

FINAL REPORT

ADB

Asian Development Bank



National Capital Region Planning Board

Capacity Development of the
National Capital Region Planning Board
Package 2 Component B
TA No. 7055-IND

**Volume IV-D: Generic Environmental Management Plan
Detailed Project Report for
Improvement of Solid Waste Management in Ghaziabad**



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July 2010

NCR Planning Board
Asian Development Bank

Capacity Development of the National Capital Region Planning Board (NCRPB) – Component B (TA No. 7055-IND)

Volume IV-D: Detailed Project Report for Improvement of Solid
Waste Management in Ghaziabad

Generic Environmental Management Plan

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I. GENERIC ENVIRONMENTAL MANAGEMENT PLAN

A. Background

1. Ghaziabad City is located in the western part of Uttar Pradesh State sharing the borders with the National Capital Territory Delhi. It is the headquarters of Ghaziabad District. Owing to its location close to Delhi, and with good connectivity, it is one of the important and fast developing city in the State of Uttar Pradesh and as well as in the National Capital Region. Under the ongoing Asian Development Bank - Technical Assistance supporting the preparation of Master Plans (MPs) and Detailed Project Reports (DPRs) for urban infrastructure development in NCR Towns, Ghaziabad is selected as one of the sample towns. Solid Waste Management (SWM) component was selected from Ghaziabad for preparation of Master Plan and Detailed Project Report.
2. Accordingly, Master Plan for SWM component was formulated for Ghaziabad under the TA and submitted as part of Interim Report. As suggested by the Master Plan, priority subproject is selected for detailed study and preparation of Detailed Project Report for immediate implementation. Accordingly the present subproject of Improvement of Solid Waste Management System in Ghaziabad is formulated and the Detailed Project Report (DPR) is prepared.
3. The main components of the proposed subproject of improvement of solid waste management in Ghaziabad, for which the DPR has been prepared include (i) procurement of waste collection, storage, and transportation vehicles and equipment, (ii) development of elevated transfer stations, with all necessary civil works, and equipment, and (iii) development of solid waste composting and sanitary landfill facility, with all necessary civil works and equipment.

B. Need & Purpose of this Generic EMP

4. As there was no site finalized for development of compost plant and sanitary landfill facilities or transfer station, no environmental assessment report has been prepared. This generic Environmental Management Plan is therefore prepared to guide the future site selection and development of the facility. This provides guidance on the legislative requirements and the need for conducting Environmental Assessment.

C. Status of Site Identification

1. *Land Requirement*
5. Total land requirement for compost plant and Sanitary Landfill (SLF) facility has been estimates as 44 hectare for GNN (Ghaziabad Nagar Nigam) area and 60 hectare for waste from total GDA (Ghaziabad Development Authority) area, which includes the GNN area.

2. *Available Site in Ghaziabad*

6. A site measuring 14 Acre area in Doonda Hera (belonging to Ghaziabad Nagar Nigam) was selected for setting up of compost plant and sanitary land fill under the CSS of GOI. UP Jal Nigam constructed compound wall around the 14 acre land in year 2004, which was under possession of GNN at that time .No Objection Certificates were also granted by Air force station Hindan and UP state pollution control board, Lucknow for the proposed site in year 2004. In Ghaziabad Master Plan 2021 prepared by Ghaziabad Development Authority and duly approved by GoUP (this came into force in July 2005), the land use of the Doonda Hera site was changed to residential considering the development around the area. The matter is presently in the Court of Law, which has barred carrying out of any SWM related activities on the site as it violates the Master Plan Land Use.
7. Subsequently, due to lack of any alternative land and the government has initiated various actions to revise the Master Plan and reserve Doona Hera site for SWM use. Accordingly, GDA has recommended change of land use, which is presently review and approval of the State Government (GoUP). Considering two reasons this site was not considered for preparation of DPR, (i) the matter is sub-judice and therefore can not be taken up for surveys and investigation, and (ii) considering the present development activities around the site, it appears that the site is not ideal for setting up of SWM disposal site. The development around the site can be observed within in 150-200 m of the site.

3. *Efforts for Identification of Site*

8. Identification and selection of new site is a very critical activity. Ideally, suitable site shall be selected and reserved at the time of finalizing the Master Plan of the region itself but this is normally not done. Generally, no area is earmarked for activities related to SWM. As the SWM related activities are not properly maintained, therefore public perception is also against the setting up of any facility near the neighborhood (NIMB – Not In My Backyard syndrome), hence lot of public resistance is faced even for putting a community bin, leave apart the setting up a full-fledged processing plant/SLF site. Once the area is fully developed then it becomes more and more difficult to find a suitable land in sufficient size in a fast growing city on account of rising market rates of the land cost. Moreover, it is not easy to develop, operate and maintain the engineering landfill site in true sense, as it requires heavy investment and high technical and managerial capabilities. For smaller towns, where such expertise and funds are not available, it is an uphill task to develop and maintain SLF sites at their own.
9. In order to cope up with this situation, it is suggested to develop common/regional SLF sites, instead of individual site for each town. The regional SLF site shall cater the waste from nearby towns/cities falling within 25-50 Km of radius, for which land, development and operation& maintenance cost shall be jointly shared by all the stakeholders on the basis of size, waste quantity, financial condition or any other specific criteria. This model is being successfully implemented in the State of Gujarat. The critical issue of identification of suitable sites, complying with the site selection criteria (Given below in next sections) is addressed using the remote sensing and GIS techniques. The

Bhaskaracharya Institute of Space Application and Geo-informatics (BISAG) of Government of Gujarat used this technique for identification of regional sites for entire State of Gujarat.

