and pollutes the lakes around the site.

Leachate ponds to store the liquid have been of no use as they overflow during rains. Capping normally means laying of a thick soil cover over a cover of HDPE (High Density

Polyethylene). To facilitate release of gaseous emissions from the dump, pipes are planned to be installed. Besides, drainage pipes will also need to be laid to pump out leachate emanating from wet garbage inside. The concessionaire claims to have so far completed 95 per cent of the profiling of garbage, and capped about 30% of the dump with soil cover.

6. Training:

Bio-remediation and bio-mining is currently (January 2019) going on at several places: Dimapur, Vijayawada, NOIDA, Vadodara, Indore and is planned at a few more cities in Tamil Nadu, Assam and Madhya Pradesh. The best way to learn how to do it well is to observe legacy waste stabilizing (bio-remediation) and screening (bio-mining) and disposal of fractions at such sites. Every State where dumpsite clearing is under way must arrange for educational field visits by the field officers of nearby cities and districts. Bio-remediation with 40% waste volume reduction has been done by cities in-house at over eight sites, using their existing earthmoving equipment and manpower available at the dump, and engaging only the bio-culture spraying services which often are paid for by savings in fire control and leachate management. So bio-remediation can begin at once anywhere, while tenders are floated for the bio-mining operations that usually begin five months later when the stabilized waste is dry enough for screening.

7. Stabilising Fresh Municipal Solid Waste:

Clearing of old dumps is meaningless unless the creation of fresh open dumpsites is stopped. This is best done by proper segregation of biodegradable waste and its processing through aerobic composting or Biomethanation as mentioned in SWM 2016 Rule 15 (v) (a). For this the practice of unloading waste and then levelling it into airless heaps must stop. Instead, incoming waste must be unloaded in wind-rows.

This is easily done by moving the garbage vehicle slowly forward during unloading. This leaves the waste unloaded as a long low heap which can be bio-treated with composting bio-cultures and then shaped by a Bobcat or JCB into neat parallel windrows of maximum 2 – 2.5 meter height and of whatever length the site space permits. More than one row per day can be formed, depending on daily waste volumes. If prevailing winds in the area are West to East, let the wind-rows stretch from West to East (not North to South) so that the wind can blow freely between the rows for maximum aeration and moisture removal.

These windrows must be punctually and regularly turned every 5-7 days, using small earthmoving equipment or even tractors with lifting arrangement for smaller quantities. The

heaps can be turned to form a parallel windrow, with the innermost airless portion getting exposed to air on the outside of the new heap at each turning. Or the waste from one end of the windrow can be lifted up and dropped a little forward, so the entire heap is aerated and moved a little forward in the process. At the next turning the whole heap can be moved backward again similarly, if space is a constraint. Leave enough space between windrows for movement of turning equipment.

When the heaps are so hot inside that a lot of white water vapour like steam is seen coming out during turning, that is a good sign that stabilizing is going well. After 4-5 turnings, water vapour will no longer be visible and the waste will have reduced in volume by 40% and become free-flowing. A germination test is the best way to ensure that the waste is stabilized and good to use. Sprinkle exactly 50 or 100 ragi seeds in one tray of stabilized waste and in a similar tray of good red soil. Water both in the same way for a week and count the sprouted seedlings. If waste is well stabilized, the numbers in it should be similar to those in the red earth.

Smaller towns with farms nearby can keep a mesh screen available onsite for use by farmers who may wish to do some coarse screening before taking away the stabilized waste to their fields, preferably free or on nominal payment. It is never really free to farmers, who have to spend a day plus labour and vehicle hire to take it away to their fields. But it is a huge help to cities to have their disposal sites emptied this way.

If windrow unloading and stabilising is done for unmixed wet waste, all of the resulting material is usable. But this should invariably be done even for mixed waste. The non-biodegradable waste left over after screening may contain recyclables. These should reach the dry waste sorting centres for recycling or sustainable end of life disposal. Such Sorting Centres (SC) or Dry Waste Collection Centres (DWC) should preferably be present in every ward. Material Recovery Facilities (MRF) for processing the waste at city level should also be established based on the quantum of the waste generation. Establishment of such MRFs and DWC shall be at the discretion of Local Bodies.

