

TR12-108-113

## 28. REPORT ON THE GEOLOGICAL AND GEOPHYSICAL WORK ON THE NORTH EASTERN OUTLET ROAD, BELL BAY TO BRIDPORT

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This work was carried out in response to a request, on 21 March 1967, from the Public Works Department for advice on:—

- (a) Materials likely to be encountered from Chainage 20,400 feet to 45,000 feet.
- (b) Depths of rock strata likely to be encountered from Chainage 45,000 feet to Bridport.
- (c) Availability of road gravel within five miles of any section of the route.

The information was derived from two days' field work and a further two days' seismic survey in the Lefroy area and two days' field work between Lefroy and Bridport. The Pipers River Sheet, No. 31 of the Department of Mines Geological Survey Branch, to which reference will be made, covers the route eastwards from Lefroy.

### ROCK STRATA FROM CHAINAGE 20,400 FEET TO 45,000 FEET

The position of each cut was examined first geologically and later geophysically, the results being described in that order.

#### Geological Examination

From Chainage 20,400 feet to 45,000 feet the road passes through a wooded, hilly ridge of rocks of the Mathinna Beds. These are slightly metamorphosed siltstone and mudstone with subsidiary sandstone, having cleavage striking approximately NNW to SSE. The bedding direction is not usually apparent. The unweathered grey rock of this unit is only seen on steep rapidly eroding slopes and in coast sections.

Along this portion of the road the Mathinna Beds are deeply weathered and appear as soft yellow-brown mudstone having little trace of metamorphism. Gentle slopes are mantled with talus, sand and clay.

Geological conditions at the proposed cuttings are listed below:—

- (i) *Chainage 20,400 feet*: soft yellow deeply weathered siltstone. Gentle relief indicates lack of hard strata close to the surface.
- (ii) *Chainage 26,600 feet*: no outcrops present but there is variegated clay in post holes. Shallower bedrock indicated by moderate slopes.
- (iii) *Chainage 29,400 feet*: yellow-brown mudstone overlain by pebbly soil. The ground slopes gently toward the creek bed. Probability of unweathered rock at some depth.
- (iv) *Chainage 30,800 feet*: outcrops of yellow-brown mudstone on a steeply sloping spur. Unweathered rock probable at shallow depth.
- (v) *Chainage 32,100 feet*: no outcrop occurs but there are boulders of yellow-brown mudstone on a gently sloping spur.
- (vi) *Chainage 34,300 feet*: in nearby mine shafts there is weathered yellow-brown mudstone. Unweathered rock is expected at shallow depth even though slopes are relatively gentle.
- (vii) *Chainage 35,900 feet*: a low spur of yellow-brown mudstone occurs. Moderate relief indicates probability of unweathered rock.
- (viii) *Chainage 43,400 feet*: low rise, covered by loose white quartz gravel up to eight feet deep which overlies yellow-brown mudstone. No indication of unweathered bedrock.

A correlation has been suggested between topography and depth of weathering. This arises because rain-wash and soil creep are more effective on steeper slopes and therefore hard bedrock would be expected at more shallow depths.

#### Geophysical Survey

At all accessible proposed road cutting sites seismic spreads, sixty feet in length have been shot, and the velocities of the underlying materials determined. In addition, a calibration test was made on a cutting, about one mile W from Lefroy, on the present road. Rocks along the route include talus and scree deposits; soil, sand and gravel; and weathered and unweathered rocks of the Mathinna Beds. The following table suggests seismic velocities of each.

