Capacity Building on Legacy Waste Management

under

Swachh Bharat Mission- Urban 2.0 and Swachh Survekshan 2025-26

- **Implementing Bio-remediation and Bio-mining as per SWM Rules 2016**

- Objective: Strengthening institutional capacity for sustainable dumpsite remediation

Content of Presentation

- What is legacy waste?
- Environmental and health hazards due to Dumpsites.
- Composition and percentage of waste fractions.
- Approaches to dumpsite remediation- Bio-capping and biomining.
- Steps in biomining and key considerations.
- Challenges and way forward.

Swachh Bharat Mission 2.0 and Dumpsite remediation

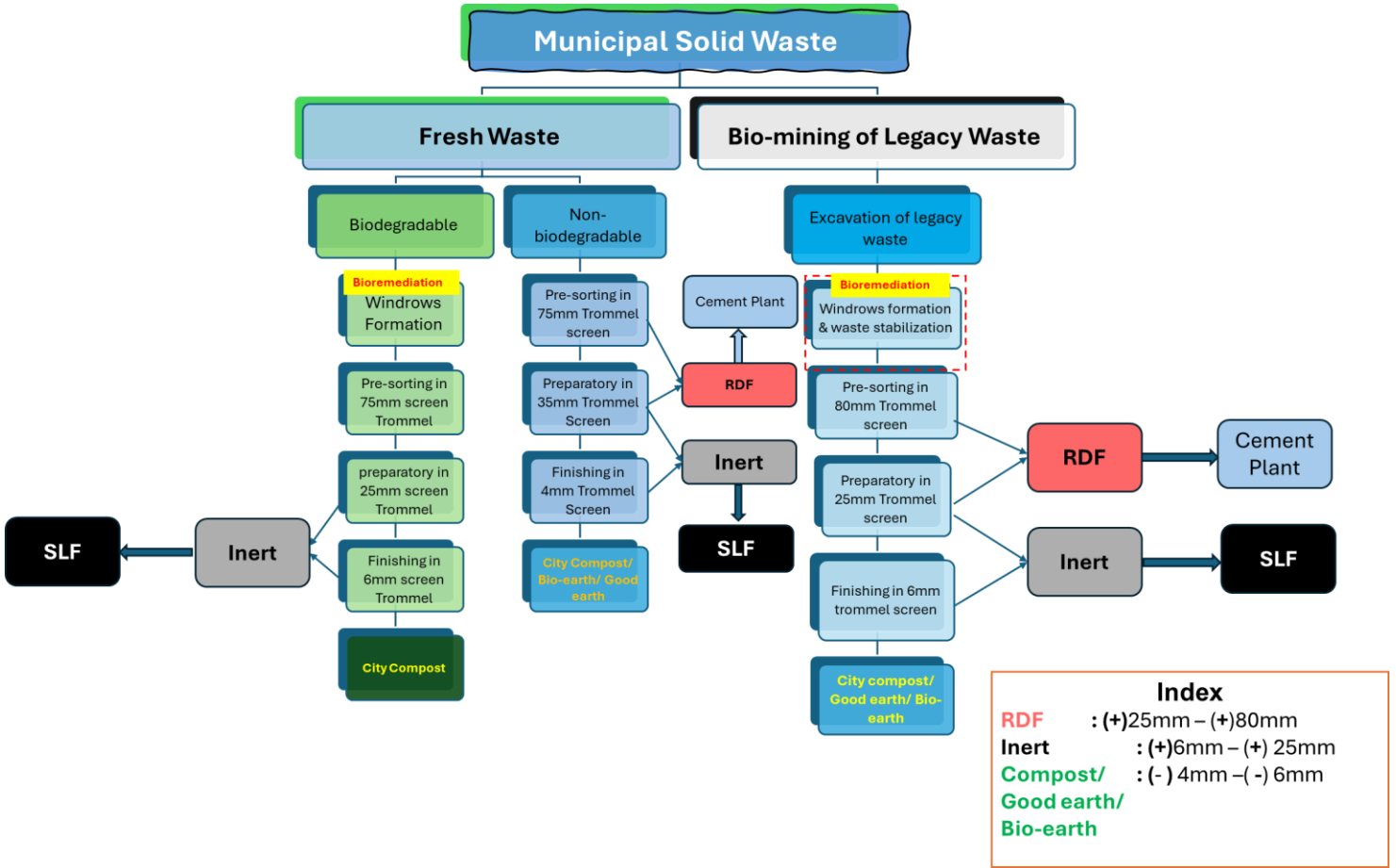
- **Legal mandate** – Solid Waste Management Rules, 2016.

