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1977/2. Groundwater and site investigations near Koonya

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Mr W.D. Coombs requested that the Department of Mines investigate the groundwater potential, and site conditions for a proposed house, on a recently purchased 10.3 ha property near Koonya on Tasman Peninsula. The land [EN647333] includes a small unnamed peninsula projecting north-westerly into Norfolk Bay, 1 km west of Parkinson's Point; apart from a narrow access onto Nubeena Road, its southern boundary is about 0.5 km north of the road.

GEOLOGY

The property and surrounding district is underlain by Triassic sediments, which dip west at a low (<5°) angle. Good exposures occur along the coast in Norfolk Bay, where the rocks consist of yellow-brown, massively and in places cross-bedded quartz sandstone, overlying a finely bedded alternating sequence of pink, purple and brown mudstone and paler quartz sandstone. Elsewhere, the rocks are rarely exposed, and Mr Coombs' property is mantled by a variable cover of grey sandy loam, and in places darker, more clayey soil. Weathered sandstone and minor clay horizons are exposed in a road cutting on Nubeena Road at the entrance to the property.

In the small bay to the east of the property, on the shore platform at [EN651332], finely bedded mudstone and sandstone have been intruded and disrupted by an irregular, narrow (<2 m) subvertical dyke of fine grained Jurassic dolerite. The dyke pinches and swells, and is probably discontinuous as it is not exposed in the adjacent sea cliff or on the flatter land at the rear of the cliff. Contact metamorphism is confined to a narrow (about 2 m) zone on either side of the body and the country rocks are variably fractured. The dolerite appears to have intruded along a major north-easterly trending joint, or minor fault, and has caused local drag dips of about 30° (west side down) in the sediments.

SITE CONDITIONS AND STABILITY

Mr Coombs proposes to build a new house (with a concrete slab foundation) on the north-westerly flank of a low spur near an old farm house. The land steepens from about 5-7° at the site [EN648332], to about 10-12° downhill. A small area below the site slopes at more than 15°. Although there is no definite evidence of former slope instability, small surface undulations below the house site may be indicative of minor failure. The owner reports that the area was very wet, and drained poorly, after heavy rains last winter.

Slope failure has previously been observed in the district. Small landslips have occurred on slopes of about 10-15° underlain by Triassic clay and mudstone on the Nubeena-Koonya road on the western side of Grooms Hill.

Nevertheless, the proposed house site is considered stable in view of the low slope angle, the nearby presence of large trees, and the proposed nature of construction of the house. However, it is recommended, and in any case is judicious, to test foundation conditions by digging back-hoed trial pits on the site to establish the local geology (clay or sandstone, or both, may be present), and the degree of weathering of the country rock. If plastic clay is present, it may be necessary to stabilise the concrete slab on piers sunk to a suitable level. Whatever the results of the trial pits, the house site should be (permanently) drained prior to construction, by a french drain upslope from the site, excavated well below foundation level and back filled with permeable material.

GROUNDWATER POSSIBILITIES

Natural surface runoff is at present collected in two small dams, but as the property has only recently been acquired, Mr Coombs is not certain whether the supply is sufficient for summer dry periods. He asked whether prospects existed for obtaining groundwater if it were needed.

Eight percussion bore holes were drilled in the Koonya-Nubeena area in the early 1960s'. All penetrated Triassic sandstone and mudstone, and only one was considered a failure. The most successful yielded 70 *l*/min. Water was struck at depths varying from 5-15 m, in both sandstone and mudstone. The quality of the groundwater was not recorded, but analyses of water from similar rocks elsewhere in Tasmania suggest that groundwater salinities in the Koonya area are probably in the range 1000-2000 parts per million of total dissolved solids. Water of this quality is unsuitable for human consumption; it is marginal for general domestic and toilet uses (since it may cause corrosion of, and encrusting on, pipes and fittings) but suitable for gardening, stock and irrigation.

Topographically, the peninsula on Mr Coombs' property is unsuitable for a bore site. A limited catchment area exists, and the potential for groundwater storage in the sediments is small. The southern parts of the property are more favourable. A low-lying area south of the existing farm house, and above the existing dam, is recommended. The bore is expected to be low yielding (10-20 *l*/min) but the quality should be suitable for the required uses. A large catchment area exists to the south and east, and the low-angle westerly dip of the sediments is conducive to a regional westerly groundwater movement.

[13 January 1977]