Informal sector workers should be employed at such SC/DWC or MRFs to help include waste pickers into city's solid waste management together with their up-liftment. To ensure sustainable and maximum waste recovery and recycling from such centres, the prime responsibility can be contracted to competent executing agencies where disposal of dry waste can operate through the principle of Extended Producers Responsibility. The non-recyclables can be used to prepare refuse derived fuel for co-processing in cement plants or used in road making as per the city's requirement or pyrolysis etc.

8. Environmental Risks of Bio-mining :

There are several potential environmental risks associated with bio-mining projects and therefore a plan addressing these potential risks should be kept ready. Most of the conditions present at the landfill and its surroundings will be unique to the specific landfill, and specific to the age of the waste being excavated.

Majorly the risks would be associated with proper management of hazardous waste that may be uncovered during the operations of reclamation, managing the releases of gases, odours, its associated risks to human health and controlling any fire, subsidence or collapse.

Environmental risks can be managed well if considered in advance of the operations and appropriate mitigation measures have been designed by the executing agency.

9. Safety

- i. The execution of projects of legacy waste bio-remediation/ bio-mining all the workers involved should be covered under ESIC and proper safety equipment and kits should be provided
- ii. Such projects can be a part of regulatory compliances of environmental protection under PWM Rules, 2016.
- iii. Local Bodies (LB) shall ensure insurances of workers working at the Bio-remediation/ Bio-mining dumpsite for any hazards due to fire, radiation or explosion.
- iv. Small scale/ laboratory testing for monitoring a Bio-remediation / Bio-mining project will need to be borne by the LB in addition to Operational expenditure to achieve objectives of Bio-remediation / Bio-mining project.

v. Proper slope stabilization should be maintained during biomining.

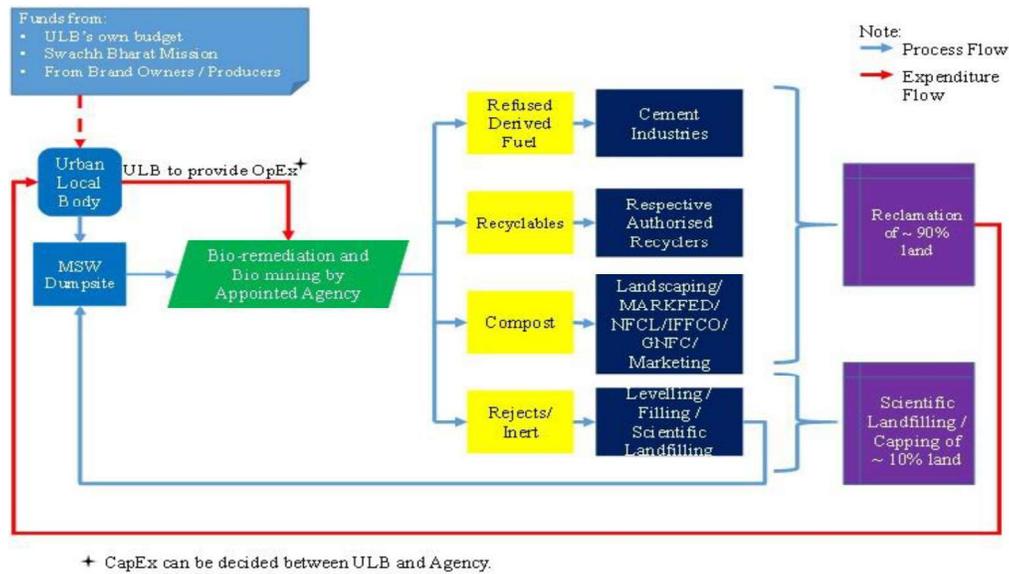


Fig. 9 Schematic representation of the operating model for legacy waste bio-remediation and bio-mining

10. Conclusion:

Legacy Waste has several ill-effects like generation of greenhouse gases, pollution of the entire ecosystem around the dump site, posing risk of uncontrollable fire, etc. Thus it is very critical to start working on clearing it today and ensuring that fresh waste is also handled accordingly. This will also improve the morale of the ULB and its residents.

