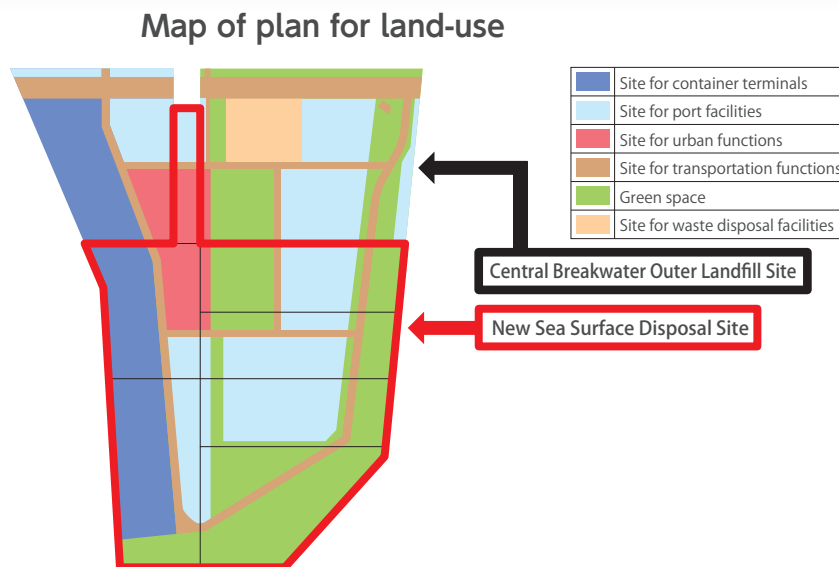


▶ III - ii Plan for land-use of New Sea Surface Disposal Site

The specific land-use of the New Sea Surface Disposal Site is as shown in the figure below. The current plan is to develop container terminals and port and harbor facilities on the west side and establish a large-scale green space on the east side. The plan for land-use has been devised with integration with the adjacent Central Breakwater Outer Landfill Site in mind.



▶ III -iii Case: Land-use at the former Central Breakwater Inner Landfill Site “Umi no Mori” (Sea Forest) Project

Reviving Tokyo: Creating a beautiful town surrounded by water and green corridors

The project site used to be the Central Breakwater Inner Landfill Site, where waste with a total weight of 12.3 million tons was landfilled from 1973 to 1987. Development of a planting ground and the planting of trees are underway to transform the 30-meter high mountain of waste into a forest.



The “Umi no Mori” (Sea Forest) project will nurture a rich and diverse forest with the concepts of resource-recycling, forest creation through cooperation by citizens, and forest creation as the origin of a green network.

Planting foundation soil

To enable planting at the former disposal site, the surface is covered with surface soil with a thickness of 1.5 meters to create the planting ground. The surface soil is a mixture of compost, soil improvement agents, high-quality soil, and soil dug from construction sites. The compost is made from the pruned branches and leaves of roadside trees in Tokyo. Resource recycling is realized in this manner.



Planting of trees through cooperation of citizens and businesses

In this project, activities from the preparation and planting of nursery trees to the nurturing of the forest are carried out with cooperation and collaboration from primary school students, volunteers, and businesses.

Features of planting

In the “Umi no Mori” (Sea Forest), which faces the ocean and is exposed to strong winds, the creation of a coastal forest is underway. The nursery trees are selected from domestic species to prevent genetic disturbance. Now, several years into the project, many kinds of organisms have already been observed inhabiting the area, and the forest is gradually becoming rich in diversity.




Inland Disposal Site : Futatsuzuka Disposal Site

Overview of disposal site

In the western part of Tokyo, there is the Futatsuzuka Disposal Site. This facility is located in an inland area, and is used for the final disposal of the municipal solid waste that comes from around four million citizens of the 26 cities comprising the Tama area. The Futatsuzuka Disposal Site is managed and operated by a special local public entity, the Tokyo Tama Regional Association for Waste Management and Resource Recycling, which is co-operated by the municipalities of the 26 cities in the Tama area.

The site was originally used to bury incineration ash and incombustible waste after the shredding process. The incineration ash is now recycled as a raw material for cement at the Eco-cement facility.

■ Overview of Futatsuzuka Disposal Site

Area	Site area : 59.1 ha/Landfill area : 18.4 ha, Management facility : 10.3 ha/Eco-cement facility : 4.6 ha, Remaining green area : 25.8ha	
Landfill capacity	Total landfill capacity : 3.7 million cubic meters (Breakdown) Waste landfill capacity : 2.5 million cubic meters, Cover soil capacity : 1.2 million cubic meters	
Landfill period	From 1998 up to the present day (16 years from 1998) * Due to the Eco-cement Project starting in 2006, the service life of the disposal site can be extended to 30 years or longer.	
Construction process	The disposal site is constructed in three phases in consideration of disaster prevention, environmental preservation, securement of landfill cover soil, reduction of financial burden and other factors. First phase construction : FY 1995-1998 Second phase construction : FY 2000-2002 Third phase construction : To be implemented in the future depending on the landfill condition	
Construction cost	Total cost: 50 billion yen (projected) *Including land acquisition costs, compensation costs, and other related costs	

■ Overview of Eco-cement Project

The Futatsuzuka Disposal Site was originally used to bury incineration ash and incombustible waste after the shredding process. Since 2006, the amount of landfilled waste has been reduced substantially by recycling the incineration ash, which accounted for more than 90 percent of the total landfill volume, as a raw material for cement named Eco-cement, leading to a successful extension of the service life of the disposal site.

