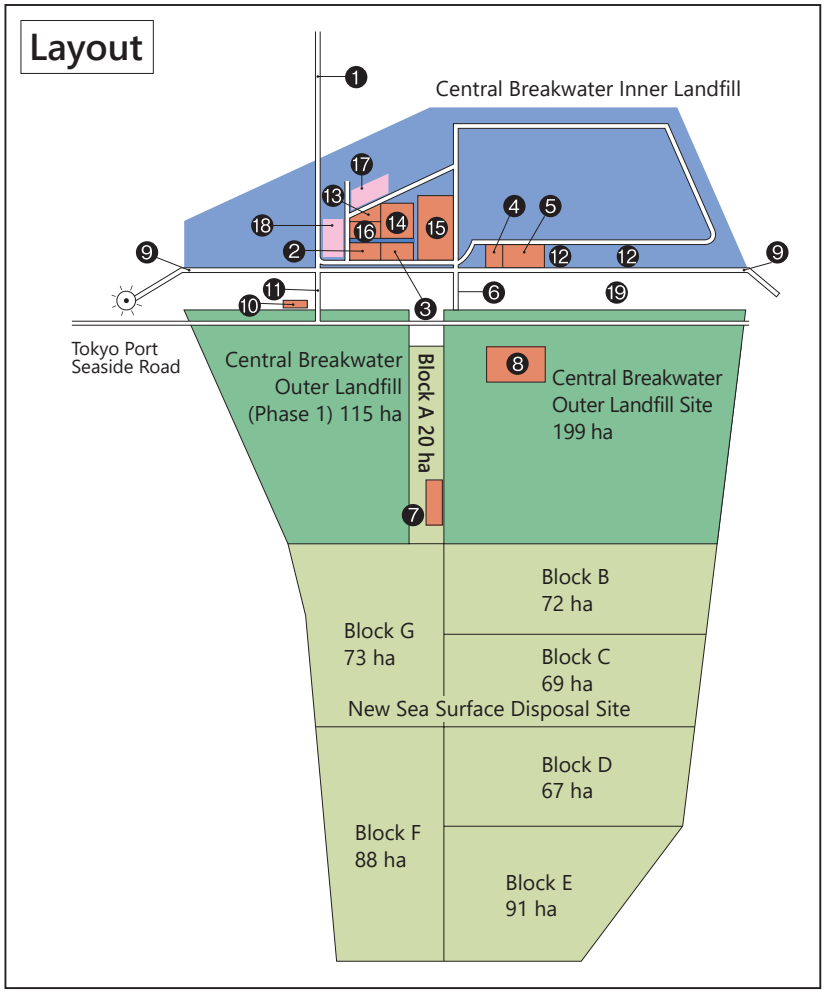
Tokyo Metropolitan Government Waste Landfill Sites

Central Breakwater Outer Landfill Site & New Sea Surface Disposal Site

Photographed on February 5, 2023

Bureau of Environment
Tokyo Metropolitan Government

Layout



Central Breakwater Inner Landfill

Area	Approx. 195 ha
Landfill area (waste)	Approx. 78 ha
Landfill volume (waste)	Approx. 12.3 million tonnes

Central Breakwater Outer Landfill (Phase 1)

Landfill area (dredged soil, soil from construction sites)	Approx. 115 ha

Central Breakwater Outer Landfill Site

Landfill area (waste)	Approx. 199 ha
Landfill capacity (waste)	Approx. 47.58 million m^3

New Sea Surface Disposal Site

Area (A-G)	Approx. 480 ha
Landfill capacity (A-G)	Approx. 120 million m^3
Area (A-E)	Approx. 319 ha
Waste landfill capacity (A-E)	Approx. 45.80 million m^3

