

APPENDIX J

GEOTECHNICAL DESKTOP STUDY



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Our ref: Appendix J - Geotechnical desktop study

Your ref: PS117658-GEO-LTR-001 RevA

By email
Tim.Donnan@transgrid.com.au

30 April 2021

Tim Donnan
Land Access and Approvals Strategy Project Manager
TransGrid

Dear Tim

EnergyConnect (Victorian Section) - Geotechnical Desktop Study

1. INTRODUCTION

This report presents the findings of the geotechnical desktop study component undertaken by WSP Australia Pty Ltd (WSP).

This study area (the site), approximately 1.3 km stretch of land which runs north east from Red Cliffs substation, is a section of a proposed transmission line upgrade. Up to six transmission monopoles are proposed within the site area. It is assumed these monopoles are self-standing and approximately 46 metres in height.

Red Cliffs Main Pumping Station and Red Cliffs substation are in the south west corner of the site. The remainder of the site area falls within the Kings Billabong Park. The aerial image of site area, accessed from maps.au.nearmap.com and site boundary provided, are shown in Figure 1.

The aim of this desktop study is to provide high level preliminary comments on:

- potential extensive or major effects on land stability
- potential for acid sulfate soils or highly erodible soils over the short or long term
- any other geotechnical concern of the study area.

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Figure 1: Study area

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2. INFORMATION SOURCES

It is understood that, extensive earthworks and geotechnical investigations would have been required during the development of the land and potentially prior to construction of the existing substation and associated facilities in the southwest corner of the site. However, this information was not available at the time of this desktop study.

The following information sources were referred to during this study:

- VandenBerg, A.H.M., 1997. Mildura SI 54-11 Edition 2, 1:250 000 Geological Map Series. 1:250,000 geological map. Geological Survey of Victoria.
- ‘Department of Environment and Primary Industries’ Visualising Victoria’s Groundwater website (www.vvg.org.au).
- Australian Soil Resource Information System, ASRIS website (www.asris.csiro.au).
- Australian Standard AS2870-2011 ‘Residential slabs and footings’.

3. METHODOLOGY

The methodology included review of the available geotechnical information sources described in Section 2 for the site and provides preliminary commentary on the following items:

- anticipated subsurface soil and groundwater conditions
- an indicative site classification in accordance with Table D1 of AS 2870-2011 ‘Residential slabs and footings’
- commentary on suitable founding systems
- anticipated excavation conditions
- engineered fill construction, and trafficability during construction
- land stability and dispersive potential
- likely settlement characteristics of the subsurface soils
- likelihood of acid sulfate soils.

4. GEOTECHNICAL REVIEW OF GROUND CONDITIONS

4.1 SURFACE CONDITIONS

Aerial images and Google street view images of the site area accessed through the Nearmap website (www.nearmap.com), indicate the following surface features of the site:

- the existing Red Cliffs substation and transmission line structures in the vicinity
- the site is relatively flat
- the Kings Billabong Park is vegetated with trees and shrubs
- site is located on a bend of the Murray River (see Figure 1)
- historical aerial images show the north-east section of site show historic occurrences of inundation (see Figure 2).



Figure 2: Historical image displaying inundation (Source: Google Earth)

Note: Red Cliffs Terminal Station referred in memo as the Red Cliffs substation

4.2 ANTICIPATED SUB SURFACE CONDITIONS

The Geological Survey of Victoria 1:250,000 Mildura map sheet (1997) indicates the site is underlain by Quaternary age fluvial deposits comprising clay, sand and sandy clay.

According to the historical imagery, accessed via Google Earth, in Figure 2, it is understood that site has historically been subject to inundation in areas within the vicinity of the Murray River. These factors are indicative of the potential for presence of soft and compressible clay/silty clay layers.

The Geological Survey of Victoria 1:250,000 Mildura map sheet and historical borehole information accessible via Department of Environment and Primary Industries' Visualising Victoria's Groundwater website (www.vvg.org.au) provide a general indication of the subsurface profile of the site area.

Based on the available information, the anticipated subsurface profile of the site is likely to comprise of a surface layer of topsoil, overlying fluvial deposits, primarily comprising of clay, silty clay and sandy clay.

and the engineering properties of the natural soils is unknown at time of this desktop study.

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4.3 ANTICIPATED GROUNDWATER CONDITIONS

Based on the Department of Environment, Land, Water and Planning depth to Watertable data, sourced by Lotsearch on 1 September 2020 (see Appendix B of *the EnergyConnect (Victorian Section) Phase 1 Preliminary Site Investigation, WSP 2020*), the expected depth to groundwater at the site is between five metres to 10 metres below ground level. Groundwater levels may fluctuate due to seasonal changes. Perched water may also be encountered.

5. PRELIMINARY GEOTECHNICAL RECOMMENDATIONS

5.1 INDICATIVE SITE CLASSIFICATION

A site classification is assigned by the potential characteristic surface movements that may occur, which is limited to the depth of soil profile that can be influenced by changes in moisture. The profile depth can be reduced by the presence of shallow rock or a permanent water table.

In accordance with AS 2870-2011 'Residential slabs and footings', the site is located within Victorian Climatic Zone 5 and has a design suction change depth of 4.0 m.