- Project cost (including tax): Construction cost: 27.2 billion yen, maintenance and operation cost : 2.64 billion yen/year
- Project operation method: Publicly constructed and privately operated (The facility is owned by Tokyo Tama Regional Association for Waste Management and Resource Recycling. Private companies undertake the design, construction, operation, maintenance, and management of the facility and the sales of Eco-cement in an integrated manner.)

Overview of facility

Area	Facility site area : 4.6 ha
Scale of facility	Average processing amount of incineration ash, etc. : 300 tons/day Average production volume of Eco-cement : 430 tons/day
Material for processing	Incineration ash and molten fly ash that come from the waste incineration facilities in 25 cities and one town in the Tama area



Eco-cement facility



Example of Eco-cement usage

■ Environmental consideration

To minimize the impact on the nature around the disposal site, a zone with a width of around 50 meters outside the periphery of the landfill site was preserved as a remaining green area. Additionally, to reduce the area where trees were cut down, the road was constructed through a tunnel. The remaining green area, with an area of 25.8 hectares, is home to various animals and plants. One of the most important keywords for the management and operation of the disposal site is the "Environment."

■ Mechanisms preventing leachate leakage

Various facilities and mechanisms to prevent the leachate from draining into the surrounding environment are installed in the disposal site. The leachate is processed using microorganisms and chemicals until it satisfies the sewerage sluicing standards and is then discharged to the public sewerage system.

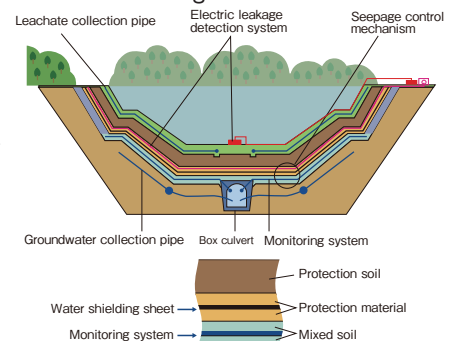


Forest green treefrog

Calanthe

Tokyo giant salamander

Cross-section diagram



Water shielding structure

The bottom of the disposal site has an impermeable multilayer structure to prevent the leachate from draining to the outside.

Leachate collection and drainage pipe

This pipe collects the leachate occurring in the landfill site and then sends it to the leachate treatment facility.

Groundwater collection and drainage pipe

This pipe collects the groundwater under the water shielding structure and then sends it to the box culvert.

Box culvert

This is a tunnel for inspection and maintenance works.

Electric leakage detection system

The system monitors damage to the water shielding sheet and detects the location of any damage.

Monitoring system

To monitor leakage of the leachate, a monitoring system is installed in the water shielding structure.

<Leakage detection function> If the water shielding sheet is damaged and the leachate leaks, this function detects the leakage.

<Water shutoff agent injection function> Additionally, this function injects a water shutoff agent to repair the damaged part.

Type of final disposal site in Japan

There are generally three types of the final disposal sites for waste: isolated, stabilized, and controlled types. For these types, the technical standards (structural standards), the technical standards for maintenance and operation (operation and maintenance standards) and the technical standards for closure (closure standards) are defined. The type of final disposal site should be selected according to the degree of impact on the environment resulting from the landfilled waste from the following three types: the isolated type disposal site, where harmful waste such as combustible residue, soot and dust, sludge, and tailings containing hazardous substances beyond standards is landfilled; the stabilized type disposal site, where waste plastics and other waste with stable properties is landfilled; and the controlled type disposal site, where waste that is not applicable for the isolated or stabilized type disposal sites is landfilled.

* The final disposal sites for waste installed and managed by the Tokyo Metropolitan Government are of the controlled type.

Appendix 3

Waste Management and Public Cleansing Law (December 25, 1970, Law No.137)

(Chapter 1 omitted)

Chapter 2 Municipal Solid Waste

Section 1 Municipal Solid Waste Management

Section 2 Municipal Solid Waste Management Service

Section 3 Municipal Solid Waste Disposal Facility

Article 8

Paragraph 1 : (Permission of Municipal Solid Waste Disposal Facility) : Any person intending to install a municipal solid waste disposal facility must have been granted permission by the prefectural governor with jurisdiction over the place of installation of said municipal solid waste disposal facility.

