Appendix 7 – Evidence of Neil Thomas on Drinking Water Protection

BEFORE THE	**TIMARU DISTRICT COUNCIL HEARING COMMITTEE**
IN THE MATTER	of the Resource Management Act 1991
AND	
IN THE MATTER	of the Proposed Timaru District Plan

STATEMENT OF EVIDENCE BY NEIL MALCOLM THOMAS

1.0 QUALIFICATIONS AND EXPERIENCE

1.1 My full name is Neil Malcolm Thomas.

1.2 I hold the qualifications of BSc (Geological Sciences) and MSc (Hydrogeology) both from the University of Leeds.

1.3 I am a Technical Director with Pattle Delamore Partners Limited (**PDP**) and have been employed at PDP since 2011. Prior to working at PDP, I was employed by Entec UK Ltd (now AMEC) in the United Kingdom for 5 years (from 2005 to 2010) as a hydrogeologist specialising in groundwater modelling. I have over 15 years of experience as a hydrogeologist in groundwater resources.

1.4 My role at PDP involves working on a wide range of groundwater management issues including assessments of groundwater quality and quantity within the Canterbury region, and elsewhere in New Zealand. These management issues include the effects of land use, abstractions and discharges on groundwater and the interaction between groundwater and surface waterways.

2.0 INVOLVEMENT WITH TIMARU DISTRICT COUNCIL

2.1 The proposed Timaru District Plan (**the proposed Plan**) was notified on 22 September 2022 and included some provisions and rules regarding non complying activities specified within Drinking Water Protection Areas. Timaru District Council (Drainage and Water Unit) have lodged a submission regarding these rules and have proposed that the list of activities classified as non-complying within Drinking Water Protection Areas is expanded.

2.2 I have been engaged by Timaru District Council (**TDC)** to provide expert evidence about their proposed list of non-complying activities that may be included in the proposed Plan.

2.3 I have been provided with a list of the proposed activities that could be included in the proposed plan as 'non complying activities' within specified Drinking Water Protection Areas and I have also discussed the origin of that list with the relevant TDC staff. In addition, I have been provided with a list of submissions lodged both in opposition and in support of the proposed list of activities.

2.4 The list of submitters includes Silver Fern Farms, who have submitted in opposition to the proposed list of activities. The Silver Fern Farms factory in Pareora is covered by two Drinking Water Protection Areas and would be impacted by the proposed list of non complying activities. I note this here because PDP is currently engaged by Silver Fern Farms to assist with a groundwater take at the Pareora site. I have consulted with both Timaru District Council and Silver Fern Farms regarding potential and perceived conflicts of interest and both parties have indicated that they are happy with my involvement with the issue covered by this brief of evidence. I am also aware that PDP is currently engaged by Fonterra Limited and Road Metals Limited who have also submitted on the proposed Plan, although I am not directly involved in work with either of those parties.

3.0 CODE OF CONDUCT

3.1 I have read the Code of Conduct contained in the Environment Court's Practice Note 2023 and agree to comply with it. This evidence is within my area of expertise as a groundwater scientist and I confirm that I have not omitted to consider any material facts known to me that might alter or detract from the opinions expressed herein.

4.0 SCOPE OF EVIDENCE

4.1 My scope of evidence covers the following key areas:

a. Drinking water protection areas and how they are defined and what they intend to protect

b. Management of activities within drinking water protection areas

c. Whether the proposed activities are consistent with those types of activities

d. Comments on the submissions received on the proposed change to the proposed plan

e. Proposed refinements to the listed activities

5.0 DRINKING WATER PROTECTION AREAS

5.1. There are several areas of legislation that require definition of the source of drinking water supplies, as well as the effects of proposed activities within those areas. These include:

a) The Resource Management (National Environmental Standards for Sources of Drinking Water) Regulations 2007, which include an 'upstream' criterion.

b) Section 104G of the Resource Management Act 1991 requires regional councils to have regard to the effects of proposed activities on the source of drinking water supplies registered under the Water Services Act 2021.

c) Regional councils must also consider impacts on drinking water supplies under the National Policy Statement for Freshwater Management (2020).

d) Drinking water suppliers (such as TDC) also have responsibilities under the Water Services Act 2021 to understand the source of their water, and to identify and manage risks to that water as part of source water risk management plans.