Facilities associated with Super Eco Town

⑰ PCB waste treatment plant operating since November 2005

⑱ Pyrolysis and gasification power generation plant operating since August 2006

Tokyo Metropolitan Government

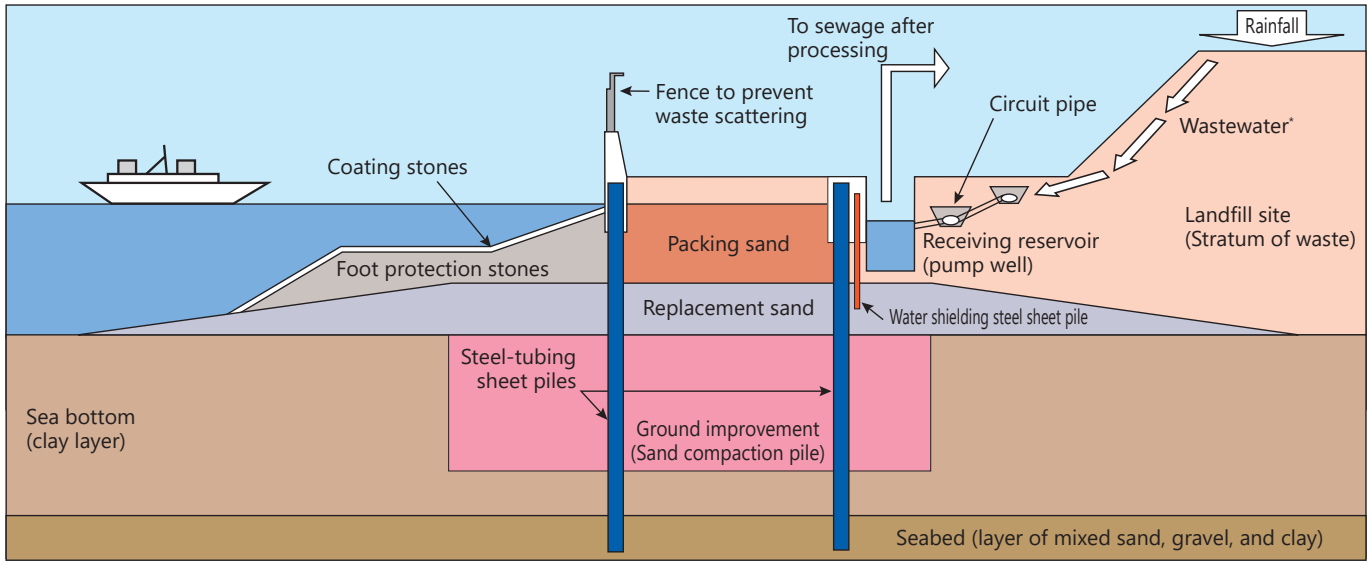
① Passage No. 2 Undersea Tunnel
② Central Breakwater Landfill Joint Office, Bureau of Environment
③ Wastewater Treatment Plant No. 1
④ Landfill-gas utilization facility
⑤ Wastewater Treatment Plant No. 3
⑥ Umi-no-Mori (Sea Forest)-Ohashi Bridge
⑦ Reception gate
⑧ Buffer reservoir
⑨ Central Breakwater
⑩ Wharf (marine transport unloading facility)
⑪ Chubo-Ohashi Bridge
⑫ Tokyo Bayside Wind Power Plant (Tokyo Kazaguruma)

Clean Association of TOKYO 23

⑬ Facility for processing pulverized waste
⑭ Facility for pulverizing bulky waste
⑮ Chubo Incombustible Waste Processing Center
⑯ Chubo Ash Melting Facility

⑲ Sea Forest Waterway

Double steel-tubing sheet piles for the Outer Landfill Site and New Sea Surface Disposal Site



* Rainwater seeps through a stratum of waste and becomes polluted, resulting in wastewater.

Collection & transportation

(By the 23 wards of Tokyo)