It is the responsibility of ULB to ensure that remediation of dumpsite is done inhouse or by engaging a competent agency. ULB will have to pay an agency the expenditure for remediation of legacy waste as one cannot forecast the chance of recovering recyclables from the highly contaminated waste nor forecast revenue from selling of recyclables so as to financially sustain the entire model. However, a clause can be made by ULB during appointing agency that the revenue generated by selling any recoverable material shall be transferred back to ULB. This can make the executing agency a technology and manpower partner in the project, who is paid for a management cost.

ULB can either go with the 5 models explained for bio-remediation and bio-mining of legacy waste, or make its own cost-effective, space effective and sustainable option, introduce new technology or install various other machinery/equipment based on the practical circumstances of legacy waste. Various types of waste will be recovered from legacy waste like dry waste,

soil conditioner, hazardous waste, bio-medical waste, construction and debris waste, e-waste, etc. All these wastes should be disposed of as per the norms and guidelines issued by MoEF&CC under respective waste management and handling rules under the Environment (Protection) Act 1986. It would be the responsibility of ULB to bear the cost of disposal of all these types of waste,

Waste below the size of 50 mm need not be shredded before sending to cement companies for co-processing. For waste above the size of 50 mm, tie-up can be done with neighbouring cement plants to install shredder at their plant if agreeable.

ULB also needs to ensure that fresh waste generated in city is handled collected and processed separately as per the norms and guidelines issued by MoEF&CC. Covered collection vehicle and segregated collection needs to be ensured. For Dry Waste a Material Recovery Facility should be installed to recover maximum material for ensuring that our cities are Zero Waste to Landfill cities. Recyclable waste is sent to authorize recyclers and non-recyclable waste should be sent to hotmix plants for plastic roads or to P2F (Polymer To Fuel) plants or for co-processing to cement plants. Wet waste should be processed to get compost/ bio-gas etc. Bio-medical waste, hazardous waste, e-waste, construction and debris waste, etc. should be sent to respective authorized disposal sites.

It is also very important to understand that to ensure that no such legacy waste is accumulated in future, all ULB's should refrain from floating tenders for collection, handling, and processing of mixed waste. All ULB's should keep infrastructure required for collection, handling and processing different type of waste separately. There are various benefits attached to clearing dumpsites which need to be understood by ULB to speedily start work on it.

These guidelines apply to cities, towns and even villages. Bio-remediation and bio-mining of MSW projects may not be economically viable but are mandatory to improve waste management ecosystems across India. Besides, land cleared by way of bio-mining and bioremediation of legacy waste, huge land area is evacuated, which can compensate the cost of its treatment.

11. References:

- i. Solid Waste Management Rules, 2016
- ii. Plastic Waste Management Rules, 2016 as amended 2018
- iii. IPCC Third Assessment Report, 2001
- iv. Feasibility and Viability of Landfill Mining and Reclamation in Scotland by Ricardo-
AEA on behalf of Zero Waste Scotland.



CP-99/143/2021-UPC-II-HO-CPCB-HO

May 26, 2022

To,

The Chairman
All SPCBs/ PCCs

Sub: Directions under Section 5 of Environment (Protection) Act, 1986 for implementation of the Solid Waste Management Rules, 2016-regarding Fire Incidents at MSW Dumpsites.

WHEREAS, the Ministry of Environment, Forest & Climate Change has notified Solid Waste Management Rules on April 08, 2016 which inter-alia state procedures for Solid Waste Management;

WHEREAS, in accordance with Rule 11(d) of the Rules, it is the duty of the State/UT Urban Development Department to ensure implementation of provisions of these Rules by all local authorities;

WHEREAS, in accordance with Rule 15(a) of the Solid Waste Management (SWM) Rules, 2016, the local authorities and Panchayats should prepare a solid waste management plan as per state policy and strategy on solid waste management within six months from the date of notification;

WHEREAS, in accordance with provision of Rule 15(zd) of the SWM Rules, 2016, the local authorities and Panchayats shall ensure that the operator of a facility provides personal protection equipment including uniform, fluorescent jacket, hand gloves, raincoats, appropriate foot wear and masks to all workers handling solid waste and the same are used by the workforce;

