Framework for Construction and Demolition Waste (C&D) Management

Compiled and Prepared by
Bangalore Political Action Committee

Proposed Pilot Implementation Framework

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EXECUTIVE SUMMARY

Bengaluru's rapid urbanisation, driven by infrastructure development, redevelopment projects, and real estate growth, has led to a significant increase in Construction and Demolition (C&D) waste generation. In the absence of a robust management system, the city faces challenges such as illegal dumping, inefficient collection, limited traceability, and environmental impacts. As per KSPCB estimates, Bengaluru generates approximately 6,700 tonnes of C&D waste daily which gets dumped in low-lying areas, drains, lake buffers, roadside shoulders, quarry pits, and vacant lands.

Following are our key recommendations:

1. Ensure speedy implementation of the C&D waste management rules/bylaws with the following modifications:

2. The KSPCB Report on C&D Waste is based on four zones which do not correspond to the five corporation boundary limits. The zoning framework for C&D waste collection and management should be aligned with existing corporation boundaries. It should be the responsibility of each corporation to collect its C&D waste in the manner prescribed to facilitate efficient governance, streamline administration, and ensure clear accountability.

3. There should be a single point of responsibility for collection of all the streams of waste, including C&D Waste, wet waste, dry waste, sanitary waste, Leaf waste, cut trees and branches, bio-medical waste, bulky waste, E-Waste, etc.

- Currently C&D waste collection is the responsibility of the engineering department, which has neither the resources nor the requisite equipment for the timely collection of C&D waste. Further, the engineering department has no performance KPI for timely waste collection. As a result, debris gets dumped across footpaths and roads, soon turning into mixed waste dumps. There is no collection facility for mixed waste.
- Currently collection of cut trees and branches is the responsibility of the forest department. There is no regular collection system for the same. Therefore, trees and branches are left on the footpath uncollected, soon turning into mixed waste dumps. There is no collection facility for mixed waste.
- We therefore recommend there should be a single point of accountability for city cleanliness. So that citizens are aware whom to reach out to when they see any form of waste dump in public places.

4. Current C&D Rules do not make a clear distinction between micro, small and bulk generators. Segregation, Collection, Transportion, pricing and other responsbilities for each process for each category must be clearly described.

“Micro generators”: The small generators that occasionally generate C&D Waste less than 50 kgs

“Small Generators”: Those that generate C&D waste that amounts to more than 50 kg and less than 20 MT per day in the entire project

“Bulk waste generators”: Waste generators who generate more than

(a) 20 MT or more in one day or 300 MT per project in a month, as identified separately in the C&D Rules and/or

(b) demolition work covering an area equal to or more than 600 square metres; and/or

(c) construction or building repair work covering an area equal to or more than 6000 square metres.

5. Debris on call’ must be made mandatory for micro and small generators

6.Avoid transferring waste between bins; instead, stack containers directly to minimise handling and prevent spillages.

7. Multiple official documents on C&D Waste Management insists on segregation at source into various streams. But the segregation requires heavy machinery. Thus, do not insist on segregation on-site or at transfer stations, as all sorting should be conducted at the processing station. C&D Waste segregation is a complex process requiring heavy equipment and man power for segregation. This is best done at processing facility.

8. For Micro and Small waste generators, Loading of waste into the collection vehicle should be the responsibility of the authorized collector.This ensures standardized handling practices, reduces disputes and improves service reliability.

- GPS Tracking with full traceability: Real-time route monitoring and deviation alerts from pickup point to processing destination for BWGs and to Transfer stations for micro & small generators.
- QR Verification: Digital logging of every collection trip.
- CCTV Monitoring: Oversight of unloading and waste handling.
- Weight Checks: Pickup vs. disposal weight comparison via hookloaders picking the containers at each site, and at the end, once again to detect dumping.

INTRODUCTION

Bengaluru is witnessing rapid urbanization, infrastructure expansion, redevelopment, road works, utility projects, and private real estate growth. This has resulted in a sharp increase in Construction and Demolition (C&D) waste generation across the city.