"*investigate and analyse all old open dumpsites for their potential of biomining and bio-remediation and take necessary actions to bio-mine or bio-remediate the sites*"

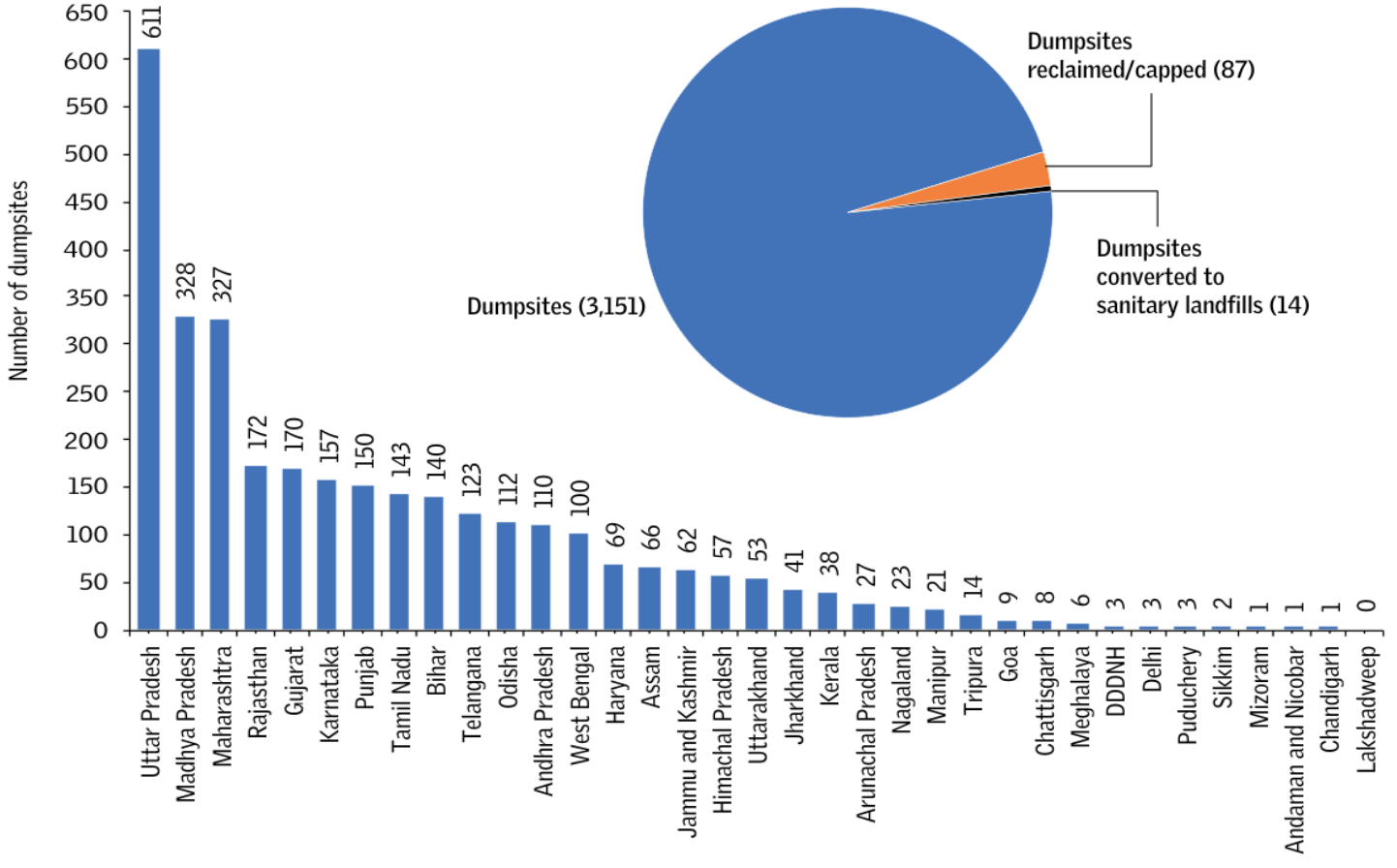
What is legacy waste ?