WHEREAS, in accordance with provision of Rule 16 (1a) of SWM Rules, 2016, the State Pollution Control Board or Pollution Control Committee shall enforce these rules in their State through local bodies and review implementation of these rules at least twice a year in close coordination with concerned Directorate of Municipal Administration or Secretary-in-charge of State Urban Development Department;

WHEREAS, MSW is being disposed of unscientifically in most cases which is one of the major causes for public nuisance due to frequent fire incidents, foul odour, generation of leachate and other adverse environmental impacts;

WHEREAS, waste disposed at dumpsites is prone to catching fire in view of inadequate waste management practices adopted at these sites;

WHEREAS, several fire incidents have been reported recently at Ghazipur & Bhalsawa dumpsites in Delhi, Manesar in Haryana and Ludhiana in Punjab;

WHEREAS, fire incidents at dumpsites may lead to severe adverse impact on environment and related health hazards. People living in and around the dumpsites are likely to be affected due to the frequent outbreaks of fire

WHEREAS, Hon'ble NGT in OA No. 286 of 2022, in reference to News item published in The Indian Express dated 20th April, 2022, titled "7 Charred to death in fire near Ludhiana dumpsite" issued the following Directions:

"CPCB to collect information about garbage dumpsites from all States/ UTs in respect of at least Metro cities and issue statutory directions / guidelines for preventing such fires and handling them effectively if they take place, specifying serious consequences of delay in dealing with the issue, in violation of binding rules."

WHEREAS, as per the information provided by SPCBs/PCCs there are 3,184 dumpsites in the country, of which XXX are located in your State/UT;

WHEREAS, CPCB had issued Directions dated October 20, 2018 regarding fire at Bhalsawa site to North Delhi Municipal Corporation in which specific measures to be taken for prevention of fire at the dumpsites had been identified which amongst others included using Construction & Demolition waste material to immediately check fire, stopping dumping of fresh waste, installation of CCTV cameras, setting up of decentralized facilities for biodegradable waste;

WHEREAS, as per Guidelines for Disposal of Legacy Waste (Old Municipal Solid Waste) issued by CPCB, it is important to carry out comprehensive risk assessment and develop onsite emergency plan which should be kept handy prior to commencement of dumpsite bio-remediation & bio-mining;

WHEREAS, CPCB had issued following Directions dated January 27, 2021 to SPCBs/PCCs regarding biomining of legacy waste

- i. SPCBs/PCCs to provide complete list of legacy waste dumpsite in their States /UTs as per format enclosed
- ii. SPCBs/PCCs to ensure that necessary action for biomining and bio-remediation of these dumpsites is done by the concerned Local authorities in compliance with provisions of SWM Rules 2016
- iii. SPCBs/PCCs shall ensure that concerned Local authorities engaged in the biomining process of legacy waste follow procedures as per CPCB Guidelines for disposal of legacy waste with specific compliance to the following points:
 - a. Analysis of various screened fractions i.e. RDF, fine earth / bio earth etc. prior to its disposal / utilization
 - b. Preparation of action plan for utilization / disposal of screened fractions
 - c. Adequate provisions for leachate treatment
 - d. Maintenance of records / documents for disposal / utilization of the RDFs or fine earth and other material

- iv. SPCBS shall ensure that the local bodies prepare time targeted Action Plan for biomining / bio-remediation of these dumpsites in compliance with points listed above. The timeline as specified in SWM Rules and Hon'ble NGT Directions on the matter are to be adhered to for remediation of these sites
- v. SPCBs/PCCs to ensure that no fresh waste is disposed at these dumpsites and local authorities make proper arrangement for management of fresh solid waste
- vi. SPCBs/PCSS to ensure that at least one legacy waste dumpsite is remediated in their jurisdiction which can be considered as model for compliance for other legacy waste dumpsites in Non-Attainment Cities

WHEREAS Hon'ble NGT in its Order dated April 22, 2022 in O.A No. 288/ 2022 regarding News item published in the Times of India dated April 22, titled "Delhi: Another long-drawn effort to douse fire at Ghazipur landfill" has stated that dumpsite may be considered as isolated and vulnerable site which require On-site and Off-site Fire and other disaster management plans; **AND**

