MORRISON GEOTECHNIC

Brisbane | Gold Coast | Maroochydore
Unit 1, 35 Limestone Street (PO Box 3063), Darra Q 4076 P (07) 3279 0900 F (07) 3279 0955
ABN: 26 602 913 673
www.morrisongeo.com.au

Job No. DE21/113
Ref No: 28651-Rev1
Author: Simon Wynne

PLANS AND DOCUMENTS
referred to in the PDA
DEVELOPMENT APPROVAL

Approval no: DEV2023/1448

Date: 7 June 2024

Queensland Government

21 July 2023

Golding Contractors
58 Union Circuit
Yatala QLD 4207

ATTENTION: CAMERON MCCLURE
Email: cameron.mcclure@golding.com.au

RE: GEOTECHNICAL DESKTOP REVIEW FOR PRECINCT 6 YARRABILBA

1.0 INTRODUCTION

This report presents the results of a geotechnical desktop review carried out for the proposed residential development at Yarrabilba – Precinct 6 (herein referred to as the 'site'). The work was requested by Cameron McClure representing Golding Contractors (Golding).

The purpose of the desktop review is to provide a summary of the expected geotechnical conditions at the site based on a review of the available information.

2.0 PROVIDED INFORMATION

The following information, pertaining to the geotechnical aspects associated with the site were considered in this desktop review:

- Precinct 6 layout plan – provided by Golding
- Morrison Geotechnic – *Geotechnical Investigation – Precincts 5 and 6,* Ref. No. 27330, dated 4 May 2022 (herein referred to as the MG investigation report)

3.0 SITE DESCRIPTION

The site occupies Lot 6000 on SP338330 and part of Lot 3102 on SP338990 for the access leg and is located to the west and southwest of the existing Yarrabilba Precincts 4 and 4E. The area appears to currently comprise undeveloped rural land / farmland.

The ground surface in the area slopes downwards at approximately 3° to the north, east and west from a minor north-south aligned ridge in the southern part of the site.

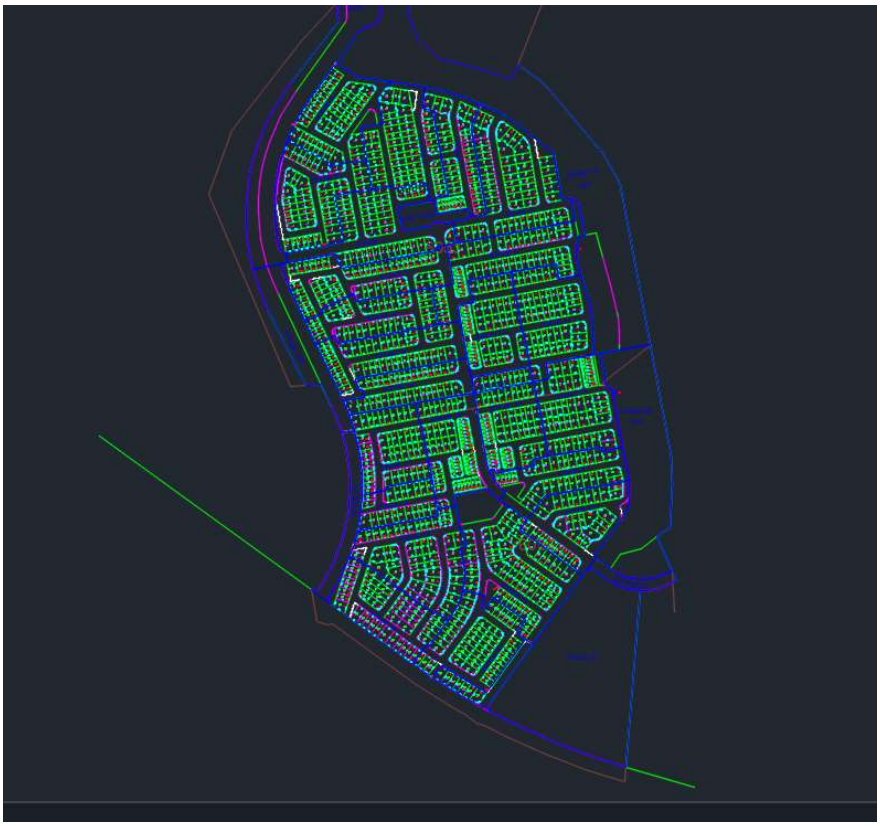
The vegetation in the area consists of various ground cover including grasses with common weeds and shrubs with sparse mature trees.

An aerial image of the site which shows the broad site conditions is given in Figure 1. A copy of the Precinct 6 layout plan provided by Golding is given in Figure 2.

