Pre-Feasibility Study
Bhopal Solid Waste Management

May 2015
Executive Summary

FUNDED BY
IMPLEMENTED BY

i. The Project

A. Rationale

1. Bhopal is the capital and second largest city of the Indian state of Madhya Pradesh. Being an important regional hub, the city's population of 2 million is expanding rapidly, driven notably through urban expansion. From a development perspective, the city contrasts markedly between modern urban developments in the south and west with older, densely packed inner-core areas to the north, where population densities exceeded 35,000-capita/km^2. Bhopal is known as one of the India's greenest cities, being blessed with ten lakes and expanses of forest.

2. The Bhopal Municipal Corporation (BMC) is responsible for the city's civic infastructure and administration. This includes its solid waste management (SWM) system that currently employs over 4,700 personnel, utilizing about 250 road vehicles. There is one registered dumpsite serving the city, the Bhanpura dumpsite. Unlike the city's other infastructure systems, however, Bhopal's SWM system is seriously deficient. Its waste collection system is only capable of collecting about half of the city's waste, which is approaching 1,000 tons/day, while the Bhanpura dumpsite, itself a significant health and environmental threat, only receives about a third of this waste. About 250,000 tons/year of waste therefore is currently being dumped directly into streets, vacant lots, drainage channels and lakesite areas: an issue that is most serious in Bhopal densely backed communities. Without action, the situation is destined to progressively worsen, as the city's generation rate accelerates from 350,000 tons/year currently to over 600,000 tons/year by 2030.

3. Public awareness and engagement in SWM is low in Bhopal, waste minimization is a virtually unknown concept, and source segregation is ad hoc. Although BMC operates a door-to-door collection system for certain areas, others are unserved. Over 3,000 collection bin centers exist throughout the city: most are visually ugly, create odors, blight adjacent residences, attract vermin and create disease vectoring. Waste burning is common, polluting the atmosphere. Although Bhopal's informal recycling sector is extensive, providing livelihoods to at least 8,000 recyclers, they operate in unsanitary conditions and are worryingly unprotected from the dangers of direct waste contact. Bhopal's collection fleet is old and dilapidated and many trucks are small and inefficient. As mentioned, the Bhanpura dumpsite is causing serious environmental and human health impacts, threatening nearby communities. BMC's departments involved in SWM have acute capacity limitations, and although tariffs exist, tariff collection efficiency is extremely low.

4. BMC now fully recognizes this situation, and through this project proposes to completely transform its SWM system. SWM sector reform and investment in Bhopal is also fully supported at the national and state level, notably through the national government's *Swachh Bharat Mission* (Clean India Mission) and the state's recent initiative to cluster SWM projects within the state in order to achieve critical mass and improve system viability.

B. Impact and Outcome

5. The project's impact is an improved urban environment, and enhanced public health and quality of life for the residents of Bhopal. The outcome will be improved SWM infrastructure and service delivery with improved technology throughout the city.

C. Project Description

6. The project includes the following physical components and support programs:

7. **Component 1: Door-to-Door Waste Collection System.** A revitalized and expanded waste collection system to serve the entire Bhopal population, comprising three different waste collection methods: manual tricycle, small vehicle, and direct community bin collection.

8. **Component 2: Street Sweeping and Cleaning System.** A citywide street sweeping and cleaning system incorporating about 2,000 street sweepers, with funding for manually operated tricycles, and operational and protective equipment.

9. **Component 3: Waste Transfer System.** A new citywide waste transfer system for direct waste transfer to the proposed Adampur Chhaoni waste treatment and disposal facility in the east of the city. The system is envisioned to include 151 waste collection vehicles, and three equipment yards for vehicle storage and minor maintenance.

10. **Component 4: Adampur Chhaoni Waste Treatment and Disposal Facility.** Development of the 27-hectare Adampur Chhaoni waste treatment and disposal facility, including construction of a sanitary landfill built to international standards, and provision for additional waste treatment facilities within the facility confines.