WHEREAS, CPCB made the following observations based on inspected various dumpsites, where bioremediation of legacy waste is being carried out:

- i. Fresh solid waste continued to be dumped at these dumpsites.
- ii. Fire incidents have been reported at locations where fresh waste is being dumped
- iii. Inaccessible slopes of garbage were observed
- iv. No standard operating plan in place for prevention and management of dumpsite fires
- v. Cause of fire incident reported is excess release of Methane (CH₄) gas due to anaerobic decomposition of the bio-degradable organic waste, high temperature and dry atmospheric conditions.
- vi. Partial fencing with barbed wire provided at the boundary observed.
- vii. Police patrolling the site not observed.
- viii. No fire tender observed at site.
- ix. Anti-Smog Gun have been installed which were not found in use; **AND**

NOW THEREFORE, in view of above and in exercise of powers vested under section 5 of Environment (protection) Act, 1986 to the Chairman, Central Pollution Control Board (CPCB) the following directions are issued for compliance;

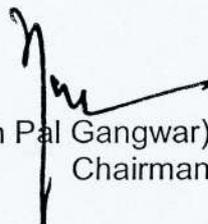
- i. Provide updated information w.r.t Directions dated 27.1.21 regarding biomining issued to SPCBs/PCCs. It is to be ensured that updated information w.r.t at least all Metro cities is provided in accordance with NGT Directions
- ii. Direct State UDDs to conduct comprehensive risk assessment studies and accordingly prepare detailed On-site Emergency Plan for each dumpsite located in their jurisdiction addressing the following issues:
 - a. The onsite emergency plan to cover potential risks / emergencies due to fire, obnoxious / flammable emissions, odour, vector borne diseases,

- rodents, bird nuisance, seasonal affects i.e. summer / winter / monsoon (rainy season) and all other potential risks at the dumpsites.
- b. The onsite emergency plans to address the worst possible case scenarios preferably using appropriate risk assessment softwares covering any or all of the potential emergency issues / scenarios cited above.
 - c. The on-site emergency management plan to cover likely affected geographical area including population, flora & fauna in and around the dumpsites
 - d. The on-site emergency plan to contain detailed remedial measures both hardware and software based for mitigating various emergency situations, which should finally be available with respective control rooms and on-site emergency notice boards.
- iii. To direct District Collector or District Emergency Authority designated by the State Government for integrating such (dumpsites) On-site Emergency Plans with the existing Off-site District Disaster Management Plans in their respective Districts, prepared by the Local Authorities in compliance with Rule 14 of The Manufacture, Storage and Import of Hazardous Chemical Rules, 1989
 - iv. The State / UT Authorities to prepare the on-site & off-site (or update off-site) emergency management plans preferably through an expert agency on the subject.
 - v. The following interim measures to be implemented on priority till the time On-site/Off-site Emergency Plans are prepared and implemented.
 - a. **Disposal of Waste:** Fresh waste not to be disposed at the dumpsite where bio-remediation is being undertaken. Organic waste from slaughter house, fish market etc., industrial waste not to be disposed at the dumpsite. It is to be further ensured that industrial waste / E-waste / lithium battery is not dumped at the site. Waste that is being unloaded at the site should be examined visually for potential fire sources fire sources when located, should be neutralized with cover material immediately. Emergency tipping area to be provided to set aside from the immediate working area where incoming loads of material known to be on fire or suspected of being so can be deposited, inspected and dealt with. Adequate compacting of waste to be done to minimize formation of air or methane pockets which can lead to subsurface fire at site
 - b. **Monitoring at dumpsites:** Methane Gas Detectors (on downwind side) to be installed at site so that area with high methane concentration can be identified and preventive actions be undertaken. Further temperature at windrows to be monitored with non-contact infrared thermometer (as used for monitoring human body temperature under COVID circumstances) and records be maintained for any major deviations. The temperature is to be in the range of 35°C to 59°C. Treated leachate / water to be sprayed on the waste when rise in temperature is observed

at the bioremediation site. Suitable mechanism to be in place. Installation of CCTV cameras at the site and provision of fencing & frequent patrolling to be done for checking unauthorized entry at dumpsite