As per assessments undertaken by KSPCB, approximately 6,700 TPD of C&D waste is generated daily across Bengaluru. Of this:

North & Northeast Zone – 2541 TPD

East & Southeast Zone – 2675 TPD

West & Southwest Zone – 802.5 TPD

West & Northwest Zone – 696 TPD

At present, a major portion of this waste is handled through unorganized transportation systems and illegal dumping in low-lying areas, drains, lake buffers, roadside shoulders, quarry pits, and vacant lands.

The proposed framework is intended to establish a scientifically designed, technology-enabled, environmentally sustainable, and economically viable system for handling C&D waste in one of the selected areas/ward/constituency/zone through a pilot implementation model under GBA.

The model is designed as a scalable framework that can later be replicated across all zones of Bengaluru.

2. BACKGROUND AND NEED FOR INTERVENTION

The current C&D waste ecosystem in Bengaluru is fragmented and largely informal. Multiple challenges exist:

Absence of dedicated collection systems

Illegal dumping across public spaces

Lack of accountability of generators

Poor source segregation

High transportation inefficiencies

Environmental pollution

Dust emissions and traffic disturbance

Underutilization of existing processing facilities

Absence of integrated monitoring systems

Studies indicate that hundreds of truckloads of debris are dumped daily across Bengaluru. Existing transportation systems are largely unregulated and do not follow scientific disposal pathways.

The Environment (Construction & Demolition) Waste Management Rules, 2025, now mandate:

- Extended Producer Responsibility (EPR)
- Waste Management Plans
- Waste Utilisation Plans
- Registration of stakeholders
- Recycling targets
- Online monitoring systems
- Environmental compensation for non-compliance

The GBA C&D Waste Management By-Laws, 2026, further empower the authority to establish:

- Collection points
- Intermediate Waste Storage Facilities (IWSF)
- Processing facilities
- Registration systems
- Monitoring and enforcement systems

We need a zonal implementation framework to operationalise the regulatory ecosystem.

3. OBJECTIVES OF THE FRAMEWORK

3.1 Primary Objectives

To establish a dedicated scientific mechanism for the collection and transportation of C&D waste.

To eliminate unauthorised dumping and black spots.

To reduce transportation-related pollution and carbon emissions.

To operationalise provisions of C&D Rules 2025 and GBA By-Laws 2026.

To integrate digital monitoring and tracking systems.

To establish a scalable pilot framework for Bengaluru.

- **3.2 Secondary Objectives**
- Promote circular economy principles.
- Increase utilisation of recycled aggregates.
- Improve public participation.
- Generate green employment.
- Improve urban cleanliness.
- Reduce pressure on landfills.
- To improve recycling and resource recovery.

4. KEY CHALLENGES

a)Illegal Dumping: Large quantities of debris are dumped on roadsides, stormwater drains, Lake buffer zones, Vacant plots, Quarry pits, and low-lying areas

b) Unorganised Transportation: Open trucks without covers, no tracking system, no route optimisation, no authorised disposal mechanism

c)Lack of Generator Accountability: No registration systems, no waste estimation mechanism, no segregation obligations

d)Environmental Issues: Dust pollution, Air emissions, Traffic congestion, Water contamination, Drain choking

e)Poor Recovery Rates: A significant quantity of recyclable material is lost due to mixed dumping.

5. DEFINITIONS

"**Micro generators**": The small generators that occasionally generate C&D Waste less than 50 kgs from minor house repairs, broken ceramic sanitary ware like tiles, bathtubs, commodes, washbasins, etc.

"**Small Generators**": Those that generate C&D waste during building renovation, remodelling, or petty construction, repair, or maintenance works, etc., where the total amount of C&D Waste generated in the entire project is more than 50 kg and less than 20 MT per day.