	<i>Feet/sec</i>
Talus and scree deposits .....	1,000-3,000
Soil .....	1,000
Sand and gravel .....	1,000-2,500
Weathered Mathinna Beds .....	4,000-6,000
Unweathered Mathinna Beds .....	10,000

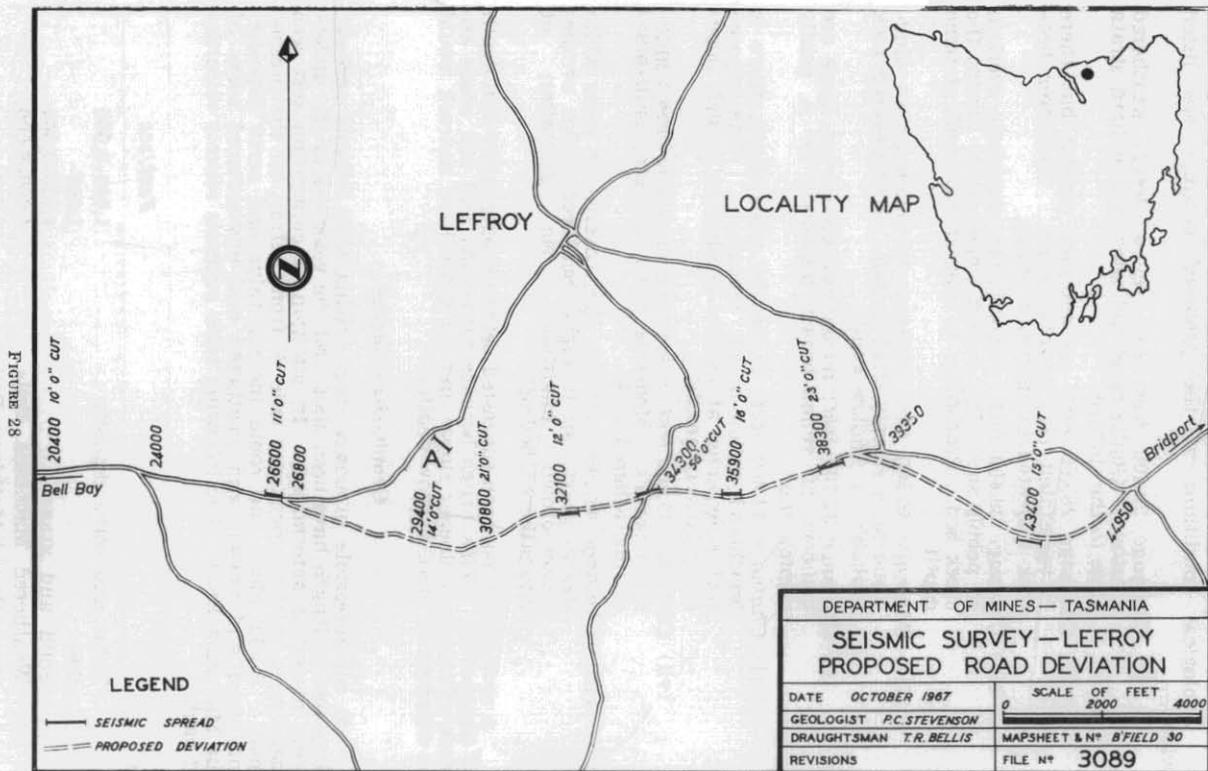


FIGURE 28

Weathered material may be inspected in the road cutting (A) (see fig. 28). The depths given above, and in the table below for the proposed cuttings are minima. The interface may be at a greater depth due to its dip. Where possible the range of variation is listed.

Chainage	Layer 1	Layer 2	Layer 3
26,600 .. .. .	0-3 feet	3-15/20 feet	15/20 feet
	1,150-1,330 ft/sec	1,600-2,200 ft/sec	5,000-6,600 ft/sec
	Soil	Sand and gravel	Fairly solid rock
32,100 .. .. .	0-2 feet	2-35 feet	—
	700-1,000 ft/sec	1,430-2,000 ft/sec	No rock encountered
	Soil	Sand, gravel and talus	Less than 35 feet
34,300 .. .. .	0-3 feet	3-22 feet	22 feet
	700-1,000 ft/sec	2,200-2,500 ft/sec	5,500 ft/sec
	Soil	Sand, gravel and talus	Fairly solid rock
35,950 .. .. .	0-1.5 feet	1.5-22.5/30 feet	22.5/30 feet
	700 ft/sec	1,810-2,000 ft/sec	6,600 ft/sec
	Soil	Talus and gravel	Fairly solid rock
38,300 .. .. .	0-2 feet	2-22/32 feet	22/32 feet
	750 ft/sec	2,000-2,400 ft/sec	4,000 ft/sec
	Soil	Talus and gravel	Weathered rock
43,400 .. .. .	0-2 feet	2-30 feet	—
	700-1,000 ft/sec	2,500-2,836 ft/sec	No rock encountered
	Soil	Gravel and sand	Less than 30 feet