10. For identification of suitable sites for solid waste facilities in the National Capital Region (NCR), the Central Pollution Control Board and the National Capital Region Planning Board have jointly initiated process. The CPCB has engaged the services of BISAG, which has successfully selected sites in Gujarat State, with the task of identifying suitable sites within the NCR. This task is presently underway, and it is expected to complete by November 2009.

D. Suggested Site Selection Criteria

11. The avoidance of negative impacts (by sensitive site selection, amending features of the design, etc) is a key facet of environmental assessment, as it both protects the environment and can save considerable time, effort and cost downstream in a project, by avoiding the need for difficult and costly environmental mitigation and compensation measures. It is important therefore that environmental impacts are taken into account throughout the development of projects and subprojects, beginning in the earliest stages, and that decisions are made on the basis of environmental criteria, as well as feasibility and cost.
12. The understanding of the potential impacts of the proposed solid waste treatment and processing facility enables the formulation of certain criteria that, if they are taken into account in selecting and developing projects, should reduce their environmental impacts. These are presented in the Table below:
 - (i) Avoid involuntary resettlement by selecting vacant government; in unavoidable circumstances, the land acquisition (LA) and resettlement and rehabilitation (R&R) must be dealt in consistent with ADB Involuntary Resettlement Policies, besides government legislations;
 - (ii) Projects must not be located in environmentally sensitive locations including sites with national or international designation (eg for forest areas, wet lands, ecological/biological conservation, historical or cultural importance, etc);
 - (iii) Based on the significance of the area, consult the relevant national and/or state archaeological agencies regarding the archaeological potential of proposed sites,
 - (iv) Site selection shall comply with requirements of relevant national law, including: the Municipal Solid Wastes (Management and Handling) Rules 2000;
 - (v) Locate landfill sites a minimum of 500 m (and at least 1 km where possible) from any inhabited areas, in locations where no urban expansion is expected in the next 20 years, so that people are not affected by odour or other nuisance from the site;

- (vi) Locate landfills at sites where there is no risk of flooding or other hazards that might impair functioning of the site and present a risk of damage to the site or its environs;
- (vii) Shall not located site, where there the groundwater depth is shallow, and near the areas with potential for groundwater recharge
- (viii) Locate landfill sites adjacent to STP whenever possible so that leachate can be collected and treated;
- (ix) Provide a properly engineered and managed sanitary landfill site that is sealed to prevent leaching of contaminants into surface or groundwater, where refuse is compacted and covered each day, and where there is a separate concreted area for the safe disposal of hazardous waste;
- (x) Provide a composting facility for the beneficial use of biodegradable wastes such as vegetable peelings, agricultural waste, etc; these wastes shall not be disposed in the landfill

E. Provisions of MSW (Management & Handling) Rules, 2000

1. Compliance Criteria for Disposal of Municipal Solid Wastes

13. Land filling shall be restricted to non-biodegradable i.e., inert waste and other waste that are not suitable either for recycling or for biological processing. Land filling shall also be carried out for residues of waste processing facilities as well as pre-processing rejects from waste, processing facilities. Land filling of mixed waste shall be avoided unless same is found unsuitable for waste processing. Under unavoidable circumstances or till installation of alternative facilities land-filling shall be done following proper norms. Land filling shall meet the specifications as given in Schedule III of Rules (reproduced below)

2. Specifications for Landfill Sites

14. *Site Selection.*

- (i) In areas falling under the jurisdiction of ‘Development Authorities’ it shall be the responsibility of such Development Authorities to identify the landfill sites and hand over the sites to the concerned municipal authority for development, operation and maintenance. Elsewhere, this responsibility shall lie with the concerned municipal authority.
- (ii) Selection of landfill sites shall be based on examination of environmental issues. The Department of Urban Development of the State or the Union territory shall co-ordinate with the concerned organisations for obtaining the necessary approvals and clearances.

- (iii) The landfill site shall be planned and designed with proper documentation of a phased construction plan as well as a closure plan.
- (iii) The landfill sites shall be selected to make use of nearby wastes processing facility. Otherwise, wastes processing facility shall be planned as an integral part of the landfill site.
- (iv) The existing landfill sites which continue to be used for more than five years, shall be improved in accordance of the specifications given in this Schedule.
- (v) Biomedical wastes shall be disposed off in accordance with the Bio-medical Wastes (Management and Handling) Rules, 1998 and hazardous wastes shall be managed in accordance with the Hazardous Wastes (Management and Handling) Rules, 1989, as amended from time to time.
- (vi) The landfill site shall be large enough to last for 20-25 years.
- (vii) The landfill site shall be away from habitation clusters, forest areas, water bodies monuments, National Parks, Wetlands and places of important cultural, historical or religious interest.
- (viii) A buffer zone of no-development shall be maintained around landfill site and shall be incorporated in the Town Planning Department's land-use plans.
- (ix) Landfill site shall be away from airport including airbase. Necessary approval of airport or airbase authorities prior to the setting up of the landfill site shall be obtained in cases where the site is to be located within 20 km of an airport or airbase.

15. *Facilities at the Site.*

- (i) Landfill site shall be fenced or hedged and provided with proper gate to monitor incoming vehicles or other modes of transportation.
- (ii) The landfill site shall be well protected to prevent entry of unauthorised persons and stray animals.
- (iii) Approach and other internal roads for free movement of vehicles and other machinery shall exist at the landfill site.
- (iv) The landfill site shall have wastes inspection facility to monitor wastes brought in for landfill, office facility for record keeping and shelter for keeping equipment and machinery including pollution monitoring equipments.