"**Bulk waste generators**": Waste generators who generate more than

(a) 20 MT or more in one day or 300 MT per project in a month, as identified separately in the C&D Rules and/or

(b) demolition work covering an area equal to or more than 600 square metres; and/or

(c) construction or building repair work covering an area equal to or more than 6000 square metres.

"**C&D Waste Management Cell**" means a dedicated administrative unit established by the GBA at the zonal or headquarters level for implementation, coordination, and enforcement of these By-Laws.

"**Completion Certificate**" means a certificate issued by the GBA or competent authority confirming that the construction, renovation, or demolition work has been completed in accordance with the sanctioned plan and applicable By-Laws, including C&D waste management compliance.

"**Demolition Permit**" means written permission or authorisation issued by the GBA permitting the demolition of all or part of a building, structure, or civil engineering work within GBA jurisdiction.

"**Extended Producer Responsibility (EPR)**" means the responsibility of a producer to manage construction and demolition waste and to meet recycling targets as per the First Schedule to ensure its environmentally sound management;

"**Intermediate Waste Storage Facility (IWSF)**" means a place in the jurisdiction of the local authority, operated by the authority or an authorised operator, where construction and demolition waste can be stored to facilitate its management in an environmentally sound manner;

"**Legacy Waste**" means the orphan and untreated C&D waste lying in the jurisdiction of the GBA on the date of commencement of these By-Laws,

"**Nodal Officer**" means an officer of the rank of Executive Engineer or equivalent, designated by the GBA for each zone or ward cluster, responsible for implementation, monitoring, and enforcement of these By-Laws.

"**Processing Facility**" means a designated establishment equipped with requisite infrastructure to process C&D waste, operated by a Recycler, carrying out reception, storage, segregation, treatment, or manufacturing of value-added articles or materials.

"**Temporary Site Storage Area**" means a designated, demarcated, and contained area within a project site used for temporary on-site storage of segregated C&D waste before collection and transportation.

"**Waste Management Plan**" means a document prepared by Producers, duly approved by the GBA, for management of C&D waste to meet EPR targets under the First Schedule of the C&D Rules 2025.

6. WASTE COMPOSITION AND SOURCES

Waste Composition (India estimates)

Material	Share
Soil Sand and Gravel	36%
Brick and Masonry	31%
Concrete	23%
Metal	5%
Wood	2%
Bitumen	2%
Other	1%

7. PROPOSED INTEGRATED C&D WASTE MANAGEMENT FRAMEWORK

Integrated Command and Control System

A centralised ICCC-based monitoring system shall be established

- 1 operation office
- 1 Enforcement Team
- 1 Data Monitoring Unit
- 1 Citizen Support Unit (Included with the toll-free no.)

7.1. The Operational Model:

To handle ~100 Tonnes Per Day (TPD), the system prioritises collection nodes over constant transit.

Channels

- Toll-free helpline
- Web portal/App

User Inputs Required

- Location
- Approximate waste volume
- Waste category
- Photographs

Segregation at Source (Ideal)

Every waste generator shall ensure segregation of C&D waste at the point of generation into the following minimum material streams:

Category A: Inert debris-cement concrete, masonry, bricks, stone, rubble, tiles, ceramics, and cement plaster (EPR-accountable stream);

Category B: Soil, sand, and gravel (excavated material);

Category C: Wood and timber waste-formwork, scaffolding, offcuts;

Category D: Metal and ferrous scrap-reinforcement bars, structural steel, pipes, fixtures;

Category E: Glass, plastic, wires, conduits, and packaging materials;

Category F: Hazardous materials- asbestos, lead-based paint, contaminated soil, chemical containers (to be managed under applicable Hazardous Waste Rules).

7.2 Source Collection Mechanism

Micro Generators (< 50 kgs)- "Debris on Call"

Storage Mandate: C&D waste must be packed in cement bags or appropriate sturdy storage mediums and kept strictly within the generator's premises until collection to avoid dumping on footpaths or in any public spaces.

