

Business Requirement Document

**Project title : Smart Waste Management System
.
(IoT + Mobile App)**

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1. INTRODUCTION :

1.1 EXECUTIVE SUMMARY:

Urban municipalities face significant challenges in managing solid waste due to inefficient collection schedules, lack of real-time visibility into bin status, and limited citizen engagement. These challenges result in overflowing garbage bins, increased operational costs, health hazards, and reduced citizen satisfaction.

The Smart Waste Management System addresses these issues by leveraging IoT sensors to monitor bin fill levels, mobile applications for citizens and waste collectors, and a centralized dashboard for municipal administrators. The system enables priority-based route optimization, real-time alerts, complaint tracking, and performance analytics.

The expected outcomes of this project include a reduction in waste overflow incidents, lower fuel consumption through optimized routing, improved complaint resolution times, and higher citizen satisfaction. This initiative supports smarter urban governance, operational efficiency, and sustainable city management.

1.2 EXECUTIVE SUMMARY:

The purpose of this Business Requirements Document (BRD) is to clearly define the business needs, objectives, scope, stakeholders, and high-level requirements for the Smart Waste Management System.

This document serves as a reference for all stakeholders including municipal authorities, IT teams, IoT vendors, and implementation partners to ensure a shared understanding of the business problem and the proposed solution. It outlines what the system should achieve from a business perspective without detailing technical implementation.

1.3 PROJECT OVERVIEW:

The Smart Waste Management System project is designed to improve municipal solid waste collection through the use of IoT-enabled smart bins, mobile applications, and real-time analytics dashboards. The system enables municipalities to monitor bin fill levels, optimize garbage collection routes, and provide a transparent complaint management platform for citizens.

By integrating sensor data, route optimization, and citizen feedback, the project aims to reduce waste overflow, minimize fuel and operational costs, and enhance overall sanitation and public health outcomes in urban areas. The solution supports data-driven decision-making for municipal authorities and improves service efficiency.

2. BUSINESS OBJECTIVES

- Provide smart bins with sensors.
- Real-time dashboard for municipality.
- Reduce fuel and operating cost per collection route by 30–40%.
- Reduce overflow of waste.
- Optimize garbage truck routes.
- Provide easy citizen mobile app/web access.
- Implement a smart system to improve waste collection efficiency.

3. SCOPE :

IN-SCOPE

1. Real-time bin status monitoring through sensors
2. Municipal operations dashboard
3. Driver mobile app for route & collection updates
4. Citizen mobile app/web portal for complaints
5. Route optimization engine
6. Analytics & reporting module

OUT-OF-SCOPE

1. Recycling plant operations
2. Composting processes
3. Waste segregation activities
4. Third-party transport management beyond municipal trucks

4. STAKEHOLDERS :

Municipal Commissioner	Governance, approvals, KPIs, review reports
Field Supervisor	Daily monitoring, route assignment, field issue resolution
Truck Drivers	Route execution, collection marking
Citizens	Complaints, feedback, view schedule
IT Team	System development, maintenance, integration, security
IoT Vendor	Sensor supply, installation, maintenance

5. HIGH-LEVEL BUSINESS REQUIREMENTS (HLR)

<u>ID</u>		<u>REQUIREMENT</u>
HLR-1	-	Real-time bin status visibility (fill-level & alerts)
HLR-2	-	Priority-based route generation for trucks or waste collectors
HLR-3	-	Driver app for receiving optimized routes and marking garbage collection points
HLR-4	-	Citizen app for reporting & notification system
HLR-5	-	Performance dashboard + monthly analytics
HLR-6	-	Data exporting & integration with municipal ERP

6. ASSUMPTIONS & CONSTRAINTS

ASSUMPTIONS :

1. IoT sensors will be compatible and installed correctly.
2. Internet connectivity is available for sensors and mobile app.
3. Citizens have access to smartphones for reporting.
4. Municipality provides required datasets and ward maps.

CONSTRAINTS :

1. Sensor must connect with solar for battery life.
2. Budget limitations for scaling to multiple wards.
3. High dependency on external IoT vendors.
4. Limited network connectivity in remote areas.

7. SUCCESS METRICS

- Reduce overflowing bin incidents by 60% within 3 months.
- Reduce fuel consumption by 20% through optimized routing.
- Achieve 90% closure rate for complaints within 24 hours.
- Improve citizen satisfaction score by 40%.
- Achieve real-time dashboard accuracy.

8. RISKS & MITIGATION

<u>RISK</u>	<u>IMPACT</u>	<u>MITIGATION</u>
• Sensor failure	Incorrect data	Regular calibration & maintenance alerts
• Driver not using app properly	Data inconsistency	Training + supervisor monitoring
• Network issues	Delay in updates	Offline mode & auto-sync
• Data security issues	Privacy risk	Strong authentication & encryption

