

BEFORE THE CANTERBURY REGIONAL COUNCIL

IN THE MATTER OF The Resource Management Act
1991 (the Act)

AND

IN THE MATTER OF a submission by the Department of
Conservation on proposed Land and
Water Regional Plan, Plan Change 4
Omnibus provisions

Evidence of John Cocks
for the Department of Conservation

Dated 29 January 2016

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STATEMENT OF EVIDENCE OF JOHN COCKS

INTRODUCTION

1. My full name is John Hugh Carswell Cocks.
2. I hold degrees of Bachelor of Engineering (Civil) from the University of Canterbury and a Master of Engineering Science (Waste Management) from the University of New South Wales, Sydney.
3. I am registered as a Chartered Professional Engineer. I am 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.
4. I am senior environmental engineer for and a principal of the firm MWH New Zealand Limited, based in its Dunedin office.
5. I have over 35 years' experience in civil and environmental engineering. Over the past 30 years I have specialised in the field of wastewater management. I have experience with on-site and small community wastewater treatment and disposal systems. Relevant examples of my work and experience are as follows:
 - a. Extensive work for the Department of Conservation (the Department) designing on-site systems for backcountry and front country wastewater management facilities, including the preparation of a standing operating procedure for the management of human waste and sullage (waste water of domestic origin other than that from a toilet) at backcountry huts and preparing a means of compliance with the Building Code for toilets and greywater at backcountry huts.
 - b. Providing advice to the Southland Regional Council (Environment Southland) during the review of its regional plan provisions for effluent application to land.
 - c. Work for the Invercargill City Council that has 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 since 2006, and carrying out other work relating to on-site wastewater treatment and disposal.

- d. Work in Hong Kong between 1990 and 2000 on developing solutions for rural areas (inhabited by approximately 800,000 people) including a code of practice for septic tank systems, and managing a detailed investigation into environmental effects of septic tank discharges.
- e. Work for Public Health South in Southland on investigations over a two year period into the design, construction and performance of selected on-site wastewater treatment and disposal systems.
- f. Representing the Institution of Professional Engineers, New Zealand (IPENZ) and the Department of Conservation on a combined Australian New Zealand standards committee that reviewed the current four standards for on-site domestic wastewater treatment and disposal (and being the IPENZ representative on the former committee that developed these standards).
- g. Work in Australia, Samoa, Vanuatu, Laos, Maldives, Philippines and China, on the planning, design, construction, and operation of on-site and small community wastewater management systems.
- h. An appointment under section 54 of the Building Act 1992 to act as an investigator with regard to a complaint about an on-site wastewater system and to present evidence at an enquiry.
- i. Being the MWH New Zealand Limited national specialist for on-site and small community wastewater management systems work.
- j. Preparing and presenting continuing professional development courses about on-site wastewater management for IPENZ annually since 2009.
- k. Preparing and presenting courses or seminars about wastewater management for government departments and universities in New Zealand and overseas
- l. Being a person who, from school days, has tramped and climbed extensively in New Zealand and stayed in many backcountry huts

- m. Being a member of the New Zealand Alpine Club and, for the last 28 years, a member of its accommodation committee, which provides guidance on the management of the Club's 15 huts and lodges.
6. I am familiar with the Practice Note issued by the Environment Court in 2014 and have prepared my evidence in accordance with it. I agree to comply with the code of conduct for expert witnesses as set out in the Practice Note. This evidence is within my area of expertise. I have not omitted any relevant facts that I am aware of material to the matters before the hearing.

SCOPE OF EVIDENCE

7. I have read the Department's submission on Rules 5.7 and 5.8 of Plan Change 4 and I have read that part of the Section 42A report responding to the submission.
8. My evidence provides:
- a. an overview of backcountry huts and wastewater generation facilities;
 - b. a description of backcountry hut wastewater system design and operation;
 - c. comment on proposed new Rule 5.8A.

BACKCOUNTRY HUTS AND WASTEWATER GENERATION FACILITIES

9. Broadly, a backcountry hut is a building situated in an isolated location that provides overnight shelter for people who are engaged in conservation, recreational, scientific or other back country related activities. Examples of a backcountry hut are in Attachment A.
10. Typically, a backcountry hut is accessed by foot (although helicopters are used for access on occasions and a few huts can be accessed by 4-wheel drive vehicles) by people who carry their own food, sleeping bags, clothing and other outdoor travel equipment.
11. Facilities provided at a backcountry hut are basic, and include some or all of the following: sleeping platform or bunks, cooking bench, inside sink, hand-basin, and toilet.
12. Backcountry huts provided by the Department are categorised as Great Walk Huts, Serviced Huts, Standard Huts and Basic Huts. There are no Great Walk Huts in the Canterbury region.

