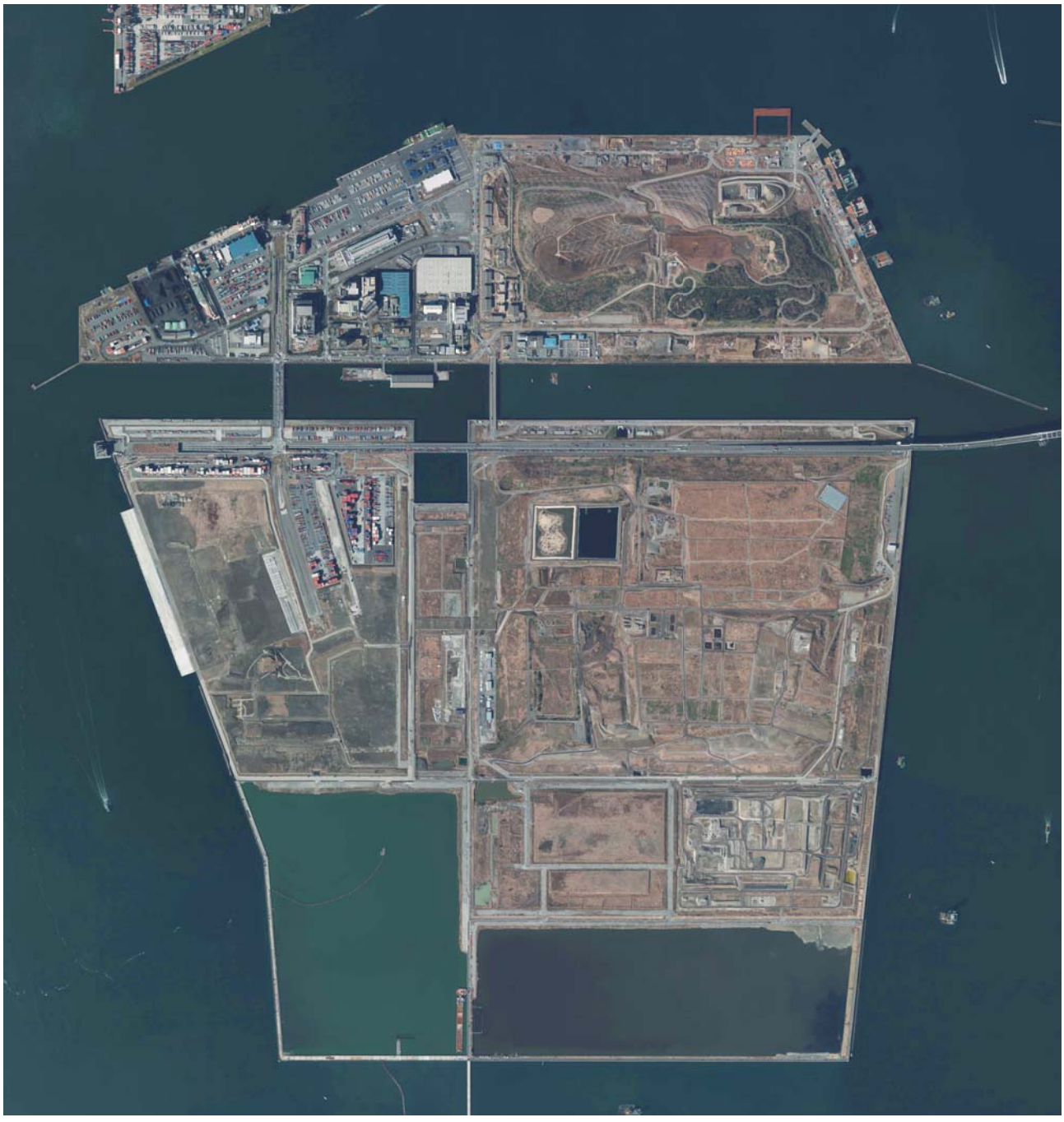
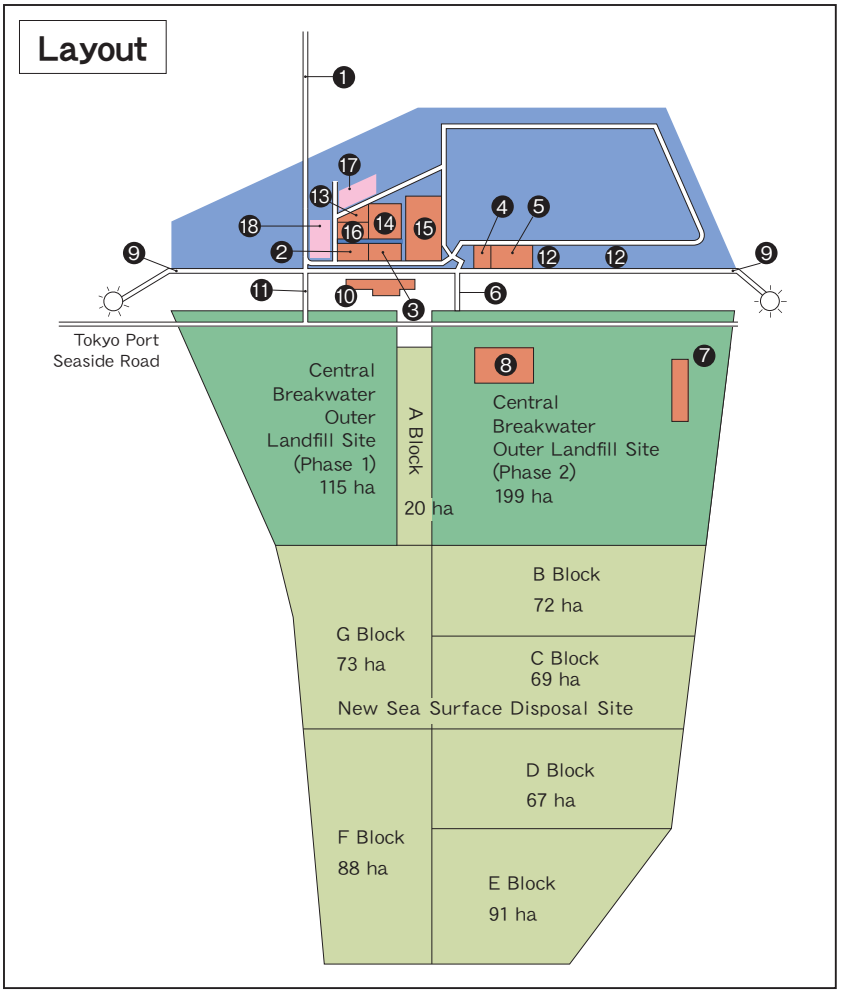
Tokyo Metropolitan Government Waste Landfill Site

