Tokyo Metropolitan Government Waste Landfill Site

Central Breakwater Outer Landfill Site • New Sea Surface Disposal Site

Photographed on February 9, 2020

Tokyo Metropolitan Government Bureau of Environment
Central Breakwater Inner Landfill Site

**Area**
Approx. 195 ha

**Landfill area (waste)**
Approx. 78 ha

**Landfill volume (waste)**
Approx. 12.3 million tonnes

Central Breakwater Outer Landfill Site

**Phase 1 (dredged soil, soil from construction sites)**

**Landfill area**
Approx. 115 ha

**Phase 2 (waste)**

**Landfill area**
Approx. 199 ha

New Sea Surface Disposal Site

**Area (A-G)**
Approx. 480 ha

**Landfill Capacity (A-G)**
Approx. 120 million m³

**Area (A-E)**
Approx. 319 ha

**Landfill Capacity (A-E)**
Approx. 45.8 million m³

Super Eco Town Related Facilities

1️⃣ PCB Waste Treatment Plant (Operating from November 2005)

1️⃣ Pyrolysis and Gasification Power Generation Plant (Operating from August 2006)

Clean Association of TOKYO23

1️⃣ Pulverized Waste Processing Facility

1️⃣ Pulverization Processing Plant for Large-Size Waste

1️⃣ Chubo Incombustible Waste Processing Center

1️⃣ Chubo Ash Melting Facility

1️⃣ Sea Forest Waterway

**Tokyo Metropolitan Government**

1️⃣ Undersea Tunnel Passage No. 2

2️⃣ Bureau of Environment, Central Breakwater Landfill Joint Office

3️⃣ Wastewater Treatment Plant No. 1

4️⃣ Landfill-Gas Utilization Facility

5️⃣ Wastewater Treatment Plant No. 3

6️⃣ Umi-no-Mori (Sea Forest)-Ohashi Bridge

7️⃣ Reception Gate

8️⃣ Buffer Reservoir

9️⃣ Central Breakwater

10️⃣ Wharf (marine transport unloading facility)

11️⃣ Chubo-Ohashi Bridge

12️⃣ Tokyo Bayside Wind Power Plant (Tokyo Kazaguruma)

**Double Steel-tubing Sheet Pile (Outer Landfill Site and New Sea Surface Disposal Site)**

- Coating Stones
- Foot Protection Stone
- Steel-tubing Sheet Pile
- Replacement Sand
- Packing Sand
- Ground Improvement (Sand Compaction Pile)
- Water Shielding Steel Sheet Pile

※Wastewater is rainwater that seeped through the stratum of waste to become polluted water.
The annual volume of Tokyo’s waste has significantly increased since 1985, primarily due to changes in lifestyle and the social system of mass consumption and mass production. In 1989, the waste volume was at a record high of 4,900,000 tonnes. In the following years, the volume decreased, totaling 2,750,000 tonnes in 2018.
Landfill Operation

After intermediate processing, the waste is carried and dumped at specified locations by trucks. The waste is then laid down by bulldozers efficiently and safely.

Covering Waste with Soil

When the waste reaches a certain thickness or when road construction is necessary, soil is applied to cover the waste. Also, when the landfill is complete, a final cover of soil is applied.

Cell Method

Each day’s garbage is covered with soil in one-day increments in order to prevent waste scattering and foul smells.

Sandwich Method

Landfill area covered with soil before laying down additional waste.

The Sandwich Method has the following merits.
(1) Prevents waste from scattering
(2) Prevents the spread of offensive odors
(3) Prevents vermin (prevents incubation of insect eggs)
(4) Prevents waste from burning (cuts off the air)

Gas Drainage

Landfill waste generates methane gas. To prevent fires from occurring, pipes are driven into the landfill to drain the gas.

Patrolling the Site

In addition to managing landfill operations, workers patrol the site for dangerous materials and to supervise insect pest control operations. They also handle any other safety-related tasks.

Gas Well and Gas Gathering Lines

The gases that are emitted from the landfill site are collected, stored, and burned in gas turbines to produce electric power. (January, 2017, expended)
The wastewater of the landfill site is collected into a receiving reservoir located at the side of the peripheral road.

After the wastewater quality is adjusted in the buffer reservoir, the water is sent to the wastewater treatment plant.

Using various methods, the wastewater from the landfill undergoes purification at the treatment plant.

The final disposal management facility of the landfill site is cut off from the sea. If left on its own, the water from rainfall that gathers here would overflow. However, since the rainwater seeps through a stratum of waste to become polluted water, it is not flushed out to sea. Instead, following purification at the wastewater treatment plant, the water is released into the sewage system.

**Wastewater Treatment Flow**

- **Receiving Reservoir (Pump well)**
- **Buffer Reservoir**
- **Wastewater Treatment Plant**

The Wilson Stwart have undergone purification at the wastewater treatment plant and is released into the sewage system.

