Appendix 6 – Evidence of Grant Hall on Drinking Water Protection

Before the Hearing Panel
Appointed by the Timaru District Council

Under The Resource Management Act 1991 (**RMA**)

In the matter of The Proposed Timaru District Plan

Statement of evidence of Grant William Hall

28 February 2025

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Introduction

1 My name is Grant William Hall. I hold the qualifications of BE (Civil) from the University of Canterbury (NZ), and MSc (Public Health Engineering) and Diploma of Imperial College both from the Imperial College of Science and Technology, London (UK).

2 I am currently the Principal Three Waters Specialist at Timaru District Council (**TDC**). Prior to my current role I have held the role Drainage and Water Manager at TDC for twenty years.

3 I have forty years' experience as an engineer and manager in the three waters field. As the TDC Drainage and Water Manager I was responsible for the strategic management and operation of the districts' three waters systems with an emphasis on effective asset management, strategic planning, and operation and maintenance across a wide range of activities.

4 I have provided technical assistance on behalf of the Infrastructure Group at TDC to Mr Andrew Willis in his role as a s42A author as it relates to addressing submissions on the management of Drinking Water Supplies within the Proposed Timaru District Plan (**PDP**).

5 I confirm I have read the Code of Conduct for expert witnesses contained in the Environment Court New Zealand Practice Note 2023 and that I have complied with it when preparing my evidence. Other than when I state I am relying on the advice of another person, this evidence is within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

Scope of Evidence

6 My scope of evidence covers the following areas:

a. Management of drinking water supplies and TDC's core statutory responsibility for ensuring drinking water is safe and sufficient.

b. TDC's Source Water Risk Management Plans.

c. The overlapping functions of territorial and regional councils specifically in relation to the control of land use activities that may be a risk to drinking water sources.

d. Some recent examples that TDC has experienced of land use activities impacting on the protection of drinking water sources.

e. Comments on activities within drinking water protection areas that may pose a risk to drinking water sources.

Managing Drinking Water Supplies

7 The provision of potable drinking water supplies to communities is a key role and responsibility for TDC. Under the Water Services Act 2021 (**WSA**) TDC must ensure that the drinking water supplied by it is safe (section 21(1)) and complies with the drinking water standards (section 22(1)). The requirements around the provision of these supplies are heavily regulated and Council must continually adapt to ensure the water supplies provided meet relevant regulations and standards.

8 The provision of reticulated community networks needs to be carefully managed, to ensure the safe and efficient delivery of this service district wide. Accordingly, there

needs to be careful management of the abstraction, treatment and delivery of water to the necessary standard for community supplies.

9 If a water supply is compromised for any reason, Council is unable to simply provide an alternative. There are often significant constraints applied to a compromised water supply, such as Boil Water Notices or the carting of tankered or bottled water to a site, and in most instances the solutions involve costly changes to the abstraction or treatment which takes a considerable period of time to implement.

10 The Drinking Water Quality Assurance Rules set out how water suppliers must comply with the Drinking Water Standards and the WSA, which covers all TDC's community water supplies. These rules and standards also include Very Small Communities of up to 25 people, and Self-supplied Buildings with water supplies (excluding domestic self-suppliers) which provide drinking water to buildings on one site (usually one property) to more than 25 people. These water supplies are often privately owned and operated.

11 The progression over time of a drinking water supply from a domestic self-supplier to supplying more than one property, which then becomes a Very Small Community, or to a Self-supplied Building is not uncommon and, in my opinion, needs to be considered in the management of Drinking Water Protection Areas (**DWPA**).

12 Additionally, my experience is that even when Council is not providing an individual property with a water supply (such as when it is supplied by a private bore), when something goes wrong, there is often an expectation that Council will provide a solution to individual landowners. To maintain an efficient network, community water supplies cannot expand in an unsustainable or cost prohibitive way to accommodate compromised private supplies.

13 A recent example of this was published in The Press on Saturday 22 February 2025[1] under the headline "Selwyn residents confront the council about nitrates in water". The article starts with rural residents in Selwyn district with contaminated drinking water calling on the district council for urgent help.

14 The article quotes the residents' spokesperson that "dairy farm run-off, the (waste)water treatment plant and sewage pipes, and industry effluent" as likely culprits of the contamination, and then suggests "extending the reticulated network, subsidising domestic treatment systems … were possible ways the council could help".

