# Equipment and Resource Guidelines for Island Waste Management Facilities

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# 1. Introduction

This guideline provides a framework for establishing and managing waste management facilities on islands, excluding those with populations above 4000. The guidelines are structured based on resident populations and categorize islands into five tiers. Each tier has specific requirements for land area, equipment, and staffing necessary to effectively manage waste. The recommendations are for the waste generated by the projected residing population. If a facility is designed to process waste from multiple islands, the requirements may differ. Additionally, if alternative treatment options such as incineration are available, the standard requirements might not be sufficient. In such cases, the requirements need to be analyzed and adjusted accordingly.

# 2. Population Tiers and Waste Management Method (Organic Waste)

Waste Management Method refers to the various processes and techniques used to handle, treat, and recycle discarded materials. These methods aim to reduce the volume of waste sent to dumpsites and facilities, minimize environmental impact, and convert waste into useful products like compost. It is recommended to treat organic waste at the island level, while pre-treating inorganic and recyclable materials for transfer to regional facilities. The following outlines the recommended method for managing waste at islands level based on population size.

| Population Tier | Waste Management Method | Land Area Required ($m^2$) | Land Area Required ($ft^2$) | Size of Compost Pad ($m^2$) | Anaerobic Digestion Area ($m^2$) |
|---|---|---|---|---|---|
| **2500 - 4000** | Anaerobic Digestion | 1,225 | 13,200 | - | 90 |
| **1500 - 2500** | Anaerobic Digestion | 1,225 | 13,200 | - | 90 |
| **900 - 1500** | Anaerobic Digestion | 900 | 9,700 | - | 90 |
| **450 - 900** | Aerobic Composting | 625 | 6,800 | 35 | - |
| **<450** | Aerobic Composting | 625 | 6,700 | 20 | - |

Anaerobic digestion is a process where microorganisms break down organic materials, like food waste or animal manure, in the absence of oxygen. This process produces biogas (a mix of methane and carbon dioxide), and a nutrient-rich substance called digestate, which can be used as fertilizer.

Aerobic composting is a process where microorganisms break down organic materials, like food scraps and yard waste, in the presence of oxygen. This process turns the waste into compost, a nutrient-rich material that can be used to improve soil. Unlike anaerobic digestion, aerobic composting does not produce biogas but does produce heat as the materials break down.

## 3. Collection/Transport Equipment

Collection/Transport Equipment refers to the tools, vehicles, and machinery used to gather and move waste from its source to processing or disposal sites. This equipment is essential for efficiently managing waste, ensuring that it is safely and effectively collected and transported to where it can be recycled, treated, or disposed of. The following is the recommended equipment's by population size.

| Population Tier | Equipment |
|---|---|
| **2500 - 4000** | 2 Pickup Trucks (2.5 tons), 2 Push Carts, 1 Mini Excavator |
| **1500 - 2500** | 2 Pickup Trucks (1.5 tons), 2 Push Carts, 1 Mini Excavator |
| **900 - 1500** | 1 Pickup Truck (1.5 tons), 1 Pickup Truck (0.5 tons), 2 Push Carts |
| **450 - 900** | 1 Pickup Truck (1.5 tons), 1 Pickup Truck (0.5 tons), 2 Push Carts |
| **<450** | 2 Pickup Trucks (0.5 tons), 1 Pushcart |

## 4. Electricity Requirements

Electricity requirements refer to the amount of electrical power needed to operate various systems and equipment within a facility. Following is the recommended method to powerup the waste management facilities.

| Requirement | Details |
|---|---|
| **Solar Panels** | Install solar panels for renewable energy generation |
| **If far from main grid** | Use a generator set of adequate capacity |

| Requirement | Details |
|---|---|
| **If close to main grid** | Connect to the main grid |
| **Stand-alone equipment** | Provide stand-alone equipment as much as possible |

## 5. Water Requirements

Water requirements refer to the amount of water needed to support the operations and processes within a facility. Following is the recommended method to source water for waste management facilities.

| Requirement | Details |
|---|---|
| **Ground Water Pumps** | Install ground water pumps |
| **Islands with water supply** | Water connection |

## 6. Equipment

Equipment is essential for efficiently managing waste and ensuring effective operations within waste management facilities. The following equipment is recommended based on the population tiers.