The proposed cuts at 29,400 feet and 30,800 feet were inaccessible to the seismic party. In summary the cuts at 26,600 feet, 32,100 feet, 35,950 feet, 38,300 feet and 43,400 feet are not expected to encounter material having a velocity greater than about 3,000 feet/sec; i.e., either unconsolidated material or deeply weathered mudstone of the Mathinna Beds. The deep cut at 34,300 feet may enter rock of velocity greater than 5,500 feet/sec. Of the two inaccessible cuts the deeper one at 30,800 feet may encounter unweathered rock at depth, while only weathered material is expected in the cutting at 29,400 feet.

As a guide to the conditions to be expected, the cutting W of Lefroy is excavated in material of velocity 3,600-4,400 feet/sec. Unweathered material of velocity 10,000 feet/sec exists at depth.

### ROCK GROUPS TRAVERSED FROM CHAINAGE 45,000 FEET TO BRIDPORT AND POTENTIAL SITES FOR GRAVEL QUARRIES

The rocks traversed by the road for this portion of the route are shown on the Piper River Sheet, No. 31, published by the Department of Mines.

Four rock types are present:—

- (a) Mathinna mudstone with subsidiary sandstone, slightly cleaved and re-crystallised by metamorphism, which weathers to a yellow-brown mudstone.
- (b) A suite of unconsolidated Tertiary quartz gravel and sand overlying the Mathina Beds and very often occupying the side slopes of hills. Patches of gravel occur mainly in the valleys of Pipers River, Pipers Brook, the Little Forester River and the Brid River. Between these valleys the Mathinna Beds are at the surface.

A thickness of about eight feet of gravel must be present before it is indicated on the map. If no gravel is shown a thin veneer of pebbles represents the Tertiary deposits may still be present. It is usually much less than eight feet thick.

The gravel consists almost entirely of white quartz derived from veins in the Mathinna Beds. An exception is the 'ferruginous, pisolitic gravel with ironstone blocks', which is cemented with dark red iron oxides and is hard enough to present excavation problems. Silt and clay, although widespread, are not extensive along the route.

- (c) Tertiary basalt flows are closely associated with the gravel, often capping higher ground, and sometimes deeply weathered. They also occur on valley floors and on hillsides. There are typical outcrops at Chainage 88,350, 92,550 and 98,100.
- (d) Modern aeolian sand and gravel, valley clay and marsh deposits. These are restricted to narrow strips along all the river valleys on the route except the Little Piper and its tributaries. Here they form a wide valley floor. The water table is very close to the surface. Wind-blown sand which has been tied by vegetation is seen on some sections of the route but is not extensive. Marsh deposits, clay, silt and peat are present in the valley of the Little Forester and its tributaries.

#### SUMMARY

With the exception of parts of the basalt and minor ferruginous members of the Tertiary gravel suite, excavation of normal road foundations should not be difficult. Where deeper cuts are to be made seismic profiles are suggested to investigate the possibility of unweathered basalt or Mathinna Beds.

The geological mapping indicates that considerable deposits of gravel exist along the route, though these fall into three locations:—

- (A) Between the Little Forester and Bridport.
- (B) In the Pipers Brook area.
- (C) In the Pipers River area.

It is suggested that trial pits be dug with a back hoe, in locations indicated by the geological map, to ascertain the quantity and quality of the material available.