- Aged municipal solid waste
- Partly, completely, un-decomposed waste
- Contains scrap polymeric and combustible materials
- Inerts

Process Flow Chart of Municipal Solid Waste



Status of dumpsites in India



Source: CPCB annual report, 2019–20

Environmental and health hazards due to Dumpsites

1 ton MSW → Landfill without methane capture → 1610 kg CO_2 equivalents

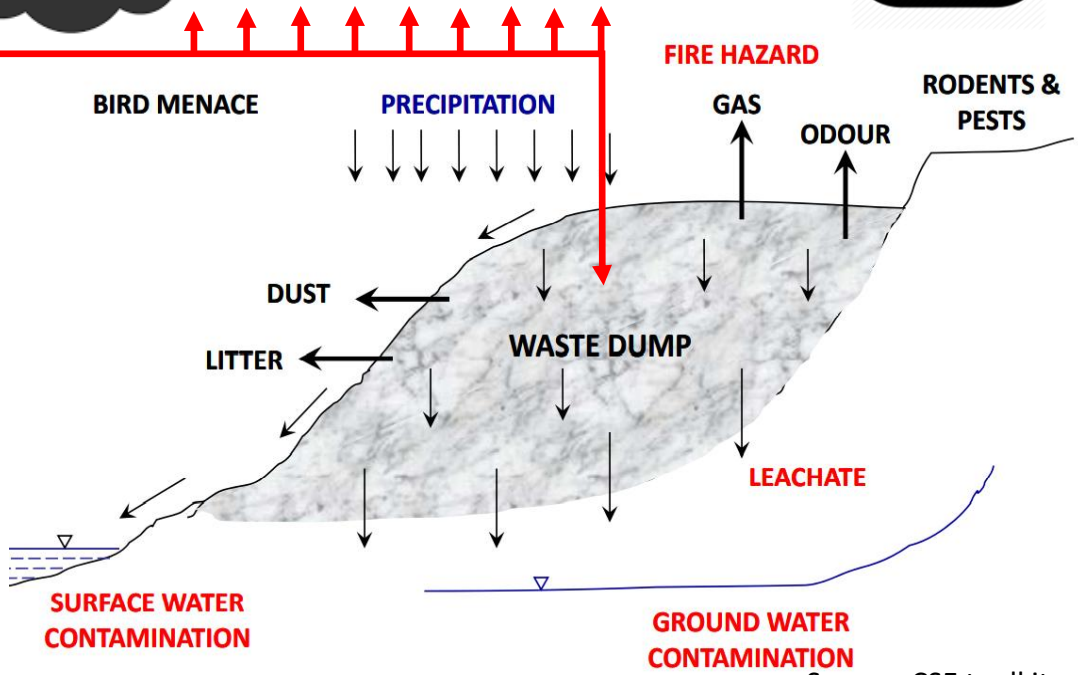
CH_4

Microbial degradation of wet waste causes **GHG EMISSIONS**

CO_2

"Mixed waste" Biodegradable (wet waste) & non-biodegradable (dry waste)

