

Reconnaissance geological investigation of a proposed reservoir site, Glenhall, Kingston

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The Hobart Regional Water Board (HRWB) engaged the services of Mineral Resources Tasmania to carry out a reconnaissance geological investigation for the proposed 40 ML in-ground reinforced concrete reservoir on a site adjacent to the Southern Outlet, at Glenhall, Kingston (524000 mE, 5242700 mN).

The preliminary on-site inspection indicated that geological conditions may vary across the site; a major change in rock type was anticipated from surface observations. Following subsequent discussions with the HRWB, it was decided that the initial phase of the geological investigation should involve shallow test pitting to ascertain the nature and spatial distribution of the near subsurface materials prior to the planned series of cored boreholes to 15 m depth as originally proposed by the Board.

The resulting investigation involved the digging of three test pits (fig. 1). Descriptions of materials encountered are detailed in the appended engineering logs. The apparent discrepancy in the siting of test pit 2 in relation to the proposed site (stations A-B-C-D, fig. 1) resulted from a misunderstanding of the actual site location by the Board's engineer who was present at the time of the investigation.

The provisional 1:25 000 scale Engineering Geology Map of the Greater Hobart Area (Hofto, 1990) indicates that the site lies close to the contact between Permian age sedimentary rocks and Tertiary age basalt. The reconnaissance inspection of the immediate area prior to the test pitting showed the map to be partially in error, specifically with respect to the indicated boundary between the Permian and Triassic sedimentary rocks occurring to the west. The continuous section exposed in the Southern Outlet road cutting immediately to the north of the proposed site showed a sequence of cross-bedded quartz sandstone (Triassic age) in contact with basalt to the west; the contact as observed is indicated in Figure 1. Permian age sedimentary rocks were noted in the

general area but well to the east of the site under consideration.

The engineering logs show *in situ* high strength basalt (slightly weathered bedrock) occurring at shallow depth (1.2 m) at the crest of the hill as shown in test pit 1. In contrast, test pits 2 and 3 encountered a 1.5 m layer of highly weathered tuffaceous material overlying a low to medium strength quartz sandstone (bedrock).

From the available geological information, the sandstone-basalt contact is considered to pass directly through the proposed reservoir site (stations A-B-C-D). With the absence of additional subsurface information, the actual boundary and its orientation is unknown. It is possible that only the NW corner (station B) is underlain by sandstone with the majority of the site underlain by basalt. The thickness of the basalt beneath the site is unknown but may well be quite variable as it is close to the edge of the flow.

In summary, the proposed reservoir site is most probably underlain by two rock types of differing age. Each rock type has distinct physical properties and there is the potential they may not behave uniformly under load.

It is recommended that a second phase of test pitting be carried out to more accurately define the geological boundary between the rock types. This would then enable a more informed decision with respect to the final siting of the structure. Depending on the results, a short drilling program involving cored boreholes may be deemed necessary to ascertain the nature and variability of materials at depth.

REFERENCES

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

[7 April 1994]

