3680
11 April 2011

GEOTECH
consulting ltd

Selwyn District Council
PO Box 90
Rolleston 7614

Attention: Craig Friedel

Dear Sir,

PC8 – Holmes Block
PC9 – Skellerup Block
Geotechnical assessment

1 Introduction

My name is Ian Ferrier McCahon. I hold a degree of Bachelor of engineering (Hons) from the University of Canterbury and am a Chartered professional Engineer. I have more than 35 years of experience in civil engineering with 20 years specialising in geotechnical and hazard identification and mitigation work. I have investigated many sites in Christchurch and elsewhere for liquefaction potential and mapped the liquefaction zones for the Christchurch Engineering Lifelines Study and for the Canterbury Region. Since the 2010 Canterbury earthquake I have been advising Selwyn district Council on the liquefaction hazard in the district and how best to approach the issue in both planning and building consent processes.

The Selwyn District Council has asked for a brief statement on the geotechnical aspects of thse two private plan change requests seeking rezoning of rural land to rural residential densities. Both sites are on Dunns Crossing Road, on the western periphery of Rolleston.

A geotechnical investigation has been carried out on the sites by Connell Wagner – Geotechical Investigation report, proposed plan change at Rolleston, Selwyn Plantation Board Ltd, 25 September 2008.

This assessment is based on the contents of the CW report, information on the fault rupture and liquefaction from the 2010 Canterbury earthquake, and the application of personal experience and knowledge of the area. No specific site inspection has been made

2 Sites

PC8 Holmes block is an area of 92 ha, adjoining SH1 on the north side. PC9 Skellerup Block is 73 ha, 1.5 km to the south of Holmes block. Both sites are flat.

The shallow test pits reported by Connell Wagner confirm that the sites are underlain with predominantly gravel alluvium of the Canterbury plains, virtually to the surface with only 0.1 – 0.2m of topsoil over the gravel. The water table is likely to be 10 – 15m depth.

Dr. Mark Yetton **E-mail** myetton@geotech.co.nz
Nick Traylen **E-mail** ntraylen@geotech.co.nz
Ian McCahon **E-mail** mccahon@geotech.co.nz

Tel (03) 9822 538
Fax (03) 3257 555
PO Box 130 122
120 Peterborough Street
Christchurch 8141 New Zealand

3 Recent Earthquakes

The sites were strongly shaken by the M7.1 Canterbury earthquake of 4 September 2010. The Holmes Block is about 15km south east of the earthquake epicenter, and the Skellerup Block 17km. Distances from the surface trace of the Greendale fault are about 3 and 5km respectively. Peak ground accelerations recorded at Rolleston were 0.39g; an acceleration with return period of about 1,500 years.

I am not aware of any reports of ground damage in this area, beyond the ground rupture and deformation along and immediately adjacent to the Greendale fault. The closest confirmed liquefaction is over 11km away beyond Lincoln. With the low water table in the area, any lenses of liquefiable sand that may exist are at considerable depth and effects at the ground surface would be minimal. There is a very low risk of liquefaction.

There was little reported structural damage to buildings in Rolleston, despite the strong shaking. Provided that new houses on the sites are built to current codes, there is no reason why they would not also perform satisfactorily in future earthquakes.

The large aftershock of 22 Februaruy2001 (Christchurch earthquake) caused extensive ground and building damage in east and central Christchurch, because of the proximity of these areas to the epicenter and the particular geology underlying the city. The distance of these sites from the earthquake and the much firmer gravel soils under the sites meant that the shaking was much lower at Rolleston than in Christchurch, and for the September 2010 event. Peak ground accelerations recorded at Templeton and Lincoln in February 2011 were 0.16g compared with 0.9g in September 2010. There are no reports of any ground damage in the Rolleston area from the February earthquake.

Seismologists are suggesting that the Canterbury area is probably entering a period of enhanced seismic risk because of the recent earthquakes and the resulting strain redistribution in the bedrock. Geologists are also conducting research on other fault lines buried under the Canterbury Plains and have already identified two possible fat lines in the Christchurch – Lincoln area. This research does not materially affect the overall likelihood of earthquakes in the region, as a background seismicity was built into the previous seismic hazard model; it is just identifying in more detail where the earthquakes could occur. Because of the denser soils under Rolleston, the locality remains less susceptible to ground damage than much of the urban area of Christchurch.

4 Conclusion

The sites are underlain with shallow gravel soils which provide good foundation conditions for residential buildings. The Greendale is far enough away not to be any direct hazard. There is a very low risk of any liquefaction.

- The near surface soils have suitable bearing capacity for houses
- Seismic liquefaction is extremely unlikely
- There are no known faults passing through the site
- The site is geotechnically suitable for residential development

Yours faithfully
Geotech Consulting Limited

Ian McCahon

Disclaimer. This report has been prepared solely for the benefit of the Selwyn District Council. No liability is accepted by this Company or any employee or sub-consultant of this company with respect to its use by any other person. This disclaimer shall apply notwithstanding that the report may be made available to other persons for an application for permission or approval or to fufill a legal requirement

References

These papers are all recently published in the Bulletin of the NZ Society for Earthquake Engineering, Vol 43, No. 4, December 2010:

Gledhill et al:	*The Darfield Earthquake of September 2010: Preliminary Seismological Report*
Cousins & McVerry	*Overview of Strong Motion Data from the Darfield Earthquake*
Beavan et al	*The Darfield Earthquake: Geodetic Observations and Preliminary Source Model*
Quigley et al:	*Surface Rupture of the Greendale Fault during the Darfield earthquake: initial findings*
Allen et al	*Geotechnical Reconnaissance of the 2010 Darfield earthquake*