Figure 1 – Aerial Image of the Site (in red)
(Image © Nearmap – showing April 2023)



Figure 2 – Indicative Precinct 6 Layout Plan



4.0 SUBSURFACE CONDITIONS

4.1 Regional Geology

Reference to the National Map website, https://nationalmap.gov.au (State of Queensland, Department of Resources, 2022 ©) indicates that the geology at the site comprises:

Geological Unit:	Woogaroo Subgroup
Age:	Late Triassic to early Jurassic
Type:	Sedimentary rock
Lithology:	Sublabile to quartzose sandstone, siltstone, quartz-rich granule to cobble conglomerate and coal

4.2 Local Subsurface Conditions

The subsurface profiles described in the MG investigation report generally comprise surficial silty sand topsoil, overlying natural silty sand soils extending to depths ranging between 0.3m and 1.1m, overlying very stiff and hard natural clay soils, underlain by weathered sandstone rock at depths ranging between 1.2m and 2.7m. A summary of the subsurface conditions described in the MG investigation report is given in Table 1.

Table 1 – Summary of Subsurface Conditions in the MG Investigation Report

Test Location	Topsoil (m)	Natural Silty Sand (SM) (m)		Residual Clay (CI-CH) (m)		Weathered Rock (m)		Termination Depth (m)[2]
		Very Loose to Loose	Medium Dense	Very Stiff	Hard	Very Low to Low Strength	Low to Medium Strength	
BH6-4	0.0 – 0.1	NE	NE	0.1 – 0.9	0.9 – 2.0[3]	2.0 – TD	NE	5.86
TP5-1	0.0 – 0.2	0.2 – 0.5	NE	0.5 – 1.3	1.3 – 1.7[3]	1.7 – 2.7	2.7 – TD	2.8[4]
TP5-2	0.0 – 0.1	NE	0.1 – 0.3	0.3 – 0.7	0.7 – 1.3[3]	1.3 – 3.1	3.1 – TD	3.2[4]
TP6-5	0.0 – 0.1	0.1 – 1.1	NE	1.1 – 1.9	1.9 – 2.7[3]	2.7 – 4.7	4.7 – TD	4.8[4]
TP6-6	0.0 – 0.1	0.4 – 0.7	0.1 – 0.4	0.7 – 1.3	1.3 – 1.6[3]	1.6 – 1.8	1.8 – TD	1.9[4]
TP6-7	0.0 – 0.1	NE	0.1 – 0.3	0.3 – 1.0	1.0 – 1.2[3]	1.2 – 1.5	1.5 – TD	1.6[4]
TP6-8	0.0 – 0.1	0.1 – 0.4	0.4 – 1.0	1.0 – 1.5	1.5 – 1.9 1.9 – 2.5[3]	2.5 – TD	NE	5.0

Notes:
(1) TD – Termination Depth; NE – Not Encountered.
(2) Depth below the existing ground surface level as at the time of field work between 25/01/2022 and 18/02/2022.
(3) Residual Sandy Clay material described as 'Extremely Weathered Sandstone'.
(4) Excavator bucket refusal reached prior to test pit target depth.

4.3 Local Groundwater Conditions

The MG investigation report indicates that groundwater seepage was encountered in two of the test pits in the Precinct 6 area (TP6-5 and TP6-8) at depths of 0.8m and 0.9m.

5.0 ENGINEERING ASSESSMENT

Based on the geological mapping and the findings of the available broadscale geotechnical investigation undertaken by Morrison Geotechnic, the geotechnical conditions at the site are likely similar those already experienced across the Yarrabilba development.

A summary of the geotechnical recommendations for the site based on the desktop review are given in the following sections. The information given in the following sections is based on current available information and some variations across the site are to be expected. Regardless of the frequency of the test pitting or borehole drilling, there always remains an inherent risk that geotechnical conditions may differ from those revealed within the investigation.

5.1 Earthworks

Information on the proposed earthworks (eg cut and fill depths) for the new Precinct 6 configuration was not provided. The concept bulk earthworks plan in the MG investigation report indicates cutting and filling of up to approximately 2m.

The MG investigation report provides general earthworks information including information on foundation preparation, the suitability of the encountered materials for reuse as fill and fill compaction.

Upper silty sand soils were identified in the majority of the test pits. This material was deeper in test pits TP605 and TP6-8 which were located in the lower site areas near the tree areas around the site boundary. Groundwater seepage was also encountered in these two test pits. Where the silty sand is present (and particularly where it is deeper), issues for earthworks likely include poor trafficability and inability to pass proof roll testing. Treatment may be required similar to that which was used in Precinct 4E including initially cutting drains, removal to stockpile of the majority of the silty sand (down to approximately 100mm above the natural clayey material) and blending the sand in with the more clayey material for reuse as fill.

Excavations in the natural sand and clay-based soils and very low strength weathered sandstone rock should be within the capacity of conventional earthmoving equipment such as medium to large sized excavators (15t – 30t). Refusal was reached with a 25t excavator (fitted with a tooth bucket) in 5 of the 6 test pits at depths ranging between 1.6m and 4.8m. Efficient excavations in the weathered sandstone rock below these depths may require the use of large excavators fitted with ripper attachments or pre-ripping with dozers.

Emerson Class laboratory testing indicates that the clay soil is non-dispersive. However, rill and gully erosion of the upper soil layers was observed on most slopes, this was caused by water turbulence or concentrated rapid water flow toward the vegetated gullies and the farm dams.

5.2 Soil Reactivity

The site classifications for the individual lots will depend on the predominant subsurface profile at each location, and the conditions existing after the bulk earthworks have been completed.