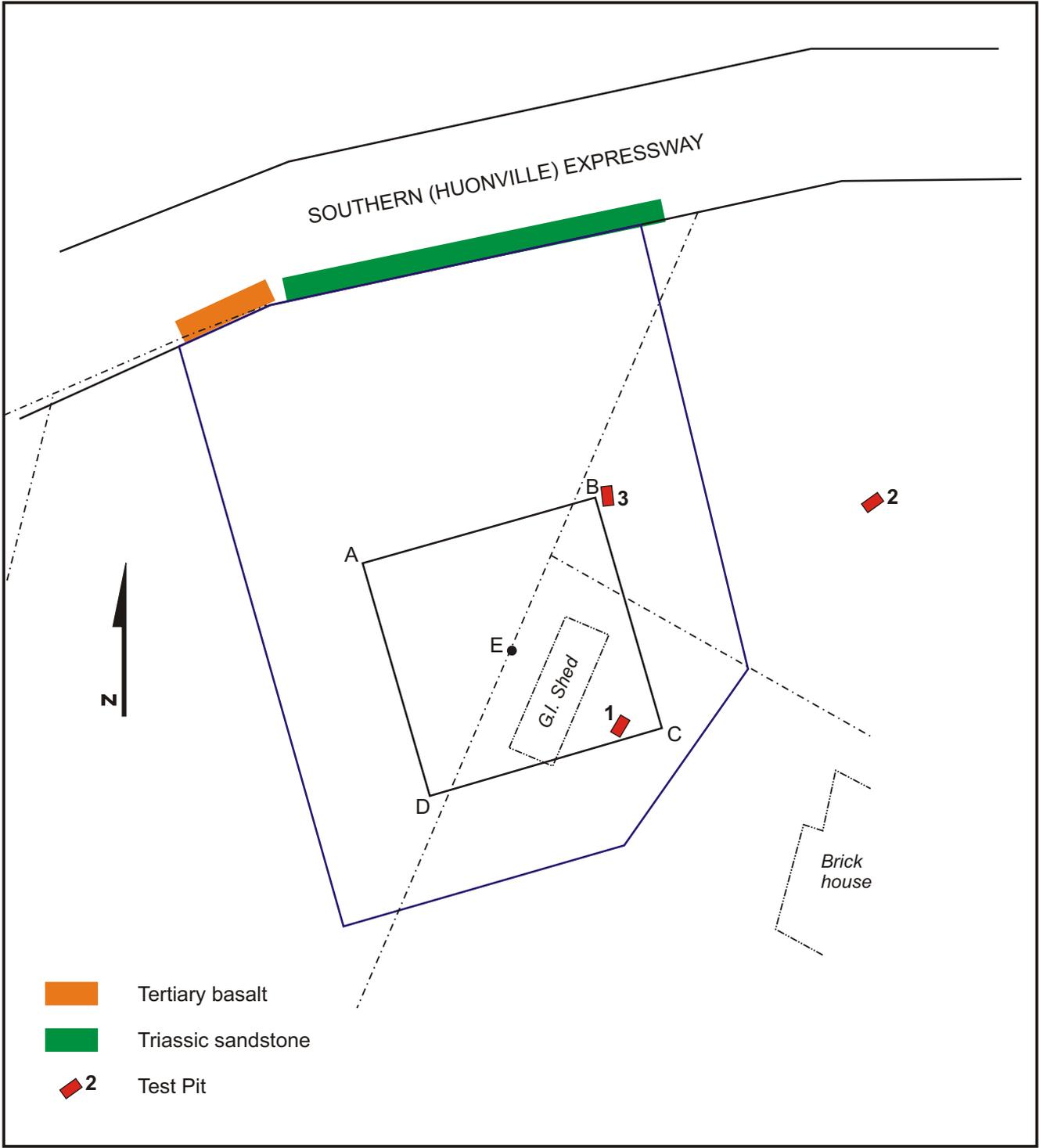


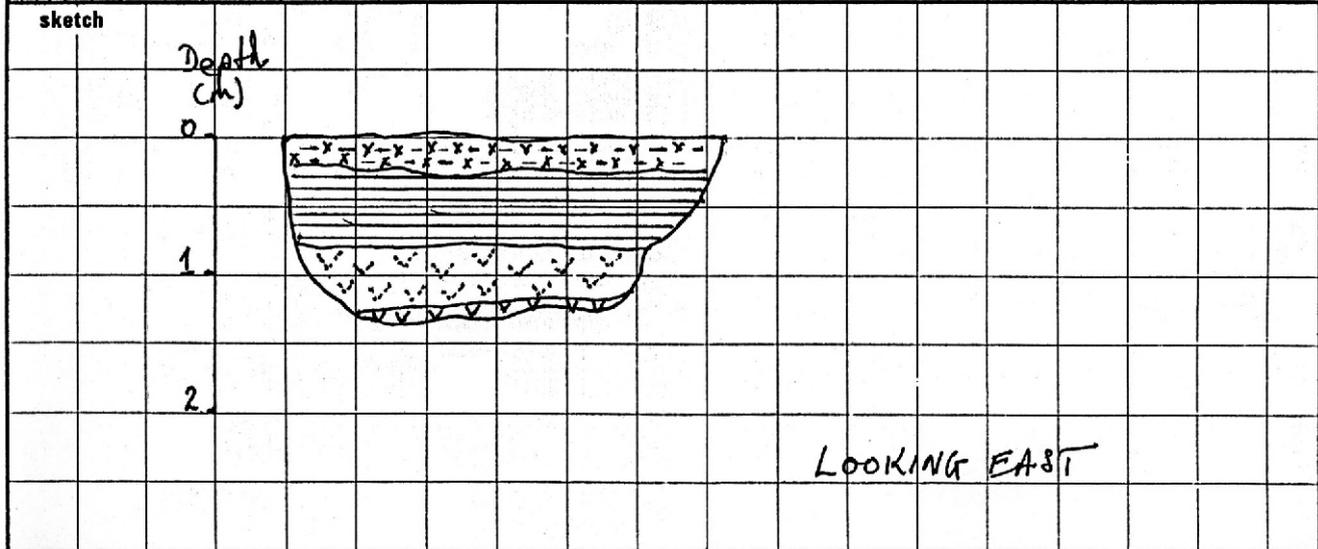
Figure 1

ENGINEERING LOG - EXCAVATION

excavation no. 1
sheet 1 of 1

project **HRWB-PROPOSED RESERVOIR** location **GLENHALL SITE - KINGSTON.**
 co-ordinates **Refer Plan** exposure type **Backhoe Pit** pit commenced **21 Dec '93**
 R.L. equipment **JCB 3CX** pit completed **-**
 excavation dimensions **3.2m L x 2.0m W x 1.3m deep.** operator **L. Shadbolt** logged by **R.C. Donaldson**
 checked by

penetration 1 2 3	support	water	notes samples, tests	metres		graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour secondary and minor components	moisture condition	consistency density index	hand penetr- ometer kPa 25 50 100 200 400	structure, geology
				R.L.	depth							
							CL	Silty CLAY: low-medium plasticity, light grey some gravel size sandstone rock fragments	D	L		FILL
							CH	CLAY: high plasticity, red brown- brown, some fine sand, some fine- medium gravel size weathered basalt rock fragments.	M L PL	H		RESIDUAL CLAY PROFILE
					1			BASALT: mottled yellow brown and grey extremely-highly weathered, remoulded on part to gravelly clay (G.C).				IN-SITU TERTIARY BASALT
					2			BASALT: fine grained, dark grey, vesicular (in filled with carbonates), very high strength. REFUSAL @ 1.3m IN SLIGHTLY WEATHERED - FRESH BASALT				