- (v) Provisions like weigh bridge to measure quantity of waste brought at landfill site, fire protection equipments and other facilities as may be required shall be provided.
- (vi) Utilities such as drinking water (preferably bathing facilities for workers) and lighting arrangements for easy landfill operations when carried out in night hours shall be provided.
- (vii) Safety provisions including health inspections of workers at landfill site shall be periodically made.

16. *Specifications for Land filling.*

- (i) Wastes subjected to land filling shall be compacted in thin layers using landfill compactors to achieve high density of the wastes. In high rainfall areas where heavy compactors cannot be used alternative measures shall be adopted.
- (ii) Wastes shall be covered immediately or at the end of each working day with minimum 10 cm of soil, inert debris or construction material till such time waste processing facilities for composting or recycling or energy recovery are set up as per Schedule I.
- (iii) Prior to the commencement of monsoon season, an intermediate cover of 40-65 cm thickness of soil shall be placed on the landfill with proper compaction and grading to prevent infiltration during monsoon. Proper drainage berms shall be constructed to divert run-off away from the active cell of the landfill.
- (iv) After completion of landfill, a final cover shall be designed to minimize infiltration and erosion. The final cover shall meet the following specifications, namely :--
- (v) The final cover shall have a barrier soil layer comprising of 60 cms of clay or amended soil with permeability coefficient less than 1×10^{-7} cm/sec.
- (vi) On top of the barrier soil layer there shall be a drainage layer of 15 cm.
- (vii) On top of the drainage layer there shall be a vegetative layer of 45 cm to support natural plant growth and to minimize erosion.

17. *Pollution Prevention.* In order to prevent pollution problems from landfill operations, the following provisions shall be made, namely :-

- (i) Diversion of storm water drains to minimize leachate generation and prevent pollution of surface water and also for avoiding flooding and creation of marshy conditions;

- (ii) Construction of a non-permeable lining system at the base and walls of waste disposal area. For landfill receiving residues of waste processing facilities or mixed waste or waste having contamination of hazardous materials (such as aerosols, bleaches, polishes, batteries, waste oils, paint products and pesticides) minimum liner specifications shall be a composite barrier having 1.5 mm high density polyethylene (HDPE) geomembrane, or equivalent, overlying 90 cm of soil (clay or amended soil) having permeability coefficient not greater than 1×10^{-7} cm/sec. The highest level of water table shall be at least two meter below the base of clay or amended soil barrier layer;
- (iii) Provisions for management of leachates collection and treatment shall be made. The treated leachates shall meet the standards specified in Schedule- IV;
- (iv) Prevention of run-off from landfill area entering any stream, river, lake or pond.

18. *Water Quality Monitoring.*

- (i) Before establishing any landfill site, baseline data of ground water quality in the area shall be collected and kept in record for future reference. The ground water quality within 50 metres of the periphery of landfill site shall be periodically monitored to ensure that the ground water is not contaminated beyond acceptable limit as decided by the Ground Water Board or the State Board or the Committee. Such monitoring shall be carried out to cover different seasons in a year that is, summer, monsoon and post-monsoon period.
- (ii) Usage of groundwater in and around landfill sites for any purpose (including drinking and irrigation) is to be considered after ensuring its quality. Specifications of IS 10500: 1991 for drinking water quality shall apply for monitoring purpose.

19. *Ambient Air Quality Monitoring.*

- (i) Installation of landfill gas control system including gas collection system shall be made at landfill site to minimize odour generation, prevent off-site migration of gases and to protect vegetation planted on the rehabilitated landfill surface.
- (ii) The concentration of methane gas generated at landfill site shall not exceed 25 per cent of the lower explosive limit (LEL).
- (iii) The landfill gas from the collection facility at a landfill site shall be utilized for either direct thermal applications or power generation, as per viability. Otherwise, landfill gas shall be burnt (flared) and shall not be allowed to directly escape to the atmosphere or for illegal tapping. Passive venting shall be allowed if its utilization or flaring is not possible.

- (iv) Ambient air quality at the landfill site and at the vicinity shall be monitored to meet specified standards

20. *Plantation at Landfill Site.* A vegetative cover shall be provided over the completed site in accordance with the and following specifications, namely :-

- (i) Selection of locally adopted non-edible perennial plants that are resistant to drought and extreme temperatures shall be allowed to grow;
- (ii) The plants grown be such that their roots do not penetrate more than 30 cms. This condition shall apply till the landfill is stabilised;
- (iii) Selected plants shall have ability to thrive on low-nutrient soil with minimum nutrient addition;
- (iv) Plantation to be made in sufficient density to minimize soil erosion.

3. *Norms for Landfill Siting – CPHEEL Manual on MSWM*

- (i) Lake or Pond: No landfill should be constructed within 200 m of any lake or pond. Because of concerns regarding runoff of waste water contact, a surface water monitoring program should be established if a landfill is sited less than 200m from a lake or pond.
- (ii) River: No landfill should be constructed within 100 m of a navigable river or stream. The distance may be reduced in some instances for nonmeandering rivers but a minimum of 30 m should be maintained in all cases.
- (iii) Flood Plain: No landfill should be constructed within a 100 year flood plain. A landfill may be built within the flood plains of secondary streams if an embankment is built along the stream side to avoid flooding of the area. However, landfills must not be built within the flood plains of major rivers unless properly designed protection embankments are constructed around the landfills.
- (iv) Highway: No landfill should be constructed within 200 m of the right of way of any state or national highway. This restriction is mainly for aesthetic reasons. A landfill may be built within the restricted distance, but no closer than 50 m, if trees and berms are used to screen the landfill site.
- (v) Habitation: A landfill site should be at least 500 m from a notified habitated area. A zone of 500 m around a landfill boundary should be declared a No-Development Buffer Zone after the landfill location is finalised.
- (vi) Public parks: No landfill should be constructed within 300 m of a public park. A

landfill may be constructed within the restricted distance if some kind of screening is used with a high fence around the landfill and a secured gate.