Primary and secondary collection and transportation

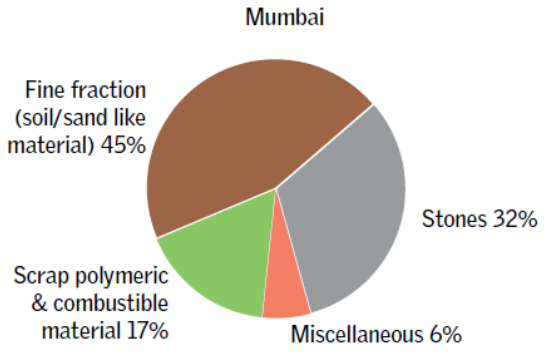


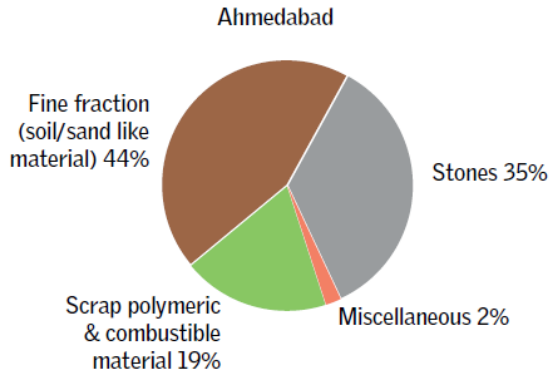
Source: CSE toolkit

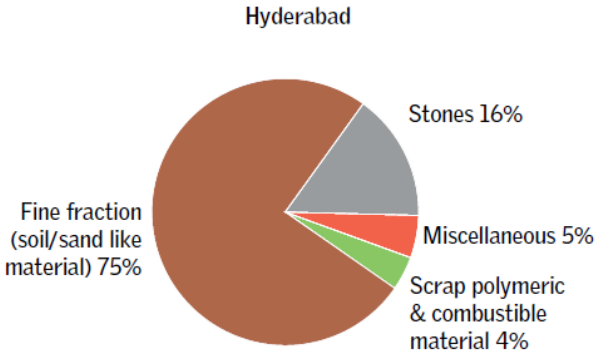
Composition of legacy waste

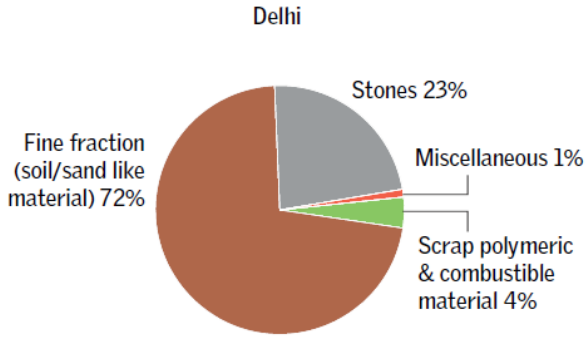
- Indian dumpsite contains a mix of legacy waste (aged waste) and fresh MSW.
- Characteristics and composition are different – which affects the choice of treatment technology and end use of recovered material.
    - Significant proportion of fine-soil like material (40 to 60 per cent)
    - The combustible material ranges between 15 to 18 per cent on weight basis.
    - Coarser particles such as broken bricks, masonry, stones etc constitute nearly 20 per cent.
    - Other miscellaneous fractions comprising broken glass, metallic fractions such as razors, needles, sanitary waste, and diapers might constitute almost 1-5 per cent in the total waste quantum.

Source: CSE toolkit









Source: Richa Singh, *Solidification and Stabilization of Hazardous Waste*, Department of Environmental Science and Engineering, IIT Bombay; Somani, M. et al , Elsevier, 137, pp. 82–92; and Singh, A. and Chandel, M.K., 2020, Elsevier, 134, pp. 24–35

Available options for remediation

Biomining of dumpsite:

- entire waste is treated
- entire land is reclaimed
- entire waste fractions are used for gainful applications

Bio-capping of dumpsite:

- Leachate collection and treatment
- Land is not recovered. Legacy waste is not treated, no waste fractions utilized

Hybrid model (biomining and bio-capping)

- A fraction of waste is treated
- A fraction of land is reclaimed
- A fraction of waste are used for gainful applications
- Rest of the unused waste is bio-capped