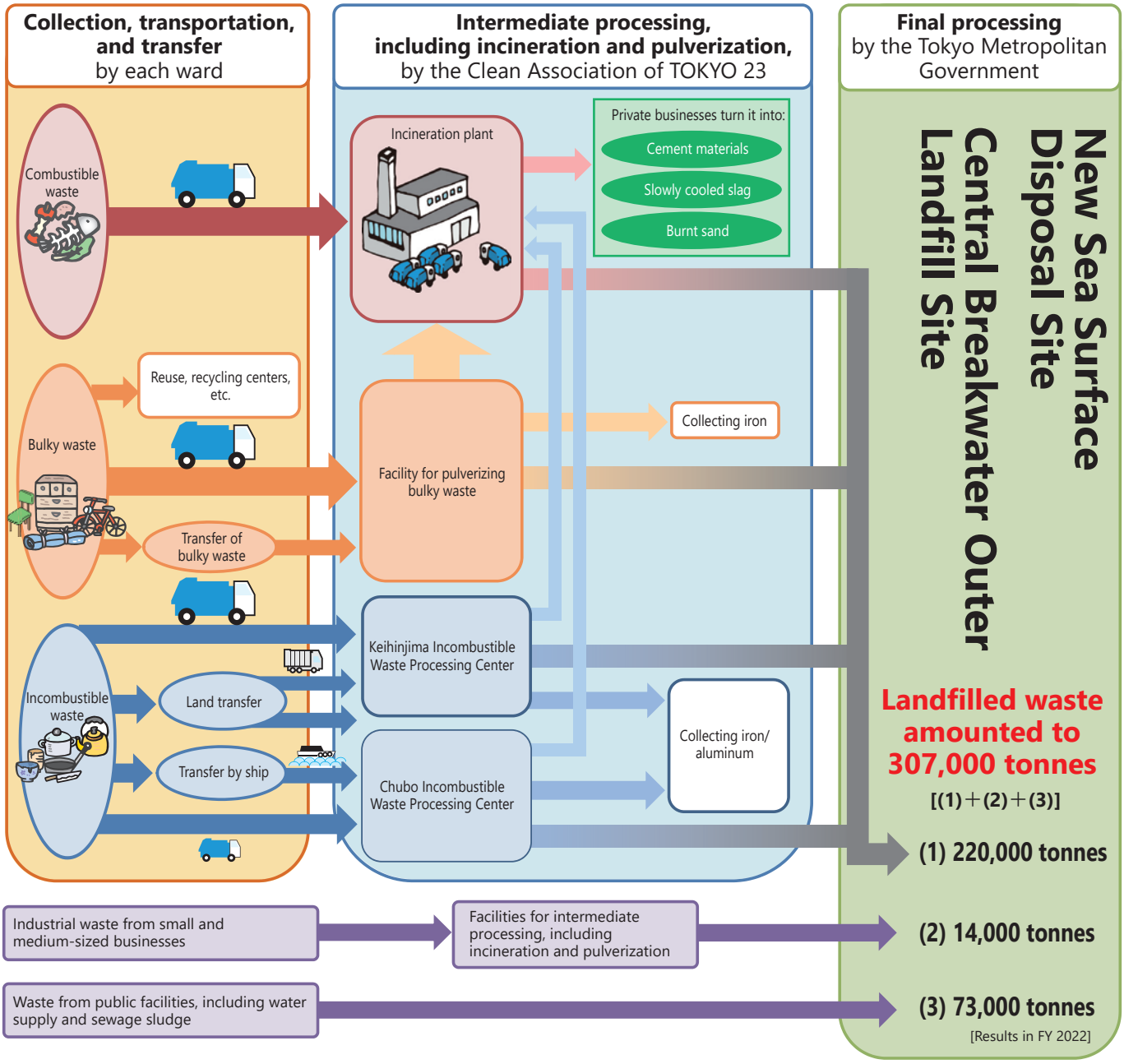
Waste is collected and transported from each district.

Intermediate processing

(By the Clean Association of TOKYO 23)

To extend the lifetime of landfill sites, waste is put into intermediate processing before being landfilled.

The amount of municipal solid waste produced in the 23 wards of Tokyo started to increase sharply in the mid-1980s, primarily due to changes in lifestyle and the development of a society based on mass production and consumption. The amount peaked at 4,900,000 tonnes in FY 1989 and thereafter steadily decreased to 2,540,000 tonnes in FY 2022.



Garbage collection

Facility for pulverizing bulky waste

Incineration plant
(Photo provided by the Clean Association of TOKYO 23)

Landfill

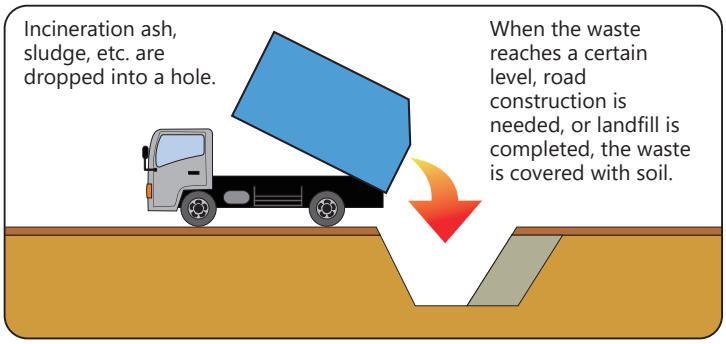
After intermediate processing, waste is carried to landfill sites by container or dump trucks and dumped at specific locations according to its types. The waste is laid down by bulldozers then shaped and compacted in an efficient and safe manner.

