

**[NAME OF THE LOCAL GOVERNMENT] LANDFILLS (OPERATION AND CLOSURE)
BYELAWS, 2023**

No. _____ In exercise of the powers conferred by section 203 read with sixth schedule of the Punjab Local Government Act, 2022 (Act XXXIII of 2022), the [Name of the Local Government], promulgates the following Landfills (Operation and Closure) Byelaws:

1. **Short title and commencement.** – (1) These Byelaws shall be cited as [Name of the Local Government] Landfills (Operation and Closure) Byelaws, 2023.

(2) These shall come into force at once and shall be applicable to the whole local area of [Name of the Local Government].

2. **Definitions –**

(1) The following words and expressions, wherever used in these Bye-laws, unless repugnant to the context, shall have the meaning assigned to them as defined hereunder:

- (i) "Act" means the Punjab Local Government Act, 2022 (Act XXXIII of 2022);
- (ii) "authorized officer" means any officer of the Local Government or its entity who has been authorized by it to administer, implement and enforce the provisions of these Bye-laws or the Act;
- (iii) "Closure" refers to the process of ceasing the operation of a landfill and implementing measures to secure and monitor the site after its closure.
- (iv) "Landfill" refers to a designated area of land where waste is disposed of, covered, and compacted in accordance with the Act or any rules or bye-laws made thereunder.
- (v) "Landfill Operator" refers to the local government, individual, organization, or entity authorized by the Local Government for the operation and management of a landfill.
- (vi) "Local Government" means a Metropolitan Corporation, a District Council, or a Union Council promulgating these Bye-laws;

3. **Terms not defined** – A word or term used in these Bye-laws, but not defined, shall have the same meaning as in the Act or the relevant rules or bye-laws made thereunder.

4. **Site Selection and Planning:**

(1) The selection of a landfill site shall be made by the Local Government based on a comprehensive assessment considering factors such as waste generation patterns, accessibility, geology, hydrogeology, and environmental sensitivity.

(2) Prior to site selection, a thorough environmental impact assessment shall be conducted.

(3) The landfill shall be located reasonably away from sensitive areas, such as residential zones, water bodies, protected areas, and other environmentally significant sites.

(4) The landfill operator shall develop a site management plan, detailing the overall operation, monitoring, and closure procedures and shall submit it to the Local Government for approval.

(5) The landfill site shall be large enough to last for at least 20-25 years and shall develop 'landfill cells' in a phased manner to avoid water logging and misuse.

(6) The sites for landfill and processing and disposal of solid waste shall be incorporated in the land use plans envisaged under the Act.

(7) Temporary storage facility for solid waste shall be established in each landfill site to accommodate the waste in case of non-operation of waste processing and during emergency or natural calamities.

5. Permits and Licenses:

(1) The landfill operator shall obtain all necessary permits, licenses, and authorizations from the competent regulatory authorities prior to commencing operations. If the Local Government itself is the operator, it shall obtain licenses if required in any other law for the time being enforced.

(2) The permits shall specify waste acceptance criteria, operating conditions, monitoring requirements, and closure obligations.

6. Development of facilities at the landfill:

In this regard, the following shall be observed:

- a) The landfill site must be enclosed with fencing or hedging and equipped with a proper gate to effectively monitor incoming vehicles and prevent unauthorized access by individuals and stray animals.
- b) The approach and internal roads leading to the landfill site should be constructed with concrete or pavement to minimize the generation of dust particles caused by vehicular movement. These roads should be designed to ensure smooth and unhindered traffic flow for vehicles and other machinery.
- c) The landfill site should have a waste inspection facility to monitor and assess the waste being brought in for landfilling. Additionally, there should be an office facility for record-keeping purposes and a shelter to house equipment, machinery, and pollution monitoring devices. The operator of the facility is responsible for maintaining accurate records of waste received, processed, and disposed of.
- d) Necessary provisions, such as a weigh bridge to measure the quantity of waste being brought to the landfill site, fire protection equipment, and other required facilities, should be provided.
- e) Utilities such as drinking water and sanitary facilities should be made available, and if possible, bathing and washing facilities should be provided for the workers. Adequate lighting arrangements should be in place to facilitate safe landfill operations during night hours.
- f) Adequate provisions should be made for parking, cleaning, and washing of transport vehicles that carry solid waste. The wastewater generated from these activities should be treated to meet the prescribed environmental standards.