Central Breakwater Outer Landfill Site・New Sea Surface Disposal Site



Photographed on February 2, 2016

Tokyo Metropolitan Government Bureau of Environment



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 m^3
Area (A-E)	Approx. 319 ha
Landfill Capacity (A-E)	Approx. 45.8 million m^3

Super Eco Town Related Facilities

⑰ PCB Waste Treatment Plant (Operating from November 2005)

⑱ Pyrolysis and Gasification Power Generation Plant (Operating from August 2006)

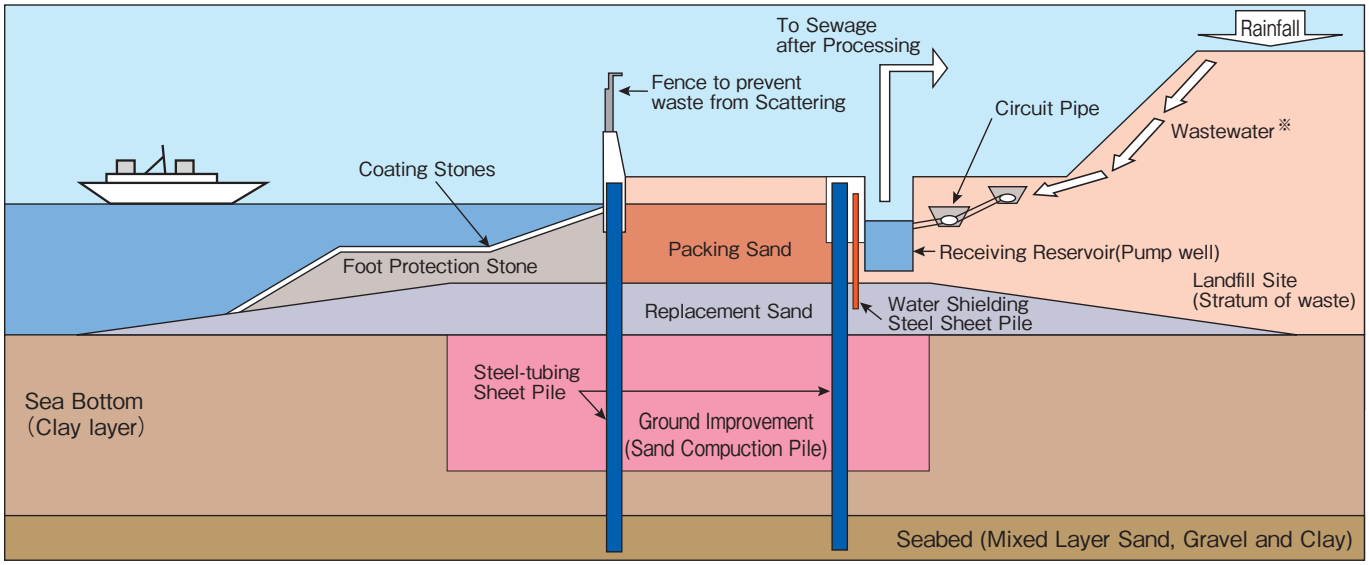
Tokyo Metropolitan Government

