

2020-05-11

Greg Dewe  
Land Operations Manager  
Fulton Hogan Ltd

Via email: Gregory.Dewe@fultonhogan.com

Dear Greg

### **Rosemerry Subdivision – Stage 14 Geotechnical Completion Letter Report**

This geotechnical completion letter report is submitted to fulfil the geotechnical requirements of Condition 21 of the Selwyn District Council Resource Consent RC185574.

This Revision 2 letter incorporates comments from the project Civil Engineer and supersedes all previous revisions.

#### **1 Introduction**

As part of the Fulton Hogan Land Development Limited (FHLD) Rosemerryn Subdivision Development located at Lincoln, Aurecon has completed a geotechnical investigation and assessment for Stages 10 to 18, including the area now known as Stage 14. The investigation and assessment are detailed in the Aurecon geotechnical report “*Rosemerryn Subdivision, Lincoln, Stages 10 to 18 Geotechnical Investigation Report*”, dated 25 September 2015.

#### **2 Liquefaction Hazard Assessment**

The report was issued following the publication of the Ministry of Business Innovation & Employment (MBIE), guidelines in December 2012 and subsequent updates in 2014, which define the Technical Category zoning and the liquefaction induced deformation limits for each Technical Category.

The categories and corresponding criteria are as follows:

- **Technical Category 1 (TC1)** – Future land damage from liquefaction is unlikely, and ground settlements are expected to be within normally accepted tolerances.
- **Technical Category 2 (TC2)** – Minor to moderate land damage from liquefaction is possible in future large earthquakes.
- **Technical Category 3 (TC3)** – Moderate to significant land damage from liquefaction is possible in future large earthquakes.

The indicative vertical and horizontal displacements associated with each Technical Category classification, together with the impact of liquefaction on house foundations, are presented in Table 1 below.

**Table 1 Liquefaction Deformation Limits and House Foundation Implications**

Technical Category	Index Liquefaction Deformation Limits				Likely Implication for House Foundations (subject to individual assessment)
	Vertical		Lateral Spread		
	SLS	ULS	SLS	ULS	
TC1	15mm	25mm	Nil	Nil	Standard NZS3604 type foundations with tied slabs are acceptable subject to shallow geotechnical investigation.
TC2	50mm	100mm	50mm	100mm	MBIE enhanced foundation solutions.
TC3	>50mm	>100mm	>50mm	>100mm	Site specific foundation solution.

A liquefaction hazard assessment was carried out as part of the site assessments in 2015 using the prescribed in the Ministry of Business, Innovation, and Employment (MBIE, 2014) guidelines for residential development in Canterbury following the Canterbury earthquake sequence.

The liquefaction analysis for Stage 14 was based on the boreholes and CPT testing carried out as part of the geotechnical investigations for the larger subdivision. The geotechnical investigation information used to assess Stage 14 is part of a large group of geotechnical information and only the tests that are relevant for this stage have been assessed. Consideration was given to information and data from outside the stage boundary when assessing geotechnical hazards and issues.

### 3 Technical Category Classification

Based on this assessment and, observed site performance, we consider that:

- **Lots 503 to 543 fulfil the requirements of a TC1 Classification.**
- **Lots 1020, 7004 and 7005 are roading and reserve areas; therefore, no Technical Category Classification is applicable for these lots.**

### 4 Clayey-Silty Soils

Soft to firm clayey silty soils may be encountered in isolated pockets within Stage 14. Based on the available investigation logs, where this silty material has been encountered during the subdivision wide investigations, it is unlikely that shallow bearing for a typical house foundation of 300kPa could be achieved in these areas. Therefore, despite Stage 14 being expectant to have a performance equivalent to TC1, if these soils are encountered 'Good Ground' as per NZS3604 is unlikely to be met and specifically designed foundations may be required based on the building consent investigations. However, it is anticipated that any additional foundation requirements for these lots due to the presence of soft soils are likely to be readily accommodated by a TC2 type foundation system, pending detailed foundation design at building consent stage.

### 5 Recommendations

Due to the identified underlying ground conditions (TC1 but with the potential for softer silty soils) lot and building specific shallow geotechnical investigations shall be undertaken for all lots in Stage 14 in accordance with NZS3604.

**This report is not intended to be used for detailed design of site specific shallow foundations and is not suitable to support a building consent application. Site specific investigations are required at building consent stage.**

## 6 Reference

Aurecon, 2015. *Rosemerryn Subdivision, Lincoln, Stages 10 to 18 Geotechnical Investigation Report, Rev3* - dated 25 September 2015. Aurecon New Zealand Limited, Christchurch, New Zealand.

MBIE, 2012. *Repairing and rebuilding houses affected by the Canterbury earthquakes*. Ministry of Business, Innovation and Employment, Wellington, New Zealand – December 2012.

MBIE, 2014. *Repairing and rebuilding houses affected by the Canterbury earthquakes*. Ministry of Business, Innovation and Employment, Wellington, New Zealand – October 2014.

## 7 Explanatory Statement

The contents of this letter are for the sole use of the Client and no responsibility or liability will be accepted to any third party. Information or opinions contained within this letter may not be used in other contexts or for any other purposes without our prior agreement.

The comments in this letter are based on our investigations of the site for the sole purposes of the geotechnical aspects only, as requested by the Client. Only a finite amount of information has been collected and this letter does not purport to completely describe all the site characteristics and properties.

The extent of our investigations and the results of all the tests carried out are as presented in the geotechnical report for Stages 10 to 18 "*Rosemerryn Subdivision, Lincoln, Stages 10 to 18 Geotechnical Investigation Report*", dated 25 September 2015.

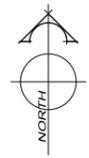
We trust this meets your requirements and if there are any further queries please do not hesitate to contact us.

Yours faithfully



**Dr Jan Kupec**  
*Technical Director – Ground Engineering*

Enc: SDC Approved Subdivision Plan for Rosemerryn Subdivision Stage 14



AMENDMENTS:		
AMENDMENT	DATE	DESCRIPTION

- NOTES:
- 1) This plan has been prepared for Earth Fill asbuilt purposes only. No liability is accepted if the plan is used for any other purpose.
  - 2) Any measurements taken from information which is not dimensioned on the electronic copy are at the risk of the recipient.

LEGEND:

CONTOURS SHOWN ARE APPROXIMATELY CUT (-ve) AND FILL (+ve) AT 0.1m INTERVALS.

	CUT
	FILL ≥ 0.2m
	ASBUILT KERB
	ASBUILT FOOTPATH

**DAVIE LOVELL-SMITH**  
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JOB TITLE:  
**Rosemerryn - Stage 14**

SHEET TITLE:  
**Earthfill Asbuilt**

DRAWING STATUS:  
**Asbuilt**

SCALE: 1:500@A1 DATE: March 2020  
1:1000@A3

CAD FILE: J:\19825\Asbuilt\E19825_AB_EF_00.dwg	DRAWN: DG
DRAWING No: <b>E19825.AB.EF01</b>	SHEET No: <b>R0</b>