DEPARTMENT OF MINES
SOUTH AUSTRALIA

GEOLOGICAL SURVEY
ENGINEERING DIVISION

FOUNDATION CONDITIONS AT MANGALO, EYRE PENINSULA

-Proposed Quarterly Note-

by

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Rept.Bk.No. 77/114
G.S. No. 5933
Eng.No. 1964/70
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5th October, 1977

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INTRODUCTION

Recent excavations at Mangalo (Fig. 1), in connection with extensions to a silo complex, have revealed unusual foundation conditions that were not anticipated in the original site investigation.

The geological section, exposed in the main foundation trench, clearly shows the relationship of several Quaternary units with weathered Cleve Metamorphics, which form bedrock beneath the area.

The site lies on the crest of a low rise which drops gently down to Salt Creek about 0.5 km to the south east. Fresh strong gneiss and schist crops out in the creek and on the flanks of the rising ground towards the site. A site investigation for the first silos, (Steel, 1964) showed fresh strong bedrock at from 1 to 1.5 m below ground in two cable tool holes. A third hole encountered weathered clayey gneiss extending to 3 m before fresh rock was proven, but indications were that the weathered material was of very limited distribution and reasonably stiff.

During the construction of an additional group of silos in June, 1977, excavations for the foundation trench at the eastern end of the site, revealed several metres of clay and gravel passing down to a stiff red clay. As a result of this, the fotting design was changed to reduce the load on the foundation in this area.

SITE GEOLOGY

The Cowell geological map (Johns, 1957) shows that the Cleve Metamorphics are folded in this region, and that an anticlinal axis runs northwards beneath the site. The anticline was exposed in the foundation trench and it is this structure, combined with the proximity of Salt Creek, that provides the key to the origin of the unconsolidated material found in the excavations.

Fig. 2 is a geological section across the site and three zones can be distinguished.

Zone A is typical of conditions found during the original site investigation, with fresh bedrock at shallow depth overlain by a thin development of platy Ripon Calcrete. Weathering is largely restricted to deposition of calcareous material along radial tension joints.

Zone B is transitional and reveals more about the geological relationships present. The Ripon calcrete can now be distinguished from the pre-Pleistocene calcreted bedrock surface, as the two are separated by a narrow band of clayey gravel. Weathering has penetrated down bedrock foliation planes, exposed to the pre-Pleistocene surface on the limb of the anticline, leaving corestones of fresher rock.

Zone C shows a well developed layer of clayey gravel and river sand beneath the Ripon Calcrete overlying completely weathered bedrock (Plate 1). The full sequence exposed at this eastern end of the site is given below:-

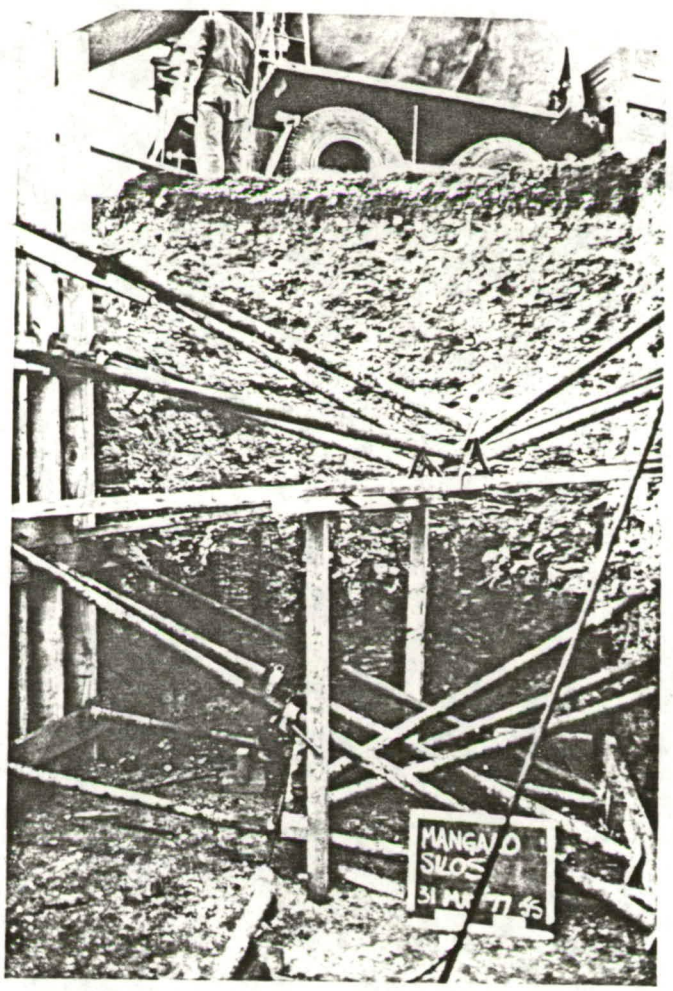

Plate I

Depth (cm)	
0 to 30	Dark brown silty soil.
30 to 35	Sandy pebble gravel.
35 to 55	Nodular calcrete with loose thin slabs.
55 to 140	Rounded to sub-angular quartz pebble gravel in a mottled grey-brown sandy clay matrix.
140 to 160	Light grey, fine, micaceous sand with a few rounded pebbles.
160 to 190	Clayey gravel with calcareous material at base.
190 to 300+	Red brown stiff to hard clay of low plasticity (completely weathered bedrock, dipping 70°E).