11. **Component 5: Adampur Chhaoni Closure.** Closure of the Adampur Chhaoni facility in the medium-term, due to its reduced lifespan as a result of its small size: to be replaced with a larger, longer-term facility.

12. **Component 6: Bhanpura Dumpsite Closure and Remediation.** Complete closure of the dumpsite including necessary engineering works, and provision for the monitoring of impacts caused by the facility.

13. **Component 7: SWM Support Programs**.

A. Public Awareness and Engagement Program. A program to raise awareness and build capacity to minimize waste, segregate and store recyclable materials, responsibly handle, store and dispose of residual waste, maintain community cleanliness, reduce illicit dumping and report offenders.

B. Recycling Support Program. A program to firstly improve informal recycler and waste worker awareness, engagement and working practices and secondly, to support the recycling sector to progressively improve recycling efficiencies and long-term sustainability.

C. Institutional Support Program. An extensive, long-term institutional support program to build capacity in BMC to plan, implement and manage the SWM system over the long term.

D. Project Investment Costs

14. The project is estimated to cost US$ 49.122 million, shown as follows.

Project Investment Plan

Item		Amount US$
1	Waste Collection System	10,223,089
2	Street Sweeping and Cleaning System	1,325,096
3	Waste Transfer System	8,079,272
4	Adampur Chhaoni Waste Treatment and Disposal System	13,223,013
6	Adampur Chhaoni Closure	2,918,281
5	Bhanpura Dumpsite Closure and Remediation	3,892,613
7	SWM Support Programs	3,053,190
	Subtotal	**42,714,552**
	Contingency (15 percent)	**6,407,183**
	TOTAL	**49,121,735**

E. Implementation Arrangements

15. Although BMC retains full responsibility for SWM in Bhopal, it plans to involve the private sector through public-private-partnership (PPP) arrangements in virtually all aspects of SWM provision. Accordingly, BMC is currently considering a range of PPP options under five broad categories: service contracts, management contracts, lease arrangements, concessions, and private ownership and divesture. Planned PPP intervention therefore mandates a dramatic shift of BMC's principal role from service provider to contract manager. As a result, a two-year institutional support program is included in the project to assist BMC with this transition process.

F. Project Benefits and Beneficiaries

16. The project will improve living conditions and the environment for all residents of Bhopal, and particularly for poor communities who will have improved access to reliable SWM services. All residents will also benefit indirectly as a result of (i) reduced illicit waste dumping, (ii) reduced incidence of waste-related diseases and the resulting reduction in medical costs, and (iii) reduced pollution loads on air, water, lands and groundwater resources following improved SWM collection, transfer, treatment and disposal. SWM system upgrades and assistance to the informal recycling sector will improve public health and safety conditions for waste workers and informal recyclers. Recycling support initiatives will stimulate more efficient recycling practices, with the potential to both improve livelihood sustainability and create additional employment. Jobs will also be created during the construction and operation phases of the project, together with anticipated additional employment due to follow-on multiplier effects.

17. The project will have a positive impact on climate change due to the reduction in greenhouse gas (GHG) emissions to the extent of approximately 120,000 tCO_{2eq}/year, primarily due to increased recycling, the prohibition of waste burning, and the utilization of an engineered landfill facility for waste disposal that has an active gas collection system.

ii. Due Diligence

A. Technical

18. In addition to international best practices review, technical due diligence has also included assessment of SWM technologies, systems and processes of specific Indian cities

in order to ensure that the most appropriate solutions are incorporated in the project. As a result: (i) the proposed waste collection system adopts conventional door-to-door methodologies that are well known throughout India for their simplicity and reliability, (ii) a waste transfer system comprising of a vehicle fleet that is sized to efficiently transfer waste directly to the treatment and disposal facility, negating the need for complicated transfer station methods, and (iii) a treatment and disposal system designed to include an international-standard sanitary landfill, together with an allocation of land within the facility to pilot test, and where successful, to mainstream alternative waste treatment technologies into the system. This latter concept is important, as it provides an opportunity to add new treatment technologies to the system while assuring reliable and secure waste disposal is provided by the sanitary landfill.