| Population Tier | Equipment |
|---|---|
| **2500 - 4000** | Chain Saw, Glass Grinder, Vegetation Shredder, Baler, Mechanical Trolley, Weighing Platform |
| **1500 - 2500** | Chain Saw, Glass Grinder, Vegetation Shredder, Baler, Mechanical Trolley, Weighing Platform |
| **900 - 1500** | Can Crusher, Plastic Shredder, Chain Saw, Glass Grinder, Vegetation Shredder, Mechanical Trolley, Weighing Platform |
| **450 - 900** | Can Crusher, Plastic Shredder, Chain Saw, Vegetation Shredder, Weighing Platform |
| **<450** | Can Crusher, Plastic Shredder, Chain Saw, Vegetation Shredder, Weighing Platform |

## 7. Dustbins

Dustbin requirements refer to the types and quantities of bins needed to effectively collect and manage waste. This includes ensuring proper placement and capacity to accommodate various waste streams, such as general waste, recyclables, and organic materials, to support efficient waste separation and disposal. The following is the recommended bin requirements based on population tiers.

| Population Tier | 660L Bins | 240L Bins | 120L Bins |
|---|---|---|---|
| **2500 - 4000** | 50 | 80 | 260 |
| **1500 - 2500** | 50 | 60 | 220 |
| **900 - 1500** | 40 | 30 | 100 |
| **450 - 900** | 30 | 30 | 100 |
| **<450** | 20 | 20 | 60 |

## 8. Infectious and Hazardous Waste Storage

Infectious and hazardous waste storage involves specialized containers and facilities designed to safely handle, contain, and isolate waste that poses health or environmental risks. This includes using secure, clearly labeled bins or areas with controlled access, proper ventilation, and spill containment measures to prevent contamination and ensure safe management of these types of waste. It is recommended to provide specialized containers for hazardous and infectious waste.

| Requirement | Details |
|---|---|
| **Infectious Waste Storage Containers** | Provide for all population tiers |
| **Hazardous Waste Containers** | Provide for all population tiers |

## 9. Organics Management

Processing systems for organics management include methods and equipment such as composting facilities, anaerobic digesters, compost beds and pads, which are used to convert organic waste into valuable products like compost and biogas. The following is the recommended equipment and system for organic waste treatment.

| Population Tier | Equipment and Systems |
|---|---|
| **2500 - 4000** | Anaerobic Digestion System, Biogas Collection Treatment, Leachate Tank, Planted Bed |
| **1500 - 2500** | Anaerobic Digestion System, Leachate Tank, Planted Bed |
| **900 - 1500** | Anaerobic Digestion System, Leachate Tank, Planted Bed |
| **450 - 900** | Mechanically Aerated Compost Pad, Composting Equipment, Leachate Tank, Planted Bed |
| **<450** | Compost Pad, Composting Equipment, Leachate Tank, Planted Bed |

## 10. Fire Fighting Equipment

Firefighting equipment should be as per MNDF requirements. Fire safety is critical for waste management facilities to protect lives, prevent property damage, and ensure safe operations in an emergency.

| Population Tier | Equipment Provided |
|---|---|
| All Tiers | Fire Fighting Equipment |

## 11. Staff Requirements

Staff requirements refer to the number and types of personnel needed to effectively operate and manage a facility, ensuring that all necessary roles are covered to maintain efficient and safe operations. The following is the recommended staff requirement for each tier.

| Population Tier | Staff Categories |
|---|---|
| **2500 - 4000** | 2 Collection, 1 Sorting/Organics, 1 Sorting/Inorganics, 1 Finances, 1 Admin |
| **1500 - 2500** | 2 Collection, 1 Sorting/Organics, 1 Sorting/Inorganics, 1 Finances/Admin |
| **900 - 1500** | 2 Collection, 1 Sorting/Organics, 1 Sorting/Inorganics, 1 Finances/Admin |
| **450 - 900** | 3 Collection/Sorting/Management, 1 Finances/Admin |
| **<450** | 2 Collection/Sorting/Management, 1 Finances/Admin |

# Reference

Ministry of Climate Change, Environment and Energy, Waste Management and Pollution Control Department. *Waste Tiers 2020 [Unpublished]*