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)

Clean Association of TOKYO23

⑬ Pulverized Waste Processing Facility
⑭ Pulverization Processing Plant for Large-Size Waste
⑮ Chubo Incombustible Waste Processing Center
⑯ Chubo Ash Melting Facility

Double Steel-tubing Sheet Pile (Outer Landfill Site)



※Wastewater is rainwater that seeped through the stratum of waste to become polluted water.

Collection・Transport

(23 Wards of Tokyo)

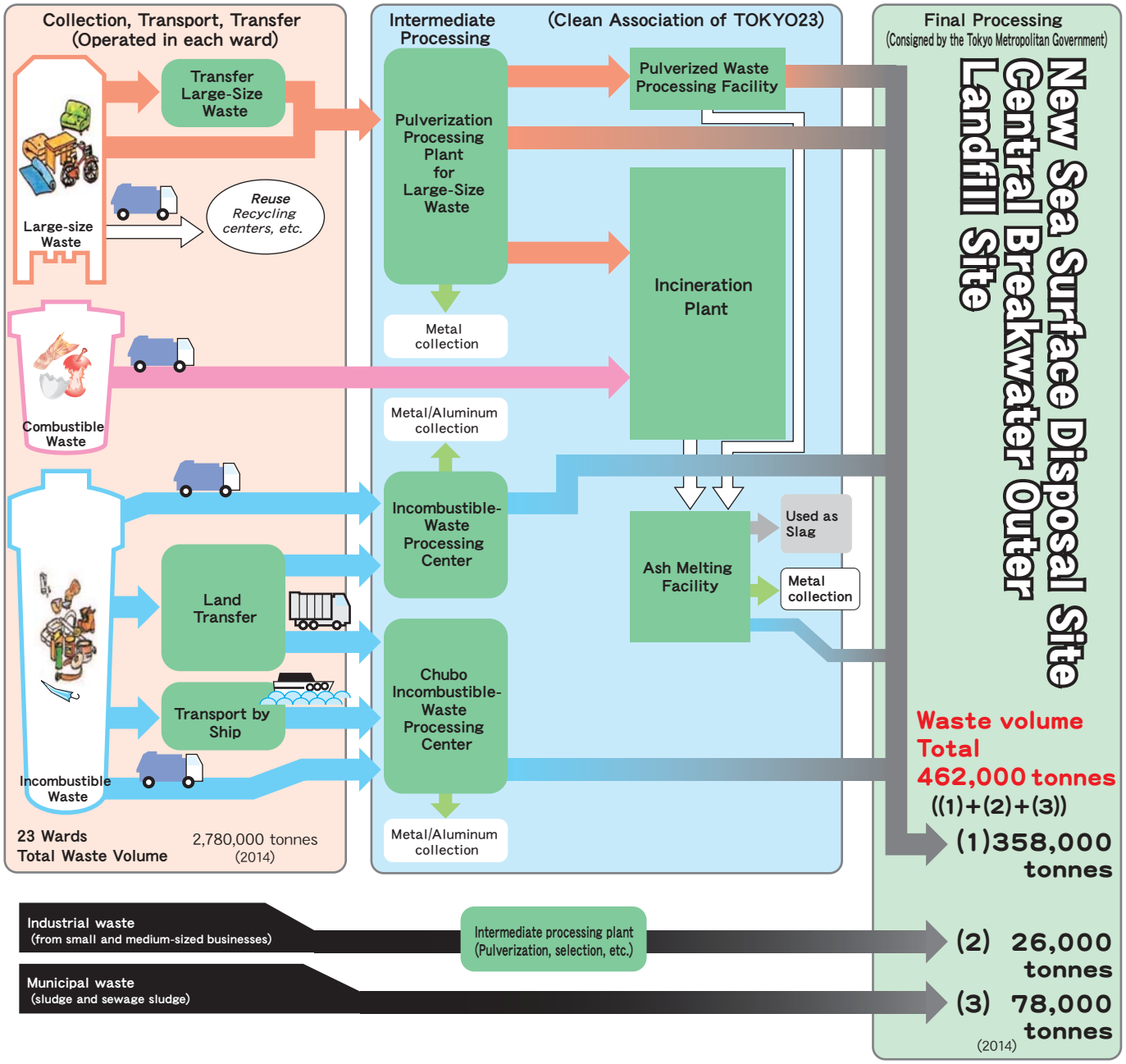
Waste is collected and transported from each district.

