

2024-09-06

Greg Dewe
Land Operations Manager
Fulton Hogan Ltd

Via email: Gregory.Dewe@fultonhogan.com

Dear Greg,

Rosemerryn Subdivision – Stage 21B Geotechnical Completion Letter

This geotechnical completion letter report is submitted to fulfil the geotechnical requirements of Condition 21 of the Selwyn District Council Resource Consent RC185574. Condition 21 requires confirmation that the original Technical Classification remains applicable after final earthworks have been completed.

1 Introduction

Fulton Hogan Land Development Limited (FHLd) is developing the Rosemerryn Subdivision located in Lincoln, Christchurch. Aurecon New Zealand Limited (Aurecon) has provided Geotechnical Engineering services from the subdivision development, including a geotechnical investigation and subsequent assessment of Stages 19 to 24 for the purposes of obtaining a subdivision consent. The investigation and assessment are detailed in the Aurecon geotechnical report “*Rosemerryn Subdivision, Lincoln, Stages 19 to 24 Geotechnical Investigation Report*”, dated 22 June 2018.

FHLd has engaged Aurecon to provide a geotechnical review of the construction completed in Stage 21B of the Rosemerryn Subdivision to confirm the Technical Category Classifications of the proposed allotments. The extent of Stage 21B is shown in the attached Earthfill As-built plan for Stage 21B provided by Davie Lovell-Smith Ltd (Davie Lovell-Smith) and attached as Appendix A of this Letter. Aurecon’s review is summarised in the letter below.

2 Earthworks

Cut and fill earthworks have been carried out across Stage 21B to ensure adequate drainage towards the street in accordance with the Selwyn District Council Code of Practice (SDC COP). The work was also carried out in accordance with the Christchurch City Council Construction Standards Specification (CCC CSS), the Infrastructure Design Standard (CCC IDS) and the New Zealand Building Code (NZBC). All bulk filling was compacted in accordance with NZS 4431:1989. Earthworks were undertaken using site won engineered fill between October 2022 and July 2024. Cut and fill earthworks have been undertaken to a maximum 0.3m of cut and 1.1m of fill.

Bulk earthworks and compaction have been observed and signed-off separately by the project Civil Engineers Davie Lovell-Smith in September 2024. An Earthfill As-built plan for Stage 21B provided by Davie Lovell-Smith is attached as Appendix A of this letter.

3 Liquefaction Hazard and Technical Category Assessment

3.1 Seismically Induced Liquefaction

Aurecon’s Geotechnical Report for Stages 19 to 24 was issued following the publication of the Ministry of Business, Innovation & Employment (MBIE) guidelines in December 2012, and subsequent updates in 2018, 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 implications for House Foundations (subject to individual assessment)
	Vertical		Lateral Spread		
	SLS	ULS	SLS	ULS	
TC1	15mm	25mm	Nil	Nil	Standards NZS 3604 type foundations with tie 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 undertaken as part of Aurecon’s 2018 Geotechnical Report using the prescribed MBIE (2018) guidelines for residential development in Canterbury following the Canterbury Earthquake Sequence (CES).

The liquefaction analysis for Stage 21B was based on the boreholes and Cone Penetrometer (CPT) testing carried out as part of geotechnical investigations for the larger subdivision. The geotechnical investigation information used to assess Stage 21B is part of a large group of geotechnical information and only the tests relevant for this stage have been included in our assessment. Consideration was given to information and data from outside the stage boundary when assessing geotechnical hazards and issues.

3.2 Technical Category Classification

Given the subdivision development has comprised relatively minor cut and fill earthworks, Aurecon considers that there has been no change in Technical Category Classification from our original assessment. Therefore, we consider that:

- **All Lots (Lots 827 to 831 and Lots 854 to 875) fulfil the requirements of a TC2 Classification.**

4 Silty Soils

Investigations undertaken by Aurecon prior to earthworks indicate that loose to medium dense sands with interbedded layers of soft to firm silts may be encountered at shallow depths across the entirety of Stage 21B. Stage 21B is expected to have a seismic performance equivalent to MBIE TC2 and the silty soils may have a settlement potential, we therefore believe that standard NZS 3604 type footings would not be appropriate.

Lot specific shallow geotechnical investigations will be required for all Lots as part of the detailed building design process. The anticipated bearing capacities from the near surface soils are likely to be readily accommodated by a TC2 type foundation system, pending detailed foundation investigation and design at building consent stage.

5 Recommendations

Due to the identified underlying ground conditions (TC2 and the potential for softer silty soils) Lot and building specific shallow geotechnical investigations shall be undertaken for all Lots in Stage 21B in accordance with the requirements of NZS 3604.

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

6 Reference

Aurecon, 2018. Rosemerryn Subdivision, Lincoln, Stages 19 to 24 Geotechnical Investigation Report, Rev0 - dated 22 June 2018. Aurecon New Zealand Limited, Christchurch, New Zealand.

Davie Lovell-Smith, 2024. Earthfill Report, Fulton Hogan Land Development Ltd, Rosemerryn Stage 21B – dated 12 June 2024.

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

MBIE, 2018. Repairing and rebuilding houses affected by the Canterbury earthquakes. Ministry of Business, Innovation and Employment, Wellington, New Zealand – May 2018.

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 19 to 24 "Rosemerryn Subdivision, Lincoln, Stages 19 to 24 Geotechnical Investigation Report", dated 22 June 2018.

We trust this meets your requirements and if there are any further questions, please do not hesitate to contact the undersigned.

Yours sincerely,

A handwritten signature in blue ink, appearing to read "I. McPherson".

Ian McPherson

BE (Civil) Hons, M.A.Sc., DBS, CMEngNZ, CPEng
Technical Director – Geotechnical Engineering

Appendix A – DLS Earthfill As-built Plan for Rosemerryn Subdivision Stage 21B



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.
3. All roading and footpath information is asbuilt.

LEGEND

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

	CUT
	ASBUILT FILL ≥ 0.2m
	ASBUILT KERB
	ASBUILT FOOTPATH

DAVIE LOVELL-SMITH
PLANNING SURVEYING ENGINEERING

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JOB TITLE:

Rosemerryn - Stage 21B

SHEET TITLE:

Earthfill Asbuilt

DRAWING STATUS:

Asbuilt

SCALE: 1:500@A1 DATE: August 2024
1:1000@A3

CAD FILE: J:\20764\ASBUILT\STG 21B\E20764_STG21B_ABEF_R0.dwg	DRAWN: JS
DRAWING No: E.20764.AB.EF01	REVISION: RO