

BEFORE THE HEARINGS PANEL

IN THE MATTER of hearings on submissions
concerning the Proposed
One Plan notified by the
Manawatu-Wanganui
Regional Council

**SECTION 42A REPORT OF MR HAMISH T LOWE
FOR THE WATER HEARING
ON BEHALF OF HORIZONS REGIONAL COUNCIL**

1. MY QUALIFICATIONS/EXPERIENCE

1. I hold the qualifications of a Bachelor of Agricultural Science (Honours) and a Master of Agricultural Science (Honours in Agricultural Engineering). I am a Principal and Senior Environmental Scientist with CPG New Zealand Limited (CPG).
2. I have worked in the area of soil, water and waste engineering for more than 17 years. I am a member of the New Zealand Water and Waste Association, New Zealand Hydrology Society and Soil Science Society of New Zealand. I am a past Chairman of the New Zealand Land Treatment Collective technical committee, an elected position I held for four years, and am currently serving a third term on the technical committee.
3. At a national level, I have been actively involved in various industry debates about the appropriateness and management of on-site and small community wastewater systems and their appropriateness of their application in a range of environments. This includes providing on-site and small community wastewater guidance to Regional and District Councils and the Ministry for the Environment. I consider that my expertise is acknowledged nationally. A brief summary of my expertise is attached in Annex A.
4. I have read, and agree to comply with, the current Code of Practice for Expert Witnesses in the Environment Court. Except where I state that I am relying on the specified evidence of another person, my evidence in this statement is within my area of expertise. I have not omitted to consider material facts known to me that might detract from or alter the opinions that I express in this statement.
5. I am familiar with hearing procedures, being certified as a Hearing Commissioner in accordance with the Ministry for the Environment's Making Good Decisions programme.

2. MY ROLE IN THE PROPOSED ONE PLAN

6. I have been involved in technical discussions with Horizons Regional Council science and planning staff on wastewater and related issues over a number of years. More recently this has spanned on-site wastewater system design and management, and assessment of municipal discharges and biosolid management as they relate to the One Plan process.
7. Further, staff under my direction have been preparing resource consent applications for Horizons Regional Council on behalf of clients for more than 10 years. More recently we have been applying the Proposed One Plan's provisions since they were first publicly

notified over two years ago.

8. I have been invited by Horizons Regional Council's Science Manager to prepare and speak to this evidence because of my experience in the field of wastewater management.

3. SCOPE OF EVIDENCE

9. My evidence to this hearing addresses two issues. The first is to provide a comparative review of recent and projected municipal wastewater treatment plant upgrades, highlighting the issues addressed by the upgrades and their costs. The second is to provide a commentary on the limited extent to which land application of municipal wastewater has been pursued in New Zealand. These two issues are summarised in a recent report prepared by CPG titled Horizons Regional Council: Recent History and Rationale for Wastewater Treatment Plant Upgrades (November 2009) a copy of which is attached to and forms part of this evidence.
10. My professional experience and involvement with design and consenting of community wastewater treatment plant upgrades is such that I can provide this evidence personally. To support my knowledge, I have enlisted the support of CPG staff, including those of Waste Solutions, a subsidiary business unit, who have assisted me with the logistics of collecting and compiling the information used in the preparation of the attached report.

4. POTENTIAL CONFLICT OF INTEREST

11. I have been engaged by Horizons to undertake a technical review of information freely available from public sources. This includes published Council annual reports and resource consents. In addition to this work I have been engaged by Horizons to review consent applications and assist with their processing.
12. In addition to being engaged to work for Horizons, I am responsible for submitting consent applications to Horizons on behalf of clients.
13. Further, I have prepared on behalf of CPG (formerly Duffill Watts) submissions supporting elements within the Proposed One Plan document, but proposing several improvements. These submissions have been prepared internally and not under the instruction of any client. I have also coordinated a submission by a group of local wastewater industry providers, lodged with CPG as the point of contact.

14. CPG, and its predecessors, have worked for a number of clients throughout the Manawatu-Wanganui region, including Territorial Local Authorities, and continue to do so.
15. The views expressed in this evidence and attached report are based on a scope of impartial, factual and independently verifiable information. The evidence is the same as I would provide on this subject to any client, irrespective of their interest. While CPG has been engaged on a commercial basis to prepare the evidence, neither CPG nor I have any other pecuniary interest arising from or influencing its preparation.
16. It should also be noted that in an industry with comparatively few players, those with experience and expertise will necessarily have been involved with a range of clients in a range of capacities. If persons were to be disqualified from giving expert evidence on such matters by virtue of the appearance of a conflict of interest arising from previous involvement in the issue at hand, then there would be no experts available to inform hearings such as this one.

5. OVERVIEW

17. As part of the One Plan process, Horizons is taking an opportunity to provide for ongoing sustainable management of waterways by revising policy, objectives and strategies for managing discharges into waterways. Horizons has sought to gain an understanding of what is happening nationwide regarding wastewater treatment upgrades, as a basis for further consideration of waterway management.
18. Horizons is also interested in understanding issues surrounding the uptake of wastewater land application systems and generic rationale that may limit their uptake. This includes the merits of combining consents for land and water discharges.
19. Horizons engaged CPG to conduct a nationwide review of present practices in wastewater treatment plant (WWTP) upgrades and to provide commentary on the general uptake of land application systems for wastewater discharge.

