



Division of Mines and Mineral Resources — Report 1991/30

Reconnaissance geological site investigation: proposed secondary sedimentation tanks, HCC sewage treatment plant, Selfs Point

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Introduction

At the request of the Hobart City Council, a preliminary investigation of the foundation conditions for the proposed secondary sedimentation tanks at the Selfs Point sewage treatment plant (525900 mE, 5255950 mN; fig. 1) was carried out by the Division of Mines and Mineral Resources. The investigation sought to provide Council with basic geological information on the subsurface materials and conditions existing at the site. A reconnaissance seismic refraction survey was carried out as the first stage of the investigation. This report discusses the findings and recommends further work.

Geology

The provisional 1:25 000 Engineering Geology Map of the Greater Hobart area (Hofto, 1990) indicates that the sewage treatment plant at Selfs Point is on reclaimed land and underlain by fill. A series of boreholes was drilled by the Department of Mines in 1971 in relation to the construction of the existing works at the sewage plant. The drilling indicated that a variable thickness of fill material, ranging from 5.2 to 21.9 m thick, occurred over the site. The majority of the bores encountered Tertiary basalt, possibly interbedded with Tertiary sediments, underlying the fill. Columnar basalt is seen in outcrop in the road cutting along Selfs Point Road between the sewage treatment plant and the oil depot further to the east.

Seismic refraction survey

Survey details

A two spread seismic refraction survey was carried out to ascertain the nature of the subsurface materials at the site of the proposed works. A twelve-channel seismograph was used, with spread lengths of 60 m and 5.0 m geophone spacings. Shots were fired from both ends, with an extension and centre shot in one spread. Calculations were by the critical distance, intercept time, and where appropriate the reciprocal time methods. The locations of the spreads are shown in Figure 2 and the results of the survey summarised in Table 1.

Results

It is stressed that in any investigation employing geophysical methods, the results are an interpretation (based largely on experience) of the physical properties measured. No amount of investigative work at this preliminary survey level can accurately predict the extremes or rapid variability of materials (both laterally and vertically) that may exist over short distances. The results should be viewed as a guide only to conditions anticipated at the site. A series of drill holes or trial excavations should preferably be undertaken to test the validity of the information inferred from the geophysical results.

The seismic refraction survey results (Table 1) indicate low velocities representing soil conditions (fill

Table 1
Seismic refraction survey results

Spread	Velocity (m/s)	Layer depth (m)	Geological interpretation
1	V ₁ 450-700	3.5-5.5	Fill — soil characteristics
	V ₂ 2600-2700	-	MW-SW bedrock (basalt); joints generally tight
2	V ₁ 450-600	3.5-4.5	Fill — soil characteristics
	V ₂ 2350-2800	-	MW-SW bedrock (basalt); joints generally tight

MW = moderately weathered; SW = slightly weathered



Figure 1
Location of site investigation

material) at between 3.5 and 5.5 m depth, underlain by a competent bedrock, probably a moderately to slightly weathered basalt.

The velocity plots are basically symmetrical but have stepped segments indicating that variable foundation conditions can be anticipated across the site. This stepping effect is considered to represent a locally uneven bedrock surface with probable variable weathering and jointing of the rock mass.

Typically, basalt is likely to exhibit highly variable weathering characteristics which results in rapid changes in the nature and strength of the rock mass over short distances.

Foundation conditions

The information gained from previous investigations in the immediate area, together with the results of the current preliminary investigation, indicate that the site has between 3.5 and 5.5 m of consolidated fill overlying a moderately to slightly weathered basalt, possibly interbedded with Tertiary sediments. The drilling results from the 1971 investigation on the land

adjacent to the current site suggests that the basalt may be of limited thickness, possibly a few metres only, and underlain by clayey sediments. It is not known whether there are several basalt flows.

Recommendations

It is recommended that further work be undertaken to assess the results of the seismic refraction survey. A drilling program of up to five boreholes taken into bedrock is proposed.

Several drilling options are available although it is considered that totally cored holes from the surface are the most appropriate. Several metres of bedrock (about 4–5 m) should be cored prior to termination of the hole, giving borehole depths of the order of 10 to 12 metres.

