

2019-06-12

Greg Dewe  
Land Operations Manager  
Fulton Hogan Ltd

Via email: Gregory.Dewe@fultonhogan.com

Dear Greg,

**Rosemerryn Subdivision - Stages 13A and 13B  
Geotechnical Completion Letter Report**

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

**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 Stages 13A and 13B. 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 Stages 13A and 13B were 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 Stages 13A and 13B is part of a large group of geotechnical information and only the tests that are relevant for this stage has been assessed. Consideration was given to information and data from outside the stage boundary when assessing geotechnical hazards and issues, as well as the site's performance in the recent Canterbury Earthquake sequence.

### 3 Technical Category Classification

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

- **Lots 441 to 450, 468 to 472, 482 to 502 and 751 fulfil the requirements of a TC1 Classification.**
- **Lots 451 to 467, 473, 475 to 481, 752 and 2000 fulfil the requirements of a TC2 Classification.**
- **Lot 706 is the balance lot for the remainder of the wider Rosemerryn Development and will be allocated a Technical Category as these stages are developed.**
- **Lots 1016, 1032 to 1034, 7002, 7003 and 7019 are roading and reserve areas and therefore no Technical Category Classification is applicable for these lots.**

### 4 Clayey-Silty Soils

The southeast corner of Stage 13A (around Lots 458 to 460 and 476) has been identified as likely being underlain by soft silt layers at shallow depths. Based on the available investigation logs it is unlikely that shallow bearing for a typical house foundation of 300kPa could be achieved in this area. Therefore, if these soils are encountered 'Good Ground' as per NZS3604 will not be met and specifically designed foundations will be required based on the building consent investigations. We note that this area is classified as being TC2 equivalent and enhanced foundations will be required (see Table 1) and it is anticipate that any additional foundation requirements for these lots due to the presence of soft soils are likely to be accommodated in the TC2 foundation requirements anyway.

## 5 Recommendations

Due to the identified underlying ground conditions (a mixture of TC1 and TC2, and soft silty soils) lot and building specific shallow geotechnical investigations should be undertaken for all lots in Stages 13A and 13B in accordance with the MBIE (2012) guideline documents '*Repairing and rebuilding houses affected by the Canterbury earthquakes*' released in December 2012.

**This report is not intended to be a detailed site specific shallow ground investigation and is not suitable to support a building consent application.**

## 6 References

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 Limitations

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



**Ian McPherson**

*Technical Director – Ground Engineering*

Enc: SDC Approved Subdivision Plan for Rosemerryn Subdivision

REVISIONS	DATE	DESCRIPTION
1	14/03/2018	LOTS AWARDED FOR STAGES 13-24
2	20/03/2018	STAGE 11 REWORKED
3	20/03/2018	STAGE 10 REWORKED
4	20/03/2018	STAGE 10 & 11 REWORKED LOTS RE-ORDERED
5	17/02/2018	STAGE 10 & 11 REWORKED LOTS RE-ORDERED
6	17/02/2018	STAGE 10 & 11 REWORKED LOTS RE-ORDERED


NOTES:

- 1) Areas and dimensions are approximate only and are subject to final survey and deposit of plan.
- 2) Service easements to be created as required.
- 3) This plan has been prepared for submission consent purposes only. No liability is accepted if the plan is used for any other purposes.

STAGES 13-24 SCHEDULE OF AREAS	
Description	Area
Residential Lots (Average: 715m <sup>2</sup> )	37,700m <sup>2</sup>
Roadway	11,909m <sup>2</sup>
Reserve	2,510m <sup>2</sup>
Drainage Reserve	2,324m <sup>2</sup>
Sewer Pumpstation	107m <sup>2</sup>

STAGES 13-24 DENSITY	
Total Area	54,546 ha
Net Area	52,221 ha
Lots	527
Lot/ha	10.091
OVERALL DENSITY	
Total Area	91,670 ha
Net Area	87,789 ha
Lots	875
Lot/ha	9.948

- CONSTRUCTED
- UNDER CONSTRUCTION
- CONSENTED, BEING ALTERED
- PROPOSED
- DRAINAGE RESERVES
- RECREATION RESERVES
- COMMERCIAL SITES (6230m<sup>2</sup>)



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PLANNING SURVEYING ENGINEERING

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JOB TITLE: **Rosemeryn**

SHEET TITLE: **Proposed Subdivision Stages 13 - 24**

DRAWING STATUS: **For Consent**

SCALE: 1:2500(A1) DATE: October 2018

CAD FILE: C:\Users\jlovel\Documents\13-24\_Rosemeryn

DRAWING No: **19458** SHEET No: **1 OF 1** R5

Stage	Residential Lots	Drainage Reserves	Recreation Reserves
13A	27	471m <sup>2</sup>	44,281m <sup>2</sup>
13B	35	232m <sup>2</sup>	-
14	41	157m <sup>2</sup>	-
15	42	-	-
16	43	690m <sup>2</sup>	45,507m <sup>2</sup>
17	59	227m <sup>2</sup>	-
18A	41	78m <sup>2</sup>	-
18B	20	2235m <sup>2</sup>	1,6131ha
19	42	9108m <sup>2</sup>	-
20	35	8469m <sup>2</sup>	-
21	49	1397m <sup>2</sup>	-
22	28	-	-
23	30	-	-
24	35	183m <sup>2</sup>	-
Completed Stages	348	9388m <sup>2</sup>	2,4421ha
Proposed Stages	527	2,3247ha	2,5109ha
TOTALS	875	3,2635ha	4,9530ha



**AS APPROVED BY  
SELWYN DISTRICT COUNCIL  
Planning Department**  
  
**RESOURCE CONSENT  
185574 and 185575**  
  
**19/12/2018     pankha**

