Li Liangren Family Trust Private Plan Change

Expert Evidence Review

Wastewater

Prepared for Kaipara District Council
AUTHORS EXPERIENCE AND QUALIFICATIONS

This report has been prepared by John Cocks of MWH NZ Ltd.

John Cock holds degrees of Bachelor of Engineering (Civil) from the University of Canterbury and Master of Engineering Science (Waste Management) from the University of New South Wales, Sydney. He is registered as a Chartered Professional Engineer. He is a Fellow of the Institution of Professional Engineers, New Zealand (IPENZ), a member of the New Zealand Geotechnical Society, and a member of the Chartered Institution of Water and Environmental Management, United Kingdom. He is a senior environmental engineer for and a principal of the firm MWH New Zealand Limited, based in its Dunedin office.

He has over 35 years’ experience in Civil and Environmental Engineering. Over the past 28 years he has specialised in the field of wastewater management. He has experience with on-site and small community wastewater treatment and disposal systems.

Examples of John’s work include the following.

- Reviewing a design for an on-site system in terms of a Consent Order, for the Kaipara District Council.
- Representing the Institution of Professional Engineers, New Zealand (IPENZ) and the Department of Conservation on the combined Australian New Zealand Standards Committee that reviewed the current four standards for onsite sewerage treatment and disposal (and the IPENZ representative on the former committee that prepared the standards).
- Running a continuing professional education course about on-site domestic wastewater management for IPENZ since 2009 at venues throughout New Zealand.
- Extensive work for the Department of Conservation including the preparation of a standard operating procedure for the management of human waste and sullage at backcountry huts and preparing a means of compliance with the building code for toilets and greywater at backcountry huts, and the design of many on-site wastewater treatment and disposal systems for backcountry huts throughout New Zealand. The largest land application system designed for a backcountry hut is that for Anchorage Hut on the Abel Tasman Coastal Walk, with a design overnight population equivalent to 85 residential persons. The largest land application system reviewed for a front country location is that serving Whakapapa and Iwikau Villages on Mount Ruapehu, with a design population equivalent to 3,500 residential persons.
- Overseas projects involving on-site and small community sewerage schemes in Australia, Samoa, Vanuatu, Fiji, Laos, Maldives, Philippines and China.
- Reviewing a draft BIA Acceptable Solution for Onsite Systems.
- Reviewing a Health Information Guideline about Domestic On-Site Wastewater Treatment and Disposal for the Ministry of Health.
- Lecturing on wastewater treatment and on-site wastewater management courses run for the Ministry of Health.
- Working for the Invercargill City Council on projects that have included managing the preparation of the Draft Memorandum On-site Domestic Wastewater for Local Soils (MWH 1999), the Soil Characterisation and Investigation Methodology (Greenwood 2007); and the Technical Memorandum On-site Domestic Wastewater Management for Local Soils (MWH 2007), carrying out peer reviews of building consent applications for on-site systems, and carrying out other work relating to on-site wastewater treatment and disposal including acting as an expert witness for the Council at planning and environment court hearings.
- Working in Hong Kong between 1990 and 2000 on solutions for rural areas (inhabited by approximately 800,000 people), including developing a code of practice for septic tank systems, and managing a detailed investigation into environmental effects of septic tank discharges.
- Working for Public Health South in Southland over a two year period investigating the design, construction and performance of on-site wastewater treatment and disposal systems.
- An appointment under s.54 of the Building Act 1992 to act as an investigator with regard to a complaint and to present evidence at an inquiry.
- Registered as a suitably qualified person for on-site system investigation and design by the Marlborough District Council and the Clutha District Council.
- Knowledge leader for Small Community and On-site Systems for MWH New Zealand Ltd.
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CONTENTS
1 Introduction .................................................................................................................. 1
  1.1 Purpose of report ................................................................................................. 1
2 Comment on Statements of Evidence ........................................................................ 1
  2.1 Evidence of Mr Dean Botica .............................................................................. 1
  2.2 Mr Brett Lewis Hood ......................................................................................... 2
3 Conclusion .............................................................................................................. 2
1 Introduction

1.1 Purpose of report

Li Liangren Family Trust (LLFT) has lodged an application for a Private Plan Change. The change is to rezone part of Lot 1 DP 403278 at Tinopai from Rural (Harbour) zone to Residential (Harbour) Zone.