15 For these reasons it is my opinion that where risks to water supplies exist it is appropriate that Council seeks to implement controls to manage those risks. I believe this applies to both community drinking water supply and private bores. I therefore recommend that submissions seeking to remove private bores from the application of the PDP rules are rejected.

16 The accepted methodology for managing contaminant risks to drinking water sources is based on the source-pathway-receptor approach, where one of these factors must be removed in order to mitigate the risk. The receptor exists as the drinking water supply, and the pathway usually exists through the shallow water table, permeable unconfined aquifer or surface water, and as a result I believe it is appropriate to remove the contaminant source or at the very least manage the contaminant sources

[1] https://www.thepress.co.nz/nz-news/360588309/price-dairy-boom-selwyn-residents-confront-council-about-nitrates-water#:~:text=Rural%20residents%20in%20Selwyn%20district,detected%20in%20their%20private%20wells.

very carefully to ensure TDC provides the duty of care necessary for safe drinking water.

17 Source protection is a fundamental component of the multi-barrier approach to drinking water protection. It was highlighted in the findings of the Havelock North Drinking Water Inquiry that minimising the extent of contaminants in the source water is the first barrier.

Source Water Risk Management Plans

18 Under the WSA, TDC must also prepare and implement a source water risk management plan (**SWRMP**) (section 43(1) WSA) which, among other things, must identify how potential risks to the source water will be managed, controlled, monitored or eliminated (section 43(2)(c) WSA).

19 TDC developed SWRMP for all its community water supplies in 2022 and is in the process of updating these plans. Part of the process for developing the SWRMP is the identification and assessment of risks, broken down into relevant areas including (amongst others):

- previous land use;
- current land use; and
- future land use.

20 The events associated with the risks to the source water include microbiological contamination and elevated levels of chemicals in the water from contaminated sites or quarries, the storage and use of fertiliser, petrochemicals, pesticides and herbicides, domestic wastewater, livestock, rural intensification and unconsented activities.

21 The assessments for these key risks have generally resulted in an overall risk score of 'High'. The current preventative measures include groundwater monitoring (E.coli, turbidity, protozoa, nitrates etc), provision of water treatment processes, and regular observation of land use activities within DWPAs. These measures do not directly result in removing the contaminant source.

22 Further mitigation actions identified in the SWRMP (based on future land use or activities) include assessments on an on-going basis of any land use change, noting the need for TDC rules to be appropriate and complementary to regional council processes.

Overlapping Functions of Regional and Territorial Councils

23 I understand that there could be concern with a perceived overlap or duplication of function with the regional council Canterbury Land and Water Regional Plan (**LWRP**) and TDC's PDP.

24 A summary of the LWRP rules governing land uses that could pose a risk to drinking water supply sources are set out in Appendix A to this evidence, which identifies any differences in the activity status within or outside a Community Drinking Water Protection Zone (**CDWPZ**) as defined in the LWRP.

25 While LWRP rules control a range of land uses (in addition to contaminant discharges), I believe the activity status of such land uses under those rules does not reflect current understandings as regards the nature and extent of effects of land uses on drinking water supply sources, with only two land use activities within Community Drinking Water Protection Zones classified as prohibited activities.

26 TDC currently has limited powers to manage, control or eliminate land use activities that pose a risk to drinking water supply sources, and any powers are reactive in the sense they would be initiated after a public health risk to drinking water supply arises or after contamination has occurred. For the most part TDC must rely on the regional council through planning, consenting and enforcement.

27 As shown further in this evidence with recent examples of source water issues, I believe the activity status of some land use activities under the LWRP may influence the regional council's approach to managing and enforcing relevant regional rule compliance.

28 I also understand that there will be a delay in the regional council's review of their provisions for community drinking water supply source protection, as part of the future statutory planning process for a new freshwater plan for Canterbury Region in light of the expected new National Policy Statement for Freshwater Management (which is not yet issued) and the subsequent development of a new Canterbury Regional Policy Statement.

29 In my opinion any shortcomings of the LWRP provisions for drinking water supply source protection are unlikely to be improved in the near future.

30 It is my view that these reasons provide the impetus for the PDP to include land use controls to manage risks to drinking water supply sources.