Source: CSE toolkit

Steps for biomining of legacy waste

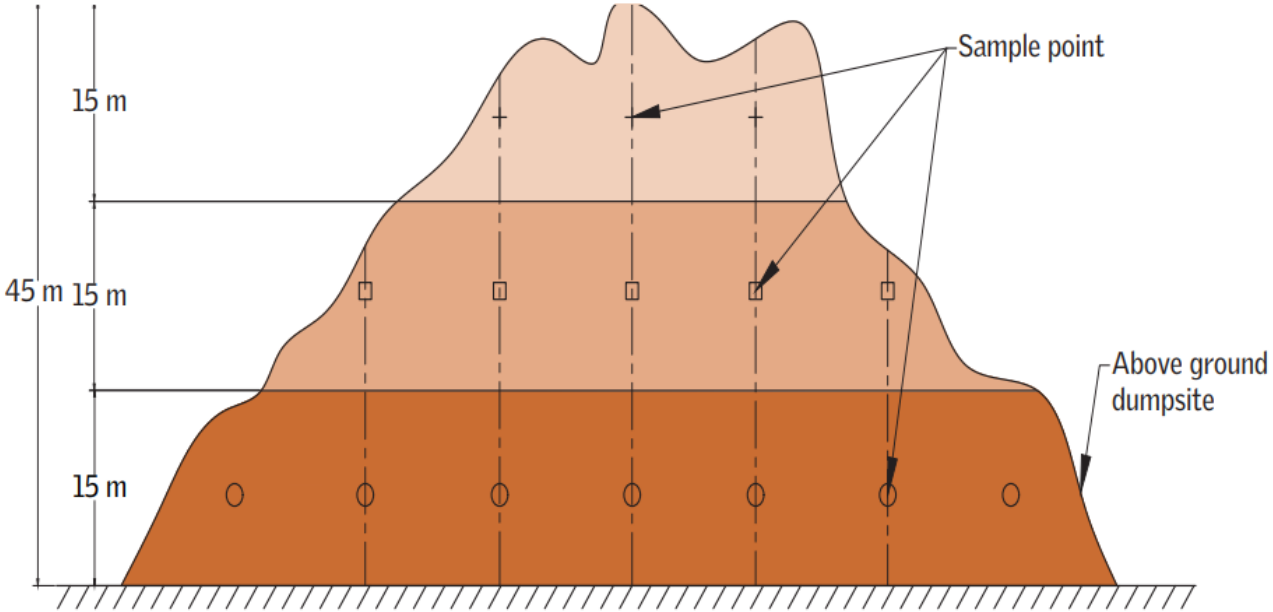
1. Pre-feasibility assessment, including thorough site investigation studies, surveys and waste characterization;
2. Systematic excavation of legacy waste;
3. Stabilization by the spraying of bioculture to reduce the volume and mass of the waste;
4. Processing of the excavated fraction;
5. Utilization of extracted waste fractions in various gainful applications; and
6. Clearing and conditioning of recovered land

Source: CSE toolkit

Pre-feasibility assessment

- Technical and operational feasibility
- Economic feasibility
- Legal feasibility
- Timeline feasibility