7. Financial Provisions:

(1) The landfill operator shall establish and maintain financial provisions to ensure the availability of funds for the establishment, operation, and closure of the landfill.

(2) Financial provisions shall include provisions for post-closure monitoring, maintenance, and potential corrective measures.

(3) The operator shall periodically review and update the financial provisions to account for inflation and changing regulatory requirements.

8. Site Preparation and Construction:

(1) Geotechnical Considerations: Prior to construction, a comprehensive geotechnical investigation shall be conducted to assess soil stability, bearing capacity, and slope stability.

The landfill design shall consider the geological and hydrogeological conditions of the site to prevent contamination of groundwater and surface water.

Adequate measures shall be taken to control erosion and sedimentation during site preparation and construction activities.

(2) Liner Systems: The landfill shall have a liner system consisting of impermeable materials, such as high-density polyethylene (HDPE), to prevent the migration of contaminants into the environment.

The liner system shall be designed, constructed, and installed in accordance with approved engineering designs and regulatory requirements.

Quality control measures shall be implemented during the installation of liner components to ensure their integrity.

(3) Leachate Collection and Treatment:

A leachate collection system shall be installed to collect and manage leachate generated within the landfill.

The leachate collection system shall be designed to efficiently collect leachate and transport it to an appropriate treatment facility.

Regular monitoring of leachate quality shall be conducted to ensure compliance with applicable standards.

(4) Gas Management:

The landfill shall implement a gas management system to control and collect landfill gas, primarily composed of methane.

The gas management system shall include gas collection wells, a gas conveyance system, and an appropriate gas utilization or treatment facility.

Continuous monitoring of gas emissions shall be carried out to ensure compliance with regulatory requirements.

9. Waste Acceptance and Management:

(1) Waste Acceptance Procedures:

The landfill shall only accept waste types and quantities specified in the permit or authorized by the local government.

Waste acceptance procedures shall include visual inspection, sorting, and documentation to ensure compliance with waste acceptance criteria.

The operator shall maintain records of waste receipts, including quantity, type, origin, and documentation from waste generators.

(2) Odor and Vector Control:

Adequate measures shall be implemented to minimize odor emanating from the landfill and prevent the attraction of vectors, such as rats, flies, and birds.

Daily cover materials shall be used to reduce odor and vector nuisance, and to provide temporary stabilization and aesthetics.

(3) Litter and Windblown Debris:

The operator shall implement measures to prevent litter and windblown debris from leaving the landfill area, including the use of windbreaks, cover materials, and proper waste compaction techniques.

10. Operation and Monitoring:

(1) Operational Procedures:

The landfill shall be operated in accordance with approved operating plans, which include waste compaction, cover placement, and daily cover requirements.

Operational practices shall aim to minimize environmental impacts, such as dust generation, noise, and traffic congestion.

(2) Environmental Monitoring:

Regular monitoring of leachate quality, groundwater quality, surface water runoff, gas emissions, and other relevant environmental parameters shall be conducted.

Monitoring frequency and sampling locations shall be determined based on regulatory requirements and site-specific conditions.

Monitoring results shall be documented and reported to the Environmental Protection Department as per specified guidelines.

(3) Fire Prevention and Management:

The operator shall have a fire prevention and management plan in place, which includes measures to reduce fire risks, early detection systems, firefighting equipment, and emergency response protocols.

Regular fire risk assessments shall be conducted, and staff shall be trained in fire prevention and emergency response procedures.

(4) Worker Health and Safety:

Adequate training, personal protective equipment (PPE), and safety measures shall be provided to landfill workers to ensure their health and safety.