Recent Examples of Source Water Issues Due to Land Use Activities

31 There are a number of land use activities that have the potential to provide a significant risk of contamination of a drinking water supply. These activities usually involve some form of plant or process to provide a system to minimise adverse effects of the activity, however there is a total reliance on there being no failure of any component of that system. Consent conditions do not cover situations like a valve accidently being left on or a pump failing to operate or a power outage. Contamination events usually occur due to an 'unforeseen' event, while the consequences of contaminating a water supply could be severe and long lasting. Therefore, my view is that it is appropriate that activities are managed very carefully within DWPAs.

32 TDC have had two recent examples of land use activities impacting or potentially impacting on the quality of the source of drinking water.

33 The recent contamination of the Timaru water supply with manganese was largely attributed to the installation of a farm silage pit upstream of an infiltration gallery running at right angles to the Opihi River.

34 The silage pit is thought to be above an underground stream feeding the gallery. Although the base of the pit had a combination of lime and bark to provide some protection from soakage of contaminants into the ground, the location of the pit is thought to have resulted in the removal of the oxygen in the groundwater, producing a 'reducing' environment (as compared to an 'oxidising' environment when oxygen is present) that subsequently converted manganese from the surrounding soil into solution in the groundwater only to be precipitated into the drinking water through the water treatment disinfection process.

35 The discharge of contaminants was only partially the issue, it was also the very existence of the pit in that location that contributed to the oxygen depleted environment that took the manganese into solution.

36 The intensive Stock Holding Area in the vicinity may also have contributed to the 'reducing' environment conditions. Although there is some uncertainty on the actual cause of the presence of manganese in the raw water, the subsequent removal of the

land use activities, being the farm silage pit and the stock holding area, has coincided with the absence of manganese in the raw water.

37 This incident resulted in significant costs and damage to TDC and the landowner. There were extensive investigations, water sampling and testing, and consultancy fees, along with comprehensive public communications programmes, provision of alternative water bottle filling points and contractor costs for flushing of reticulation mains. There were significant costs in relocating the silage pit. There were also many claims for subsequent damage due to the manganese in the water and a general loss in public confidence and damage to the reputation of the public water supply.

38 Another recent example that TDC had to consider was a proposed development for a truck yard, service station and ancillary activities located within a DWPA, although the proposal has since been withdrawn.

39 Although there are various safeguards that can be installed, such as having fuel tanks above ground, there are numerous potential contamination sources that are a significant risk to the water supply that must be considered, that are not necessarily covered in discharge consents. Some examples of these from the truck yard proposal are:

a. Regardless of whether the stormwater system designs meet or are even greater than the typical 10-year ARI for pipework and sumps and 50-year 24-hour event for storage and treatment, they are highly likely to be exceeded in their life – there is a high probability that a storm event will occur that exceeds the design. These events would result in overland flow causing contaminants to discharge to soak pits and to land.

b. The failure of a stormwater storage or treatment system such as a pond liner or a pipe blockage could result in contaminant discharge to ground.

c. The passive stormwater discharge through site gravelled areas must also be considered.

d. Containment systems for contaminants often have a bypass valve for draining that can accidentally be left open which could potentially discharge to ground.

e. There is often uncertainty in the design of human wastewater discharge systems in relation to the order of magnitude of the reduction of bacteria and viruses in different ground strata (such as gravel aquifers or coarse gravel aquifers) and hydraulic conductivity.

f. There is often uncertainty in the actual direction of shallow groundwater flow, as piezometric surveys generally represent a coarse resolution of regional groundwater flow and do not provide insight into any finer scale local variations in groundwater flow direction from local influences such as groundwater abstraction.

g. Increased sediment runoff from the site which has the potential to increase turbidity within groundwater.

40 Some of the shallow bores on TDC's water supply had to be shut down during a major rain event due to elevated turbidity measurements, which had never occurred before and was after earthworks had been carried out on site in preparation for the truck yard proposal under the permitted activity earthworks rule in the LWRP. While the observed increase in turbidity may have been caused by other sources, TDC are concerned that the earthworks may have exacerbated this problem.

41 It should be noted that in order to provide additional protection to the community drinking water supply source, to ensure a similar activity is not proposed for the site in the future, TDC is purchasing the land. In my opinion, this is an example of the justification of the potential overlap of function between regional and territorial councils.