On a site where the surface fill thickness is greater than 0.4 m, an indicative site classification of Class P is applicable. If the site has an existing uncontrolled fill greater than 0.4 m, it should be classified as Class P.

If fill is required to be removed from site, for preliminary assessment purposes, the underlying natural soil profile across the site would be classified as Class H1-D to E-D with potential characteristic surface movements (y_s) of 40 - >75 mm.

It should be noted that the use of standard footings in accordance with AS 2870-2011 is only applicable to buildings with a loading and construction style similar to that of a residential dwelling.

5.2 EXCAVATION CONDITIONS

The natural soils are expected to be excavatable using conventional mechanical equipment such as a backhoe, or excavator.

Excavations could deteriorate quickly if exposed to moisture such as inclement weather, damaged services, or construction traffic. As such, any construction sequence requiring excavation should be carefully managed, monitored and timed, to avoid adverse effects from stormwater runoff and with excavations blinded in a timely manner to avoid loss of strength prior to construction.

Dewatering measures will likely be required for excavation below the water table if encountered.

5.3 TRAFFICABILITY

The materials likely to be present near surface would be expected to require some form of running course to provide a trafficable surface whilst in a dry condition.

Furthermore, when wet and/or remoulded, the existing surface materials may rapidly deteriorate, likely becoming unsuitable for trafficking, even with tracked vehicles and other construction traffic. The use of granular access tracks and construction planning to minimise trafficking is likely to be required to control these issues.

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5.4 LAND STABILITY AND DISPERSIVE POTENTIAL

Based on the elevation data accessed from Google Earth aerial images, the site is almost flat with a gentle downward slope towards the north east. There is no evidence to support potential for land slide risk on this site. However, this would need to be confirmed by a suitably experienced geotechnical professional following a site visit.

Further site investigation and laboratory testing will be required to assess the dispersive potential of subsoil layers.

5.5 SETTLEMENT CHARACTERISTICS

Fluvial deposits available on the site are likely to be comprised unconsolidated soft clay layers.

Location specific assessment are likely to be required at the intrusive investigation level to assess the settlement characteristic.

5.6 LIKELIHOOD OF ACID SULFATE SOILS

Based on the Australian Soil Resource Information System website (www.asris.csiro.au) accessed on 11 August 2020, the site has “Extremely Low Probability of Occurrence” of acid sulphate soil. This would need to be confirmed with laboratory testing at the intrusive investigation stage to confirm the absence of acid sulfate soil.

6. INTRUSIVE INVESTIGATION

An intrusive investigation will be required to confirm geological conditions and to provide geotechnical recommendations to inform the design process. It is likely that the intrusive works would comprise a deep boreholes and laboratory testing at specific monopole locations.

Previous geotechnical investigation reports are likely to have been required during the construction of existing transmission towers. If this data were available, it would be highly beneficial to undertaking an appropriate desktop review, prior to any intrusive investigation.

7. CLOSURE

We trust this memo meets your requirements. This memo should be read in conjunction with our limitations provided in Attachment A. Please contact the undersigned should you have queries relating to this memo or require anything further.

Yours sincerely

Adam Farr
Associate Geotechnical Engineer

Attachment A – Limitations

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ATTACHMENT A

LIMITATIONS

SCOPE OF SERVICES

This geotechnical site assessment report (the report) has been prepared in accordance with the scope of services set out in the contract, or as otherwise agreed, between the client and WSP (scope of services). In some circumstances the scope of services may have been limited by a range of factors such as time, budget, access and/or site disturbance constraints.

RELIANCE ON DATA

In preparing the report, WSP has relied upon data, surveys, analyses, designs, plans and other information provided by the client and other individuals and organisations, most of which are referred to in the report (the data). Except as otherwise stated in the report, WSP has not verified the accuracy or completeness of the data. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in the report (conclusions) are based in whole or part on the data, those conclusions are contingent upon the accuracy and completeness of the data. WSP will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to WSP.

AVOID MISINTERPRETATION

A geotechnical engineer should be retained to work with other appropriate design professionals explaining relevant geotechnical findings and in reviewing the adequacy of their plans and specifications relative to geotechnical issues.

GEOTECHNICAL INVOLVEMENT DURING CONSTRUCTION

During construction, excavation is frequently undertaken which exposes the actual subsurface conditions. For this reason, geotechnical consultants should be retained through the construction stage, to identify variations if they are exposed and to conduct additional tests which may be required and to deal quickly with geotechnical problems if they arise.

REPORT FOR BENEFIT OF CLIENT

The report has been prepared for the benefit of the client and no other party. WSP assumes no responsibility and will not be liable to any other person or organisation for or in relation to any matter dealt with or conclusions expressed in the report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in the report (including without limitation matters arising from any negligent act or omission of WSP or for any loss or damage suffered by any other party relying upon the matters dealt with or conclusions expressed in the report). Other parties should not rely upon the report or the accuracy or completeness of any conclusions and should make their own enquiries and obtain independent advice in relation to such matters.

OTHER LIMITATIONS

WSP will not be liable to update or revise the report to take into account any events or emergent circumstances or facts occurring or becoming apparent after the date of the report.

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