The operator shall conduct regular safety inspections, maintain safety records, and implement measures to prevent accidents and occupational hazards.

(5) Operational and closure specifications:

The following shall be considered:

- a) Waste designated for landfilling should be compacted in thin layers using heavy compactors to achieve a high density of the waste. In areas with heavy rainfall where heavy compactors are not feasible, alternative measures should be adopted.
- b) Until waste processing facilities for composting, recycling, or energy recovery are established, the waste should be directed to the sanitary landfill. At the end of each working day, the landfill cell should be covered with a minimum of 10 cm of soil, inert debris, or construction material.
- c) Prior to the onset of the monsoon season, an intermediate cover of soil with a thickness of 40-65 cm should be applied to the landfill. The cover should be properly compacted and graded to prevent water infiltration during the monsoon. Adequate drainage systems should be constructed to redirect runoff away from the active landfill area.
- d) Upon completion of the landfill, a final cover should be designed to minimize both water infiltration and erosion. The final cover should adhere to the following specifications:
 1. A barrier soil layer of 60 cm comprising clay or amended soil with a permeability coefficient of less than 1×10^{-7} cm/sec.
 2. A drainage layer of 15 cm above the barrier soil layer.
 3. A vegetative layer of 45 cm above the drainage layer to promote natural plant growth and reduce erosion.

(6) Ground water protection:

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 meters of the periphery of landfill site shall be periodically monitored covering different seasons in a year that is, summer, monsoon and post-monsoon period to ensure that the ground water is not contaminated.

11. Plantation at the landfill:

A vegetative cover shall be provided over the completed site in accordance with the following specifications, namely:

- a. Locally adopted non-edible perennial plants that are resistant to drought and extreme temperatures shall be planted;
- b. The selection of plants should be of such variety that their roots do not penetrate more than 30 cms. This condition shall apply till the landfill is stabilized;
- c. Selected plants shall have ability to thrive on low-nutrient soil with minimum nutrient addition;
- d. Plantation to be made in sufficient density to minimise soil erosion.
- e. Green belts shall be developed all around the boundary of the landfill.

12. Closure and Post-Closure:

(1) Closure Plan:

The landfill operator shall develop a closure plan in accordance with regulatory requirements, detailing the activities and timelines for the closure process.

The closure plan shall include final cover placement, slope stabilization, surface water management, and erosion control measures.

The operator shall ensure that all closure activities are carried out in a systematic and environmentally sound manner.

(2) Post-Closure Monitoring and Maintenance:

Post-closure monitoring shall be conducted for a specified period to assess the effectiveness of closure measures and detect any potential environmental impacts.

The operator shall implement necessary maintenance and corrective measures during the post-closure period to ensure the long-term integrity of the closed landfill.

Financial provisions shall be made to cover post-closure monitoring, maintenance, and potential corrective actions.

(3) Final Reporting:

Upon completion of landfill closure and post-closure activities, the operator shall prepare a final report documenting the entire operation, closure, and post-closure process.

The final report shall include details of waste management practices, monitoring results, maintenance activities, and any deviations from the approved plans.

The report shall be submitted to the local government, if the Local Government itself is not the operator.

13. Reporting and Compliance:

(1) Regulatory Reporting:

In case the landfill operator is other than the local government, the operator shall submit regular reports to the local government, including waste receipts, monitoring data, and any incidents or non-compliance issues.

The reports shall be prepared in accordance with the specified reporting formats and timelines.

(3) Documentation and Record-Keeping:

The landfill operator shall maintain accurate and up-to-date documentation related to operational activities, inspections, maintenance, closure, and post-closure monitoring.

Records shall include waste management records, monitoring reports, maintenance logs, staff training records, and correspondence with local government.

(4) Non-Compliance and Corrective Actions:

Any deviations from the approved operating or closure plans shall be promptly reported to the Local Government or the Environmental Protection Department.

The operator shall take necessary corrective actions to address non-compliance issues, mitigate environmental impacts, and prevent reoccurrence.