- c. **Arrangements for Fire Extinguishing:** Arrangements for adequate storage of sand / chemical fire extinguishing medias such as foam or powder at site to be made to douse fire in case a fire incident is reported. Usage of water for dousing fire to be avoided. Isolation and allowing rapid natural burnout or smothering with soil to be done for dousing dumpsite fires. Dedicated fire tenders (preferably chemical extinguishing media) and adequate fire safety measures are to be deputed, specifically during summer season when dumpsites fire is more likely to take place. All mobile equipment or vehicles should be fitted with fire extinguisher and spark arrester
- d. **Health & Safety of Workers:** Fire protection measures and safety equipment to be provided to all workers at the site and checked before entry to the dumpsite. Workers to be trained for detection of fire and necessary action to be taken in case of fire. Periodic training of workers be conducted in Safe handling of Waste, PPE's, Health & Safety issues etc
- e. **Mock Drills & safety audits:** Periodic mock drills to be conducted to prevent fire accidents at dumpsites. Quarterly, Fire Safety and Hazardous Emissions Audits to be conducted.

SPCBs/PCCs are hereby directed to submit action taken report within 15 days for Action Point listed at (v) above. Action taken report for Points (i-iv) to be provided within thirty days of receipt of these Directions


 (Naresh Pal Gangwar)
 Chairman

Copy to:

1. **Additional Secretary (CP Division)** : for information please
Ministry of Environment, Forests & Climate Change,
 Indira Paryavaran Bhawan, Jor Bagh Road,
 New Delhi - 110003
2. **DH-IT Division, CPCB** : for uploading on website please


 (Prashant Gargava)
 Member Secretary

o/c

To

Reminder-I

The District Fire Officer,
Fire Station, Sector-29,
Gurugram

Memo No.- EE-SBM/MCG/2025/

Dated: 30.04.2025

Subject:- Request for depute 02 Fire Brigades for Bandhwari Landfill Site.**Ref:-** This office letter vide Memo No.- EE-SBM/MCG/2025/ 8733 dated 08.04.2025 on the subject cited matter.

With reference to the subject cited matter, a letter has already been sent to you vide this office memo no- EE-SBM/MCG/2025/ 8733 dated: 08.04.2025 regarding depute 02 no. of Fire Brigades for Bandhwari Landfill Site but didn't depute to yet. It is kindly submitted that fire incidents were happening on 06/04/2024 and 26/04/2025. As you are aware that summer season has arrived and fire incident is being happening.

Therefore, it is again requested to depute 02 no. of fire brigades for the Bandhwari landfill site located on Gurugram-Faridabad Road at the earliest. The site has experienced fire incidents in the past, and it is essential to have adequate fire safety measures in place to prevent and respond to emergencies.

As you may be aware, a fire broke out at the site last week, prompting the National Green Tribunal to seek responses from authorities, including the Union Ministry of Environment, Forest and Climate Change. The Municipal Corporation of Gurugram has also taken steps to prevent fire incidents, including installing six machines to detect methane gas and monitoring the site with CCTV cameras 24/7.

To enhance fire safety at the site, we require two fire brigades to be stationed at the landfill site. This will enable prompt response to emergencies and minimize potential damage.

Treated it as most urgent


**Executive Engineer-SBM
Municipal Corporation,
Gurugram**

Endst No.EE-SBM/MCG/2025/

Dated:-30.04.2025

A copy of the above is forwarded to the following for information and further necessary action please:-

1. Director, Fire Services Haryana, Bays No.-55-58, Sector-2, Panchkula
2. Commissioner, Municipal Corporation, Gurugram,
3. Add. Commissioner, Municipal Corporation, Gurugram,
4. Joint Commissioner-SBM, Municipal Corporation, Gurugram,
5. PA to Commissioner, Municipal Corporation, Gurugram.



