BEFORE THE SELWYN DISTRICT COUNCIL

IN THE MATTER	of the Local Government Act 2002
AND	
IN THE MATTER	of a submission by S and Z Crofts and J Williamson the draft Rural Residential Strategy 2013

STATEMENT OF EVIDENCE OF RUSSELL THOMAS BENGE
10 APRIL 2014

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1. INTRODUCTION

Qualifications and Experience

1.1 My name is Russell Thomas Benge. I have a Bachelor of Surveying from the University of Otago. I am a Licensed Cadastral Surveyor, hold the title of Registered Professional Surveyor, and am an Associate Member of the New Zealand Planning Institute.

1.2 I was employed by Davis Ogilvie and Partners Ltd as a graduate surveyor in 1994. I became a Registered Surveyor in 1997. In 2001, I was appointed an Associate; in 2005 a Principal and in 2007 a Director of the company.

1.3 My role as project surveyor with Davis Ogilvie and Partners has meant I have had overall responsibility for the management of a wide range of development projects overseeing the Urban Design, Resource Management, Engineering, Legal Survey and Financial Control components. This includes supervising technical assessments of servicing options for such projects as a key aspect of land development management, ranging from rezoning proposals through to subdivision and detailed design.

1.4 Although this matter is a proceeding under the Local Government Act 2002, I nonetheless confirm that I have prepared this evidence in accordance with the Code of Conduct for Expert Witnesses (Environment Court Consolidated Practice Note, November 2011). The evidence I will present is within my area of expertise, except where I state that I am relying on information provided by another party. I have not knowingly omitted facts or information that might alter or detract from the opinions I express.

Scope of evidence

1.5 My evidence addresses the servicing options for rural residential development, along with identifying the potential flooding and geotechnical constraints. I also comment where appropriate on the Officer Report recommendations.

2. BACKGROUND AND LOCALITY

2.1 The subject site is made up of two 4ha blocks in two different ownerships on the western edge of Tai Tapu, south of Lincoln Tai Tapu Road, and immediately adjoining the township along Hauschilds Rd.

2.2 The subject site is situated upon relatively flat level ground (slight gradient to the south, away from River – from 7.4 to 6.5 m above Lyttelton datum 1937).It is currently utilised as arable farmland and for grazing.

2.3 Detailed design and servicing investigations have led to the development of a conceptual subdivision plan for the Site to provide for 16 rural residential allotments at densities of approximately 2hh/ha.

2.3 Under my overall supervision, Davis Ogilivie provided technical advice on servicing and potential natural hazards aspects of the proposal relating to the high ground water table and liquefaction and lateral spread[1].

3. HIGH PRESSURE WATER

3.1 There is a 100 mm uPVC main in Hauschilds Road that can likely provide suitable high pressure water reticulation to the development. During detailed design the high pressure water network will be designed to supply each residential lot with a high pressure water connection along with fire hydrants in accordance with SNZ PAS 4509:2008 New Zealand Fire Service Firefighting Water Supplies Code of Practice.

4. STORM WATER

4.1 Stormwater will be managed within the applicant's site. The concept design shows an integrated stormwater management system which will be designed to provide treatment and flow attenuation during detailed design. An Environment Canterbury (ECan) stormwater discharge consent is likely to be required for the development and would be obtained by the applicant at the time of subdivision consent. The design and performance criteria for the stormwater management system will depend on the requirements of the ECan discharge

[1] Appendices A and G of submission

consent and will ensure that the post development runoff from the site is no greater than the pre development run off during peak flows.

5. ROADING

5.1 New rights of way can be constructed off the existing Hauschilds Road formation and will be designed and constructed in accordance with SDC's district plan requirements. The concept design shows one option for the layout of the rights of way.

6. RETICULATED WASTEWATER

6.1 As noted in the draft Rural Residential Strategy consideration Tai Tapu is not connected to SDC's ESSS. The current agreement between SDC and the Christchurch City Council (CCC) allows for a maximum annual volume of 90,000 m^3/year with a peak flow of 7.5 l/s. Council has confirmed that there are currently 279 lots allocated for connections within Tai Tapu.

6.2 Based on SDC's Engineering Code of Practice (ECOP) Section 6.4, the 279 allocated lots will have an average flow 1.92 l/s with a peak design flow of 9.6 l/s. This equates to approximately 60,500 m^3/year of sewerage.

6.3 The applicant proposes to utilise a low pressure sewer system which will incorporate an enlarged onsite tank, e.g. an Ecoflow 2014iP tank. The pumps are proposed to pump only during off peak times and utilise the enlarged tank for storage during other times and therefore will not increase the peak flow from Tai Tapu. The optimal off peak time would be determined in consultation with SDC's asset management team. This would ensure the peak flow aspect of SDC's agreement with CCC is not breached.

6.4 With the proposed addition of 16 rural residential lots the total volume discharged per year is approximately 64,000 m^3, which is still below the volume limit mentioned above. In combination with the off peak pumping the proposed 16 rural residential lots would have a less than minor effect on Tai Tapu's sewer reticulation.

6.5 Each of the onsite tanks would discharge into a common low pressure rising main which would be vested as a council asset. The rising main would discharge into an appropriate gravity reticulation sewer manhole

determined during detailed design. The onsite tanks and associated pumps would remain under private ownership.

6.6 The Draft Rural Residential Strategy (RRS) states that a significant constraint to development in Tai Tapu is that no connection to the ESSS is planned and Christchurch City Council has no further connections available to the Bromley wastewater treatment plant. The response to the Reticulated Wastewater consideration above demonstrates that an economic solution to this constraint currently exists.