Landfill operation

Frame Method

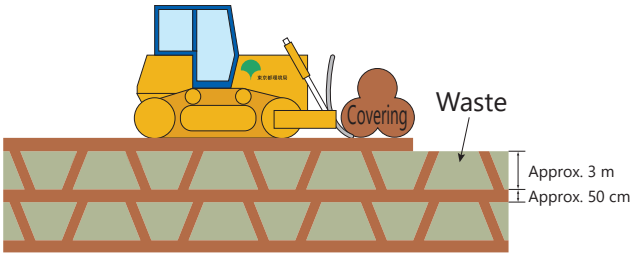
Incineration ash, sludge, etc. are dropped into a hole.

When the waste reaches a certain level, road construction is needed, or landfill is completed, the waste is covered with soil.



Sandwich Method

Landfill waste is covered with soil, and another layer of waste is laid on top of it.



The Sandwich Method is effective in preventing:
(1) Waste from scattering
(2) Spread of offensive odors
(3) Occurrence of vermin by hindering incubation of their eggs
(4) Waste from burning by cutting off the oxygen supply

Degassing

Landfill waste generates methane gas. For the prevention of fire from the gas, pipes are driven into the landfill for degassing.

Covering

When waste reaches a certain thickness or road construction is needed, the waste is covered with soil. In addition, a final layer of covering soil is applied when landfill is completed.

Covering waste with soil

Landfill covered with soil

Site patrol

In addition to managing landfill operations, we supervise insect pest control operations, find dangerous materials, and handle any other safety-related tasks throughout the sites.

Gas well and gas gathering lines

Gases emitted from the landfill site are collected, stored, and burned in gas turbines to generate electricity.

Wastewater treatment

Receiving reservoir (pump well)

The wastewater from the landfill sites is collected in the receiving reservoir located at the side of the peripheral road.

Buffer reservoir

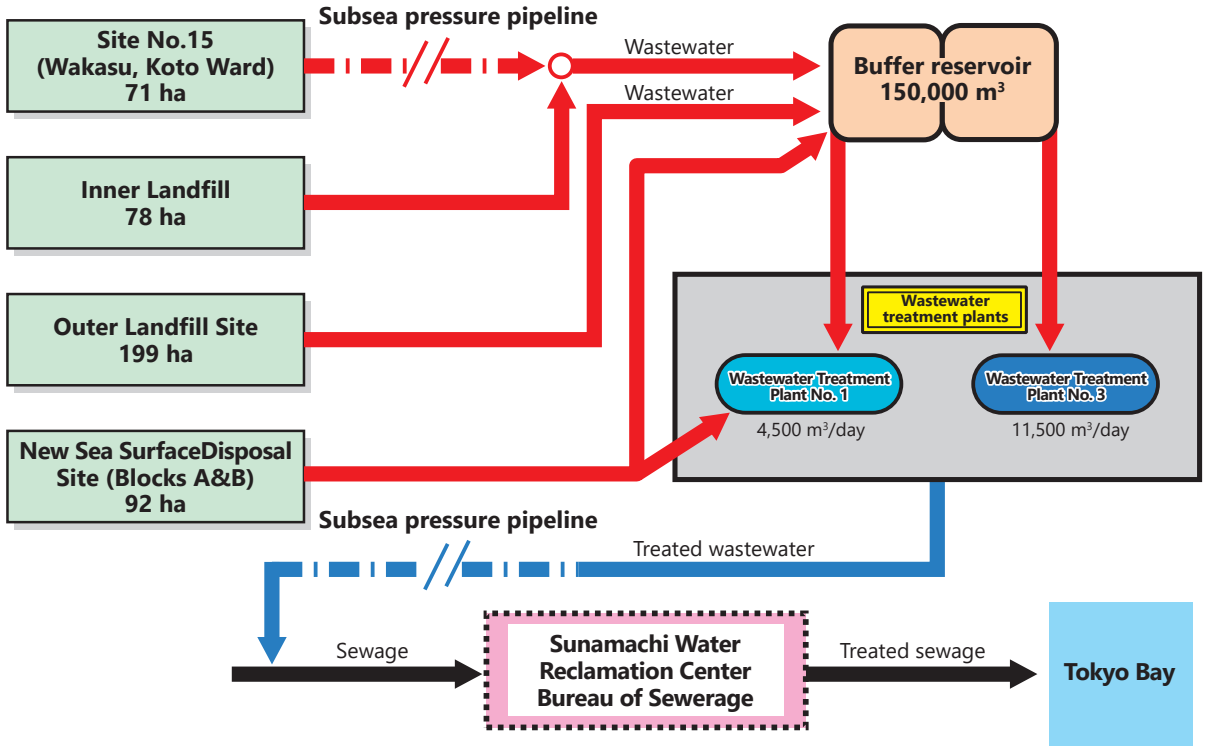
The buffer reservoir adjusts the flow rate of wastewater and homogenizes its quality before sending it to the wastewater treatment plants.