Executive Engineer-SBM

Annexure-5

Photographs taken by CPCB Team during Inspection



Fencing provided along the front side facing the road



Industrial waste dumped at Site



Industrial waste dumped at Site



Industrial waste dumped at Site



Industrial waste dumped at Site



Industrial waste dumped at Site



Bhandwari Landfill
27.02.2026 14:04
28.40120, 77.17044 (±3m)
Altitude: 263m
C53C+7V9, Faridabad - Gurgaon Rd



Fire Entiguishers



Bhandwari Landfill
27.02.2026 14:02
28.40105, 77.17049 (±4m)
Altitude: 265m
C53C+7V9, Faridabad - Gurgaon Rd



Fresh Waste dumped at site



Bhandwari Landfill
27.02.2026 14:01
28.40097, 77.17058 (±4m)
Altitude: 265m
C53C+7V9, Faridabad - Gurgaon Rd



Old machinery under installation at site



27.02.2026 14:21
28.40294, 77.17025 (±2m)
Altitude: 283m

Fresh Waste dumped at site



Bhandwari Landfill
27.02.2026 13:55
28.40428, 77.17263 (±4m)
Altitude: 263m
C53F+HJ3, Faridabad - Gurgaon Rd, G Block, DLF Phase II,
Sector 26, Gurugram

Boundary wall, Fencing and Green Belt provided along the front side facing the road



Bhandwari Landfill
27.02.2026 13:52
28.40350, 77.17414 (±7m)
Altitude: 269m
C53C+7V9, Faridabad - Gurgaon Rd

Water sprinkling



Leachate spread at site



New Machinery under installation



Foundation work for new Machinery



Fire tenders at site



Foundation work for fencing



LETTER OF AWARD

To

M/s MKG Green Energy Pvt. Ltd.
 F1, Surya Kiran Building, Block 35
 Sanjay Place, Agra
 Email-mkggreenenergypvtltd@gmail.com
 Mob. 9837041272

No.- MCG/EE-SWM/2026/2978

Dated: 30/01/2026

Subject: - Submission of Bank Guarantee/ Performance Security against the tender "Remediation and Reclamation of Existing Dumpsite at Bandhwari in Municipal Corporation Gurugram." (Phase-XI) bearing Tender ID No. 2025_HRY_481941_1.

1. In reference to the above-mentioned tender, it is hereby informed that your agency has quoted/negotiated the lowest rates (L-1 bidder) for the processing of legacy waste at the Bandhwari Landfill Site. The same has been approved by the Competent Authority vide Memo No. **DULB/SNT/2026/52 dated 23.01.2026.**
2. The approved rate is **₹900/- (Rupees Nine Hundred only) per Metric Ton** for a total quantity of **7,00,000 (Seven Lakh) MT**, amounting to **₹63,00,00,000/- (Rupees Sixty-Three Crore only).**
3. As per the terms and conditions of the DNIT / Bid Document, you are required to deposit a **Performance Security** in the form of **Fixed Deposit / Bank Guarantee / G-8** in favour of the **Commissioner, Municipal Corporation, Gurugram.** The Performance Security shall be **5% of the total contract value, i.e., ₹3,15,00,000/- (Rupees Three Crore Fifteen Lakh only),** in accordance with **RFP Clause No. 7.2.**
4. In addition to the above, as approved by the Competent Authority vide Memo No. **DULB/SNT/2026/52 dated 23.01.2026,** an **Additional Bank Guarantee equivalent to 5%** of the contract value is also required to be deposited, amounting to **₹3,15,00,000/- (Rupees Three Crore Fifteen Lakh only),** for issuance of the Work Order.
5. Accordingly, you are hereby directed to deposit the aforesaid Performance Securities as detailed below:
 - **5% Performance Security: ₹3,15,00,000/-**
 - **Additional 5% Bank Guarantee: ₹3,15,00,000/-**
 - **Total Performance Security (10%): ₹6,30,00,000/- (Rupees Six Crore Thirty Lakh only)**
6. The same shall be deposited **within 10 days** of receipt of this letter, i.e., **on or before 08.02.2026.** The Performance Security shall remain valid for a period of **365 days.**
7. Further, you are required to submit an **Action Plan within 7 days** from the date of issuance of this letter.

