**Central Breakwater Inner Landfill Site**

Area: Approx. 195 ha
Landfill area (waste): Approx. 78 ha
Landfill volume: 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**

1. PCB Waste Treatment Plant (Operating from November 2005)
2. Pyrolysis and Gasification Power Generation Plant (Operating from August 2006)

**Clean Association of TOKYO23**

1. Pulverized Waste Processing Facility
2. Pulverization Processing Plant for Large-Size Waste
3. Chubo Incombustible Waste Processing Center
4. Chubo Ash Melting Facility

**Tokyo Metropolitan Government**

1. Undersea Tunnel Passage No. 2
2. Bureau of Environment, Central Breakwater Landfill Joint Office
3. Wastewater Treatment Plant No. 1
4. Landfill-Gas Utilization Facility
5. Wastewater Treatment Plant No. 3
6. Nakashio-bashi Bridge
7. Facility to Wash Off Soil
8. Buffer Reservoir
9. Central Breakwater
10. Wharf (marine transport unloading facility)
11. Chubo-Ohashi Bridge
12. Tokyo Bayside Wind Power Plant (Tokyo Kazaguruma)

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**Layout**

- Central Breakwater Outer Landfill Site (Phase 1): 115 ha
- Central Breakwater Outer Landfill Site (Phase 2): 199 ha
- G Block: 73 ha
- New Sea: 88 ha
- B Block: 72 ha
- C Block: 69 ha
- D Block: 67 ha
- E Block: 91 ha

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**Caisson Type Outer Shore Protection (New Sea Surface Disposal Site)**

- Coating Stones
- Replacement Sand
- Ground Improvement (Sand compaction pile)
- Steel Sheet Piling
- Ground Improvement (Cement deep mixing)
- Rear Filling Soil
- Riprap
- 100 m of moderate-sloped bank and shallow bottom
- Rainfall: Circuit Pipe To Sewage after Processing
- Seabed (Mixed Layer Sand, Gravel and Clay)

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*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.
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 2,830,000 tonnes in 2012.
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.

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.
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**

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.

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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 Disposed Amount

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ten Thousand tonnes</td>
<td>50</td>
<td>100</td>
<td>300</td>
<td>350</td>
<td>400</td>
<td>450</td>
<td>500</td>
</tr>
</tbody>
</table>

Landfill site performance

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance value</td>
<td>49</td>
<td>60</td>
<td>56</td>
</tr>
</tbody>
</table>

Energy Effective Utilization

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

Landfill-Gas Utilization Facility (Micro gas turbine)

Power generation capacity (Maximum) 275 kW
Gas used Approx. 1.6 million m³ per year
Composition of Gas
- Methane Approx. 55 %
- Carbon dioxide Approx. 25 %
- Nitrogen Approx. 15 %
- Oxygen 1 % or less
Gas calorific value Approx. 18 MJ/m³ (Approx. 4,300 kcal/m³) (2005 project granted by NEDO)

Tokyo Bayside Wind Power Plant (Tokyo Kazaguruma)

Company J-WIND Co., Ltd
Selling power to Tokyo Electric Power Company Co., Ltd
Installation capacity 850 kW × 2 (1700 kW)
Projected power generation capacity 2,500,000 kWh per year
Structure (height) 44 m to the center of the wind turbine 70 m to the highest point
Wind conditions Annual average wind 5.4 m/s

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 2012, the Tokyo Metropolitan Government is actively working to prepare waste disposal facilities. The revised plan includes an 18% 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

<table>
<thead>
<tr>
<th>Type of Waste</th>
<th>Acceptance Policy</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Waste</td>
<td>• General waste produced by households, etc. within the 23 wards of Tokyo.</td>
</tr>
<tr>
<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>
</tr>
<tr>
<td>Industrial Waste</td>
<td>• Industrial waste produced by small and medium-sized businesses within Metropolitan Tokyo.</td>
</tr>
<tr>
<td></td>
<td>• Waste that has already undergone intermediate treatment is accepted up to a fixed volume.</td>
</tr>
<tr>
<td>Waste from Public Facilities</td>
<td>• Waste produced from waterworks and sewage facilities within Metropolitan Tokyo.</td>
</tr>
<tr>
<td></td>
<td>• Waste is accepted provided that it undergoes intermediate processing.</td>
</tr>
<tr>
<td>Dredged Soil</td>
<td>• Dredged soil is produced from streams and rivers within Metropolitan Tokyo and Tokyo ports.</td>
</tr>
<tr>
<td></td>
<td>• Dredged soil that cannot be used for the upkeep of rivers, canals or harbors is accepted.</td>
</tr>
<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>
</tr>
</tbody>
</table>

Making Disposal Sites Suitable for the 21st 'Environment-Friendly' Century

Currently, the waste disposal of Tokyo’s 23 wards is being handled at the Central Breakwater Outer Landfill Site and the New Sea Surface Disposal Site. As it is the final disposal site of the Tokyo port area, it is of vital importance. The Landfill Site Management Office has established the following seven points as our Environmental Protection Policy.

Environmental Policy

1. Reducing Our Environmental Impact
2. Extending the Lifespan of Landfill Sites
3. Promoting Energy and Resource Savings
4. Working to Prevent Global Warming
5. Promoting Reforestation and Greenification
6. Promoting Environmental Education
7. Preparing Manuals for Emergency Response

Social studies field trip of elementary school students
The number of visitors in 2012 was approx. 43,000
Elementary and Junior high school students totaled approx. 37,200

Green lung (Biotope space)

Seedling transplantation (Central Breakwater Outer Landfill Site)
Geographical Locations of Landfill Sites

Changes of Disposal Sites

<table>
<thead>
<tr>
<th>Site Description</th>
<th>Years</th>
<th>Area</th>
<th>Landfill Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>No.8 Site (Shiomizu, Koto Ward)</td>
<td>65, 76</td>
<td>364,000 m²</td>
<td>3.71 million tonnes</td>
</tr>
<tr>
<td>No.14 Site (Yumenoshima, Koto Ward)</td>
<td>65, 76</td>
<td>450,000 m²</td>
<td>10.34 million tonnes</td>
</tr>
<tr>
<td>No.15 Site (Wakasu, Koto Ward)</td>
<td>65, 74</td>
<td>712,000 m²</td>
<td>18.44 million tonnes</td>
</tr>
<tr>
<td>Central Breakwater Inner Landfill Site</td>
<td>73, 86</td>
<td>780,000 m²</td>
<td>12.3 million tonnes</td>
</tr>
<tr>
<td>Central Breakwater Outer Landfill Site (Phase 2)</td>
<td>73, 86</td>
<td>1,990,000 m²</td>
<td>54.88 million tonnes</td>
</tr>
<tr>
<td>Haneda Offshore Landfill Site (Haneda Airport, Ota Ward)</td>
<td>73, 86</td>
<td>124,000 m²</td>
<td>1.88 million tonnes</td>
</tr>
<tr>
<td>New Sea Surface Disposal Site</td>
<td></td>
<td>3,190,000 m²</td>
<td>6.17 million tonnes</td>
</tr>
</tbody>
</table>

Landfill Site Management Office, Bureau of Environment, Tokyo Metropolitan Government
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http://www.kankyo.metro.tokyo.jp/resource/landfill/