Composition & characterization of legacy waste



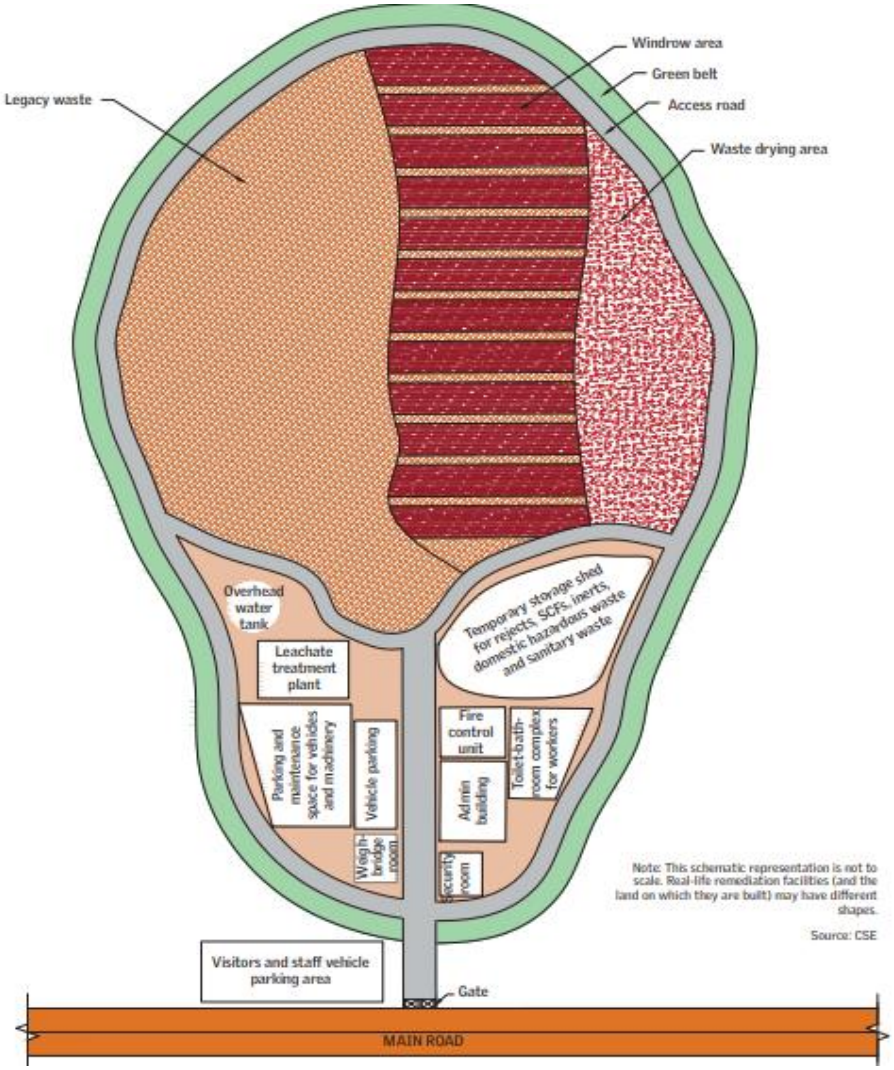
Source: CSE toolkit

Requirements of the planning phase

- Alternative plan for treatment and scientific disposal of fresh waste
- conduct risk assessment and emergency planning
- Training and capacity building of the manpower involved
- Low-lying areas in the city and surrounding areas to be identified to ensure end-use of fine fractions;
- Tie-ups and collaborations with nearby cement plants
- Potential recyclers to be explored;
- Availability of sufficient water and power supply to be ascertained

Considerations during legacy waste excavation and material handling

- Preparation of a detailed operation plan
- Availability of PPE
- Provisions for fire control
- Depth of excavation
- Procurement of machinery and equipment
- Trained manpower
- Odour and dust management
- Record keeping
- Regular monitoring
- Environmental monitoring



- Secure entrance gate
- Security and reception office
- Weighing bridge
- Records room
- Laboratory
- Medical room
- Workers' area
- Parking for vehicles (heavy earth equipment, trucks, etc.) with tyre washing facility
- Administrative building
- Temporary storage area for rejects, domestic hazardous waste and sanitary waste
- Material storage area
- Environmental monitoring unit
- Leachate collection and treatment unit
- Fire control unit
- Waste drying and windrow area
- Toilet–bath complex, with personnel protection equipment (PPE) storage room)
- Overhead water tank