Intermediate Processing

(Clean Association of TOKYO23)

To prolong the use of landfill sites, waste undergoes intermediate processing before being used as landfill.

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 2,780,000 tonnes in 2014.



Garbage Collection

Pulverization Processing Plant for Large-Size Waste

Incineration Plant
(Photo: Clean Association of TOKYO23)

Landfill

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

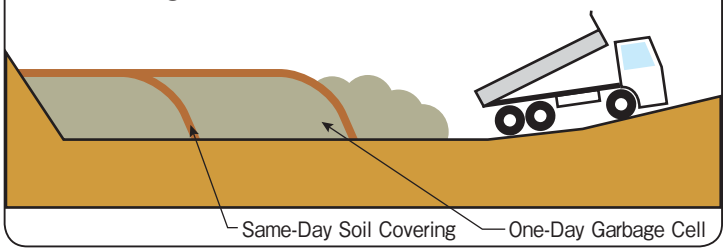
When the waste reaches a certain thickness or when road construction is necessary, soil is applied to cover the waste.
Also, when the landfill is complete, a final cover of soil is applied.

Landfill Operation

Covering Operation

Cell Method

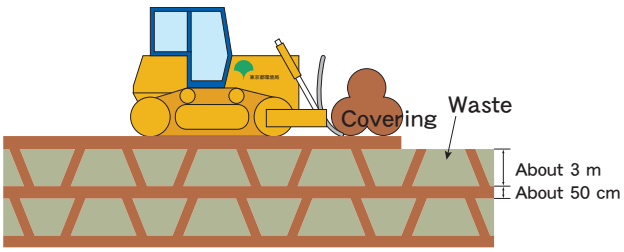
Each day's garbage is covered with soil in one-day increments in order to prevent waste scattering and foul smells.



Landfill Site Covered with Soil

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)

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 Drainage

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

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.

Wastewater Treatment

Receiving Reservoir (Pump well)

The wastewater of the landfill site is collected into a receiving reservoir located at the side of the peripheral road.

