

UR1974-05

Groundwater investigation at Lulworth.

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At the request of Messrs K. and J.C. McLauchlan a preliminary ground-water survey was undertaken of their property at Lulworth. The survey also included the small coastal settlement of Lulworth itself and covered an area of approximately 9 km² extending west from the Lulworth turnoff on the Weymouth road and north to the coast.

GEOLOGY

The McLauchlan homestead, at the Lulworth turnoff [EQ 086592], is situated on a low hill composed of indurated mudstone with some quartz veining (Mathinna Beds). The remainder of the area is a dissected coastal plain, 30-55 m in elevation, separated by a low irregular scarp from a narrow marsh and coastal lagoon area. This coastal marsh area lies behind a line of coastal sand dunes. The dunes are stabilised and completely covered by vegetation, but near Lulworth the vegetation cover is thin or absent. Along the shore is a rock bench 1-2 m high and a wave cut platform of basalt.

The higher coastal plain appears to be an old marine terrace covered with grey windblown sand. Quartz gravel of Tertiary age forms low N-S ridges on the terrace and two small areas of siliceous conglomerate are also reported, (Pipers River and Noland Bay 1:63 360 geological maps). No outcrops other than of conglomerate and quartz gravel are seen on the terrace although Mathinna sediments may occur beneath the grey sand.

GEOPHYSICAL WORK

A seismic spread was fired in an E-W direction along the Lulworth road 1.5 km west of Lulworth. This spread showed small, stepped incremental increases of seismic velocity with depth, characteristic of the Mathinna sediments. Three seismic velocity layers ($V_0=1200-1500$ m/s, $V_1=2100-3000$ m/s, $V_2=4000-4500$ m/s) were present. The V_1 layer was about 10 m thick and the V_1/V_2 interface was at a depth of 18-21 m and sloped up to the east.

The two dry holes drilled in 1967 near the homestead to a depth of 12 m and 15 m appear from the drillers' records to be in weathered Mathinna sediments. Here the weathered zone of the Mathinna sediments, the V_0 layer, is suspected as being thicker on the low hill than under the coastal plain where the seismic spread was fired. Consequently the two bores probably did not penetrate into the V_1 layer with velocities of 2100-3000 m/s. Most of the groundwater in bores in Mathinna sediments in north-eastern Tasmania appears to be derived from this unweathered but fissured layer. If a further bore is sited in the Mathinna sediments further seismic work should be undertaken to try and find an area where the fractured layer (V_1) has a thickness greater than that calculated beneath the seismic spread.

A resistivity probe was undertaken in a N-S direction along a track down the scarp of the higher terrace to the coastal marsh area. This scarp appeared to be formed by a line of old dunes with a series of seepages and soaks occurring along its base. The probe indicated a thick layer of dry sand with water occurring at depth.

RECOMMENDATIONS

The most favourable source of groundwater for the existing settlement of Lulworth and any proposed expansion of this settlement eastwards appears to be the younger and older sand dunes. Further investigation using resist-

ivity probing followed by spear bores, grain size analysis and pump tests is recommended. For the inland coastal plain of Mathinna sediments further seismic spreads are recommended followed by drilling to a minimum depth of 30-45 m.

[29 January 1974]