5.2. The drinking water protection areas (**DWPA**) that are currently defined in the proposed Plan include three different areas and include both private drinking water supplies as well as community drinking water supplies. The three areas defined in the Plan include:

a) A specified radius of 50 m from a private drinking water supply

b) A specified radius of 100 m from the private drinking water supply

c) A defined area around a community drinking water supply (as defined by Environment Canterbury)

5.3. I note that the DWPA defined in the proposed plan cover both groundwater sources as well as shallow infiltration galleries connected to surface water. I also note that the DWPA for the shallow infiltration galleries do not appear to fully extend up the nearby rivers (as would be applied to a direct take from surface water). Therefore, my evidence concentrates generally on groundwater issues.

5.4. The Ministry for the Environment (MfE) has provided guidelines[1] for the definition of DWPA (termed source water risk management areas (SWRMA) in the MfE guidance). These guidelines define a series of three areas around a drinking water source, each of which has a slightly different purpose.

[1] Ministry for the Environment, 2023. Delineating source water risk management areas. Wellington: Ministry for the Environment, New Zealand

a) The inner protection zone (SWRMA 1) aims to manage the risk of contaminants entering the supply in, or around, the well casing for groundwater sources.

b) SWRMA 2 is a larger area where activities need to be appropriately managed to avoid the risk of contamination. For groundwater sources, the size of this zone around a bore is based on limiting the risk of pathogens reaching the source water in an infective state, which also limits the risk from many other contaminant sources. It is typically defined as an area within which groundwater will take less than one year to travel to a source.

c) SWRMA 3 covers the entire capture zone or catchment for a groundwater source and extends well beyond SWRMA 2. The intent of defining this area is that it allows resource managers to address the cumulative effect of land use activities and/or persistent contaminants that may not reduce in concentration significantly before entering a drinking water source.

5.5. The DWPA defined in the proposed Plan are not precisely consistent with these SWRMA definitions, although in general the DWPA represent SWRMA 2 for the community drinking water supplies and combination of SWRMA 1 and 2 for the private water supplies. I note that in general, unless a bore is relatively deep, a 50 or 100 m radius does not typically represent a one year time of travel to a bore and in most cases, where this distance has been employed, it represents a generic protection areas around domestic supply bores. Of the two distances specified, a 100 m buffer would be a more conservative distance where there is uncertainty and in that respect would be a more common distance. For clarity, I was not engaged by TDC at the time the DWPA were set in the plan.

5.6. To a large extent, SWRMA 2 is the most important area to define and then manage through a plan because it represents the area around a supply that may be out of the direct control of a water supplier (i.e. on land owned by others) with land use activities that could present a direct risk to a supply, with the exception of persistent contaminants from the wider catchment.

5.7. In my opinion, the definition of DWPA is an important part of protecting drinking water supplies and represents good practice. However, it is important to note that the definition of the DWPA as currently completed is generic, particularly around private supplies. Whilst this approach is reasonable as an initial definition, it is important to recognize that, in some cases, the extent of a zone around a bore will depend on the depth of the bore and the hydrogeological setting in which it occurs.

5.8. For example, very deep bores that are screened below intervals of lower permeability strata could potentially have smaller zones defined which still offer the same level of protection. Equally, very shallow bores may need a larger area defined to offer the same level of protection. However, further investigative work would be required to determine whether,

and where, larger or smaller zones are required, for example, examination of drillers logs for the bore and/or consideration of surface water and groundwater interaction in the local area.