Paragraph 2 : (Standard of Permission) : The structural standards for a final disposal site of municipal solid waste are specified by Ordinance of the Ministry of the Environment. (See Box)

Paragraph 3 : (Operation and Maintenance of Municipal Solid Waste Disposal Facility) : The operation and maintenance standards for a final disposal site of municipal solid waste are specified by Ordinance of the Ministry of the Environment. (See Box)

Paragraph 4 : (Record and Reference) : (Excerpt) A person to whom permission has been granted shall record the specified matters on its operation and maintenance of the disposal facility, store said records in the disposal facility and present said records to satisfy requests by those who have an interest in the conservation of their living standard in relation to the disposal facility's operation and maintenance.

Paragraph 5 : (Reserves Fund for Maintenance)

Article 9

(Excerpt)

Paragraph 4 : Notification of the completion of the landfill disposal

Paragraph 5 : Application of the confirmation of disuse of the final disposal site

Ministerial Ordinance Determining Engineering Standards Pertaining to the Final Disposal Site for Municipal Solid Wastes and Final Disposal Site for Industrial Waste (March 14, 1997, Law No. Ministry of Health and Welfare Ordinance No. 1)

Article 1 (Final Disposal Site for Municipal Solid Waste)

Paragraph 1 (Structural Standards)

No.1) Enclosure around the landfill site

No.2) Notification board at the entrance indicating the final disposal site of municipal solid waste

No.3) Installation of landslide prevention work and/or settlement prevention work if required

No.4) Installation of retaining wall and other necessary measures for preventing runoff of waste

No.5) Measures for preventing contamination of public water areas and ground water by leachate

No.6) Installation of an open conduit or any other equipment around the landfill site for preventing inflow of surface water to the site from its opening

Paragraph 2 (Operation and Maintenance Standards)

No.1) Measures for preventing municipal solid waste from scattering or runoff escaping the landfill site

No.2) Measures for preventing exhalation of foul smells

No.3) Measures for preventing fire and full installation of fire extinguishing equipment

No.4) Required measures including spraying of chemicals for preventing habitation of rats and outbreaks of mosquitoes, flies and other noxious insects

No.5) The enclosure shall be designed to be capable of preventing people from entering into the site without permission.

No.6) The notification board shall be kept in a readily observable condition at all times.

No.7) Retaining walls shall be periodically inspected, and when recognized that the retaining walls are in danger of collapse, necessary measures shall be taken to prevent such occurrence.

No.8) Before landfilling municipal solid waste, the surface of the seepage control mechanism shall be covered by sand or any other material to prevent damage to the seepage control mechanism.

No.9) The seepage control mechanism shall be periodically inspected, and when it is recognized that the seepage control effect may decrease, necessary measures shall be taken promptly for recovery of the effect.

No.10) Water quality inspection shall be made of the ground water collected at two places around the final disposal site or the water collected from the groundwater drainage collection and drainage facilities.

No.11) When degradation of the water quality is noted as the result of the water quality inspection, necessary measures shall be taken for investigating the cause and conservation of the living environment.

No.12) (Omitted)

No.13) For retained water and the like, the reservoir shall be periodically inspected, and if it is recognized that the reservoir may break, necessary precautions should be taken to prevent this.

No.14) Maintenance of leachate treatment equipment shall be made by conducting a water quality inspection of the specified items, and the water quality of the wastewater should comply with sewerage sluicing standards

No.15) The functions of the open conduit and other equipment shall be maintained.

No.16) Ventilation apparatuses shall be installed to discharge gas generated from the landfill site.

No.17) The landfill site having completed landfill disposal shall have the opening closed by covering soil of a thickness of 50 cm or more.

No.18) For the completed landfill site, measures for preventing damage to the covering soil.

No.19) The remaining landfill capacity shall be measured and recorded at least once a year.

No.20) The type and quantity of landfilled waste as well as the checks, inspections, and actions for maintenance shall be recorded, and the records shall be preserved until closure of the final disposal site.

Paragraph 3 (Closure Standards)

No.1) The final disposal site shall be one complying with structural standards.

No.2) Measures for preventing exhalation of foul smells

No.3) Measures for preventing fires

No.4) Measures for preventing habitation of rats and outbreaks of mosquitoes, flies, and other noxious insects

No.5) The result of the quality inspection of groundwater shall comply with the quality standards for groundwater.

No.6) The quality of the retained water or the like collected by the water collecting and drainage facilities shall be recognized as complying with the standards for closure over two years or more.

No.8) Gas shall be scarcely produced.

No.9) The temperature inside the landfill site shall not be abnormally high as compared to that under the peripheral ground.

No.20) The opening shall be closed by a covering with a thickness of 50 cm or more.

No.11) No settlement, cracking, or other deformation shall be observed on the surface of the landfill site.

No.12) There shall be no effect of the final disposal site on the living environment of the surrounding area.

Tokyo Bay-side Landfill

~ Structure, Management, Land-use ~



■ Production

Tokyo Metropolitan Government

■ Cooperation

Tokyo Tama Regional Association for
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