- (vii) Critical Habitat Area: No landfill should be constructed within critical habitat areas. A critical habitat area is defined as the area in which one or more endangered species live. It is sometimes difficult to define a critical habitat area. If there is any doubt then the regulatory agency should be contacted.
- (viii) Wetlands: No landfill should be constructed within wetlands. It is often difficult to define a wetland area. Maps may be available for some wetlands, but in many cases such maps are absent or are incorrect. If there is any doubt, then the regulatory agency should be contacted.
- (ix) Ground Water Table: A landfill should not be constructed in areas where water table is less than 2m below ground surface. Special design measures be adopted, if this cannot be adhered to.
- (x) Airports: No landfill should be constructed within the limits prescribed by regulatory agencies (MOEF/ CPCB/ Aviation Authorities) from time to time.
- (xi) Water Supply Well: No landfill should be constructed within 500 m of any water supply well. It is strongly suggested that this locational restriction be abided by at least for down gradient wells. Permission from the regulatory agency may be needed if a landfill is to be sited within the restricted area.
- (xii) Coastal Regulation Zone: A landfill should not be sited in a coastal regulation zone.
- (xiii) Unstable Zone: A landfill should not be located in potentially unstable zones such as landslide prone areas, fault zone etc.
- (ix) Buffer Zone: A landfill should have a buffer zone around it, up to a distance prescribed by regulatory agencies.

4. *Compliance Criteria for Processing of Municipal Solid Wastes*

- 21. Municipal authorities shall adopt suitable technology or combination of such technologies to make use of wastes so as to minimize burden on landfill. Following criteria shall be adopted, namely
 - (i) The biodegradable wastes, shall be processed by composting, vermicomposting, anaerobic digestion or any other appropriate biological processing for stabilization of waste. It shall be ensured that compost or any other end product shall comply with standards as specified in Schedule IV

- (ii) Mixed waste containing recoverable resources shall follow the route of recycling. Incineration with or without energy recovery including pelletisation can also be used for processing wastes in specific cases. Municipal authority or the operator of a facility wishing to use other state-of-the-art technologies shall approach the Central Pollution Control Board to get the standards laid down before applying for grant of authorization.

22. *Specifications for Composting.*

- (i) The waste processing or disposal facilities shall include composting or any other facility based on state-of-the-art technology duly approved by the Central Pollution Control Board
- (ii) In order to prevent pollution problems from compost plant and other processing facilities, the following shall be complied with, namely :-
- The incoming wastes at site shall be maintained prior to further processing. To the extent possible, the waste storage area should be covered. If, such storage is done in an open area, it shall be provided with impermeable base with facility for collection of leachate and surface water run-off into lined drains leading to a leachate treatment and disposal facility;
 - Necessary precautions shall be taken to minimise nuisance of odour, flies, rodents, bird menace and fire hazard;
 - In case of breakdown or maintenance of plant, waste intake shall be stopped and arrangements be worked out for diversion of wastes to the landfill site;
 - Pre-process and post-process rejects shall be removed from the processing facility on regular basis and shall not be allowed to pile at the site. Recyclables shall be routed through appropriate vendors. The non-recyclables shall be sent for well designed landfill site(s).
 - The windrow area shall be provided with impermeable base. Such a base shall be made of concrete or compacted clay, 50 cm thick, having permeability coefficient less than 10–7 cm/sec. The base shall be provided with 1 to 2 per cent slope and circled by lined drains for collection of leachate or surface run-off;
 - Ambient air quality monitoring shall be regularly carried out particularly for checking odour nuisance at down-wind direction on the boundary of processing plant.
 - In order to ensure safe application of compost, compost quality shall meet the standards laid in.

5. *Norms for Environmental Control of Composting – CPHEEL Manual on MSWM*

- (i) All uncovered windrow areas should be provided with an impermeable base. Such a base may be made of concrete or of compacted clay, 50 centimetres thick, having permeability less than 10 centimetres/second. The base must be provided with 1 to 2 percent slope and must be encircled by lined drains for collection of leachate/surface water runoff. All lined drains should be connected to a lined settling pond, where

tests for quality of waste-water are to be performed on a weekly basis. A treatment unit will be provided to ensure that the waste-water is discharged to open drains only after it meets the regulatory standards.

- (ii) . On such days when the waste cannot be accepted at the compost plant or if shutdown occurs for extended period due to rains/cold climate/major breakdown or annual maintenance, the waste should be diverted to a properly designed and operated MSW landfill.
- (iii) . The process rejects are to be removed from the compost plant on a daily basis. The recyclables should be diverted to appropriate vendors. The nonrecyclables should be sent to a properly designed and operated MSW landfill. Temporary storage of rejects should be done in a covered area. If temporary storage is done in an open area, it must be done only for 1 or 2 days, at an area having an impermeable base and lined drains for collection of leachate/surface water runoff. The height of stockpiled waste should not exceed 3 metres and the storage area must have provision for odour control, litter control, fire control and birds control