Other Land Use Activities

42 I have reviewed the submission lodged by TDC on the PDP which seeks to add additional activities as non-complying within the vicinity of community drinking water supply and private bores, including

a. hazardous facilities;

b. earthworks;

c. composting facilities;

d. buildings that require septic/sewage facilities;

e. offal pits;

f. silage storage;

g. vegetation clearance;

h. exotic tree planting/plantation forestry; and

i. intensive primary production.

43 In reference to the evidence provided by Mr Neil Thomas from Pattle Delamore Partners Ltd on this matter, I agree that the list is relatively wide ranging however in my opinion the listed activities provide a real risk to drinking water sources, and as stated previously, minimising the risk of contaminants in the source water is the first barrier in the established approach to drinking water protection.

44 Also discussed by Mr Neil Thomas, although there are some specific activities that might fall within the proposed listed activities that might not result in a risk to drinking water sources, refinement of the list of activities should be carefully limited to where there is good technical justification. If a more detailed specific list of activities were to be proposed I believe it is inevitable that some activities that do pose a significant risk would not be covered. And as noted, the consequences of contamination of source water could be at the least very expensive and at the worst fatal.

45 Activities such as earthworks can impact on drinking water supplies through increased sediment 'contaminating' the source. The LWRP does not expressly provide earthworks controls that protect drinking water supplies (Rule 5.175[2]) and creates unnecessary risk to water supplies.

46 Sediment runoff and increased turbidity in groundwater generated by earthworks impacts on the quality of water extracted and can result in the direct non-compliance with drinking water standards. UV disinfection systems are effective against microbial pathogens including protozoa; however, earthworks and excavations have the potential to increase turbidity in groundwater which in turn has the potential to render the UV treatment system ineffective and compromise the safety of the water supply.

[2] Rule 5.175 LWRP in the Earthworks over Aquifers section, is the permitted activity rule to use land to excavate material including over an unconfined or semi-confined aquifer, which does not reference Community Drinking-water Protection Zones as set out in Schedule 1 of the LWRP.

47 A small increase in turbidity of the source water from less than 1 NTU to 5 NTU would not be noticeable by the naked eye (compared to a stream that might increase turbidity in a rain event to over 100 NTU), however this small increase in turbidity would result in the UV disinfection being non-compliant.

48 Implementing additional water treatment process upgrades (such as membrane filtration) to meet current drinking water standards with a deteriorated raw water quality is a very costly process which takes a considerable amount of time to execute.

49 I agree with Mr Neil Thomas in his evidence that the listed activities represent a generally appropriate approach to managing the potential risk to drinking water supplies and I support his proposed activity definitions and the proposed controls placed on activities within DWPA. I recommend that the TDC submission which seeks to add additional activities, with modifications as proposed by Mr Neil Thomas, is adopted.

Grant Hall

28 February 2025

Appendix A

Rules in the Canterbury Land and Water Regional Plan Governing Land Use Activities.