Buffer Reservoir

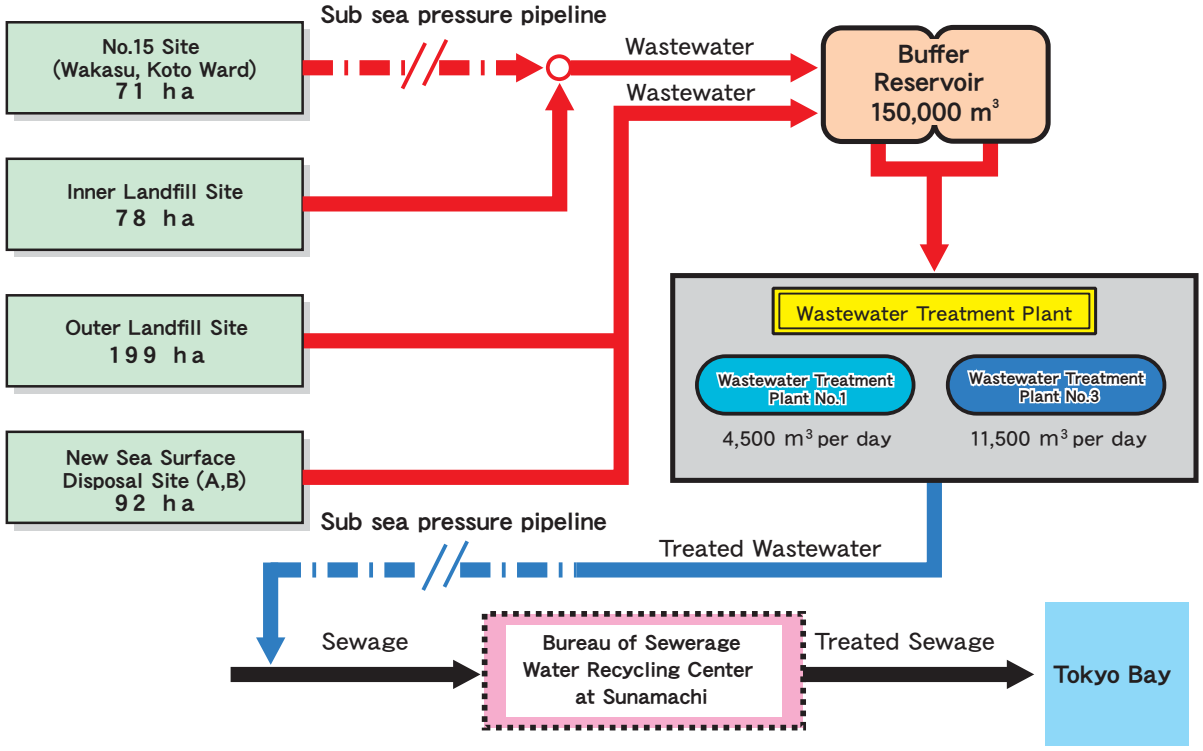
After the wastewater quality is adjusted in the buffer reservoir, the water is sent to the wastewater treatment plant.

Wastewater Treatment Plant

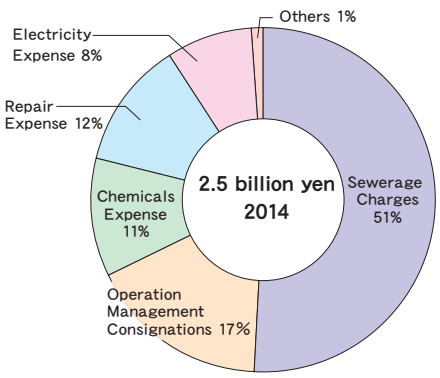
Using various methods, the wastewater from the landfill undergoes purification at the treatment plant.

Wastewater Treatment Flow

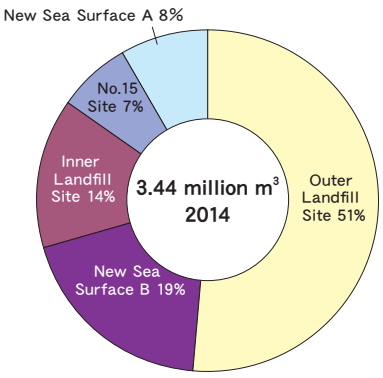
The final disposal management facility of the landfill site is cut off from the sea. If left on its own, the water from rainfall that gathers here would overflow. However, since the rainwater seeps through a stratum of waste to become polluted water, it is not flushed out to sea. Instead, following purification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



Cost of wastewater treatment



Volume of wastewater treatment



Quality of treatment water

pH……7.4 (Sewage Discharge Standards : 5～9)
Nitrogen…26mg/L (Levels Agreed with the Bureau of Sewerage : 120)
COD ……65mg/L (Levels Agreed with the Bureau of Sewerage : 150)