F. Environmental Regulatory Framework

1. Applicable Government Legislations

- 23. The GoI EIA Notification of 2006 (replacing the EIA Notification of 1994), sets out the requirement for Environmental Assessment in India. This states that prior Environmental Clearance (EC) is required for specified activities/projects, and this must be obtained before any construction work or land preparation (except land acquisition) may commence. Projects are categorised as A or B depending on the scale of the project and the nature of its impacts.
- 24. Category A projects require EC from the central Ministry of Environment and Forests (MoEF). The proponent is required to provide preliminary details of the project in the specified format, after which an Expert Appraisal Committee (EAC) of the MoEF prepares comprehensive Terms of Reference (ToR) for the EIA study. On completion of the study and review of the report by the EAC, MoEF considers the recommendation of the EAC and provides the EC if appropriate.
- 25. Category B projects require environmental clearance from the concerned State Environment Impact Assessment Authority (SEIAA) constituted by MoEF at state-level. The State level EAC categorises the project as either B1 (requiring EIA study) or B2 (no EIA study), and prepares ToR for B1 projects within 60 days. On completion of the study and review of the report by the EAC, the SEIAA issues the EC based on the EAC recommendation. The Notification also provides that any project or activity classified as category B will be treated as category A if it is located in whole or in part within 10 km from the boundary of protected areas, notified areas or inter-state or international boundaries.

26. According to the EIA Notification, Common Solid Waste Management Facilities fall under its ambit, and therefore require prior environmental clearance. Although it is not clear as what constitute “common” facilities – whether it is for a common facility for more than one town or having common facilities like processing and disposal at the same site. In any case, these are classified as Category B requiring clearances from State Environmental Impact Assessment Authority (SEIAA). Based on the preliminary information in prescribed format and site visits, the project will be further categorized as B1 or B2. B1 projects require EIA study for approval, while B2 requires no further study.
27. *Other Environmental Legislations.* Besides GoI’s EIA Notification, there are certain other environmental regulations that impose various restrictions on infrastructure development projects that are potential to cause environmental degradation. Following are likely requirements of solid waste management facilities. These are indicated in the following **Table I-1.**

Table I-1: Applicable Government Legislations

Component	Applicable Legislation	Compliance	Remarks
All composting and landfill facilities	Municipal Solid Wastes (Management and Handling) Rules 2000	Authorization of proposed site by UPPCB	✓ Based on the selected site meeting the CPCB landfill site selection criteria, USPCB issues authorization
	Water (Prevention and Control of Pollution) Act 1974; Air (Prevention and Control of Pollution) Act 1981	CFE and CFO from UPPCB	<ul style="list-style-type: none"> ✓ Based on project review and site inspection, UPPCB issues CFE before construction, and stipulates operational and waste disposal standards to be complied during operation. ✓ After completion of construction, CFO is issued confirming compliance with the CFE conditions
All municipal solid waste management components	Municipal Solid Wastes (Management and Handling) Rules 2000	Compliance with the prescribed criteria in all solid waste management activities: segregation, collection, storage, transportation, treatment and disposal	✓ The Rules clearly define the methods and approach for various components, which needs to be complied
Common waste management facilities including composting, landfills and transfer stations	Environment (Protection) Act 1986: Environmental Impact Assessment Notification	Requires environmental clearance from State Environment Impact Assessment	✓ Based on preliminary information and site visits if required, project will be categorized as B1 or B2. B1 projects require EIA study for approval.

Component	Applicable Legislation	Compliance	Remarks
	2006 Category B	Authority (SEIAA)	
5. Common waste management facilities within or 10 km outside the boundary of protected areas such as National Parks, Sanctuaries, Notified Areas and Biosphere Reserves	Environmental Impact Assessment Notification, 2006 Category A	Requires environmental clearance from the central Ministry of Environment and Forests (MoEF)	<ul style="list-style-type: none"> ✓ Conduct EIA study. ✓ Category A and B1 projects require public consultation as part of EIA

CFE – Consent for Establishment, CFO – Consent for Operation, and UPPCB – Uttar Pradesh Pollution Control Board

2. *ADB Environmental Policy, 2002*

28. *ADB Environmental Policy, 2002*, mandates the consideration of all environmental aspects in ADB operations. The key features of safeguard element of the Environmental Policy are:

- Potential adverse impacts to be avoided, minimized, mitigated, or compensated for
- Affected public to be informed and consulted
- Environmental safeguard measures
- integrated into each stage of project cycle
- designed:
 - with least-cost mitigation measures
 - to achieve environmental standards
 - with time-bound action and budget
 - with institutional arrangement & monitoring program

29. *ADB Environmental Assessment Guidelines, 2003* provides in detail the procedural and substantive elements of ADB's environmental assessment requirements. ADB requires environment assessment of all project loans, program loans, sector loans, sector development program loans, financial intermediation loans, and private sector investment operations. The borrower is responsible for carrying out the environment assessment in accordance with ADB environment assessment requirements, and is also responsible for implementing the recommendations of the environment assessment. ADB reviews the environment assessment to ensure that it meets ADB requirements, and that it provides a sound basis for project processing and implementation. ADB also monitors the implementation of agreed environmental mitigation measures.