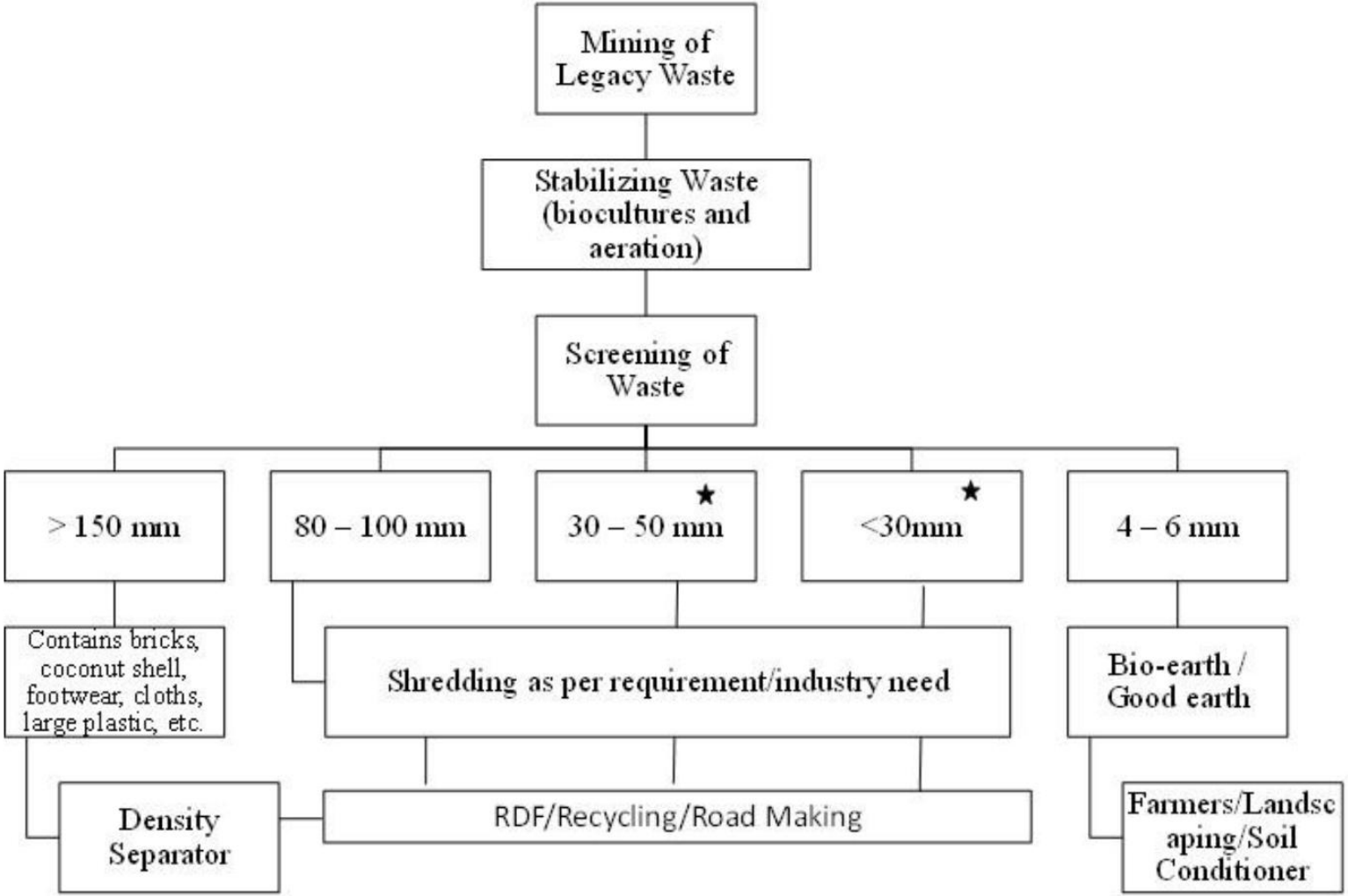
Source: CSE toolkit

Considerations during legacy waste processing and material handling

- Space for waste stabilization and processing
- Procurement of equipment/machineries for sorting and processing of legacy waste fractions;
- Quantities, types and variability of material to be handled;
- Number and types of vehicles or other transport means required for segregation, separation and dewatering;
- A record of quantity of waste treated and diverted should be prepared on a daily, weekly and monthly basis.

Utilization of extracted waste fractions for gainful application

- Following three factors are critical in assessing the potential of the scrap combustible fraction (SCF) used in cement plants:
    - calorific value of the waste should be greater than or equal to 2,500 kCal/kg;
    - ash content should be less than 20 per cent; and
    - moisture content should be less than 30 per cent



Source: CPCB toolkit

Source: CSE toolkit

Considerations for gainful application of recovered legacy waste:

- Fractions recovered from the mining of legacy waste should be tested, especially for the presence of toxic metals and organic contaminants.

Components of legacy waste	Potential applications	Environmental and health hazards
Fine soil-like material	As earth-filling and road-making material, and as substitute for clay in the construction industry	Presence of leachable heavy metals and organics
Coarser inert material	In filling up low-lying areas and as aggregate in C&D waste processing industry	Presence of leachable heavy metals and organics
Scrap polymeric combustible material	RDF and road-making	Contamination with inerts, and high ash and sulphur content
Hazardous material	Disposed of in a scientific landfill	Can lead to many environmental hazards if not disposed of properly

The way forward

- Developing a sustainable fresh waste management plan
- Ensuring maximum utilization of recovered fractions
- Utilization of the reclaimed land
- Incentives for proper management of recovered materials
- Capacity building of ULBs, SPCBs and state urban development departments
- Construction and sustainable operation of sanitary landfills

