

TR17-132-133

30. Seismic survey for the proposed foreshore development, Georges Bay, St Helens.

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A combined marine and land seismic survey was conducted across an area of several hectares on the foreshore at the Esplanade, St Helens. A proposal to develop much of the area is under consideration by the Portland Municipal Council, but in order to estimate the amount of fill and the nature of compaction under load, it was necessary to determine the types of material under the bay. A map showing the area to be filled is included in Figure 33.

GEOLOGICAL SETTING

The township of St Helens is built upon what appears to be a wide alluvial plain or terrace of the George River. Weathered granite crops out at the Golden Fleece bridge. Previous work in the area has indicated that an old, deep, clay-filled channel of the George River is present, although the total depth and southern boundary was unknown in the region of the township near the Esplanade.

SEISMIC SURVEY

An array of hydrophone spreads were fired from a control point on the jetty in front of the Bay View Hotel. A land control spread was fired along the bay side of the Esplanade. The spreads covered most of the area to be filled, but only one spread extended into the proposed marina area.

The survey was undertaken with Geospace GT2A 12 channel refraction equipment and with the exception of the land spread and an along-jetty cross spread, all detectors were placed at 15 m intervals (others at 7.5 m). All water-covered shots were fired on the bay floor.

The following materials were found:

Material	Velocity (m/s)
Water saturated sand and silt, (same velocity as water, but indicated by excess depth over known water depth).	1450
Firm clay	1650-1800
Weathered granite	2000-2400
Granite	>3600

Two profiles are shown in Figure 33 illustrating the typical distribution of the materials. The area is founded on granite with a thick clay covering and weathered granite is commonly present. The clay is overlain by water or saturated sand and the thickness of saturated sand ranges between 1 and 3 m and increases seaward.

CONCLUSION

Filling of the area will cause displacement of much of the saturated bay floor sand and silt, and may displace some of the upper parts of the clay deposit. In addition to some displacement, a high degree of consolidation is to be expected, perhaps as much as 60%. The seismic velocity indicates that the clay is well consolidated and therefore only the wet upper layers will be affected by loading (probably less than one metre). The regional geology suggests an over-consolidation in the clay equivalent to at least 30 m of its own thickness, or about 600 kPa, and thus few effects will be noted in the clays from addition of fill. An indication of what is likely

to happen is shown in the fill embankment along the Esplanade. Here settlement has taken place to a base level equivalent or to just below the boundary between the saturated sand and clay, with consequent displacement of sand and some clay over the adjacent 15-20 m (cross profile, fig. 33). It should be noted however, that the shapes of the shore profile (CD) are probably a combination of fill and shoreline effects.

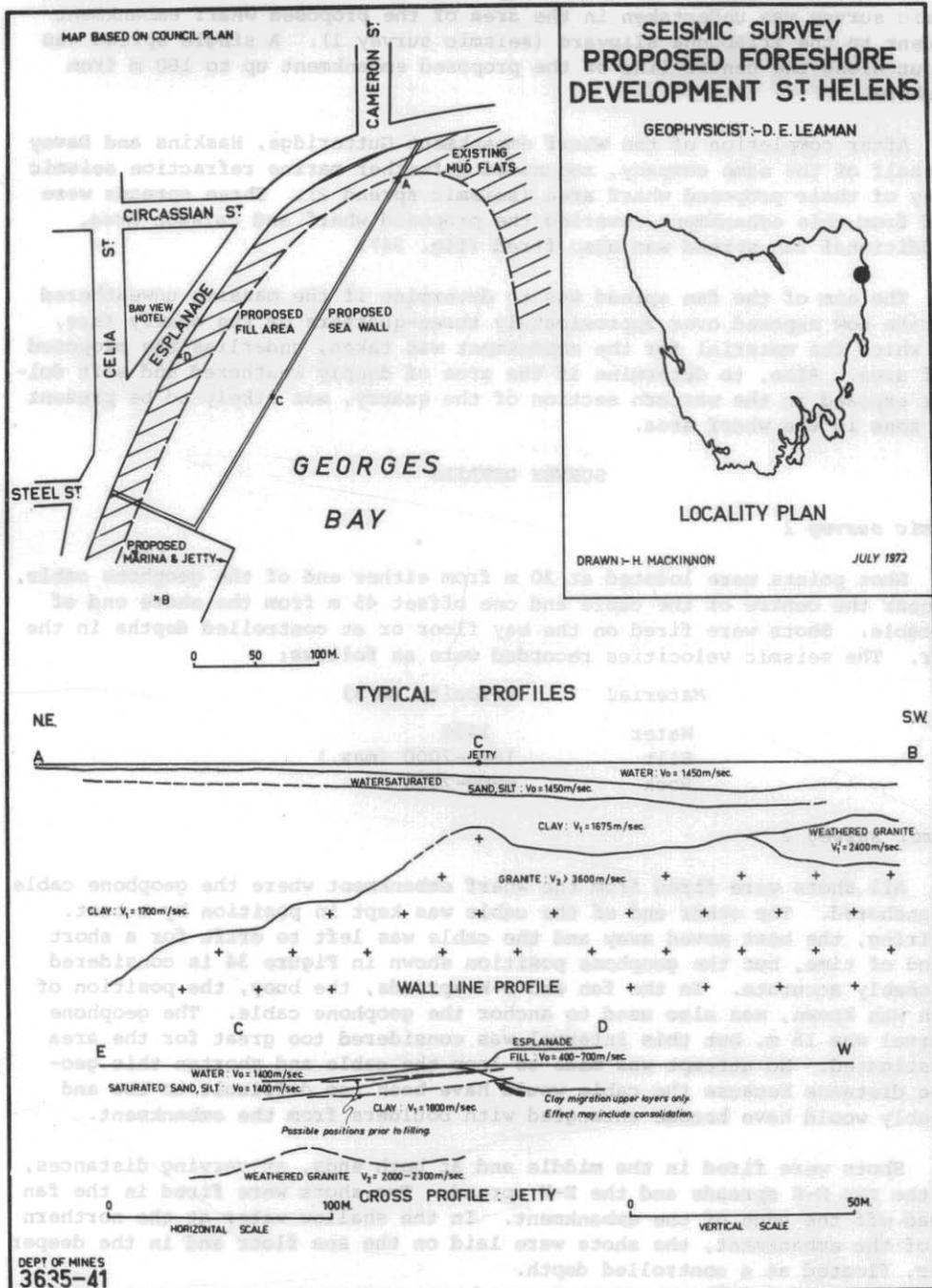


Figure 33.

5 cm