B. Financial

19. BMC's overall financial capacity to implement the project is considered acceptable based on key financial ratios. It's past financial performance during FY's 2008-13 shows encouraging results, such as an operating ratio of less than one. The results of the financial operation plan prepared, considering BMC's outstanding loans of INR 2,041 million (Mar-2013) as well the financial impact of the proposed SWM project investment with the maximum debt burden, are also found within acceptable key financial ratios. This underlines the fact that BMC has the capacity to implement the project from the general account. The proposed investment taken as a full package, the preferred project structure for BMC, is financially viable for implementation under PPP modalities assuming a reasonable tipping fee and rationalized tariffs. On a stand-alone basis however, the current cost recovery efficiency of its SWM operations is about 20 percent, requiring subsidies. BMC is taking action to improve this situation by improving tariff collection operations and rationalizing tariff structures.

20. As BMC plans to implement the project utilizing PPP modalities, it is currently evaluating various PPP structures and financing options. These financing options include (i) national and state government support in the form of grant financing, (ii) loans from domestic financial institutions, (iii) multilateral funding, (iv) subsidized loans from state government, and (v) private financing through PPP. Out of the several scenarios identified for valuation so far, BMC's preference at this stage is for a belnd of (i) national and state government grant funding, (ii) multilateral funding, (iii) PPP financing, and (iv) BMC financing to reduce the overall financial impact.

C. Poverty and Social

21. The project will contribute to poverty reduction by ensuring that poor communities have safe and reliable access to SWM services and enjoy improved living conditions. SWM system improvements will also improve both the working conditions and the sustainability of lower income waste workers and informal recyclers.

D. Safeguards

22. Initial analysis indicates that development of the Adampur Chhaoni facility will directly impact residents from a village, the Arjun Nagar village. Approximately 125 families will be directly affected by involuntary resettlement, of which only about half claim to have legal title to their properties, apparently issued in 1985. Ethnically, they belong to the Banjara community, a vulnerable group. BMC is now proceeding with their relocation to a resettlement site at Haripura, located about 1.5 km to the north of their current location. The broad adverse impacts envisaged due to the implementation of this intervention therefore are (i) small scale land acquisition, (ii) impacts on structures used for residential and other

purposes, (iii) impacts on the livelihood of land owners, those dependent on land owners, and business persons whose land and business establishments are affected, (iv) severance of social network due to accessibility difficulties, (v) basic amenities such

23. as water, electricity, road, school, sanitation facilities, and (vi) common property used for grazing and other purposes. A Rehabilitation and Resettlement Plan (RRP) is now therefore required to outline the objectives, policy principles and procedures for land acquisition, compensation, resettlement and rehabilitation.

24. The project is classified as environmental category B in accordance with the Asian Development Bank Safeguard Policy Statement (2009), and the Environmental Impact Assessment (EIA) Notification (2006) of the Indian Ministry of Environment, Forest and Climate Change. The proposed interventions of the project require environmental clearance under the EIA Notifications (2006) from the State-level EIA Authority and Consent to Establish and Operate from the Madhya Pradesh Pollution Control Board. An initial environmental examination (IEE) has been prepared for the project, focusing primarily on the proposed Adampur Chhaoni facility and the Bhanpura dumpsite. From this evaluation, the Adampur Chhaoni facility is considered to be environmentally suitable for the intended development, and there is now a need to obtain SEIAA environmental clearance for the development. The Bhanpura dumpsite needs to be closed and remediated imminently, in full compliance with recent directives. Based on the IEE, potential impacts associated with the project's design, development, operation and closure can be mitigated to standard levels through proper engineering design and the incorporation or application of recommended mitigation measures and procedures. An EIA now needs to be undertaken for the project.

25. BMC are also required to follow prescribed legal requirements in accordance with state guidelines, including the Right to Fair Compensation and Transparency in Land Acquisition, the Rehabilitation and Resettlement Act 2013, and the National Rehabilitation and Resettlement Policy 2007. Involuntary resettlement is not anticipated for other components of the project.