Wastewater treatment plant

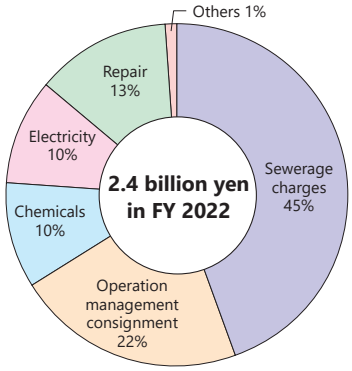
The wastewater from the landfill sites is purified through various methods at the wastewater treatment plants located in the inner landfill.

Workflow of wastewater treatment

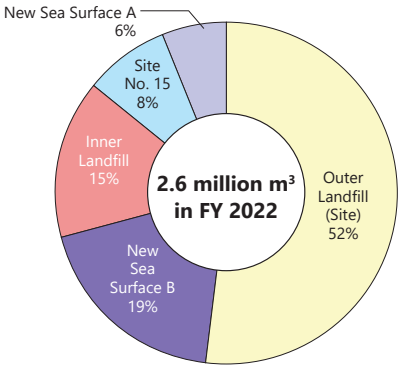
These disposal sites are final disposal management facilities that are cut off from the sea. Therefore, the water from rainfall that gathers there will overflow if it is not discharged. However, since rainwater seeps through a stratum of waste and becomes polluted, it should not be allowed to flow out to sea. This dirty rainwater, called wastewater, is purified at the wastewater treatment plants before being released into the sewage system.



Cost of wastewater treatment



Amount of wastewater treated



Quality of treated wastewater

pH..... 7.4 (5 to 9 in the Sewage Discharge Standards)
Nitrogen .... 17 mg/L (120 in the Sewage Discharge Standards)
COD..... 53 mg/L (150 in terms of the level agreed with the Bureau of Sewerage)

Raw water quality at Treatment Plant No. 3
pH..... 8.0
Nitrogen .... 296 mg/L
COD..... 185 mg/L

