Port Otago Limited.

Inshore Dredging Disposal Monitoring Factsheet - Disposal History

New Era

Why dredging is necessary?

Siltation

Like other tidal ports all around the world, the channel and basin areas within Otago Harbour need ongoing dredging to maintain the desired design depths and channel alignment for safe navigation.

Sediment is transported up the coast of the South Island by the prevailing currents. A proportion of the sediment transported past the harbour is ducted into the harbour on the flood tide and whilst some of this material is also transported out of the harbour on the ebb tide, there is a net retention of material within the Otago Harbour. This sediment is moved progressively up the harbour channel towards Dunedin. Deposition occurs on the insides of the channel bends, and also within areas where the channel is wider, and the current strength is reduced.

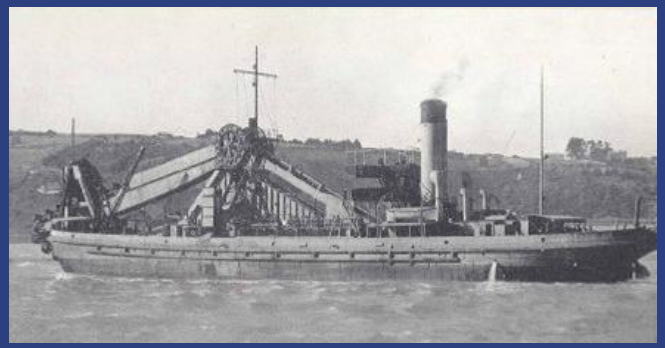
Wave action is also an important factor in the siltation process, as it is responsible for putting into suspension the fine silt and clay sediments from the large area of shallows. Tidal and wind generated currents then carry this suspended material, some of which is deposited into the upper Dunedin basin area where tidal and wave action is weak. Fine silts also enter the Dunedin basin during periods of heavy rainfall via the Leith River and the many small creeks and stormwater drains that also discharge into the harbour.

Dredging is an ongoing process as the sides of channel need to be maintained which in turn contributes material to the base of the channel that needs to be dredged to maintain an efficient channel, as it disturbs the natural channel banks. Any development dredging phase of the channel has generally always been followed by increased maintenance dredging requirements while the side slopes settle to their natural angle.

Port Otago carries out regular hydrographical surveys to identify areas of sedimentation, which in turn, determines the annual maintenance dredging program.

Bucket dredge Vulcan circa 1877

Bucket dredge circa 1929



Dredging and Disposal history

1800s

The first dredging in Otago Harbour occurred just after the Otago gold rush in 1865 when convict labourers manned a small travelling grab dredge to deepen alongside of jetties in the Dunedin basin. Since that time, the harbour has undergone major development, including the dredging of shipping channel, basins and berth pockets, the reclamation of large areas of foreshore and the construction of many wharves and jetties.

The stabilisation of the entrance channel with the construction of the Mole and placement of various rock groynes to train the tidal flow has also been carried out to assist in maintaining channel position. All of this work has been carried out to service the region by enabling shipping to progressively continue to meet the demands for world trade.

The initial development of the channel and berth areas involved dredging large quantities of material. Much of this material was able to be utilised to form reclamations around the foreshore of Dunedin, with reclaimed land now encompassing the shoreline from Anderson's Bay to Logan Park. With the completion of the reclamations, the only other economical option for disposal of dredged material was to take it out to sea for disposal. This practice has been carried out since at least 1882 when attempts were first made to deepen the sand bar at the entrance to the harbour.