Land use	Activity status	
	Within CDWPZ	**Outside CDWPZ**
Offal Pit	Restricted discretionary (Rule 5.26)	Permitted, subject to conditions (Rule 5.24), defaulting to restricted discretionary for non-compliance with conditions (Rule 5.26)
Bury a single dead animal	Permitted, subject to conditions (Rule 5.25)	Permitted, subject to conditions (Rule 5.25)
On-site refuse disposal pit	Restricted discretionary (Rule 5.28)	Permitted, subject to conditions (Rule 5.27), defaulting to restricted discretionary for non-compliance with conditions (Rule 5.28)
Stock holding area	Discretionary (Rule 5.32)	Permitted, subject to conditions (Rule 5.31), defaulting to discretionary for non-compliance with conditions (Rule 5.32)
Collection, storage and treatment of animal effluent	Discretionary (Rule 5.34)	Permitted, subject to conditions (Rule 5.33), defaulting to discretionary for non-compliance with conditions (Rule 5.34)
Silage pit or stockpiling of decaying organic matter (including compost)	Permitted (if < $20m^3$ and meets other conditions) (Rule 5.38) Restricted discretionary (if > $20m^3$ and meets other conditions, or non-compliance with other conditions of Rule 5.38) (Rule 5.40)	Permitted (if > $20m^3$ and meets other conditions) (Rule 5.39) Restricted discretionary (if > $20m^3$ and does not meet conditions of Rule 5.39, or non-compliance with other conditions of Rule 5.38) (Rule 5.40)
Farming activity	*Dependent on location, property size and nitrogen loss – governed by rules introduced by Plan Change 7*	
Use of the bed of a lake, river or wetland by stock	Permitted, subject to conditions (Rule 5.68) Discretionary, if does not meet one or more conditions of Rule 5.68. Non-complying, if the river is > 1m wide or 100mm deep and the stock is intensively farmed stock.	
Use of the bed of a lake or river by any farmed cattle, farmed deer or farmed pigs	Prohibited (Rule 5.71)	As above.
Cemeteries existing as at 5 September 2015	Permitted (Rule 5.81)	Permitted (Rule 5.81)
New cemetery or extension to an existing cemetery after 5 September 2015	Discretionary (Rule 5.83)	Permitted (Rule 5.82), defaulting to discretionary for non-compliance with conditions of Rule 5.82 (Rule 5.83).
Community wastewater treatment system	Prohibited (Rule 5.85)	Discretionary (Rule 5.84)
Installation, maintenance and use of water infiltration gallery (for hydrological or geotechnical investigation, emergency rural fire-fighting, and other uses)	Permitted, subject to conditions (Rules 5.103, 104, 104A), defaulting to discretionary activity for non-compliance with conditions of Rules 5.103, 104, 104A (Rule 5.105)	

Land use	Activity status	
	Within CDWPZ	**Outside CDWPZ**
Installation, maintenance and use of a bore for hydrocarbon exploration or production	Discretionary (Rule 5.106)	
Decommissioning a bore	Permitted, subject to conditions (Rule 5.107), defaulting to discretionary for non-compliance with conditions of Rule 5.107 (Rule 5.108).	
Refuelling of vehicles or equipment in the bed of a lake or river	Permitted, subject to conditions (Rule 5.145), defaulting to discretionary for non-compliance with conditions of Rule 5.145 (Rule 146).	
Vegetation clearance and earthworks in riparian areas	Permitted, subject to conditions (Rules 5.167 and 5.168), defaulting to restricted discretionary for non-compliance with conditions of Rules 5.167 or 5.168 (Rule 5.169).	
Vegetation clearance and earthworks in erosion prone areas (outside riparian areas)	Permitted, subject to conditions (Rule 5.170), defaulting to restricted discretionary for non-compliance with conditions of Rule 5.170 (Rule 5.171).	
Excavate material over coastal confined gravel aquifer system, unconfined or semi-confined aquifers	Permitted, subject to conditions (Rule 5.175), defaulting to restricted discretionary for non-compliance with conditions of Rule 5.175 (Rule 5.176).	
Deposition of > $50m^3$ of material in any 12 month period onto land which is excavated to a depth in excess of 5m below natural land surface and is located over an unconfined or semi-confined aquifer	Controlled, subject to conditions (Rule 5.177), defaulting to restricted discretionary for non-compliance with conditions of Rule 5.177 (Rule 5.178).	
Storage in a portable container and use of a hazardous substance listed in Part A of Schedule 4	Restricted discretionary (Rule 5.180)	Permitted, subject to conditions (Rule 5.179), defaulting to restricted discretionary for non-compliance with conditions of Rule 5.179 (Rule 5.180).
Storage, other than in a portable container, and use of a hazardous substance listed in Part A of Schedule 4	Permitted (Rule 5.181), subject to conditions including if within a CDWPZ: (a) all hazardous substances on a site are stored under cover in a facility which is designed, constructed and managed to contain a leak or spill and allow the leaked or spilled substance to either be collected or lawfully disposed of; and (b) spill kits to contain or absorb a spilled substance are located with the storage facility and use areas at all times; defaulting to discretionary for non-compliance with conditions of Rule 5.181 (Rule 5.182).	Permitted, subject to conditions (Rule 5.181), defaulting to discretionary for non-compliance with conditions of Rule 5.181 (Rule 5.182).
Decommissioning a container that is or has been used to store a hazardous substance	Permitted, subject to conditions (Rule 5.183), defaulting to discretionary for non-compliance with conditions of Rule 5.183 (Rule 5.184).	