The gravel and sand sediments are considered to have been deposited during a Pleistocene pluvial period, when the micaceous sand was presumably laid down by Salt Creek now located well to the south east of the site. This was followed by a more arid period during which the upper (Ripon) calcrete was formed.

CONCLUSIONS

Petrographic examination of the completely weathered bedrock in Zone C by Amdel (1977) shows that the material is similar to fresh rock from Zone A. The increase in bedrock weathering is related to thickness of Pleistocene cover and the orientation of foliation planes which have allowed access to percolating groundwater (Fig. 2). Weathering presumably took place during deposition of the fluvial sediments when climatic conditions were much wetter.

Experience from this site illustrates some of the engineering geological problems in this part of the Eyre Peninsula, where the uniform topographic pattern with its indications of shallow bedrock, may conceal weather and more variable material.

J. SELBY

5th October,
JS:AGT

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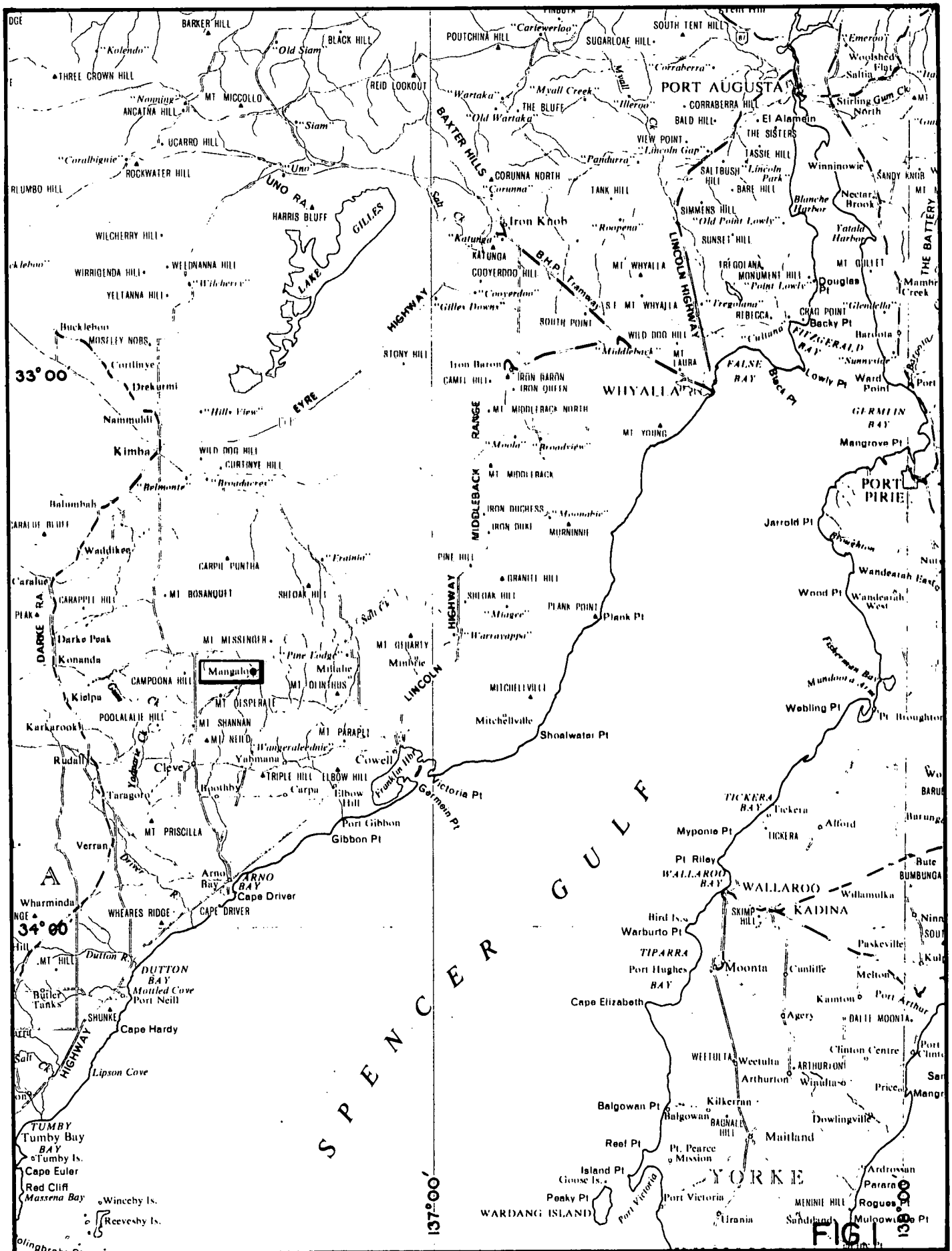

