

Explanatory Notes for the MAITLAND Special 1:250 000 geological map

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ABSTRACT

The MAITLAND Special 1:250 000 geological map covers the major part of South Australia's Yorke Peninsula. The rocks in the map area comprise deformed Palaeoproterozoic and early Mesoproterozoic basement of the southeastern Gawler Craton, and undeformed Neoproterozoic to Quaternary sediments. More than 90% of the land surface of the map area is covered by Quaternary sand dunes, calcrete, aeolianite and soil.

The oldest rocks on Yorke Peninsula belong to the middle Palaeoproterozoic Corny Point Paragneiss (~1920–1845 Ma), which has a Hutchison Group equivalent protolith and was metamorphosed at ~1845 Ma. Several felsic and mafic plutonic suites, principally Gleasons Landing Granite, intrude the paragneiss on the southern part of the peninsula. The early phases of this I-type granite could be as old as ~1855 Ma, and are intruded by megacrystic augen orthogneiss (~1850 Ma). The Gleasons Landing Granite is intruded by the deformed Royston Granite (~1849.5 Ma) and mafic dykes (Tournefort Metadolerite).

The late Palaeoproterozoic Wallaroo Group (1770–1740 Ma) comprises a succession of metasediments and volcanics, and in the northern part of the map area hosts the Moonta–Wallaroo Cu–Au deposits. The Wallaroo Group is considered to have been deformed by the Kimban Orogeny (in the restricted sense of Schwarz, 2003) during 1730–1700 Ma, and later intruded by early Mesoproterozoic Tickera Granite (1598–1586 Ma), Curramulka Gabbonorite (1589 Ma) and Arthurton Granite (1582 Ma).

Neoproterozoic sediments are known only from drillhole intersections in the northeastern part of the map area, and were deposited along the Torrens Hinge Zone marginal to the Adelaide Geosyncline. The units intersected include Rhynie Sandstone, Sturt Tillite and Tapley Hill Formation.

The Cambrian Stansbury Basin on Yorke Peninsula is interpreted to have formed on a rifted continental platform on the eastern Gawler Craton; up to 2000 m of sediments are interpreted from seismic surveys. Generally, the Cambrian succession contains three sequence sets and records two local marine transgression and regression cycles. The Cambrian sediments have petroleum potential in the region.

Permian diamictite crops out on southern Yorke Peninsula and is widely intersected in drillholes. The diamictite (Cape Jervis Formation) was deposited in glacio-lacustrine, glacio-fluvial and restricted marine environments.

Tertiary sediments are exposed in the coastal cliffs of the eastern side of Yorke Peninsula and consist of siliciclastics with minor carbonates. Deposition of the Quaternary

successions was probably controlled by the glacial-eustatic sea-level oscillations, resulting in deposition of several marine beds. Transgressions, evidenced by deposition of the marine Point Ellen Formation (~1.2 Ma), tidal channel deposits at the base of the Bridgewater Formation (<0.78 Ma), fossiliferous Glanville Formation (~0.125 Ma) and *Posidonia*-bearing beds of the St Kilda Formation (~6000 years), are recognised.

Tectonic development of Yorke Peninsula is relatively complicated, particularly the formation of the basement rocks, and interpretation is made especially difficult due to poor surface exposure. Generally in the region, six major depositional events can be recognised, relating to deposition of the middle Palaeoproterozoic (1920–1845 Ma Corny Point Paragneiss), late Palaeoproterozoic (1770–1740 Ma Wallaroo Group), Neoproterozoic (~770–700 Ma), Cambrian (~540–500 Ma), Permian and Tertiary sediments. Seven deformation or shear-faulting events (D₁–D₇) are recognised in this study.

INTRODUCTION

The MAITLAND Special 1:250 000 geological map includes the MAITLAND and northern part of the KINGSCOTE 1:250 000 geological map areas. The map contains the major part of Yorke Peninsula and is located between longitudes 136°30' and 138° E, and latitudes 34° and 35°25'S. More than half of the map area lies under the waters of eastern St Vincent Gulf and western Spencer Gulf (Fig. 1).

The first edition of the MAITLAND one-inch-to-four-mile (1:253 440) geological map (mapped by A.R. Crawford) was published in 1960. The KINGSCOTE map had been previously published in 1954. These were followed by publication of 'The geology of Yorke Peninsula' (Crawford, 1965) and 'A field guide to the geology of Yorke Peninsula' (Field Geology Club of SA Inc., 1997). Over the last three decades, Yorke Peninsula has been a focus for mineral and petroleum exploration with extensive seismic, gravity and aeromagnetic surveys. More than 3000 exploration holes have been drilled and over 5000 geochemical analyses undertaken.