I provided the Kaipara District Council with a report dated December 2014 entitled *Technical Assessment – Wastewater* that assessed the proposed plan change from the perspective of wastewater treatment and disposal, and a report dated May 2015 entitled *Technical Comment – Wastewater* that commented on further information provided by the applicant in response to my December 2014 report.

I have received statements of evidence on behalf of the applicant. This report comments, with respect to wastewater management, on the statements of evidence from:

- Mr Dean Botica, Hawthorne Geddes Engineers & Architects Ltd
- Mr Brett Lewis Hood, Reyburn and Bryant.

This report does not consider land instability issues, and it is noted that the application of treated wastewater to land, and other earthworks or soils disturbances associated with wastewater treatment and conveyance infrastructure including access tracks, may aggravate land instability.

2 Comment on Statements of Evidence

2.1 Evidence of Mr Dean Botica

Mr Dean Botica states (2.2) that “It is my understanding that the final scheme will have no more than 30 residential lots. The ultimate number of lots may be less due to design constraints (relating to lot sizes and the like), and/or due to wastewater servicing limitations”.

This statement in my view acknowledges that the ultimate number of lots has yet to be determined, implying further work is necessary to determine the number of lots.

He states (7.4) that “the soil typology was determined as poorly drained category 5 soils in accordance with AS/NZS 1547.”

This statement in my view acknowledges that the subsoil has a limited capacity to assimilate hydraulic loads, and that the subsoil may be a control on the loading rate that is used for design.

He states (8.27) that “Plant uptake rates of nitrogen can be up to 100 kg/ha/year of nitrogen with essentially complete removal in the disposal area.”

I commented in the May 2015 report, that “Without removing the plant growth, there will be nitrogen loss to groundwater. Thus, the effects of nitrogen loading have only been partly assessed.” Thus, my further comment in the May 2015 report, that “there is likely to be loss of nitrogen to the environment and the effect of this has not been assessed”, stands unaddressed.

He states (8.37) that “A reduction in the design irrigation rate used in the HG assessment during the maximum holiday period is unlikely to significantly reduce the lot yield for a communal system. Buffering of maximum holiday flows for a two week period could offset any reduction of the design irrigation rate.”

This statement appears not to take into account comment in my May 2015 report i.e. based on the assessed permeability of 10mm/day this would give a loading rate of 0.4 to 1 mm/day. A design loading rate of 2.5mm/day has been used for determining the maximum volume of effluent that can be applied. A sustainable loading rate may be significantly less than that stated for determining the number of lots for a communal system. Also, rezoning should provide for the long-term future of residential land use. Occupancy characteristics may change and a land application system should have the capacity to accommodate changes.
He notes (8.38) that “In my experience the use of permeability testing often results in over estimating the long term acceptance rates for effluent and needs to be carefully consider antecedent conditions”.

It is noted that a long term acceptance rate of a soil (as given by a design loading rate in AS/NZS 1547) pertains to the soil at the zone of effluent application. The permeability of the underlying soil controls the hydraulic assimilative capacity of the site and should be considered separately. Thus, it appears that the significance of soil permeability testing in the determination of a sustainable design loading rate for land application system has not been appreciated.

### 2.2 Mr Brett Lewis Hood

Mr Brett Lewis Hood states (81). While the final details in relation to wastewater and stormwater treatment and disposal will be determined at the time of subdivision, Mr Botica has confirmed in his evidence that the development area is capable of being adequately serviced, and that there are engineering solutions that can be incorporated into the design of future subdivision that will ensure that the potential effects of stormwater and wastewater disposal are avoided and/or mitigated. I note that this is also the general conclusion of the reviewing engineers employed by the Council.

This statement acknowledges that final details of the wastewater system have yet to be determined.

Mr Brett Lewis Hood states (53) that The Residential (Harbour) zone rules provide for a density of 1,000m² per lot and/or dwelling for lots serviced by a reticulated wastewater system, and 3,000m² for lots that are not. I have carried out preliminary subdivision design work which, coupled with the wastewater disposal area constraints covered in the evidence of Mr Botica, indicates that the likely lot yield facilitated by the subdivision will be somewhere between 25 and 30 if a reticulated wastewater system is adopted.

This statement does not acknowledge the point made in my May 2015 report that the land is marginally suitable for the land application of treated wastewater nor is it qualified against the recommendations in the May 2015 report in relation to the protection of the land identified for the land application of treated wastewater, preservation of the bush cover on the surrounding land, and further work to determine a sustainable land application rate and the final determination of the number of lots.