8. Furthermore, the **Contract Agreement** shall be signed **within five (05) days** from acceptance of the Performance Bank Guarantee/Security **or within fifteen (15) days** from the date of issuance of this Letter of Award (LOA), **whichever is earlier.**
9. Thereafter, the **Commencement of Work / Commercial Operation Date** shall be **within sixty (60) days** from the date of signing of the Contract Agreement.
10. You are also directed to ensure the installation of requisite machinery at the landfill site at the earliest.
11. All the terms and conditions as mentioned in the RFP/DNIT/Tender Document, along with the minutes approved by the competent authority vide Memo No. DULB/SMC/2026/52 dated 23.01.2026, and any other terms and conditions as may be approved by the competent authority from time to time during the entire contract period, shall be binding upon you and shall be strictly adhered to.

This is being issued after approval of competent authority.


30/01/2026
Executive Engineer-SWM
Municipal Corporation
Gurugram

Ends No.-MCG/EE-SWM/2026/ 2979

Dated: - 30/01/2026

A copy of the above is forwarded to the following for information and further necessary action please: -

1. Director General, Urban Local Bodies, Haryana, Panchkula.
2. Commissioner, Municipal Corporation Gurugram.
3. Chief Engineer, Municipal Corporation, Gurugram.
4. Addl. Commissioner-I, II & III, Municipal Corporation, Gurugram,
5. Joint Commissioner-SBM, Municipal Corporation, Gurugram,


30/01/2026
Executive Engineer-SWM
Municipal Corporation
Gurugram

d/c



LETTER OF AWARD

To

M/s Daya Charan and Company
D-2/96, Janakpuri, New Delhi
Email-saurabhagarwal2020@gmail.com
Mob. 9871698969

No.- MCG/EE-SWM/2026/2981

Dated: 30/01/2026

Subject: - Submission of Bank Guarantee/ Performance Security against the tender "Remediation and Reclamation of Existing Dumpsite at Bandhwari in Municipal Corporation Gurugram." (Phase-XII) bearing Tender ID No. 2025_HRY_481948_1.

1. In reference to the above-mentioned tender, it is hereby informed that your agency has quoted/negotiated the lowest rates (L-1 bidder) for the processing of legacy waste at the Bandhwari Landfill Site. The same has been approved by the Competent Authority vide Memo No. **DULB/SNT/2026/52 dated 23.01.2026.**
2. The approved rate is **₹900/- (Rupees Nine Hundred only) per Metric Ton** for a total quantity of **7,00,000 (Seven Lakh) MT**, amounting to **₹63,00,00,000/- (Rupees Sixty-Three Crore only).**
3. As per the terms and conditions of the DNIT / Bid Document, you are required to deposit a **Performance Security** in the form of **Fixed Deposit / Bank Guarantee / G-8** in favour of the **Commissioner, Municipal Corporation, Gurugram.** The Performance Security shall be **5% of the total contract value, i.e., ₹3,15,00,000/- (Rupees Three Crore Fifteen Lakh only),** in accordance with **RFP Clause No. 7.2.**
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5. Accordingly, you are hereby directed to deposit the aforesaid Performance Securities as detailed below:
 - **5% Performance Security: ₹3,15,00,000/-**
 - **Additional 5% Bank Guarantee: ₹3,15,00,000/-**
 - **Total Performance Security (10%): ₹6,30,00,000/- (Rupees Six Crore Thirty Lakh only)**
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This is being issued after approval of competent authority.

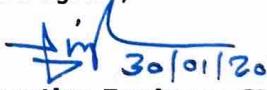

30/01/2026
Executive Engineer-SWM
Municipal Corporation
Gurugram

Ends No.-MCG/EE-SWM/2026/ 2982

Dated: - 30/01/2026

A copy of the above is forwarded to the following for information and further necessary action please: -

1. Director General, Urban Local Bodies, Haryana, Panchkula.
2. Commissioner, Municipal Corporation Gurugram.
3. Chief Engineer, Municipal Corporation, Gurugram.
4. Addl. Commissioner-I, II & III, Municipal Corporation, Gurugram,
5. Joint Commissioner-SBM, Municipal Corporation, Gurugram,


30/01/2026
Executive Engineer-SWM
Municipal Corporation
Gurugram