13. The Department's Hut Service Standards prescribe the facilities to be provided at huts. Serviced Huts are to have water supplies, toilets, sinks and hand-basins, and Standard Huts and Basic Huts are to have toilets and may have water supplies and hand-basins.
14. A water supply may be a rainwater tank or piped water from a water course. Alternatively, for Standard Huts and Basic Huts, a nearby water course, water body or permanent snow may serve as a water source.
15. A toilet is most commonly a pit toilet.
16. Sinks are used for food preparation and dish washing, and hand basins for hand and face washing, and cleaning teeth. Detergent use is low and some hut users do not use any detergent.
17. Typically, huts do not have facilities for showering, bathing or laundry except that warden's quarters, which are provided at some Serviced Huts, may have these facilities. Some private huts may have such facilities.
18. Reported usage of the Department's huts in the Canterbury Conservancy is variable, with annual occupancies in the order of:
 - a. 100 to 1000 bed-nights per year, with a maximum of 2,500, for serviced huts
 - b. 50 to 500 bed-nights per year, with a maximum of 650, for standard huts; and
 - c. 0 to 150 bed-nights per year, with a maximum of 350, for basic huts.

BACKCOUNTRY HUT WASTEWATER SYSTEM DESIGN AND OPERATION

19. Requirements or guidelines for the design and operation of systems for wastewater treatment and disposal at backcountry huts are:
 - a. the Canterbury Natural Resources Regional Plan;
 - b. the *Compliance Document for New Zealand Building Code for Backcountry Huts* (the Code compliance document); and
 - c. the Department's standard operating procedure entitled Guidelines for Human Waste and Sullage Management at Backcountry Huts (the SOP).

The Standard Operating Procedure (SOP)

20. The SOP was developed in 2003. MWH New Zealand Limited was engaged to develop it for the Department, and to review it in 2011. I was the principal author in 2003 and the principal reviewer in 2011.
21. The SOP includes design factors for determining wastewater flows and loads, and guidance on wastewater treatment and disposal solution for different hut usage categories.
22. Hut usage is categorised as:
 - a. Low where there are less than 1,000 overnight visitors per year (an average of less than 3 people per day); or
 - b. Medium where there are between 1,000 and 4,000 overnight visitors per year; or
 - c. High where there are greater than 4,000 overnight visitors per year (an average of less than 11 people per day).
23. Design factors used in the SOP were derived from the results of a detailed summer season survey carried out by the Department at huts and campgrounds in the Abel Tasman National Park, with monitoring by water supply flow meters, door counter on toilets, and observers who documented visitor toilet use.
24. Where only toilets discharge to a septic tank system, it is designed to take 30 litres per overnight visitor. Where toilets and washing water discharge to a system, it is designed to take 50 litres per overnight visitor.
25. By way of comparison, the design factor for a household system (specified in AS/NZS 1547:2012) is 180 litres per person per day where there is roof water supply, and 200 litres per person per day where there is a reticulated water supply.
26. Also, by way of comparison, for a high use hut (with toilet and sink) the design quantity of wastewater is similar to that for a 3 person house or larger occupancy. For a low use hut (with toilet and sink) the design quantity of wastewater is approximately a quarter of that for a 3 person house, or less.
27. Given that almost all the Department's huts have visitor numbers less than 1,000 bed nights per year (only 4 are reported to have visitor numbers

higher), the estimated quantity of wastewater discharge is small relative to a 3 person dwelling.

28. The SOP includes guidance for site investigations, soil classes and the soil design loading rates, which are based on AS/NZS 1547:2000.
29. The SOP states that the separation between a wastewater discharge and maximum groundwater level is to be 600mm where not specified otherwise in Departmental or Regional Plans.

The Code Compliance Document

30. Compliance with the Building Code is mandatory. It is administered by building consent authorities.
31. The Code Compliance Document includes a definition of “backcountry hut”, which states that a backcountry hut contains only basic facilities and does not contain any connection to a network utility operator – such as the operator of water supply, drainage and sewerage systems.
32. The Code Compliance Document incorporates the Department of Conservation’s *Hut Procurement Manual for Backcountry Huts* (BCH/AS1). That manual includes *Part F Toilets and Grey Water*, which was developed in 2009. I was the principal author of Part F.
33. For pit toilets Part F states:

1.6.2 Distance from Ground Water

- i) Except in gravels, scoria and fractured rock, the base of a VIP [Ventilated Improved Pit] toilet shall be located at least 0.6 metres above maximum groundwater level or the distance given in the relevant regional plan, whichever is the greater.
- ii) Where located in gravels, scoria and fractured rock, the base of pit toilet shall be 6 metres above groundwater, or the sides of the pit shall be lined and the base shall be covered to a depth of 600mm with sand or local soil.