Raw Water Quality at Treatment Plant 3

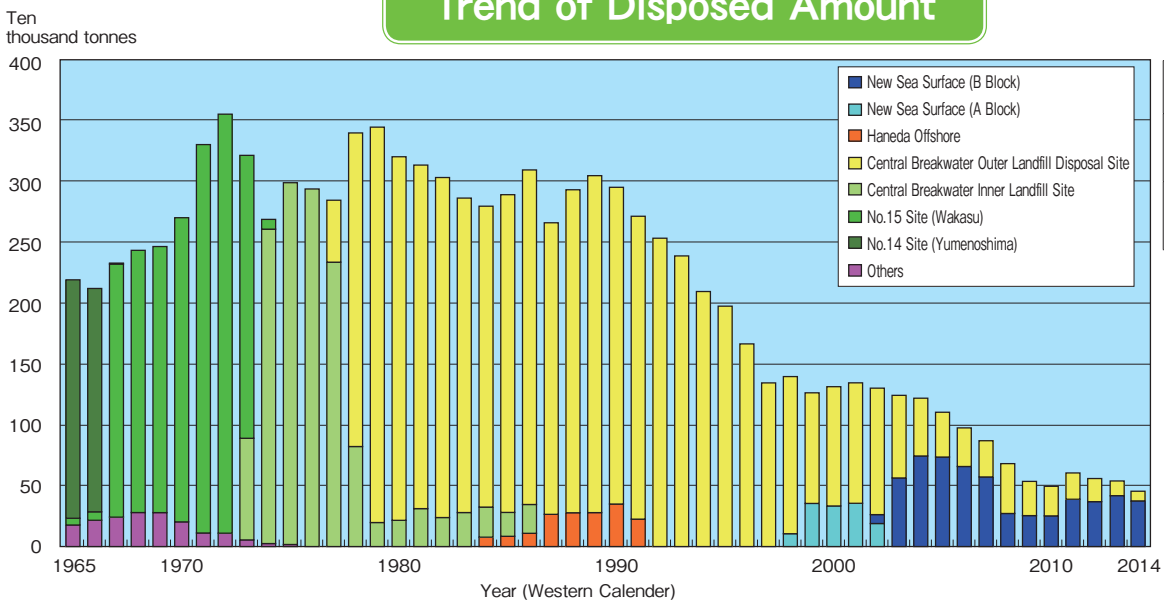
pH	8.1
Nitrogen	435mg/L
COD	295mg/L

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



Landfill site performance (ten thousand tonnes)

Fiscal Year	2012	2013	2014
Performance value	56	54	46

Energy Effective Utilization

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

Landfill-Gas Utilization Facility (Micro gas turbine)

Power generation capacity (Maximum)		275 kW
Gas used	Approx. 1.6 million m^3N per year	
Composition of Gas	Methane	Approx. 55 %
	Carbone dioxide	Approx. 25 %
	Nitrogen	Approx. 15 %
	Oxygen	1 % or less
Gas calorific value	Approx. 18 MJ/m^3N (Approx. 4,300 $kcal/m^3N$)	
	(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)	

Environment Learning

Social studies field trip of elementary school students

The number of visitors in 2014 was approx. 45,000
Elementary and Junior high school students totaled approx. 40,000