Collection Mechanism: Generators use the BSWML online portal or toll-free telephone or app system to request service.

Logistics & Payment: Hand over the waste to the designated service provider by paying the scheduled service charges.

Small Generators (> 50 kgs to < 20 MT/day) "Debris on Call"

Financial Integration: Fees are calculated based on estimated waste volume.

Logistical Options:

System Removal: They opt for removal by the Local Authority/PPP service provider through 'Debris on Call'.

Compliance & Accountability: Small generators hold ultimate responsibility for responsible disposal. They must procure a receipt. This receipt is a mandatory prerequisite for the Local Authority to issue an Occupancy Certificate.

C. ***Bulk Waste Generators (≥ 20 MT/day or 300 MT/month)***

- **Ultimate Responsibility**: The generator or main service provider holds end-to-end responsibility and must show adequate proof of management, regardless of whether subcontractors are utilised.
- **Source Segregation:** Waste must be segregated onsite into a minimum of four streams: (A) Concrete, (B) Soil, (C) Steel, wood, and plastics, and (D) Bricks and mortar.
- **Storage & Site Management:** Must set up a dedicated C&D storage site within their premises with sufficient space to prevent public nuisance.
- **Collection Scheduling**: Must adhere to daily or scheduled regular collection to prevent site overflow.
- For large projects, the area must be cordoned off. Waste cannot obstruct public roads or block surface/stormwater drains.
- **Mandatory Waste Tracking**: **BSWML (Enforcement Team or Data Monitoring Unit - suggested under ICCC)** must maintain strict tracking and documentation of all C&D waste from source generation to final processing to ensure compliance.
- **Service Providers (Infrastructure & Utility Authorities):** Entities handling civic infrastructure, roadworks, or utility lines have specific mandates:
- Must develop and submit a dedicated waste management plan tailored for civil works.
- Must establish a designated on-site segregation area during all excavation or demolition activities.
- Must have a mandatory linkage with an authorised C&D recycling or processing facility.

7.3 Container System

1. **Small Containers**

- Capacity: 5 Cu.m
- Used for source collection
- Compatible with 7.5T hook loaders

2. **Large Containers**

- Capacity: 20 Cu.m
- Used for secondary transport
- Compatible with 28T hook loaders

7.4 Collection Workflow

1**. Primary Collection:** Using 5 Cu.m Hook Loader Containers

Collection Process

- A collection request is generated.
- An appropriate container is dispatched directly to the waste generation site.
- C&D waste into the container.
- A hook loader vehicle lifts and secures the filled container.
- The container is transported to the nearest Intermediate Waste Storage Facility (IWSF)

2. IWSF (Intermediate waste storage facility)

Purpose of the IWSF

- Consolidate multiple small waste loads into a single transport load.
- Minimise long-distance trips by smaller collection vehicles.
- Serve as a buffer between collection operations and processing facilities.

Operations at the IWSF

- As per the information received by BSWML, each IWSF is around 18000sq ft, which possibly may be sized down to 5000 sq.ft.
- Incoming 5 cu.m containers are received and weighed.
- The 20 cu.m container is positioned below an elevated tipping platform or ramp designed to align the discharge point of the incoming 5 cu.m container directly above it.

- The 7.5-tonne GVW hook loader places the filled 5 cu.m container onto the tipping platform, where hydraulic mechanisms raise and tilt the container.
- The waste is discharged directly from the 5 cu.m container into the 20 cu.m container.
- Once emptied, the 5 cu.m container is lowered, removed by the hook loader, and returned for the next collection cycle while the 20 cu.m container continues to receive additional loads until full capacity is reached.

3. Secondary Transportation to Processing Facility

Once the 20 cu.m container reaches full capacity, it is transported to the designated C&D waste processing facility.

Transportation Process

- The fully loaded 20 cu.m container is mounted onto a 28-tonne Gross Vehicle Weight (GVW) hook loader vehicle.
- The vehicle transports the consolidated waste load directly to the processing facility.
- After unloading, the empty container is returned to the IWSF for reuse.

