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The Directors
Bellgrove Rangiora Ltd

Bellgrove Subdivision, Rangiora
Geotechnical Summary
Our Ref: 509177

1 Introduction

Bellgrove Rangiora Limited is proposing to develop an area of land on the eastern outskirts of Rangiora township into a new residential subdivision (Bellgrove Development). The wider development is located between Northbrook Road to the south and Coldstream Road to the north and is approximately 100 hectares in area. However, the first stage to be developed is located on the north side of Kippenberger Ave and is approximately 20 hectares in area.

Bellgrove Rangiora Limited has engaged Aurecon New Zealand Ltd (Aurecon) to provide engineering services for the development, part of which includes carrying out a geotechnical assessment of the site to confirm the ground conditions, assess any geotechnical hazards, and to provide indicative engineering mitigation measures.

2 Geotechnical Investigations

Aurecon has undertaken geotechnical investigations for the new subdivision, which comprised a review of relevant previous geotechnical investigations from the wider development within the site, and a recently completed site-specific investigation. The results of these investigations are provided in the following reports:

- *Inch Property, Kippenberger Avenue, Rangiora – Preliminary Geotechnical Investigation Report*, dated 30 July 2019, Ref 506685
- *Bellgrove Subdivision Stage 1 Fast Tracked – Geotechnical Investigation Report*, dated 6 July 2021, Ref 509177.

Of the wider development geotechnical testing one geotechnical borehole, five CPTs, three soakage tests and three piezometers are within the first stage. The recently completed site-specific geotechnical investigations comprised twelve test pits across the site to provide information on the surficial ground conditions.

3 Ground Conditions and Groundwater Conditions

The ground conditions within the first stage comprise a layer of silt and sand overlying gravels from a depth of 0.5m to 2.2m, which extend to at least 15m depth. Investigations indicate that the silt and sand layer become thicker towards the south (near Kippenberger Ave). The depth to groundwater across the site is expected to be between 1.4m to 4m below existing ground level and has shown to vary seasonally.

4 Engineering Recommendations

Based on our investigation and assessment a summary of the geotechnical aspects for the site are provided in the table below.

Aspect	Comments
Geotechnical Hazards (liquefaction, slope instability and soft ground)	Due to the flat nature of the site and the underlying ground conditions, geotechnical hazards are unlikely to pose significant issues to the development.
Technical Classification (MBIE 2012)	Based on our analysis the site is likely to be equivalent to Technical Category 1 (TC1).
Building Foundations	Ground conditions will be suitable for shallow type foundation for typical residential type structures. Specific investigation and design will be required but for residential buildings could be founded on either NZS3604 type foundations or raft type foundations, where there is lower soil bearing capacity.

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

Yours faithfully

James Muirson
Lead Engineering Geologist

Dr Jan Kupec
Principal – Ground Engineering