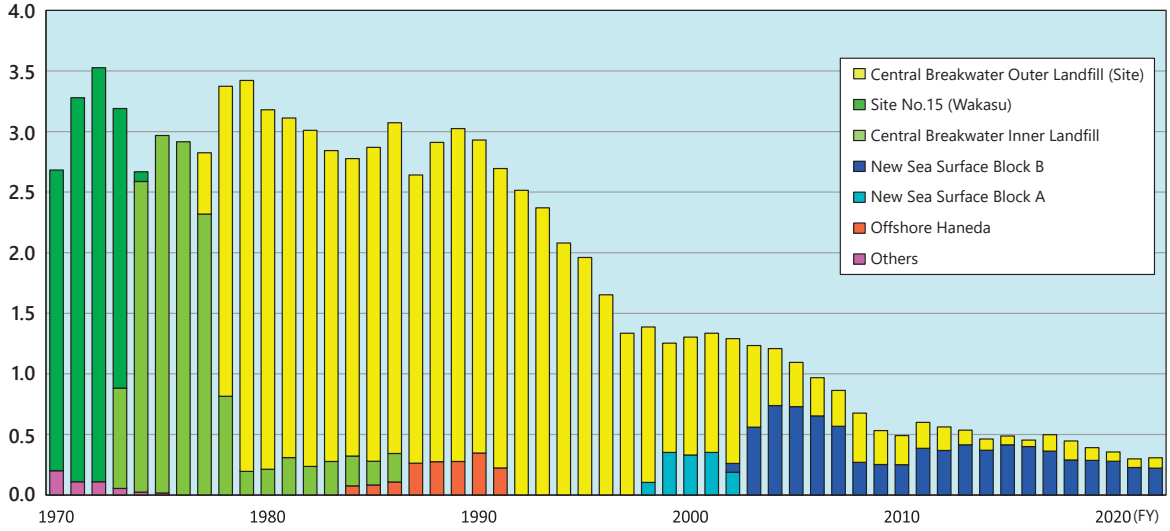
Changes in the Landfill Sites

Around 1994: Garbage and incombustible waste were directly landfilled.

At present: Intermediate processing is carried out before landfilling—garbage is burned and incombustible waste is pulverized.

Changes in the volume of waste disposal by landfill

Million tonnes from FY 1970 to FY 2022



(Mt)

FY	2020	2021	2022
Volume of waste disposal by landfill	36	30	31

Effective use of energy

Gas and sunlight are used to generate electricity at the Central Breakwater Inner Landfill and Outer Landfill Site.

Landfill-gas utilization facility with micro gas turbines

Maximum power generation capacity		275 kW
Gas consumption		Approx. 1.6 million m³N/year
Gas composition	Methane	Approx. 55%
	Carbone dioxide	Approx. 25%
	Nitrogen	Approx. 15%
	Oxygen	1% or less
Gas calorific value		Approx. 18 MJ/m³N (Approx. 4,300 kcal/m³N)

(Project in FY 2005 subsidized by NEDO)

Solar power generation system

Power generation capacity	20 kW
Solar panels	4.0 m × 18.2 m × 2 sets
Modules	178.6 W/module × 112 modules
Quality	Polycrystalline silicon

(Project in FY 2007 subsidized by the Ministry of the Environment)

Environmental studies

We have an environmental studies hall on the first floor of the Central Breakwater Landfill Joint Office.

Social studies field trip of elementary school students

〔 Of about 20,000 visitors in FY 2022, roughly 18,600 were elementary and junior high school students 〕