- **Sub sea pressure pipeline**
- **Wastewater Reservoir 150,000 m³**
- **Wastewater Treatment Plant**
  - **Wastewater Treatment Plant No.1**
    - Wastewater Treatment per day: 4,500 m³
  - **Wastewater Treatment Plant No.2**
    - Wastewater Treatment per day: 11,500 m³

The treated wastewater is discharged into Tokyo Bay.

**Cost of wastewater treatment**
- Repair Expense 2%
- Electricity Expense 8%
- Chemicals Expense 10%
- Operation Management Cost 23%
- Others 1%

**Volume of wastewater treatment**
- New Sea Surface A 6%
- New Sea Surface B 18%
- Inner Landfill Site 14%
- Outer Landfill Site 7%

**Quality of treatment water**
- pH: 7.3
- Nitrogen: 80 mg/L
- COD: 62 mg/L

- Sewage Discharge Standards: 5-9
- Levels Agree with the Bureau of Sewerage: 120
- Levels Agree with the Bureau of Sewerage: 150

**2.2 billion yen**
- 2018

**3.0 million m³**
- 2018
Landfill Site Transition

(Approx. 1994) Garbage and incombustible waste are used as landfill

(At Present) After intermediate processing, waste is landfilled at the New Sea Surface Disposal Site.

Trend of Landfill waste disposal volume

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landfill waste disposal volume</td>
<td>45</td>
<td>50</td>
<td>45</td>
</tr>
</tbody>
</table>

Energy Effective Utilization

At the Central Breakwater Inner and Outer Landfill Sites, electricity is generated using gas and natural sunlight.

Environment Learning

Social studies field trip of elementary school students

The number of visitors in 2018 was approx. 57,000 Elementary and Junior high school students totaled approx. 50,000

Landfill-Gas Utilization Facility (Micro gas turbine)

- Power generation capacity (Maximum) 275 kW
- Gas used: Approx. 1.6 million m³/N per year
- Composition of Gas:
  - Methane: Approx. 55%
  - Carbon dioxide: Approx. 25%
  - Nitrogen: Approx. 15%
  - Oxygen: 1% or less
- Gas calorific value: Approx. 18MJ/m³ (Approx. 4,300 kcal/m³)

(2005 project granted by NEDO)

Photovoltaic Generation System

- Power generation capacity 20 kW
- Solar array panel: 4.0 m × 18.2 m × 2 sets
- Module: 178.6 W/module × 112 modules
- Quality: Polycrystalline silicon

(2007 Ministry of the Environment granted project)
Waste Disposal by Landfill Plan

Having revised its “Waste Disposal by Landfill Plan” in February of 2017, the Tokyo Metropolitan Government is actively working to prepare waste disposal facilities. The revised plan includes an 5% reduction in the volume of waste disposal by landfill compared with the previous plan. The volume of waste that is disposed of by landfill is expected to continue to change in response to shifting socioeconomic conditions and advances in waste treatment and recycling technologies. As a result, this “Waste Disposal by Landfill Plan” is being reviewed approximately every five years.

Waste Acceptance Policy by Type of Waste

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<tr>
<th>Waste Type</th>
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<th>Acceptance Policy</th>
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<tbody>
<tr>
<td>General Waste</td>
<td>• General waste produced by households, etc. within the 23 wards of Tokyo.</td>
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<td></td>
<td>• All waste is accepted provided that it undergoes intermediate treatment, while efforts are also undertaken to reduce waste volume and maximize the reuse and recycling of resources.</td>
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<tr>
<td>Industrial Waste</td>
<td>• Industrial waste produced by small and medium-sized businesses within Metropolitan Tokyo.</td>
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<td></td>
<td>• Waste that has already undergone intermediate treatment is accepted up to a fixed volume.</td>
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<tr>
<td>Waste from Public Facilities</td>
<td>• Waste produced from waterworks and sewage facilities within Metropolitan Tokyo.</td>
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<td></td>
<td>• Waste is accepted provided that it undergoes intermediate processing.</td>
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<tr>
<td>Earth and Sand Type</td>
<td>Dredged Soil</td>
<td>• Dredged soil is produced from streams and rivers within Metropolitan Tokyo and Tokyo ports.</td>
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<td></td>
<td>• Dredged soil that cannot be used for the upkeep of rivers, canals or harbors is accepted.</td>
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<tr>
<td>Soil Produced in Construction Work, etc.</td>
<td>• This soil is used for the upkeep of the landfill site and as soil covering for waste.</td>
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Caisson Type Outer Shore Protection (New Sea Surface Disposal Site)

※1 Wastewater is rainwater that seeped through the stratum of waste to become polluted water.
※2 Caisson: A concrete or steel box that is filled with sand, slag, etc.
※3 Rear Filling Soil: Earth and sand that is placed behind the caisson revetment.
※4 Riprap: Rock that is used to support the caisson revetment.