

Educational and Recreational Activities

A unique landfill coexisting with vibrant marine eco-system, mangroves, grassland and shoreline habitats, Semakau Landfill provides educational yet fun and exciting outings unrivaled in other parts of Singapore.



Bird Watching

A total of 66 species of birds have been recorded on Semakau Landfill. They consist of migratory birds, shore birds and forest birds who made Semakau Landfill their home due to an abundance of fish in the surrounding waters.



Intertidal Walk

The 3-hour tour of the shoreline of Pulau Semakau during low tide would allow visitors to marvel at the vast mangroves, seagrass, coral reefs, crabs, starfishes, sponges, shrimps and many other interesting flora and fauna.



Educational Tour

The educational visit consists of a briefing on the solid waste management in Singapore, the design & operation of Semakau Landfill, as well as a tour of the landfill.



Barging of Waste to Semakau Landfill



| Landfill Data | |
|---------------------|--|
| Landfill Area | 350 hectares |
| Landfill Capacity | 28 million m ³ (when filled to the perimeter bund level with permanent capping) |
| Equipment Data | |
| Refuse Transferring | 6 barges of 3,500 m ³ capacity each 3 pusher tugs |
| Refuse Handling | 2 spreading excavators 4 unloading excavators 10 dump trucks |
| Landfilling | 1 floating platform 4 compactors 5 bulldozers 1 long arm excavator |
| Auxillary Equipment | wastewater treatment plant |

Semakau LANDFILL



Semakau Landfill was commissioned in April 1999 and is Singapore's only landfill for waste disposal. Ash from incineration plants and non-incinerable waste such as construction and renovation debris, are disposed of at the landfill. Phase 1 construction of Semakau Landfill commenced in 1995. It was constructed concurrently with Tuas Marine Transfer Station within 4 years and at a total cost of \$610 million. Phase II construction commenced in Jan 2014 and was completed in Jul 2015 at a total cost of \$36 million.

Semakau Landfill covers a total area of 350 hectares and has a landfill capacity of 28 million m³ when filled to the perimeter bund level with permanent capping. To create the required landfill space, a 7-km perimeter rock bund was built to enclose a part of the sea off Pulau Semakau and Pulau Sakeng. The bund is lined with impermeable membrane and a layer of marine clay to ensure that the water collected in the landfill due to rainfall and the filling of ash is contained within the landfill area and treated at a wastewater treatment plant. Other ancillary facilities were also built on the island to ensure self-sustainability of the landfill operation.

The Semakau Landfill is expected to meet Singapore's need for landfill space to 2035 and beyond.

WASTE DISPOSAL PROCESS

Tuas Marine Transfer Station



All incoming refuse collection vehicles are first weighed at the weighbridges (Pic. 1) before proceeding to the refuse reception hall inside the transfer building of the Tuas Marine Transfer Station (Pic. 2).

At the refuse reception hall (Pic. 3), refuse is discharged directly into specially built barges. A total of twenty discharge bays are available to ensure a short turn-around time for the refuse collection vehicles. The tipping platform is designed to overhang into the barge so that refuse is tipped into the center of the barge. Excavators are used to spread the refuse in the barge to ensure that it is optimally loaded.

At the end of the day, the hatch covers of the fully loaded barge are closed to prevent the waste material from being blown off by the wind during the voyage (Pic. 4). The closed barge is then coupled with a tugboat for its 33.3km journey to the Semakau Landfill (Pic. 5).

It takes about three hours for the barge to travel from the Tuas Marine Transfer Station to the Semakau Landfill. The barging operation is usually carried out in the evening to maximise the usage of marine vessels.

Upon arrival at the Semakau Landfill, the tugboat pushes the barge into the enclosed building before disengaging itself and returning to the Tuas Marine Transfer Station with another empty barge.

Semakau Landfill



Upon arrival at Semakau Landfill, large excavators with interchangeable and specially designed grabs, unload the solid waste from barge directly into 35-tonne payload dump trucks. It takes about six hours to empty each barge.



At the Semakau Transfer Building (Pic. 1), incineration ash or non-incinerable waste (NIW) being loaded into dump truck and carried to the Floating Platform or Phase I landfill cell.

Dump truck carrying incineration ash goes to designated discharge bay at the Floating Platform for direct discharges of ash into deeper end of the Phase II cell (Pic. 2) or for conventional landfilling at Phase II cell involving bulldoze and compactor (Pic. 3).

Dump truck carrying non-incinerable waste (NIW) goes to designated Phase I landfill cell for conventional landfilling involving bulldozer and compactor (Pic. 4).



Development Stages



Phase I

An aerial view of Semakau Landfill upon its completion in April 1999. The sea space within the perimeter bund was divided into two sections. One half consisted of eleven wet cells separated by sand bunds. The other half formed a lagoon connected to the sea via a gap in the bund.

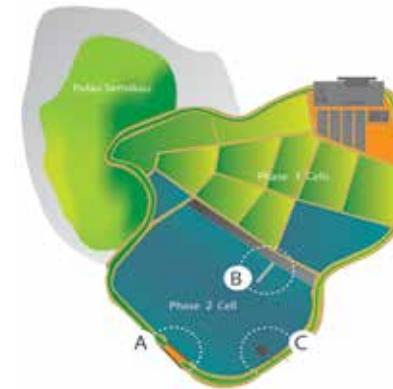
Phase II

Phase II development which was completed in July 2015 converted the remaining 157 hectares of enclosed sea space into a giant landfill cell to meet the waste disposal needs of Singapore from 2016 onwards. The development comprises the following construction works:

(A) Construction of build-up sand bund to close the 160m gap at the southern tip of Semakau Landfill;

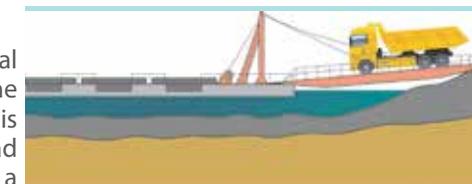
(B) Design, construction, installation, testing and commissioning of Floating Platform; and

(C) Design, construction, installation, testing and commissioning of Wastewater Treatment Plant.



Function of the Floating Platform - B

The Floating Platform is used for safe disposal of incinerated ash into the Phase II Cell. As the area of the cell is big and seabed uneven, it is necessary to use a floating platform to spread the incinerated ash to level the seabed to a depth of about 2m before conventional landfill operations can be carried out.



Function of the Wastewater Treatment Plant - C

After closing of the gap, the water within the Phase II Cell will build up due to the filling of ash within the cell and rainfall. To prevent flooding, the excess water within the Phase II Cell will be treated at the wastewater treatment plant to meet Trade Effluent Discharge Standards before it is allowed to be discharged to the sea outside the cell.