The current mapping project commenced on 1 July 1996. A major study, immediately preceding the mapping and involving interpretation of the basement and related mineralisation, was completed for the Moonta–Wallaroo data package (Conor, 1995). Field mapping was carried out using 1:40 000 scale colour aerial photographs and was compiled as 1:50 000 sheets. The geological data that have been compiled include local mapping carried out by exploration companies, university students and many departmental colleagues.

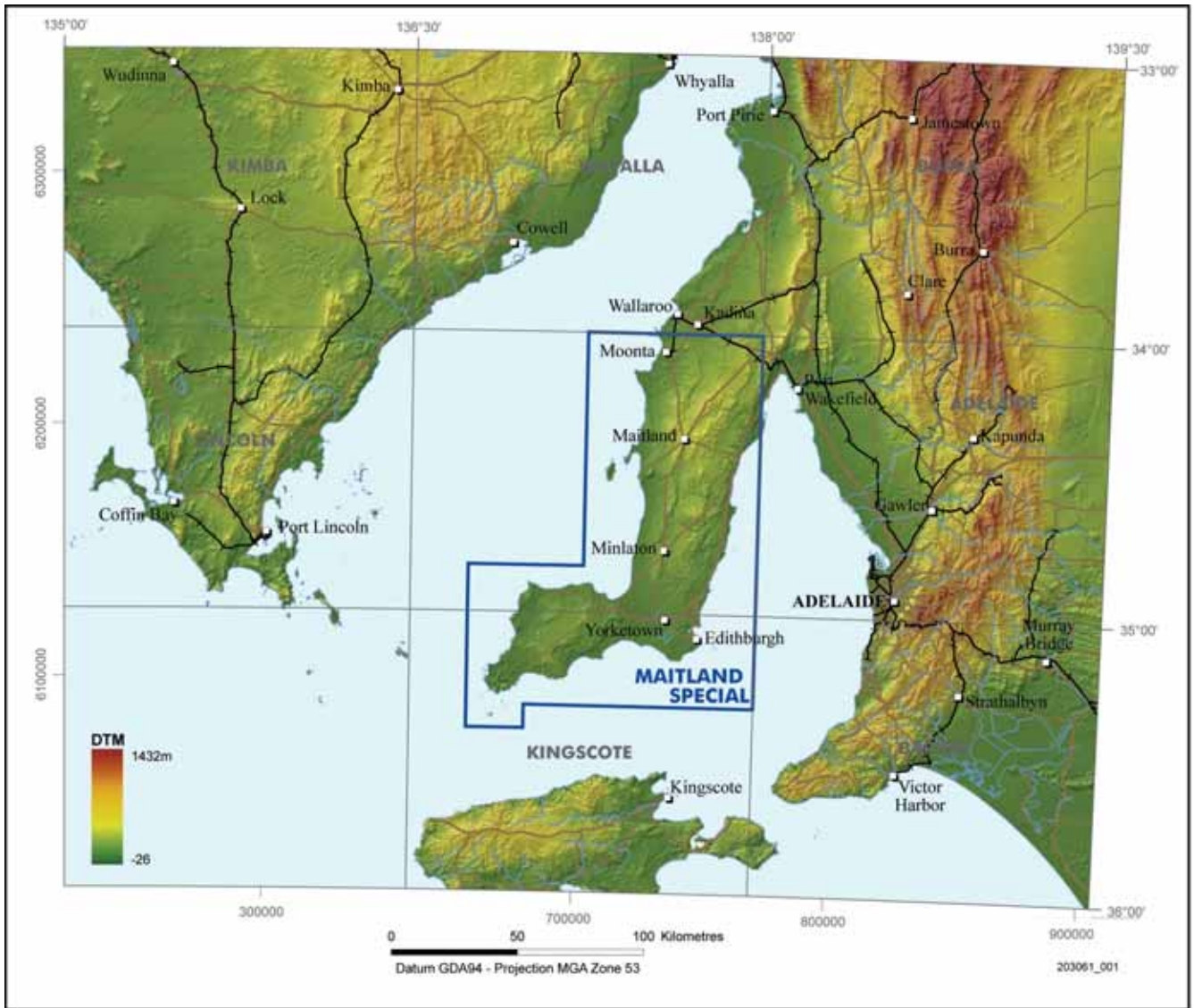


Fig. 1 Regional locality map, MAITLAND Special 1:250 000 map area.

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