34. For grey water disposal units, Part F states:

2.7.3 ii) Distance from Ground Water

Except in gravels, scoria and fractured rock, the base of a soil soakage facility shall be located at least 0.6 metres above maximum groundwater level or the distance given in the relevant regional plan, whichever is the greater.

Where located in gravels, scoria or fractured rock, the soil soakage facility shall be a soakage bed or trench constructed as a controlled discharge soil soakage facility.

35. The provisions in part F for groundwater separation defer to a regional plan where applicable.

COMMENT ON PROPOSED NEW RULE 5.8A

36. I have read the Department's submission on proposed Rules 5.7 and 5.8, including the revised rules sought in respect of the discharge of wastewater from backcountry huts. I have also read the relevant parts of the section 42A report, including the recommended new rule 5.8A.
37. In my opinion the proposed new rule 5.8A would be workable if the following provisions in condition 3 are deleted or amended:
- (4) in circumstances where the discharge would enter a surface water body...*
- (8) where there is, at any time, less than 1 m of vertical separation between the discharge point and ground water; and*
- condition 4 is modified.
38. In regard to Rule 5.8A 3 *(4) in circumstances where the discharge would enter a surface water body*, I note that whether or not a discharge of wastewater to land enters a surface water body will depend on whether or not all the wastewater enters the land as designed and, if it does, the hydrogeological conditions beneath the site of the discharge.
39. In some situations a discharge to land might enter a surface water body indirectly as a result of discharging into groundwater beneath the land application area, and then the groundwater discharging into an adjacent stream.
40. The intention of the design provisions I described earlier is to ensure that any discharge is treated in the soil prior to entering groundwater and, subsequently, any surface water.
41. In my opinion, inappropriate circumstances under which a discharge would enter a surface waterbody would be a result of system failure. A fundamental design principle is that a discharge onto or into land, will pass through a design 'soil treatment unit'.
42. The proposed requirement in Rule 5.8A 3(8) is that a discharge may not occur when there is, at any time, less than 1 metre of vertical separation between the discharge and groundwater.
43. Such rule presents the practical difficulty of determining what the ultimate maximum groundwater level would be.

44. The prevailing maximum ground level at a site may be indicated by soil characteristics, such as hard pans, mottling or gleying.
45. However, extreme rainfall events, or extreme flood events, may result in groundwater levels higher than the prevailing levels. That is particularly the case in backcountry locations which are subject to extreme events.
46. In my opinion it would be more appropriate to delete the words “*at any time*” and insert “*mean seasonal high*” or similar before “*groundwater*”. The requirement would then be to design for 1 metre of vertical separation between the discharge and the prevailing groundwater level.
47. An example of similar wording is that given in Environment Southland’s *Working Draft for Water and Land*, which was notified in July 2015.

Rule 24 b (ix) the system is designed so that:

(1) the soil beneath the soil infiltration surface is maintained as free draining to a depth of at least 600 millimetres; and

(2) the bottom of the soil infiltration surface is no less than 900 millimetres above the mean seasonal high groundwater table and any perched water.

48. The proposed Rule 5.8A 4 states that “The discharge does not result in wastewater being visible on the ground surface”.
49. Usually backcountry wastewater treatment and disposal systems are located beneath the ground. However, there can be circumstances where this is not practicable. Such circumstances include the ground having a dense network of tree roots, uneven ground without uniform areas in which to locate a soil soakage field, or ground where the bedrock is shallow or rocks make digging impracticable.
50. A design solution in such circumstances is to irrigate septic tank effluent over the ground, following design guidance provided in AS/NZS 1547: 2012 *On-site domestic wastewater management*.
51. In my opinion, an appropriate modification to the proposed rule would be to include the words “unless the discharge is a result of a specifically designed surface application system.”

CONCLUSIONS

52. The Department has provisions for the design of backcountry wastewater treatment systems which are consistent with the provisions of the proposed rule 5.8A except that condition 3.(4) creates uncertainty about what constitutes circumstances where the discharge would enter any surface water body, 3(8) sets a condition that may be difficult to meet or otherwise creates uncertainty about what constitutes a design high groundwater level, and condition 4 precludes the use of a specifically designed above ground wastewater application.
53. In my opinion, I consider that the proposed modifications to the rules would enhance the rule in terms of the requirements of RMA s70.

Dated this29th day of January 2016



John Cocks

Attachment A: Photographs



Ahuriri Base Hut (Standard hut)



Huxley Forks Hut (Standard Hut)