30. According to ADB Environmental Policy, the loans/projects funded by ADB are classified into one of the following categories:
- (i) Category A: Projects like to have potentially significant adverse environmental impacts. An environmental impact assessment (EIA) is required for;
 - (ii) Category B: Project likely to have some adverse environmental impacts, but they are expected to be less significant than those associated with category A projects. An IEE is required to determine whether an EIA is warranted. If an EIA is not needed, the IEE is regarded as the final environmental assessment report. Projects that are near environmentally sensitive areas; or that involve deforestation; loss of biodiversity; involuntary resettlement; processing, handling, or disposal of hazardous substances; or activities that may affect a wide group of external stakeholders are classified as category B Sensitive requiring an EIA ; and,
 - (iii) Category C: unlikely to have adverse environmental impacts. No EIA or IEE is required, although environmental implications are still reviewed.
31. Likely Category of Solid Waste Facilities. Unlike the EIA Notification of GoI, ADB categorization is based potential impacts and it will be on case-to-case basis. However, taking into consideration of various selection criteria indicated in the earlier section, a sensitive identification of site will lead to less likely impacts and may therefore can be classified as Category B, which requires conducting Initial Environmental Examination. Rapid Environmental Checklist which will enable the project classification is appended at **Appendix 1**. This REA may be completed once the site is identified.

3. *Environmental Assessment and Reporting*

32. It is likely that that proposed solid waste subproject will be classified as Category B by ADB (requiring IEE) and B1 by SEIAA (requiring EIA). In practice the Implementing Agency should aim to produce a single document that serves both purposes (of Government and ADB) to avoid duplication of effort, and this should be achievable given the comprehensive nature of ADB's IEE requirements.

G. **Generic Environmental Management Plan**

33. Generic Environmental Management Plan is provided in the following **Table I-2**. This shows the potential negative impacts of solid waste management projects, and the potential mitigation measures to reduce those impacts to acceptable levels. The table also shows mitigation activities, methods, i and project agencies responsible for implementation. This EMP needs to be revised and updated based on the identified site.
34. A program of monitoring needs to be conducted to ensure that all parties take the specified action to provide the required mitigation, to assess whether the action has adequately protected the environment, and to determine whether any additional measures may be

necessary. A generic environmental monitoring plan applicable to SWM projects is provided in **Table I-3**.

Table I-2: Generic Environmental Management Plan

Impact Description	Mitigation Measures	Implementation Responsibility
Location and Design Impacts		
Loss of land /lively hood, impacts due to solid waste processing and landfill development	<ul style="list-style-type: none"> Identify appropriate government site to avoid land acquisition and resettlement impacts. 	Implementing Agency (GMC)
Loss of amenity, aesthetics, property values to neighbors due to location solid waste processing and landfill facility	<ul style="list-style-type: none"> Select the ideally away from the City development zone. Select the site as per the CPCB landfill site selection criteria Control of site layout and surrounding development setting. As suggested in the MSWM Rules, 2000, the immediate surroundings of the site shall be declared as no development zone. A physical barrier and visual screen in the form of greenbelt shall be developed around the site. 	GMC/GDA in coordination with the UPPCB
Pollution of the down stream water courses due to runoff from disposal area	<ul style="list-style-type: none"> Confine the landfill site to arrest the entry of runoff. Direct- runoff from the active landfill area and leachate shall not be allowed to flow down and be redirected to landfill/treatment plant. 	GMC
Odor Nuisance	<ul style="list-style-type: none"> Adequate buffer in the form of green belt shall be provided around the site. 	GMC
Contamination of groundwater by leaching of leachate and runoff from landfill area	<ul style="list-style-type: none"> Provide proper leachate collection and treatment system. The landfill facility shall be developed as per the provisions of MSW Rules, 2000. Design of landfill cells as impermeable units to arrest the leaching. The impervious layer shall be at least 2 m above the ground water table. 	GMC
Nuisance due to location of waste collection containers. During the monsoon the waste may mix with the runoff and may potentially create unhygienic conditions around the site.	<ul style="list-style-type: none"> Containers shall be located at appropriately to avoid land use conflicts. Place the containers on a slightly elevated impervious plot form. Waste shall be regularly collected and no overflowing shall be allowed. The collection, storage and transportation of solid waste shall conform to Schedule II of MSWM Rules, 2000. 	GMC
Impact due to methane gas emissions from landfill.	<ul style="list-style-type: none"> Provide of gas control systems (gas vents and flaring system) to minimize/mitigate the impact. The design of landfill shall confirm to MSW Rules, 2000. Ambient air quality in and around the site shall meet the following standards: 	GMC

Impact Description	Mitigation Measures	Implementation Responsibility
	Sulphur dioxide: < 120 $\mu\gamma/\mu^3$ Suspended Particulate Matter: < 500 $\mu\gamma/\mu^3$ Methane: Not to exceed 25 per cent of the lower explosive limit (equivalent to 650 mg/m ³) Ammonia daily average (Sample duration 24 hrs): 0.4 mg/m ³ (400 m g/m ³) Carbon monoxide: 1 hour average : 2 mg/m ³ ; 8 hour average : 1 mg/m ³	
Construction and O&M Impacts	<ul style="list-style-type: none"> • 	
Nuisance to surrounding areas and groundwater contamination due to runoff from the landfill area.	<ul style="list-style-type: none"> • Ensure proper maintenance of the drainage system. Direct runoff shall not enter the natural drainage network. 	GMC/Facility operator
Groundwater contamination.	<ul style="list-style-type: none"> • Ensure landfill construction as per the provisions of MSW Rules, 2000. Ensure proper maintenance of leachate collection and treatment system. • Treated leachate for land disposal shall meet the following standards: Suspended solids, mg/l - max 200 Dissolved solids (inorganic) mg/l, max.- 2100 PH value - 5.5 to 9.0 Biochemical oxygen demand (3 days at 270 C) max.(mg/l) - 100 Arsenic (as As), mg/l, max - 0.2 Cyanide (as CN), mg/l, max. - 0.2 Chloride (as Cl), mg/l, max.- 600 	GMC/Facility operator
Pollution of agricultural lands and entering of heavy metal traces into food chain due to application of compost with heavy metal concentration.	<ul style="list-style-type: none"> • The compost shall meet the following specifications laid out in Schedule IV of MSW Rules, 2000. Concentration not to exceed (mg/kg dry basis, except pH value and C/N ratio): Arsenic < 10.00 Cadmium < 5.00 Chromium < 50.00 Copper < 300.00 Lead < 100.00 Mercury < 0.15 Nickel < 50.00 Zinc < 1000.00 C/N ratio < 20-40 	Facility operator