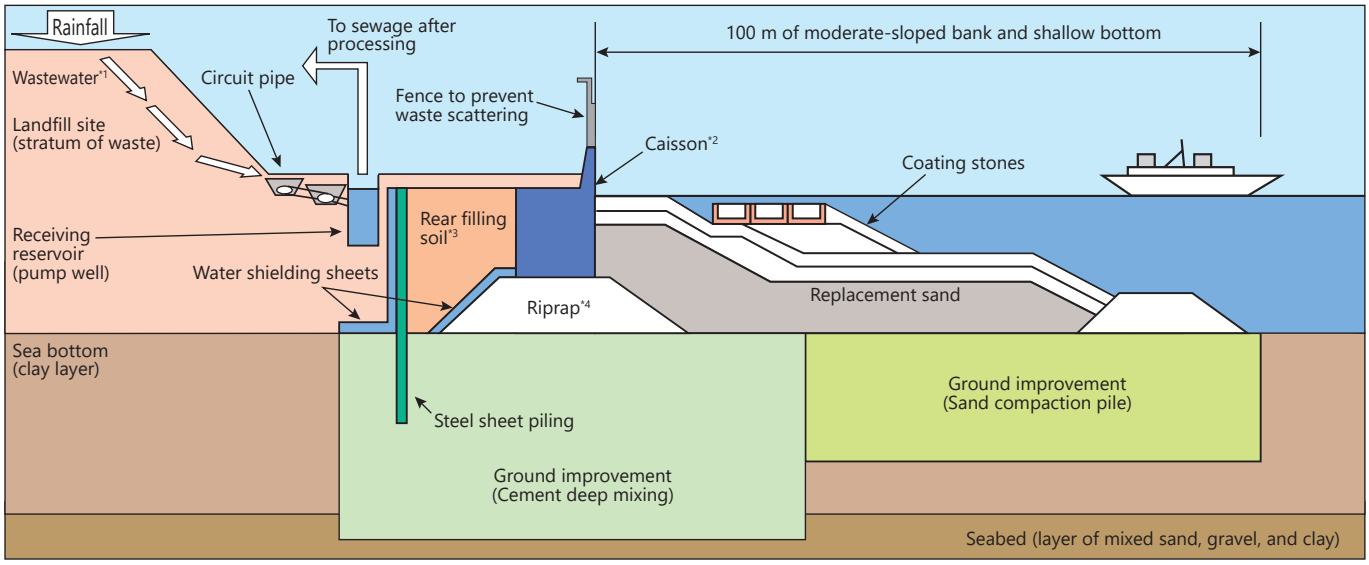
Waste Disposal by Landfill Plan

Having revised its Waste Disposal by Landfill Plan in February 2022, the Tokyo Metropolitan Government (TMG) is working to extend the lifetime of waste disposal facilities by stipulating the types of acceptable waste and the volume of waste disposal by landfill as well as using the facilities in a systematic manner. The revised plan includes a 9% reduction in the volume of waste disposal by landfill compared with the previous plan. The Waste Disposal by Landfill Plan is reviewed approximately every five years.

Acceptance policy by type of waste

Type of waste		Acceptance policy
Waste	Municipal solid waste	• Municipal solid waste, such as household waste, generated in the 23 wards of Tokyo • All waste is accepted once it has undergone intermediate processing, while efforts are also undertaken to reduce the amount of waste and maximize the reuse and recycling of resources.
	Industrial waste	• Industrial waste produced by small and medium-sized businesses in Tokyo • Waste that has undergone intermediate processing is accepted up to a certain amount.
	Waste from public facilities	• Waste discharged from water supply and sewage facilities in Tokyo • Waste is accepted once it has undergone intermediate processing.
Earth and sand	Dredged soil	• Dredged soil generated in the Port of Tokyo and from rivers in Tokyo • Dredged soil is accepted if it cannot be used for the maintenance of rivers, canals, or ports and harbors.
	Soil from construction sites etc.	• This type of soil is used for maintaining the landfill sites and covering waste.

Caisson outer shore protection for the New Sea Surface Disposal Site



*1 Rainwater seeps through a stratum of waste and becomes polluted, resulting in wastewater.

*2 A concrete or steel box filled with sand, slag, etc.

*3 Earth and sand placed behind the caisson revetment.

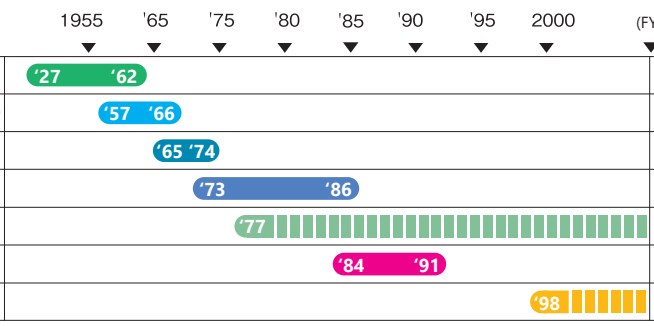
*4 Rocks to support the caisson revetment.

Geographical Locations of Landfill Sites

Source: Bureau of Port and Harbor, Tokyo Metropolitan Government (2022 Edition) ©Tokyo Metropolitan Government

Changes in disposal sites

		Area	Landfill waste disposal volume
1	Site No.8 (Shiomi, Koto Ward)	364,000m^2	Approx. 3.71 million tonnes
2	Site No.14 (Yumenoshima, Koto Ward)	450,000m^2	Approx. 10.34 million tonnes
3	Site No.15 (Wakasu, Koto Ward)	712,000m^2	Approx. 18.44 million tonnes
4	Central Breakwater Inner Landfill	780,000m^2	Approx. 12.3 million tonnes
5	Central Breakwater Outer Landfill Site	1,990,000m^2	Approx. 55.34 million tonnes (As of the end of FY 2022)
6	Offshore Haneda (Haneda Airport, Ota Ward)	124,000m^2	Approx. 1.68 million tonnes
7	New Sea Surface Disposal Site	3,190,000m^2	Approx. 9.44 million tonnes (As of the end of FY 2022)



Current town names are shown in parentheses.

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