Mr Brett Lewis Hood states (173) that “I do not consider that there is any need to impose additional overlay rules…..”.

Given the conditions recommended in my May 2015 report, additional rules may be necessary to manage potential risks associated wastewater management.

### 3 Conclusion

In my May 2015 report, I assessed that, from the perspective of wastewater treatment and disposal and based on the information provided in support of the application, the land is marginally suitable for the land application of treated wastewater, for the reasons given in the report. I also assessed that, based on the information provided, there is likely to be loss of nitrogen to the environment and the effect of this had not been fully assessed.

It is acknowledged that the information in support of the application indicates that wastewater from residential development can be managed by treatment and land application. However, the proposed number of lots that the rezoned land may yield is dependent on specified land being available for land application of treated wastewater, preservation of the bush cover on the surrounding land, and determination of key design parameters. The evidence of Mr Dean Botica states that further work is needed to determine the final number of lots.
To manage the risks associated with the application of treated wastewater to land, I have recommended that conditions be 'attached' to the rezoned land. The statements of evidence of Mr Dean Botica and Mr Brent Lewis Hood have not explicitly addressed the relevance of these proposed conditions in ensuring that the effects from the land application of wastewater are no more than minor, nor have they addressed the effect of nitrogen loss to the environment from the land application of treated wastewater. As a consequence I have not changed my opinion or conclusions.

Therefore, the recommendations given in my May 2015 report remain i.e.:

- the conditions relating to wastewater management be those given in 7.6 (refer to Attachment A)
- the conditions relating to wastewater conditions act in concert with the recommendations given in the geotechnical peer review report.

Unless it is confirmed that these conditions are adequately addressed in the Districts Plan’s subdivision provisions, in my view it is necessary to add rules to the requested plan change to give effect to the recommended conditions.
7.6 Re-zoning Land

In any rezoning of land on the Site, it is considered that conditions need to be attached to the rezoned land in order to manage the effects of subdivision for residential purpose in terms of the land application of wastewater.

If only the proposed land is rezoned as residential, appropriate conditions are that:

- the land shall be used only for lots with individual on site system (and the minimum size lot is as specified in the District Plan)
- the number of lots using individual on-site systems shall be determined by suitably qualified and experienced person, after site specific soil permeability tests and a review of the land area requirements based on AS/NZS 1547: 2012 and adopting an upper bound lot occupancy of 10 persons
- a geotechnically stable land application area and a reserve area are identified on each lot by suitably qualified and experienced person, and if adequate land is not found on a lot, that lot is then rezoned to prohibit residential use
- wastewater treatment shall be to a secondary standard as defined in AS/NZS 1547: 2012 and shall remove nitrogen so the average concentration of nitrogen discharged to a land application area is less than 25ml/litre
- the design, operation, maintenance and monitoring of individual lot onsite systems shall be in accordance with AS/NZS 1547: 2012.

If the proposed land is rezoned as residential and the land for application of treated wastewater and retention of bush is appropriately rezoned (as noted in 7.1) and “attached” to the residential zone, appropriate conditions for lots with individual-lot on-site wastewater systems are those above and for lots served by a communal wastewater system are those as follows.

- The number of lots served by a communal wastewater scheme shall be determined on the basis of site-specific soil permeability tests and soil water balance analysis, the primary land application area of 1.1 ha, and good practice design, by a suitably qualified and experienced person
- The land application of treated wastewater shall be on the areas of land identified in the Hawthorne Geddes Report for land application of treated wastewater and those areas other than the primary area are held in reserve and this reserve is not used for increasing the number of lots.
- The land with bush on the western part of the Site shall be secured as a reserve for the protection of bush (i.e. the land referred to in the Hawthorne Geddes Report).
- Wastewater treatment shall be to a secondary standard as defined in AS/NZS 1547: 2012 and shall remove nitrogen so the average discharge concentration is less than 25ml/litre.
- The application rate of nitrogen over the land application area shall be in a manner and at a rate that does not exceed the reasonable nitrogen requirements of the vegetation being grown.
- Flow balancing shall be a component of the sewerage scheme and it shall be designed to achieve soil loading rates and soil resting periods given in good practice design for the land application of treated wastewater.
- The design of a communal wastewater scheme, including the wastewater collection, treatment and land applications systems, shall be by a suitably qualified and experienced person
- The operation, maintenance and monitoring of a communal wastewater scheme shall be by suitably qualified and experienced person.