Impact Description	Mitigation Measures	Implementation Responsibility
	PH < 5.5-8.5 <ul style="list-style-type: none"> Compost (final product) exceeding the above stated concentration limits shall not be used for food crops. However, it may be utilized for purposes other than growing food crops. 	
Bird menace at the waste disposal facility.	<ul style="list-style-type: none"> Avoid open dumping of waste including in and around the site premises. Provide inert/soil cover over the waste spread immediately In case of breakdown or maintenance of compost plant, waste intake shall be stopped and be diverted to the landfill; Pre-process and post-process rejects shall be removed from the processing facility on regular basis and shall not be allowed to pile at the site. 	GMC/Facility operator
Nuisance due to waste collection residue and waste spillage during transportation and dust generation	<ul style="list-style-type: none"> Ensure regular waste collection. Bio-degradable waste shall be collected daily. Waste shall be disposed directly into the container and ensure no spillage in the surrounding area. 	GMC
Nuisance to surrounding areas due to operation of transfer stations.	<ul style="list-style-type: none"> Ensure waste do not find its way into the surrounding areas due to wind. Develop a dust screen around the tipping area. Ensure immediate clearing of waste spillages. 	GMC/Facility operator
Impacts due to methane gas emissions from landfill.	<ul style="list-style-type: none"> Avoid disposal of biodegradable waste as far as possible. Ensure compliance of MSW Rules, 2000: the concentration of methane gas generated at landfill site shall not exceed 25% of lower explosive limit (LEL); and, landfill gas shall be burnt (flared) and shall not be allowed to directly escape to the atmosphere. 	GMC/Facility operator
Health and safety hazards to workers during waste collection, transportation and at compost and disposal site.	<ul style="list-style-type: none"> Occupational Safety Plan shall be prepared. This shall include: (i) provision of personal protection equipment such as gloves, boots, (ii) Eliminating manual handling of waste; and (iii) Training of workers on safe handling of waste 	GMC

Table I-3: Generic Environmental Monitoring Plan

Project Stage	Parameters to be Monitored	Location	Measurement	Frequency	Responsibility
Pre-construction Stage	Ambient air quality	Waste disposal site	<ul style="list-style-type: none"> • Suspended Particulate Matter (SPM, • Sulphur dioxide, • Methane, Ammonia (24 hour average) and • Carbon monoxide (1hour average) 	Once prior to commencement of work	GMC
	Noise	Waste disposal site	<ul style="list-style-type: none"> • Sound Level, (Leq for day time and night time) 	Once prior to commencement of work	GMC
	Ground water quality	Waste disposal site	<ul style="list-style-type: none"> • pH, • Total Hardness (as CaCO₃), • Chlorides, • Dissolved solids, • Phenolic compounds (as C₆H₅OH), • Sulphate (as SO₄), • Zinc, • Arsenic, • Cadmium, • Chromium, • Copper, • Cyanide, • Lead, • Mercury, • Nickel, • Nitrate (as NO₃), Iron 	Once prior to commencement of work	GMC

Project Stage	Parameters to be Monitored	Location	Measurement	Frequency	Responsibility
	Water quality	River/water body in the vicinity of the site	<ul style="list-style-type: none"> • pH, • Total Hardness (as CaCO₃), • Chlorides, • Dissolved solids, • Phenolic compounds (as C₆H₅OH), • Sulphate (as SO₄), • Zinc, • Arsenic, • Cadmium, • Chromium, • Copper, • Cyanide, • Lead, • Mercury, • Nickel, • Nitrate (as NO₃), Iron 	Once prior to commencement of work	GMC
	Soil	Waste disposal site	<ul style="list-style-type: none"> • pH, • Chlorides, • Sulphate (as SO₄), • Zinc, • Arsenic, • Cadmium, • Chromium, • Copper, • Cyanide, • Lead, • Mercury, • Nickel, • Nitrate (as NO₃), Iron 	Once prior to commencement of work	GMC

Project Stage	Parameters to be Monitored	Location	Measurement	Frequency	Responsibility
	Water quality	River/water body in the vicinity of the site	<ul style="list-style-type: none"> • pH, • Total Hardness (as CaCO₃), • Chlorides, • Dissolved solids, • Phenolic compounds (as C₆H₅OH), • Sulphate (as SO₄), • Zinc, • Arsenic, • Cadmium, • Chromium, • Copper, • Cyanide, • Lead, • Mercury, • Nickel, • Nitrate (as NO₃), Iron 	Once in three month	Contractor
Operation	Noise	SW Disposal Site	<ul style="list-style-type: none"> • Sound Level, (Leq for day time and night time) 	Once in a month	GMC
	Air quality	At landfill site and at vicinity	<ul style="list-style-type: none"> • Suspended Particulate Matter (SPM, Sulphur dioxide, Methane, Ammonia (24 hour average) and Carbon monoxide (1hour average) 	Once in six months	GMC

