UNPUBLISHED REPORT 1965/04

Geological conditions in the vicinity of the proposed pellet plant site — Strahan

by I. B. Jennings

In response to a request from Austin-Anderson (Australia) Pty Ltd, a preliminary examination has been made of the site of the proposed pellet plant. The site is situated at the old site of Strahan to the west of Smith Cove and about 2 miles west of the present township of Strahan.

The site consists of a relatively flat area of button grass plain with low ridges and hills of button grass covered gravel to the north and west.

Geology

No useful exposures of bedrock can be seen in the vicinity of Smith Cove, but exposures of gravels and other relatively unconsolidated sediments were inspected at Strahan and at gravel pits on the road to the Strahan aerodrome. The basic geology of the area must therefore be interpreted from accounts in the literature concerning deposits in the general area.

It has long been recognized that the Macquarie Harbour area consists of a graben infilled with Cainozoic sediments. The most recent accounts of immediate interest are those of Banks and Ahmad (1959) and Scott (1960). Briefly, the area consists of an elongated fault trough filled with more than 1,000 feet of sand, gravel and clay but containing significant bands of lignite at most places where adequate sections are available. The age of the sediments has not been established with certainty but Banks and Ahmad (1959) showed that at Malanna the sediments are older than 32,000 years whilst Gill (in Scott, 1960) concluded that the sediments are probably of Pliocene age.

The rocks consist of unconsolidated gravel, cross bedded sand, clay and lignite. The absence of marine macrofossils and the presence of lignite together with the fabric of some of the deposits strongly suggest a terrestrial origin. Both Banks and Scott have recorded faults cutting the sediments, Banks recording drag dips up to 40° whilst Scott noted regional dips of between 5° and 10°. Some of the faults are therefore of at least post Pliocene age and have caused tilting and/or folding in the sediments. Scott indicates the general pattern of faulting (see attached plan) and indicates a probable fault passing close to the proposed site. The evidence for this fault is not conclusive and the position cannot be regarded as rigidly established. Scott gives an account of erosion surfaces in the Strahan district postulating the existence of surfaces at 30 feet, 55 feet, 130 feet, and 230 feet above sea level. No contour plans of the proposed site area are available to the writer at this stage but it would appear that the plant is probably situated on either the 30 feet or 55 feet surface. Although no detailed information is available at this stage one would expect that such surfaces would be covered by a thin veneer (10 feet or so) of reworked gravels and buried soil horizons above the parent rocks. The whole of the area is covered by peaty soils which vary in thickness up to at least 3 feet.

Scott (undated report) gives details of bores at Strahan which indicate the probable kind of sediments which may be expected in the general area. A copy of Scott's logs of these bores is attached. No details are available as to the type of drill used, the date of boring or the logging procedures. From the report and logs it is not clear if basement rocks were encountered or not but from general evidence available in this area it appears to be unlikely. Further south in Macquarie Harbour, Scott (1960) indicated a total thickness of Cainozoic sediments in excess of

730 feet which extends to about 560 feet below sea level.

Engineering Geology

The foregoing account indicates that the geological succession at the proposed plant is likely to be:

	Top
Button grass and peaty soil	0 to 3 ft
Loose gravel and buried soils	10 ft (approx.)
Unconsolidated sand, gravel and clay with lignite bands	Several hundred feet
	Bottom

However this succession is based on fragmentary evidence some distance from the site and no factual evidence from the immediate plant area is available. There is some evidence that a major fault exists near the site, which could cause tilting or folding of the beds. The precise location of the fault is not known with certainty.

The possible presence of lignite bands in the area is of some concern since they could allow excessive settlement in structures built upon them. Steep dips in such a sequence may result in instability and differential settlement. Investigations should be designed to establish the attitude of the beds and the lithology of the sediments present.

Recommendations

It is recommended that in the first instance four or five percussion bores be put down in the proposed plant area to establish the geological succession, the lithology of the beds present and their persistence. If these bores reveal that soil tests are necessary, other sampling techniques could be employed at a later stage. To establish the existence of faults in the sequence, and therefore provide information on the attitude of the bedding planes it is suggested that a gravity traverse be made from the vicinity of Strahan westwards to the coast.

Further geological investigations or soil testing would be dependent upon the results of these preliminary tests.

Water Supply

In the vicinity of the plant site the average annual rainfall is about 60 inches and the area appears to lack strong surface drainage features. This suggests that the possibility of obtaining reasonable quantities of groundwater in the vicinity are good if suitable aquifers are present. The percussion bore holes recommended for foundation testing would be adequate to carry out a preliminary assessment of the groundwater potential of the area.

A further possible source of water lies in a series of lakes about 3 miles north of the plant site along the old Zeehan–Strahan Railway line. One of these (Lake Bellinger) has been visited, it contains fresh water and the local residents claim that the level does not vary seasonably. As a rough guide to the quantity of water available the following assessment from aerial photos has been made:

Area — 160 square chains
Depth (photogrammetrical) – 22’ – 17’ – 11’
(say) average depth 10 feet.

This gives a storage of about 44 million gallons. The lake appears to have a very limited surface catchment area. However, it is situated in an area of stabilized sand dunes, probably being a flooded blow-out, and may have a considerable underground storage to the east. Several other similar lakes also occur in the same general area and in total a considerable storage could be available. An engineering study of these lakes appears to be justified.

