Aurecon New Zealand Limited
Level 2, Iwikau Building
93 Cambridge Terrace
Christchurch 8013
New Zealand

T +64 3 366 0821
F +64 3 379 6955
E christchurch@aurecongroup.com
W aurecongroup.com

2025-10-22

Greg Dewe
Land Operations Manager
Fulton Hogan Ltd

Via email: Gregory.Dewe@fultonhogan.com

Dear Greg,

Rosemerryn Subdivision – Stage 23
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 for the subdivision development, including a geotechnical investigation and subsequent assessment of Stages 19 to 25 for the purposes of obtaining a subdivision consent. The investigation and assessment are detailed in the Aurecon Geotechnical Reports "*Rosemerryn Subdivision, Lincoln, Stages 19 to 24 Geotechnical Investigation Report"*, dated 22 June 2018 and "*Rosemerryn Subdivision, Lincoln, Stage 25 Geotechnical Investigation Report"* date 17 March 2022. Following the completion of these reports and subsequent planning and development of the subdivision, the various Stage numbering and boundaries have been adjusted by the Client. As such, the final Stage 23 area associated with this Geotechnical Completion Letter spans the area of Geotechnical Assessment in both referenced reports.

FHLD has engaged Aurecon to provide a geotechnical review of the construction completed in Stage 23 of the Rosemerryn Subdivision to confirm the Technical Category Classifications of the proposed allotments. The extent of Stage 23 is shown in the attached Earthfill As-built plan for Stage 23 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 23 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 silt fill between November 2024 and June 2025. Cut and fill earthworks have been undertaken to a maximum 0.1m of cut and 1.1m of fill.

Up to a maximum of 1.5m of fill was placed in the construction phase sediment retention pond located at the bottom right corner of Stage 23 (Lots 923 to 925). Initially, site won silt fill was used, however

due to wet conditions, this material was removed. It was subsequently replaced with pitrun, which was later capped with a silt layer once conditions had improved.

Bulk earthworks and compaction have been observed and signed off separately by the project Civil Engineers, Davie Lovell-Smith. Aurecon have reviewed the Nuclear Densometer (NDM) tests results, and the Earthfill As-built plan for Stage 23 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 Reports for Stages 19 to 25 were 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 23 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 23 is part of a large group of geotechnical information and only the tests relevant for this stage have been included in our assessment.

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:

- **Lots 887 to 889, 916 to 926, 989 to 995, and 998 to 1013 fulfil the requirements of a TC2 Classification.**
- **Lots 1031, 1036 and 7022 are roading, utilities and reserve areas, and therefore a Technical Category Classification is not applicable to these lots.**

4 Silty Soil Layers

Investigations undertaken by Aurecon prior to earthworks indicate that loose to medium dense sands with interbedded layers of firm to stiff sandy silts may be encountered at shallow depths across the entirety of Stage 23. Stage 23 is expected to have a seismic performance equivalent to MBIE TC2 and the silty soils may have a consolidation settlement potential, and Aurecon therefore consider that standard NZS 3604:2011 type foundations would not be appropriate.

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

5 Recommendations

For Lots identified as TC2, Aurecon recommend founding dwellings on TC2 type 'enhanced foundation slabs' as per Option 3 or 4 from the MBIE Guidelines (2012) Section 5.1.3 to mitigate the effects of liquefaction induced vertical settlement. Alternatively, in accordance with MBIE Guidelines Section 5.4 a specific design could be undertaken by a suitably qualified chartered professional engineer.

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.

Aurecon, 2022. *Rosemerryn Subdivision, Lincoln, Stage 25 Geotechnical Investigation Report, Rev0* – dated 17 March 2022. 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, 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 Reports for Stages 19 to 24 "*Rosemerryn Subdivision, Lincoln, Stages 19 to 24 Geotechnical Investigation Report*", dated 22 June 2018 and for Stage 25 "*Rosemerryn Subdivision, Lincoln, Stage 25 Geotechnical Investigation Report",* dated 17 March 2022.

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

Yours sincerely,

Dr Jan Kupec
PhD, MSc, FEngsNZ, CPEng (Geotechnical and Project Management), IntPE
Principal – Geotechnical Engineering

Appendix A – DLS Earthfill As-built Plan for Rosemerryn Subdivision Stage 23

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 information is asbuilt.

LEGEND

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

CUT

FILL > 0.2m

ASBUILT KERB — CUT DOWN

ASBUILT FOOTPATH

DAVIE LOVELL-SMITH
PLANNING SURVEYING ENGINEERING

116 Wrights Road P O Box 679 Christchurch 8140. New Zealand
Telephone: 03 379-0793 Website: www.dls.co.nz E-mail: office@dls.co.nz

JOB TITLE:

Rosemerryn - Stages 23

SHEET TITLE:

Earth Fill Asbuilt

DRAWING STATUS

Asbuilt

SCALE : 1:500@A1 1:1000@A3

DATE : September 2025

CAD FILE : J:\21337\ASBUILT\E21337 ABEF.dwg

DRAWN : GC

DRAWING No : **E.21337.ABEF**

SHEET No:

REVISION : **R0**