6.7 Council's Strategic Asset Manager Utilities has confirmed that this alternative solution is a possibility. However they are currently trailing the viability of low-pressure systems, but have yet to reach a position where there is confidence that it is an appropriate solution. Low pressure systems are an alternative solution that other Councils utilise for waste water management, particularly for rural residential type lots. Although the Selwyn District Council has not yet approved this system a number of other Council's have. For example Waimakariri District Council have recently approved Plan Change 17 in Ohoka which allows for 81 rural residential lots with a minimum lot size of 4000m² and an average of 5000m² , the proposed reticulated sewer for this is a low pressure system. Along with this recent plan change the proposed long term sewer reticulation for the Ohoka/Mandivelle area is based on a low pressure system. Low pressure systems suit rural residential development because there is no gravity sewer main with the associated infrastructure (manholes and pipes laid to grades) and cost. Also the individual pumps located within lots are privately owned, which do not require Council maintenance.

7. FLOODING

7.1 The Halswell River can be observed to be approximately 25 metres north of the site, flowing east, alongside the Lincoln Tai Tapu Road. Research of aerial photography has identified low lying areas (6.1 m above Lyttelton Datum) along the southern fringes of the proposed site; these have been identified to be areas of ponding water.

7.2 ECan report (Ref AD5C-0018, Dated 8 August 2004) holds information on the flood risk in relation to the proposed subdivision. The highest recorded rainfall was recorded during the storm event of July 1977,

interpolating levels recorded at the ECan Depot and Branthwaites Bridge (1.5 km north east of the site) gives an estimated water level of 6.69 m above mean sea level (m.a.m.s.l). Ecan has carried out flood modelling for the area and the flood level for a 200 year and 500 year return period 48 hour duration rainfall event without pumps working is 6.88 m and 6.93 m.a.m.s.l. Based this modelling for the Halswell catchment, Ecan have confirmed that the property is not considered to be a 'High Hazard' area as per the RPS definition. Modelled depths are typically less than 0.5 m in the 500 year return period scenario. It notes that the site is not at risk from ponded flood waters to the same degree as the School Road/Forbes Road area.

7.3 Building platforms can be raised above the flood level for these large scale events. This approach in rural residential lots is not uncommon and again has been used for the 81 lots in Plan Change 17 by the Waimakariri District Council in Ohoka.

7.4 The disposal of storm water from the proposed development will need to be carefully assessed at the time of a plan change as the outlets to the Halswell River have the potential to be restricted at times of high river levels and storm water retention systems may be required to mitigate these effects. However constraints like this are not uncommon in designing storm water systems in Canterbury and the pond can be designed to take this into account.

8. GEOTECHNICAL

8.1 Following the Canterbury earthquake series moderate disruption to services and infrastructure was observed in the area, only a portion of the site is covered by LINZ Aerial Imagery (24 February 2011), however surface evidence of liquefaction and associated lateral spreading is evident towards the north of the Lot 1; towards Halswell River. The farmland north of the river was subject to significant liquefaction ejecta, as observed upon LINZ imagery, and associated lateral spreading towards the river.

8.2 According to the Environment Canterbury (ECan) Liquefaction Assessment Area Map (2012) the site is within MBIE TC Zoned Area.

8.3 Lot 2 is entirely within the Department of Building and Housing (DBH, 2012) Technical Category of TC 2, which identifies that minor to moderate land damage from liquefaction is possible in future large

earthquakes, however northern boundary of Lot 1 is within close vicinity to the Halswell River, and part of this lot is within a 150 m "buffer" zone categorised as TC 3 which identifies that moderate to severe land damage from liquefaction is possible in future large earthquakes, as shown upon Appendix C

8.4 The site is in the Green Zone as per the Canterbury Land Information Map released by the Canterbury Earthquake Recovery Authority (CERA, October 2011).

8.5 The published site geology is identified as being dominantly grey river alluvium, comprising gravel, sand and silt, in active floodplains (Quaternary). Auger hole logs from the site investigation show sand, silt and gravel which confirms the published geology

8.6 Depending on the results of future geotechnical investigations land remediation may be required on the building platforms, roads and where Council infrastructure is located. Road construction involves building subgrade and low pressure sewer and water reticulation does not need to be constructed to a grade so has some flexibility in the case of any future liquefaction or lateral spreading.

8.7 Detailed geotechnical investigations will be required at both plan change and subdivision consent stages. The results of the detailed investigation will determine the most appropriate and economic method of land remediation. The most common method of land remediating for rural residential type lots would be to treat the land below and around the building platform, i.e construct an appropriate gravel raft below the building. This method also has the advantage of mitigating against any flood risk at the same time.

9. CONCLUSION

9.1 Based on the above information I conclude that there are suitable solutions to the apparent development constraints for the applicant's land in Tai Tapu.

9.2 In general terms the issues surrounding liquefaction, lateral spreading and flooding can be mitigated by providing an appropriate gravel raft to the appropriate height for the proposed building platforms located within each lot. The costs for constructing such building platforms

would not generally result in the development being uneconomic to construct, and similar types of construction are currently occurring throughout Christchurch and Canterbury .

9.3 The constraint identified in the draft Rural Residential strategy that no further connections are available to CCC's Bromley treatment plant can be managed by the use of a low pressure sewer system with extended duration storage tanks and off peak pumping.

Russell Benge

10 April 2014