Project Stage	Parameters to be Monitored	Location	Measurement	Frequency	Responsibility
	Ground water	SW Disposal Site and 4 locations around the site	<ul style="list-style-type: none"> • pH, • Total Hardness (as CaCO₃), • Chlorides, • Dissolved solids, • Phenolic compounds (as C₆H₅OH), • Sulphate (as SO₄), • Zinc, • Arsenic, • Cadmium, • Chromium, • Copper, • Cyanide, • Lead, • Mercury, • Nickel, • Nitrate (as NO₃), Iron 	Once in three month	GMC
Construction and Operation	Compensatory tree plantation	Project Area	Tree surveillance	Once in a month	GMC

Appendices

Rapid Environmental Assessment (REA) Checklist

SOLID WASTE MANAGEMENT

Instructions:

- ❑ This checklist is to be prepared to support the environmental classification of a project.
- ❑ This checklist is to be completed with the assistance of an Environment Specialist
- ❑ This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB checklists and handbooks on (i) involuntary resettlement, (ii) indigenous peoples planning, (iii) poverty reduction, (iv) participation, and (v) gender and development.
- ❑ Answer the questions assuming the “without mitigation” case. The purpose is to identify potential impacts. Use the “remarks” section to discuss any anticipated mitigation measures.

Country/Project Title:

Sector Division:

SCREENING QUESTIONS	Yes	No	REMARKS
A. Project Siting			
Is the project area...			
▪ Densely populated?	<input type="checkbox"/>	<input type="checkbox"/>	
▪ Heavy with development activities?	<input type="checkbox"/>	<input type="checkbox"/>	
▪ Adjacent to or within any environmentally sensitive areas?			
• Cultural heritage site	<input type="checkbox"/>	<input type="checkbox"/>	
• Protected Area	<input type="checkbox"/>	<input type="checkbox"/>	
• Wetland	<input type="checkbox"/>	<input type="checkbox"/>	
• Mangrove	<input type="checkbox"/>	<input type="checkbox"/>	
• Estuarine	<input type="checkbox"/>	<input type="checkbox"/>	
• Buffer zone of protected area	<input type="checkbox"/>	<input type="checkbox"/>	
• Special area for protecting biodiversity	<input type="checkbox"/>	<input type="checkbox"/>	
• Bay	<input type="checkbox"/>	<input type="checkbox"/>	
B. Potential Environmental Impacts			
Will the Project cause...			

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SCREENING QUESTIONS	Yes	No	REMARKS
▪ impacts associated with transport of wastes to the disposal site or treatment facility	<input type="checkbox"/>	<input type="checkbox"/>	
▪ impairment of historical/cultural monuments/areas and loss/damage to these sites?	<input type="checkbox"/>	<input type="checkbox"/>	
▪ degradation of aesthetic and property value loss?	<input type="checkbox"/>	<input type="checkbox"/>	
▪ nuisance to neighboring areas due to foul odor and influx of insects, rodents, etc.?	<input type="checkbox"/>	<input type="checkbox"/>	
▪ dislocation or involuntary resettlement of people	<input type="checkbox"/>	<input type="checkbox"/>	
▪ public health hazards from odor, smoke from fire, and diseases transmitted by flies, insects, birds and rats?	<input type="checkbox"/>	<input type="checkbox"/>	
▪ deterioration of water quality as a result of contamination of receiving waters by leachate from land disposal system?	<input type="checkbox"/>	<input type="checkbox"/>	
▪ contamination of ground and/or surface water by leachate from land disposal system?	<input type="checkbox"/>	<input type="checkbox"/>	
▪ land use conflicts?	<input type="checkbox"/>	<input type="checkbox"/>	
▪ pollution of surface and ground water from leachate coming from sanitary landfill sites or methane gas produced from decomposition of solid wastes in the absence of air, which could enter the aquifer or escape through soil fissures at places far from the landfill site?	<input type="checkbox"/>	<input type="checkbox"/>	
▪ inadequate buffer zone around landfill site to alleviate nuisances?	<input type="checkbox"/>	<input type="checkbox"/>	
▪ social conflicts between construction workers from other areas and community workers?	<input type="checkbox"/>	<input type="checkbox"/>	
▪ road blocking and/or increased traffic during construction of facilities?	<input type="checkbox"/>	<input type="checkbox"/>	
▪ noise and dust from construction activities?	<input type="checkbox"/>	<input type="checkbox"/>	
▪ temporary silt runoff due to construction?	<input type="checkbox"/>	<input type="checkbox"/>	
▪ hazards to public health due to inadequate management of landfill site caused by inadequate institutional and financial capabilities for the management of the landfill operation?	<input type="checkbox"/>	<input type="checkbox"/>	
▪ emission of potentially toxic volatile organics from land disposal site?	<input type="checkbox"/>	<input type="checkbox"/>	
▪ surface and ground water pollution from leachate and methane gas migration?	<input type="checkbox"/>	<input type="checkbox"/>	
▪ loss of deep-rooted vegetation (e.g. trees) from landfill gas?	<input type="checkbox"/>	<input type="checkbox"/>	
▪ explosion of toxic response from accumulated landfill gas in buildings?	<input type="checkbox"/>	<input type="checkbox"/>	
▪ contamination of air quality from incineration?	<input type="checkbox"/>	<input type="checkbox"/>	
▪ public health hazards from odor, smoke from fire, and diseases transmitted by flies, rodents, insects and birds, etc.?	<input type="checkbox"/>	<input type="checkbox"/>	
▪ health and safety hazards to workers from toxic gases and hazardous materials in the site?	<input type="checkbox"/>	<input type="checkbox"/>	