6.0 MANAGEMENT OF ACTIVITIES IN DWPA

6.1. Development of the DWPA in isolation does not provide protection to a drinking water source. The DWPA simply define an area around the source where the risk from nearby land use is likely to be greater.

6.2. Management of the risk within a DWPA is typically achieved via a source – pathway – receptor approach. All three of these links need to be present to create a risk and removal of any will reduce or eliminate the risk. A receptor will always be present in the form of the drinking water supply and therefore to limit the risk, either the source or the pathway need to be addressed. The most robust approach is to remove the source.

6.3. Typically, the activities that may be of concern within a DWPA are those that involve some form of contaminated discharge that could enter groundwater or where the activity may remove some of the strata overlying the pumped aquifer, which would remove some of the protection from surface influences. Other activities such as those that involve no discharge (or potential discharge) will not pose a risk because there is no pathway along which contaminants could travel into groundwater.

6.4. One approach is to therefore manage the discharge (i.e. the pathway between the source and the receptor) itself, however, as noted above, the most robust approach is to remove the source, or manage the source. This approach is more likely to identify all potential discharges that could pose a risk, whereas specifying individual discharge activities in the proposed Plan may result in some potential discharges not being identified.

6.5. Whilst in my opinion, the approach of defining and managing sources with DWPA is appropriate, the benefits of this approach may vary. This is because some contaminants will undergo a greater level of attenuation across the distance of the DWPA than others.

6.6. For example, nitrates may typically undergo less attenuation compared to microbes because of the typically diffuse source of nitrate contamination and the conservative nature of nitrate as a contaminant. Therefore, using the DWPA to address diffuse contaminant sources within an aquifer is unlikely to be effective and these types of sources generally need to be managed at a catchment scale.

6.7. However, the DWPA and management of the activities within those areas are likely to be more effective at addressing point sources of contaminants.

7.0 NON COMPLYING ACTIVITIES WITHIN THE DWPA PROPOSED IN THE PLAN

7.1. The proposed plan includes a number of activities that would have 'non-complying' status if they occur within the DWPA. These activities include

a) quarrying or mining (within community supply DWPA and within 100 m of private supplies).

b) pipelines for the transfer of hazardous substances (within community supply DWPA and within 50 m of private supplies)

c) industrial activities including rural industry (within community supply DWPA and within 50 m of a private supply)

7.2. TDC have proposed that some further activities should be added to the list of non-complying activities including

a) Hazardous facilities

b) Earthworks

c) Composting facilities

d) Buildings that require septic sewerage facilities

e) Offal pits

f) Silage storage

g) Vegetation clearance

h) Exotic tree planting/plantation forestry

i) Intensive primary production

7.3. The proposed plan (Table 1) indicates that the status of non-complying activities within a district plan is that they require a resource consent and that the consent can only be granted if effects from the proposed activities are defined as minor or less than minor, and not contrary to the objectives and policies in the plan. The Council can consider any matters within its jurisdiction. This represents a higher bar to granting a resource consent relative to other consent classifications (e.g. restricted discretionary or discretionary).

7.4. The list of activities above is relatively wide ranging, and in my opinion the approach of specifying activities within a DWPA where a consent is required is consistent with an approach of managing the source of a contaminant risk to a supply. Furthermore, the listed activities generally represent point sources of potential contamination rather than diffuse sources, and therefore are consistent with the aims of DWPA. Whilst most of the listed activities are reasonably clear in the risk they may pose, I note 'vegetation clearance' is relatively less well defined; I have interpreted this risk as representing vegetation clearance with herbicides and/or tree stump removal, but some further definition may be worthwhile in this context. I

have proposed a further definition in Section 9 of my evidence. In addition, I note that industrial activities including rural industry also covers a wide range of activities, not all of which will pose a risk to a drinking water supply and I have provided further comment on these activities in Section 9..