The MG investigation report indicates that characteristic ground surface movements y_s of up to approximately 35mm (Class M) are expected for the current site conditions. Following cut and fill earthworks, this may increase to up to 60mm to 65mm (Class H1).

Information is given in the MG investigation report for the assessment of additional movements where trees are present.

5.3 Footings

It is expected that the residential buildings will be supported by stiffened raft slabs. The footing systems supporting structures at shallow depth within Precinct 6 should be designed and constructed to accommodate the potential ground movement resulting from the volume instability of the reactive clay soils.

Allowable bearing pressures for high-level and deep footings for the encountered materials are given in the MG investigation report.

5.4 Retaining Walls

The MG investigation report provides strength parameters for the design of retaining walls.

The importance of surface and subsurface drainage for retaining walls is noted. Surface water must be diverted away from the back of retaining walls to prevent the ponding of surface water behind the top of the wall. Sub soil drainage must be placed behind the permanent retaining walls to prevent the build-up of groundwater pressures, and this must be freely discharged to a point of legal discharge.

5.5 Pavements

The MG investigation report notes that pavements are likely to be constructed on a wide variety of subgrade materials which should be compacted to achieve a minimum density ratio of 100% SMDD. Preliminary design CBR values of 10% for natural sandy materials and 1.5% for silty clay materials are given.

6.0 LIMITATIONS OF DESKTOP GEOTECHNICAL INVESTIGATION

This Report has been prepared by Morrison Geotechnic (**Morrison Geotechnic**) and may include contributions from Morrison Geotechnic's officers and employees, sub-contractors, sub-consultants, or agents (**Contributors**).

This Report is for the sole benefit and use of Golding Contractors (**Client**) for the sole purpose of providing geotechnical information in respect of the residential development within Yarrabilba – Precinct 6 **(Project)**. The Report is only intended to address those issues expressly described in the scope of work in the Proposal Letter and this Report.

This Report should not be used or relied upon for any other purpose without Morrison Geotechnic's prior written consent. Morrison Geotechnic and the Contributors do not accept any responsibility or liability in any way whatsoever for the use or reliance of this Report by anyone other than the Client or by anyone for any purpose other than that for which it has been prepared.

Except with Morrison Geotechnic's prior written consent, this Report may not be:

(a) released to any other party, whether in whole or in part (other than to the Client's officers, employees, and advisers).
(b) used or relied upon by any other party; or
(c) filed with any Governmental agency or other person or quoted or referred to in any public document.

Morrison Geotechnic and the Contributors do not accept any liability or responsibility whatsoever for, or in respect of, any use or reliance upon this Report by any third party. Morrison Geotechnic is not obliged to enter discussions with any third party in respect of this Report.

The information (including technical information and information obtained through discussions) on which this report is based has been provided by the Client and third parties. Morrison Geotechnic and the Contributors:

(a) have relied upon and presumed the accuracy of this information.
(b) have not verified the accuracy or reliability of this information (other than as expressly stated in this Report).
(c) have not made any independent investigations or enquiries in respect of those matters of which it has no actual knowledge at the time of giving this Report to the Client; and
(d) make no warranty or guarantee, expressed or implied, as to the accuracy or reliability of this information.

Morrison Geotechnic and the Contributors do not accept responsibility or liability for any incorrect assumptions related to this Report. For the avoidance of doubt, this Report:

(a) contains information from widely spread borehole and test pit locations.
(b) cannot predict the ground conditions encountered at any untested location because the ground conditions surrounding test sampling locations, (or between any two test sampling locations) may be different from the test samples we have obtained
(c) is not an environmental, contamination or hazardous materials assessment; may be invalid, incomplete, or inaccurate (including errors in the scope of work, investigation methodology, observations, opinions, and advice) where the information provided to Morrison Geotechnic was invalid, incomplete, or inaccurate.

(d) is limited to observations of those parts of the site that were accessible at the time of the field investigation and is not based on observations about areas of the site which were inaccessible to the investigation equipment (including slopes, heavily vegetated areas, or service corridors); and

(e) is not a comprehensive representation of the actual site conditions and may only show a reasonable interpretation of conditions encountered at discrete, widely spaced test locations, as selected by the Client, along with general site observations.

No warranty or guarantee, whether express or implied, is made in respect of the geotechnical data, information, advice, opinions, and recommendations present in this Report. In recognition of the limited use to be made by the Client of this Report, the Client agrees that, to the maximum extent permitted by law, Morrison Geotechnic and the Contributors shall not be liable for any losses, claims, costs, expenses, damages (whether in statute, in contract or tort for negligence or otherwise) suffered or incurred by the Client or any third party as a result of or in connection with the information, findings, opinions, estimates, recommendations and conclusions provided in the course of this Report.

If further information becomes available, or additional assumptions need to be made, Morrison Geotechnic reserves its right to amend this Report.

We trust that this desk study is acceptable however, do bot hesitate to contact to contact us if you require any further details or assistance.

Yours faithfully



SIMON WYNNE (RPEQ 17390)
For and on behalf of
MORRISON GEOTECHNIC