Download the report: https://www.cseindia.org/toolkit-legacy-waste-management-and-dumpsite-remediation-to-support-swachh-bharat-mission-2-0-11417

Dumpsite/

Legacy Waste and

Swachh Survekshan

2025-26

Marks- 375

SECTION 3: SOLID WASTE MANAGEMENT

1,500 MARKS, 15%

No.	Indicator Summary	Marks
3.1	Functional Wet waste processing capacity of the ULB	100
3.2	Percentage of Wet waste processed vs generated & sale of finished Products	100
3.3	Functional Dry waste processing capacity of the ULB	100
3.4	Percentage of Dry waste processed vs generated & utilization of forward linkages for recyclables and non-recyclable waste	100
3.5	Percentage of total domestic hazardous waste and sanitary waste processed vs generated	100
3.6	Collection, processing and disposal/reuse of C&D waste	200
3.7	Waste Processing by Bulk Waste Generators	150
3.8	Waste Management in Schools	150
3.9	Functional and Effective operation of RRR Centers	100
3.10	Status and Functionality of Sanitary Landfill	150
3.11	Remediation of Dumpsites	250
	TOTAL	1,500

INDICATOR 3.11 – Remediation of Dumpsites

What is the remediation status of all identified legacy dumpsites?

OBJECTIVE

The objective of the indicator is to assess whether the ULB has successfully initiated and completed the remediation of all identified dumpsites.

VALIDATION METHODOLOGY

The validation for this indicator will be carried out by visiting remediation sites within the ULB's jurisdiction. Photographs and videos will be captured at the sampled locations.

Direct Observation | Desktop Assessment

APPLICABILITY

Very Small (< 20k Population)	Small (20k - 50k Population)	Medium (50k - 3 Lakh Population)	Big (3 Lakh - 10 Lakh population)	Million Plus (> 10 Lakh population)
✓	✓	✓	✓	✓

SCHEME OF MARKING — MAX MARKS: 250

Remediation of legacy waste at dumpsites

$$Marks\ Scored = \left[\frac{Total\ legacy\ waste\ remediated\ across\ all\ the\ identified\ dumpsites}{Total\ legacy\ waste\ across\ all\ the\ identified\ dumpsites}\right] x\ Maximum\ Marks\ for\ the\ indicator$$

IMPORTANT POINTS

1. Cities which does not have dumpsites, Marks will be distributed proportionally across the section.
2. If the ULB has remediated the dumpsites already, then the ULB needs to mention the total waste remediated, year of remediation completion and duration of the entire activity.

Dumpsite/

Legacy Waste and

Swachh Survekshan

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Marks- 375

INDICATOR 7.5 - Capacity Building

Has the ULB conducted training, workshops, seminars, or peer visits for sanitary workers and staff on sanitation topics?

OBJECTIVE

The objective of the indicator is to evaluate the ULB's efforts in conducting training, workshops, and peer visits for sanitary workers and staff on sanitation, waste management, and related safety and remediation practices.

VALIDATION METHODOLOGY

The validation for this indicator will be carried out through desktop assessment by assessing the documents along with photographic evidences provided against this indicator by the ULB with sign and stamp of the Nodal Officer.

Desktop Assessment

APPLICABILITY

Very Small (< 20k Population)	Small (20k - 50k Population)	Medium (50k - 3 Lakh Population)	Big (3 Lakh - 10 Lakh population)	Million Plus (> 10 Lakh population)
✓	✓	✓	✓	✓

SCHEME OF MARKING	MAX MARKS: 350
Has the ULB conducted any training for sanitary workers and ULB staff (such as administrative staff, sanitary inspectors, and MIS operators) to enhance their knowledge and skills in sanitation and waste management?	125
Has the ULB organized workshops or seminars focused on solid waste management, used water management, Safaimitra Suraksha, legacy waste remediation, or other sanitation and waste management topics?	125
Has the ULB conducted any peer visits to other cities to learn and implement best practices in sanitation and waste management?	100

IMPORTANT POINTS

1. ULB needs to update list of residential areas in Swachhatam Portal.

Thank you