6. COMMITTED UPGRADE EXPENDITURE

20. Recent expenditure on wastewater upgrades and proposed expenditure as outlined in Long Term Council Community Plans of Territorial Local Authorities (TLAs) were reviewed to assess the commitment to expenditure on wastewater. It was found that about half the TLAs surveyed had committed more than \$100 per person on wastewater

capital expenditure in the most recent financial year.

21. The northern region, including Otorohanga, Taupo and Opotiki northward, is proposing to spend on average \$1,320 per person over the next 10 years. This compares to \$790 in the central region (lower North Island) and \$1,320 in the southern region (South Island). By comparison, TLAs in the Manawatu-Wanganui Region are proposing to spend on average \$790 per person over the same period. This last figure is an average over the seven TLAs, skewed upwards by a higher commitment in the modestly populated Horowhenua and Rangitikei Districts.

7. REVIEW OF CURRENT UPGRADES

22. A review of the present practices and associated costs for 21 WWTP upgrades across New Zealand was undertaken. The review was limited to predominantly inland communities of 1,000 to 80,000 people.
23. The majority of upgrades were designed to meet more stringent consent targets for five-day biochemical oxygen demand (BOD₅), suspended solids, ammonia, phosphorus, faecal coliforms, and *Escherichia coli* (*E. coli*) than those under which they were previously operating.
24. The primary treatment technology used to upgrade effluent quality is mainly activated sludge systems. This includes conventional systems such as Sequencing Batch Reactors (SBR), and Membrane BioReactors (MBR). There is also an increasing tendency to include UV disinfection.
25. The upgrade costs per person are highest for nitrogen and organic removal followed by phosphorus. The costs of these upgrades are significant and the smaller the reticulated community the greater the cost of the upgrade per person. From the WWTPs surveyed the cost per person to upgrade the WWTP for a community of fewer than 10,000 people is on average \$2,500, whereas for a community of more than 10,000 people the cost is less than \$1,000 per person.
26. Most communities considered alternative discharge environments when upgrading their WWTPs. However, most WWTPs surveyed indicated that while alternatives were considered, the majority resisted changing discharge environments. Generally, only the method of discharge had changed, with a clear trend away from discharging treated effluent directly to water and rapid infiltration to discharges via rock outfalls.

8. LIMITATIONS TO ADOPTING LAND TREATMENT

27. Land application has been considered in many WWTP upgrades but there has been a reluctance to make the shift. I consider the main factors that prevent the shift to land application are:

- (i) Higher cost, which is often perceived;
- (ii) Perception of lack of need as current system is considered adequate;
- (iii) The need to maximise use of existing infrastructure;
- (iv) The preparedness to accept perceived higher risks of alternatives;
- (v) Lack of political will; and
- (vi) Cultural issues associated with discharge of human effluent to land.

28. In order to encourage the uptake of land application the following actions are typically required:

- (i) Environmental regulator taking the lead role in initiating change; and
- (ii) Increasing public awareness of problems with wastewater discharge to water.

9. DUAL DISCHARGES

29. Combined land and water discharge (CLAWD) systems are gaining popularity in New Zealand and overseas. A CLAWD system combines the advantages of both land and water discharges while potentially ameliorating the disadvantages of each system.

30. The principle is that wastewater is discharged to land during dry weather, with land providing nutrient and pathogen attenuation. During wet weather, when soils are saturated, the wastewater is discharged to water, and the effects of the discharge are mitigated by the dilution that occurs during the associated high stream flow. The main disadvantage of CLAWD systems is the increased complexity of discharging to two environments under different conditions. Careful management, decision-making, monitoring and accountability can counteract this disadvantage.

10. SUMMARY

31. Wastewater capital expenditure around New Zealand ranged from less than \$20 per person to \$540 per person in 2008-09. Average commitments for the next 10 years are more than \$100 per person per year. TLAs in Horizons' Region have committed an average of \$130 per person in 2009-10, falling to an average of \$79 per person per year over the next 10 years. This is low by national comparison.

32. Wastewater treatment plant upgrades are being driven by increasingly more stringent environmental standards.
33. Changes and improvements to treatment plants have provided an opportunity for the consideration of different discharge environments. However, in most instances only the method of discharge has been enhanced; for example a piped river outfall is upgraded to a rock diffuser outfall.
34. Land application has been considered in many upgrade projects, but there is a reluctance to consider adopting the technology for a range of reasons, including costs and perceived risk.
35. Combined land and water discharges increasingly are being considered as a means of matching infrastructure affordability with better environmental outcomes.

Hamish T Lowe
November 2009

ANNEX ONE

Horizons Regional Council: Recent History and Rationale for Wastewater Treatment Plant Upgrades (November 2009).