FIG 1

	DEPARTMENT OF MINES – SOUTH AUSTRALIA	SCALE : 1 : 1,000,000
COMPILED : J.SELBY	FOUNDATION CONDITIONS AT MANGALO	DATE : 25-10-77
DRN : CKD . A.F.	EYRE PENINSULA	PLAN NUMBER :
	LOCALITY PLAN	S13093

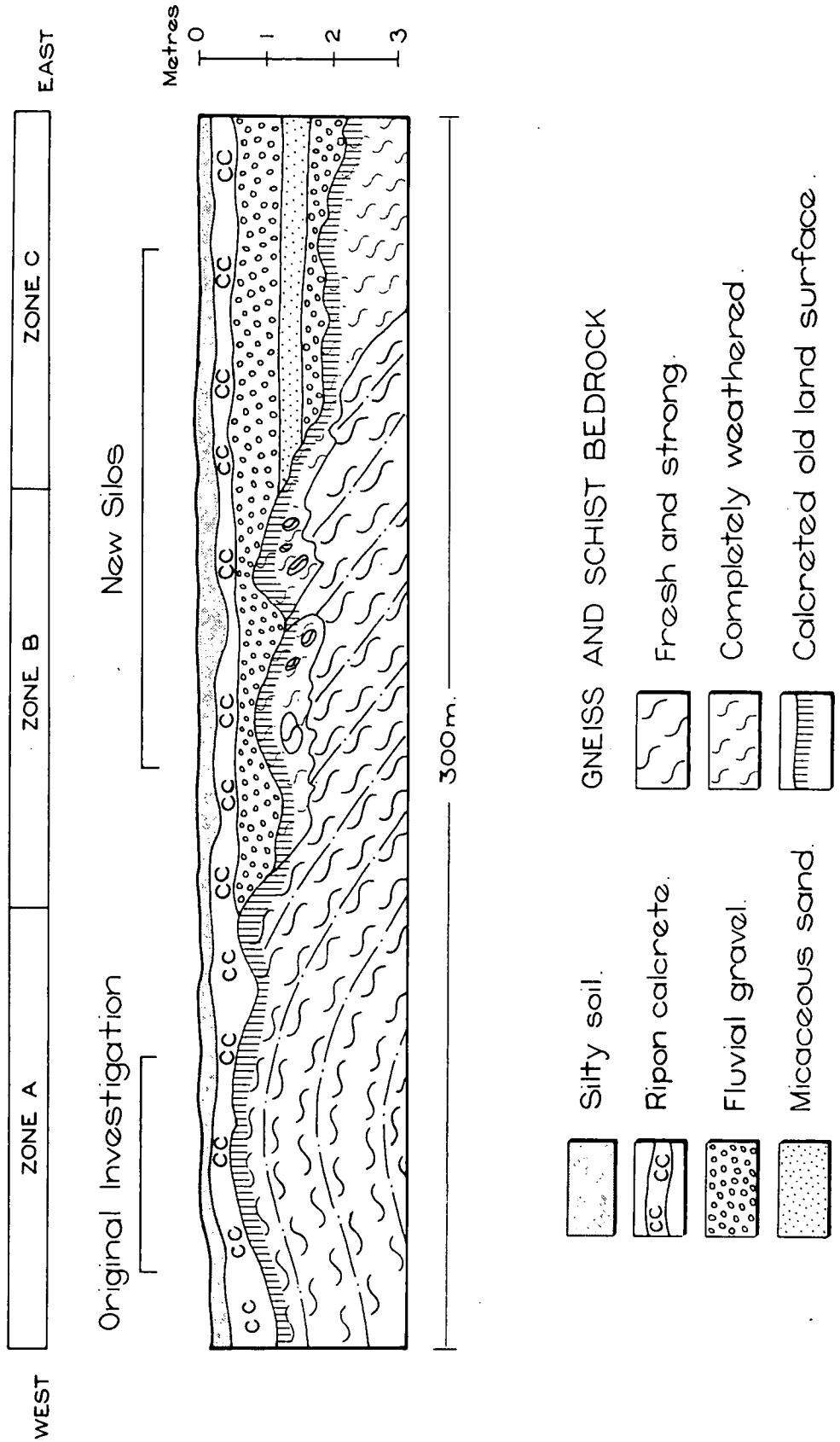

FIG. 2

	DEPARTMENT OF MINES – SOUTH AUSTRALIA	SCALE. DIAG.
COMPILED: J. SELBY	FOUNDATION CONDITIONS AT MANGALO EYRE PENINSULA GEOLOGICAL SECTION	DATE: 25-10-77
DRN: J.W. CKD. A.F.		PLAN NUMBER: S13094