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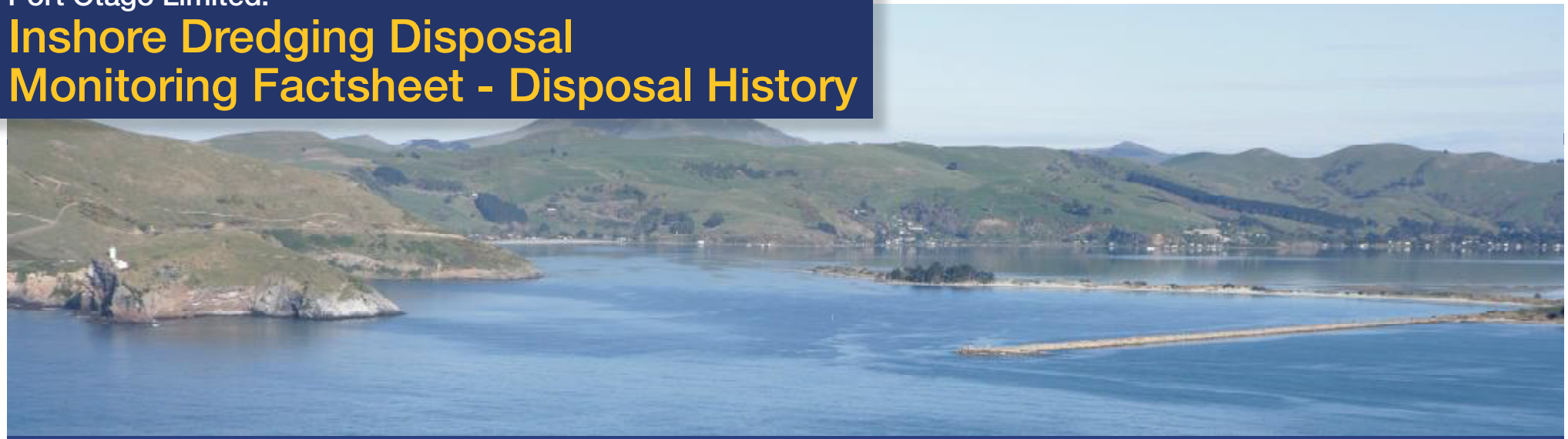

Port Otago

Disposal history - 1900s to 2000s

Prior to 1985, all dredged material was placed at the Heyward Point site. This included material derived from both development and maintenance dredging. In 1985, the Aramoana (Spit) disposal site was first used and was the preferred location for a number of years because it is closer to the dredging areas.

This results in the dredge spending less time going to and from the disposal site, and it reduces the amount of material needing to be disposed of at the Heyward Point site. The Heyward site is preferred in rough weather site, as it can often be calmer than the Aramoana site due to the greater depth of water available.

A third location, Shelly Beach was added as a further disposal option in 1987. Sediment was placed here to assist in re-nourishing Shelly Beach, which suffers from erosion. The site has consenting limitations on the amount of material deposited, and the dredging location for material deposited. Only sand from claims seaward of and including Taylers Bend are able to be disposed of at Shelly Beach to ensure that material moving onto the beach is of a similar composition to the sand that already exists there.

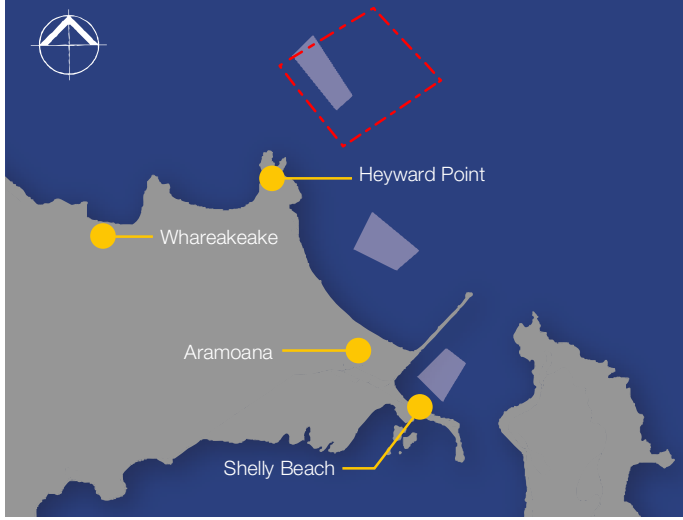

Figure 1. Map of inshore areas entrance to Otago Harbour. Existing disposal grounds shown in light blue. Proposed new disposal ground within the red dashed line.

The sand that is deposited at Shelly Beach gets gradually moved onto the beach during calmer weather, and it is moved eastwards along the beach during periods of more extreme events leading to erosion. Some of the sand placed at Shelly Beach eventually gets carried across the rock groyne at the eastern end of the beach on the flood tide to be deposited further up the harbour. For these reasons, the Shelly Beach site has been used sporadically for disposal in recent years.

Dredging has been, and will remain an important part of Port Otago's operations. Disposal at sea is the key economically viable way to dispose of dredged material.

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