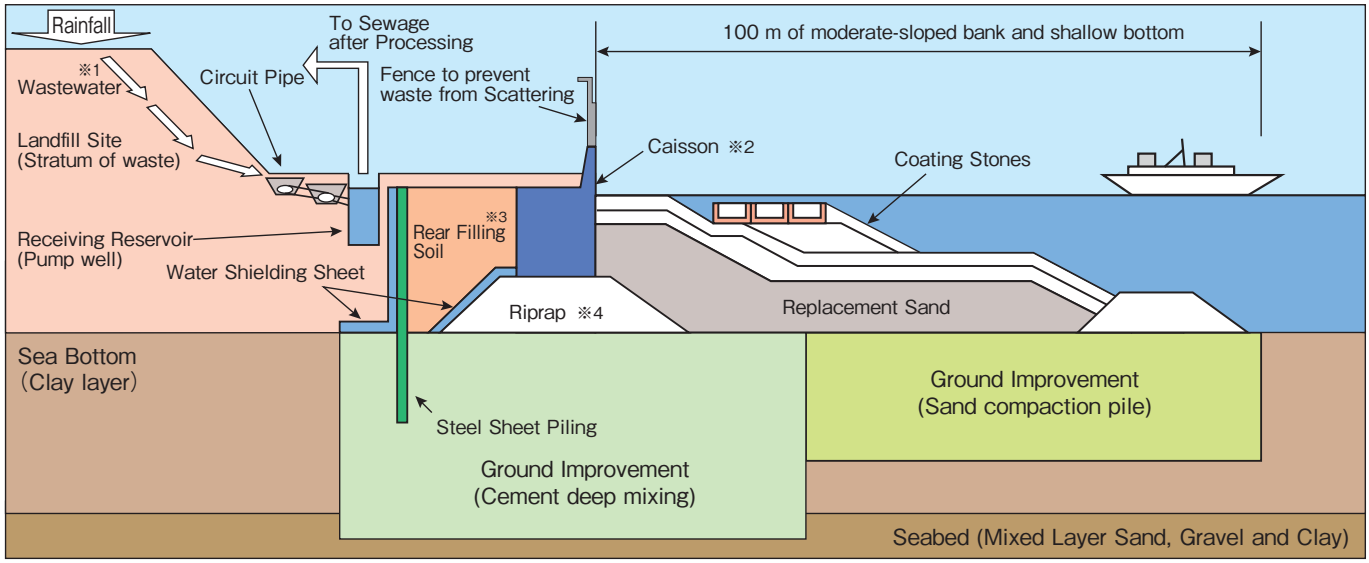
Waste Disposal by Landfill Plan

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

Type of Waste		Acceptance Policy
Waste Type	General Waste	・General waste produced by households, etc. within the 23 wards of Tokyo. ・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.
	Industrial Waste	・Industrial waste produced by small and medium-sized businesses within Metropolitan Tokyo. ・Waste that has already undergone intermediate treatment is accepted up to a fixed volume.
	Waste from Public Facilities	・Waste produced from waterworks and sewage facilities within Metropolitan Tokyo. ・Waste is accepted provided that it undergoes intermediate processing.
Earth and Sand Type	Dredged Soil	・Dredged soil is produced from streams and rivers within Metropolitan Tokyo and Tokyo ports. ・Dredged soil that cannot be used for the upkeep of rivers, canals or harbors is accepted.
	Soil Produced in Construction Work, etc.	・This soil is used for the upkeep of the landfill site and as soil covering for waste.

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.

Geographical Locations of Landfill Sites

Materials : Tokyo Metropolitan Bureau of Port and Harbor(2014Edition) ©Tokyo Metropolitan Government

Changes of Disposal Sites

	1955 '65 '75 '80 '85 '90 '95 2000 (Fiscal year)	Area
1 No.8 Site (Shiomi, Koto Ward)	'27 – '62 Landfill amount 3.71 million tonnes	364,000m²
2 No.14 Site (Yumenoshima, Koto Ward)	'57 – '66 Landfill amount 10.34 million tonnes	450,000m²
3 No.15 Site (Wakasu, Koto Ward)	'65 – '74 Landfill amount 18.44 million tonnes	712,000m²
4 Central Breakwater Inner Landfill Site	'73 – '86 Landfill amount 12.3 million tonnes	780,000m²
5 Central Breakwater Outer Landfill Site (Phase 2)	Landfill amount 54.6 million tonnes (As of the end of 2014 fiscal year) '77 –	1,990,000m²
6 Haneda Offshore Landfill Site (Haneda Airport, Ota Ward)	Landfill amount 1.68 thousands tonnes '84 – '91	124,000m²
7 New Sea Surface Disposal Site	Landfill amount 6.96 million tonnes (As of the end of 2014 fiscal year) '98 –	3,190,000m²

Current town names are shown in ( ).

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Chisaki, 3-chome, Aomi Koto-ku, Tokyo 135-0064
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http://www.kankyo.metro.tokyo.jp/resource/landfill/

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