Reference

HOFTO, P. 1990. *Urban Engineering Geological Mapping Project. Map 1. Engineering Geology Greater Hobart Area.* Division of Mines and Mineral Resources Tasmania.

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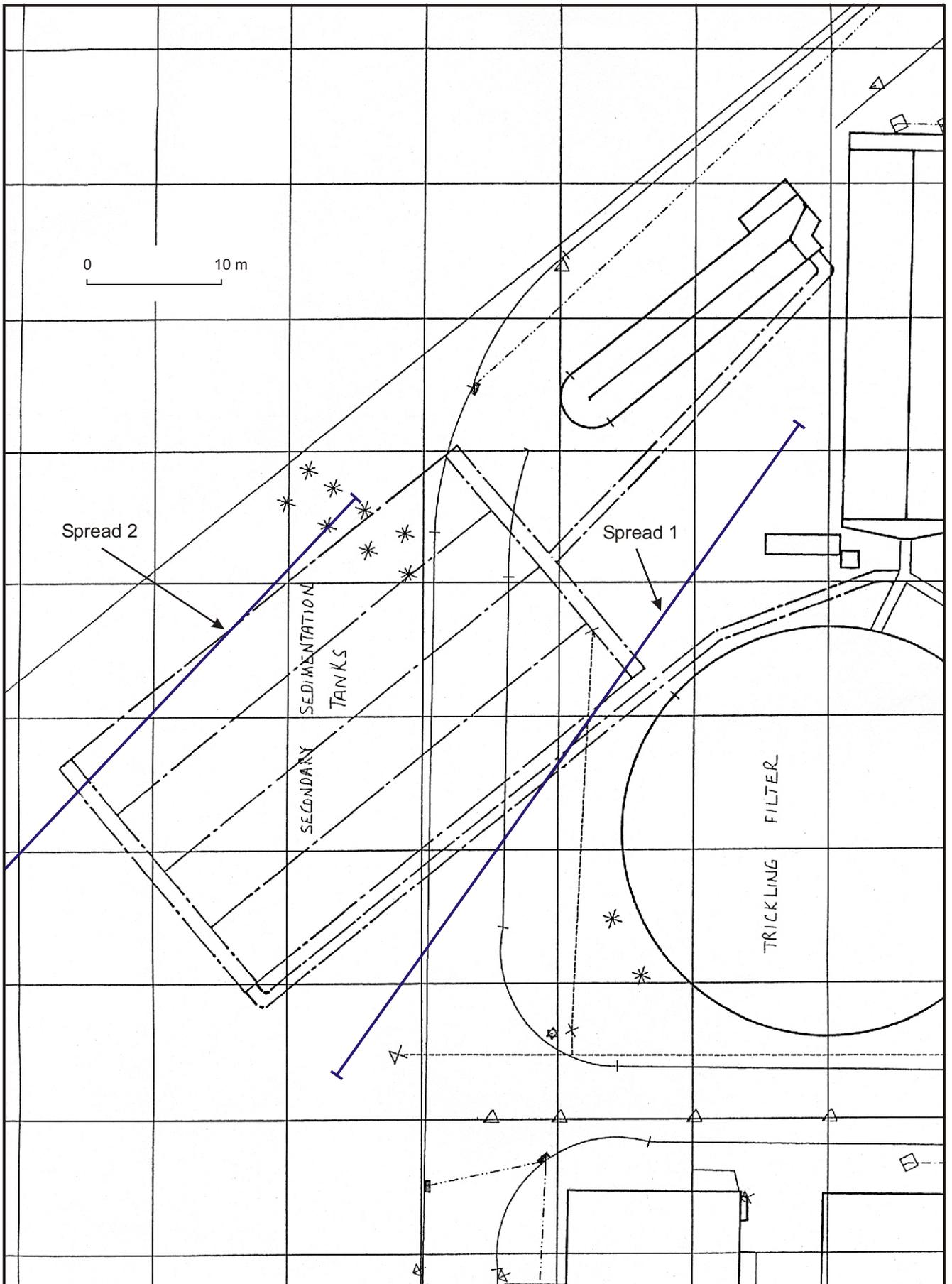


Figure 2
 Location of seismic refraction spreads