7.5 Technical Infrastructure & Accountability

GPS tracking:

- Every truck would be equipped with active GPS devices to track live movements. The system would trigger automatic "deviation alerts" if a driver went off the approved route to an illegal dumping hotspot.

The QR Scan (Point of Origin):

- When the pick-up vehicle arrives at a site, the driver scans the builder's QR sent to them after the request is made
- This "opens" the trip
- The waste is then transported to the temporary storage, which is monitored via CCTVs to ensure the dumping is done appropriately and to avoid blind spots.
- *note- IWSF sites to be monitored via CCTVs

The proposed system consists of the following chain:

8. ENFORCEMENT AND COMPLIANCE MECHANISM.

8.1 Enforcement Cell

- Dedicated enforcement teams shall be created.

8.2 Monitoring Framework

- GPS verification
- CCTV analytics
- Surprise inspections
- EPR verification

8.3 Black Spot Elimination Strategy

- GIS mapping
- Surveillance cameras
- Physical barriers
- Regular inspections

9. IWSF PLANNING

9.1 Recommended Number of IWSF

- Recommended: 2 strategically located IWSF

9.2 Site Selection Criteria

- Away from dense residential areas
- Access to arterial roads
- Adequate land

9.3 Infrastructure Required

- Weighbridge
- CCTV system
- Security
- Office and control room

10. VEHICLE AND EQUIPMENT ASSESSMENT

10.1 Planning Basis

Target handling quantity:100TPD

10.2 Operational Assumptions

Parameter	Assumption
Average primary trip	5 tonnes
Average secondary trip	18–20 tonnes
Collection efficiency	85–90%

11. HOOK LOADER AND CONTAINER REQUIREMENT ESTIMATION

Item / Vehicle Type	Quantity	Unit Cost	Total Cost
5 Cum(Primary)	30	L	
7.5 T GVW Hook loader(Primary)	5	22L	
20 Cum (Secondary)	10	L	
28TGVW Hook loader (Secondary)	3	70L	
GPS and IoT systems	TBD	15K	

12. IEC AND PUBLIC PARTICIPATION STRATEGY

12.1 Objectives

- Improve citizen awareness
- Increase compliance
- Reduce illegal dumping
- Promote recycling

12.2 IEC Components

- Awareness Campaigns
- Social media
- Ward-level campaigns
- Builder outreach
- Resident welfare meetings
- Communication Materials
- Posters
- Signage
- Mobile alerts
- Citizen Reporting System
- WhatsApp integration
- Helpline number

13. OPEX COMPONENTS

Component	Cost
Fuel	As per requirement
Labour	As per requirement
Maintenance	As per requirement
Utilities	As per requirement

14. REVENUE STREAMS

a) Tipping Fee – Primary source of income (Current fee – Rs. 1,138 per metric ton)

b) User Charges- Collected from generators.

c) Sale of Recycled Products

Potential revenue from:

- Aggregates
- Blocks
- Pavers
- Sand substitute

d) EPR Certificates- Revenue through EPR ecosystem.

e) Carbon and Sustainability Incentives- Potential future climate-linked financing opportunities.

15. OUTCOMES

Environmental Outcomes

- Reduced illegal dumping
- Cleaner public spaces
- Reduced dust pollution
- Reduced drain choking
- Lower carbon emissions

Economic Outcomes

- Resource recovery
- Reduced landfill burden
- Green job creation
- Circular economy development

Governance Outcomes

- Improved monitoring
- Data-driven administration
- Better citizen grievance handling
- Improved compliance ecosystem

16. KEY PERFORMANCE INDICATORS (KPIs)

KPI	Target
Collection efficiency	>90%
Illegal dumping reduction	>80%
Complaint resolution time	<24 hrs
GPS compliance	100%
Segregation compliance	>75% initially
Citizen satisfaction	High

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