

THIN-LAYER PLACEMENT PROJECT SHEET



Pine Harbour Marina

August 2016

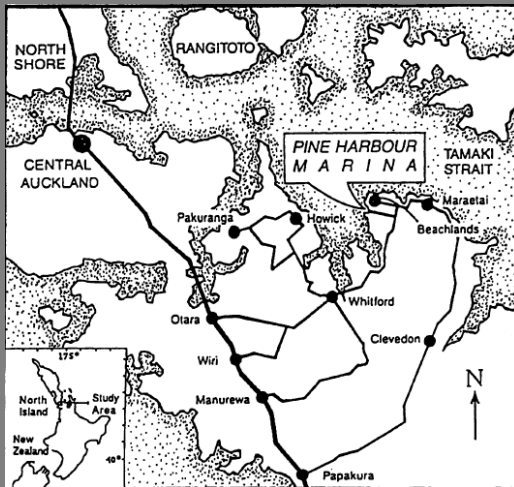
Location: Pine Harbour Marina

Type: Historical dredged material placement

Area: not available

City: Auckland

Country: New Zealand



Background

The Pine Harbour Marina is located in the Turanga-Waikopua embayment. The Marina's channel crosses a broad intertidal zone. Maintenance dredging is required for the channel on a regular basis. The channel is mainly composed of fine sand and muddy material; therefore, there was public opposition to dispose the dredge material in the littoral environment since it could transport to adjacent beaches and affect their water quality. In 1994 the dredged material was side-casted into a mound of muddy material about 50 m broad and 0.5 m high alongside the channel. The material however migrated back into the channel through reverse littoral drift processes (Healy et al. 1999). Due to this issue in 1997 the marina was allowed to place the dredged material in a thin layer over an area of similar sediment character in the adjacent embayment. The granting authorities required a substantial monitoring program for the dredged and disposal areas. The main objectives of the monitoring efforts were to confirm that "the dredging activity does not cause the release of sediment into the surrounding environment at levels in excess of those naturally experienced", and that "the marine disposal activity does not cause significant adverse effects upon the benthic organisms present in the embayment or cause the release of sediment into the environment surrounding the disposal site at levels in excess of those naturally experienced" (Healy et al. 1999).

Project Description

This project focused on the monitoring aspects of the thin layer disposal area. The dredging operations were completed within 5 weeks. The following parameters were monitored for this project: turbidity and suspended solids concentration downstream of the dredging and disposal operations, hydrographic, side-scan sonar, and ecological surveys of the dredged and disposal areas before, during and after each annual dredging operation.

Findings

The results of the monitoring efforts involved with this project showed that the turbid plume at the disposal site had high turbidity (25-30 NTU) and suspended solids concentrations (50-70 mg/L) at a distance smaller than 250 m from the barge. At distances greater than 250 m, turbidity was close to background (~ 9 NTU) which indicates that the turbidity plume was a transient future since it only lasted for 5 to 15 minutes (Healy et al. 1999). The bathymetric and side-scan sonar surveys indicated that thin layer placement was achieved and that the material transport is not significant. The ecological surveys indicated that the number of species at the disposal site declined over time however this change was not significant. A fine-grained sediment resuspension model was used to simulate the time-evolution of suspended solids concentration under a progressive wave field, or waves and a superimposed (weak) current (Mehta and Li 1997). This model showed that erodibility of bottom sediment in the disposal area is not expected to change significantly due to disposal operations. Sediment transport has not been detected in the surrounding intertidal or beach environments due to the thin layer placement event. All these results indicate that the main objectives of the project were achieved and that thin layer placement of muddy sediments did not cause adverse effects to the surrounding environment, sediment transport, and benthic organisms.

References

- Healy, T.; Mehta, A.; Rodríguez, H.; Tian, F. (1999) Bypassing of Dredged Littoral Muddy Sediments Using a Thin Layer Dispersal Technique. *Journal of Coastal Research*, Vol. 15, No. 4, pp. 1119-1131
- Mehta, A.J. and Li, Y. (1997). A PC-based short course on fine-grained sediment transport. OCP 6297 Class Report, Coastal Oceanographic Engineering Department, University of Florida, Florida, USA, 91p.

Points of Contact

Information on thin layer placement (TLP) case studies has been compiled as part of a DOTS/EWN project to provide a source of information, knowledge, and experience on TLP of sediment or dredged material in aquatic environments. The Thin Layer Placement Website and Map-Portal are funded by the US Army Engineer Research and Development Center (ERDC). POCs for the Thin Layer Placement Website and Map-Portal are:

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