Before proceeding further with the geological aspects of the water supply it will be necessary to know the general quantity of water required and the acceptable chemical tolerances, including pH.

Aggregates

The presence of gravel in the area has already been noted. A preliminary examination indicates that similar gravel would probably be available at or near the plant site. However, a few bulldozer cuts would be necessary to establish reserves. The known gravels are not suitable for high strength concrete and it will be necessary to crush, screen and wash them before use. A further examination of the area is planned but it appears doubtful if a suitable natural gravel will be located within economic distance of the plant. The lack of natural exposures throughout the area precludes the possibility of prospecting much of the area effectively. An estimate of the order of magnitude of the quantity of gravel required is desirable at an early stage.

General

The investigation to be carried out in this area will require the service of a drilling plant and associated equipment. It will be necessary before even preliminary investigation can be carried much further to provide vehicular access to the area before the onset of winter. A cheap track could be put in by proceeding south along the ridge from the end of the airstrip to the old Strahan track and reconditioning this track to the plant site. It is emphasized that during the winter movement of even light equipment across the button grass plains will be completely halted.

References

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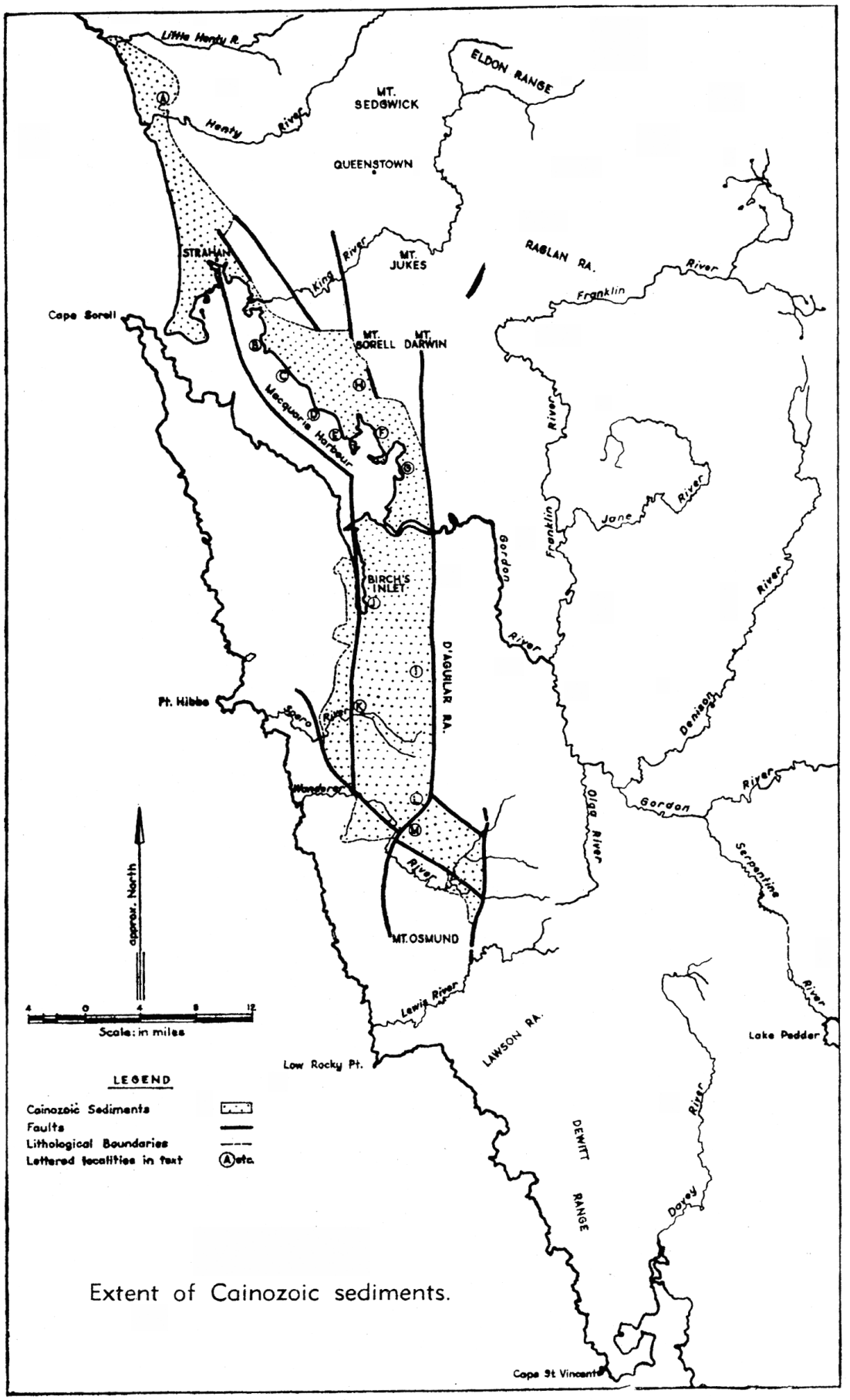
[29 March 1965]



Extent of Cainozoic sediments.

Cainozoic Sediments, Strahan

Vertical Scale: 1" = 10 ft