ENGINEERING LOG – EXCAVATION

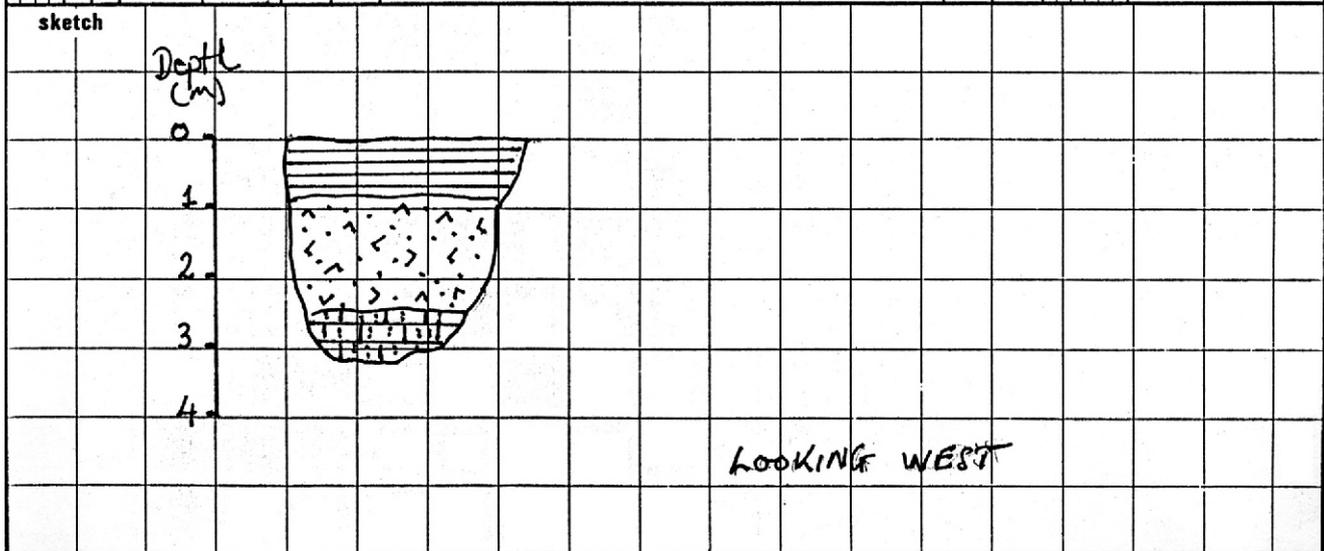
excavation no. 2
sheet 1 of 1

project **HRWB - PROPOSED RESERVOIR** location **GLENHALL SITE - KINGSTON**

co-ordinates **Refer Plan** exposure type **Backhoe Pit** pit commenced **21 Dec '93**

R.L. equipment **JCB 3CX** pit completed
excavation dimensions **3.1m L x 1.2m W x 3.1m deep** operator **L. Shadbolt** operator **L. Shadbolt** logged by **R.C. Donaldson**
checked by

penetration 1 2 3	support	water	notes samples, tests	metres		graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour secondary and minor components	moisture condition	consistency density index	hand penetr- ometer kPa 25 50 100 200 400	structure, geology
				R.L.	depth							
							CH	CLAY: high plasticity, red brown - gray some fine sand, some fine gravel basalt rock fragments.	M L PL	H.		RESIDUAL CLAY PROFILE
					1			TUFF: angular sand and gravel size olive green basalt fragments in an oxidized red brown argillaceous matrix. Extremely - highly weathered, very low strength. Remains in part to CH clay.	M L PL	H		TERTIARY AGE TUFF [VOLCANIC ORIGIN]
					2							
					3			SANDSTONE: fine grained, off white and yellow brown, dominantly quartz particles, slightly - moderately weathered, low - medium strength.				TRIASSIC AGE SANDSTONE
TRENCH TERMINATED AT REQUIRED DEPTH OF 3.1 M IN SANDSTONE.												



ENGINEERING LOG - EXCAVATION

excavation no. 3
sheet 1 of 1

project **HRWB. PROPOSED RESERVOIR** location **GLENHALL SITE - KINGSTON.**
 co-ordinates **Refer plan** exposure type **Backhoe Pit** pit commenced **21 Dec 93**
 R.L. excavation dimensions **3.1m L x 0.9m W x 3.5m deep** equipment **JCB. 3CX** pit completed
 operator **L. Shadbolt** logged by **R.C. Donaldson**
 checked by

penetration 1 2 3	support	water	notes samples, tests	metres		graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour secondary and minor components	moisture condition	consistency density index	hand penetr- ometer kPa				structure, geology
				R.L.	depth						25	50	100	200	
							CH	Silty CLAY: high plasticity, dark grey, some fine-medium sand, some surface boulders of basalt (not in-situ).	D.						TOPSOIL
					1		CH	CLAY: high plasticity, brown, some fine sand.	M V PL	V. St.					RESIDUAL CLAY
					2			TUFF: angular sand - gravel size olive green basalt fragments in an oxidized red brown argillaceous matrix. Extremely highly weathered, very low strength. Remoulds in part to clay.	M > PL	H					TERTIARY AGE TUFF [VOLCANIC ORIGIN]
					3			SANDSTONE = fine grained, off white and yellow brown, quartzitic, slightly to moderately weathered, low to medium strength.							TRIASSIC AGE SANDSTONE
					4			TRENCH TERMINATED AT REQUIRED DEPTH OF 3.5m IN SANDSTONE.							