7.5. However, I note that inevitably there will be some activities that will pose a risk but are not listed because they are not currently considered to be a source of contaminants. A good example is silage storage, which prior to the manganese contamination event in the Timaru water supply is unlikely to have been identified as an obvious source or pathway for manganese contamination in the downgradient drinking water source.

7.6. As I note in subsequent paragraphs of my evidence regarding comments on submissions, there are some areas where the proposed list of activities could potentially be refined to account for reasonable points raised by submitters. However, in my opinion, these types of refinement should be carefully limited to where there is a good technical justification. I have provided some proposed refinements to the list of proposed activities in Section 9 of my evidence.

7.7. I also note that simply requiring resource consent for specified activities within a DWPA will not provide protection from potential contaminants. Contamination events are typically preceded by some change within the catchment and therefore it is incumbent on the water supply manager to keep abreast of the activities within the catchment and to understand and be aware of compliance data that is provided via consent holders.

8.0 COMMENTS ON SUBMISSIONS

8.1. There are several submissions that have been lodged regarding the proposed changes to the proposed Plan and these include comments that both support and object to the activities listed. This section of my evidence provides comments on those submissions where they are relevant to my area of technical expertise.

8.2. I have commented principally on those submissions that oppose the proposed changes to the Plan, including both the original proposed plan change as well as the further relief sought by TDC. Based on the information available from the list of submissions available on the TDC website, these submitters include:

a) Maze Pastures Limited

b) Fonterra Limited

c) Silver Fern Farms

d) Milward Finlay Lobb

e) Fulton Hogan Limited

f) Road Metals Company Limited

g) Horticulture New Zealand

h) NZ Pork Industry Board

i) John Chapman

j) Dairy Holdings Limited

k) Port Blakely Limited

8.3. In the following paragraphs of my evidence, I comment on each of the submissions. I note that there are also submissions regarding rules around subdivisions (DWP-R2) but these are outside my area of expertise and I have not provided comment on this issue.

Maze Pastures Limited

8.4. Maze Pastures Limited submitted (41.1 and 41.1FS) that there should be no restriction on rural land use in the Drinking Water Protection overlay and that rural land use is controlled through regional council functions.

8.5. Whilst I have no comment on whether rural land use should be controlled through regional council functions or not as that is outside my area of expertise[2], drinking water protection areas are determined as the areas around a supply where land uses present the greatest risks to that supply. Therefore, in my opinion, some controls on land use are appropriate to help maintain the safety of the supply. I note that many of the land uses proposed by TDC are also controlled by the Canterbury Land and Water Regional Plan (CLWRP) which in many cases restricts the types of activities that are possible within a community drinking water protection area. However, the DWPA overlay includes additional areas around domestic supply bores which, in my opinion, seems appropriate to help manage the risks to those supplies. **Mr Grant Hall** provides further evidence regarding the need to cover domestic supply bores.

Fonterra Limited

8.6. Fonterra Limited have submitted that proposed rule DWP-R5 (defining non-complying status for industrial activities including rural industry within community supply DWPA and within 50 m of a private supply) should be removed on the basis that activities which have had no impact on drinking water supply should not be classified as non-complying.

8.7. The rule covering industrial activities including rural industry is broad and will cover a range of activities in which Fonterra Limited may be involved, including dairy manufacturing. In my opinion, although not all these activities will pose a risk to drinking water supply, some may, particularly where they occur within 50 m of a private supply, or within a community drinking water protection zone. To account for this point raised by Fonterra and other submitter such

[2] This aspect is covered by the evidence of Mr Grant Hall.

as Silver Fern Farms, I have proposed a refinement to the definition of industrial activities, outlined in Section 9.

Silver Ferm Farms

8.8. The Silver Fern Farms submission sought the deletion of the DWPA that are mapped across the Pareora site on the basis that they cover highly modified parts of the site, and no analysis is provided in the s32 report for why those DWPA are mapped across the site.

8.9. In their further submission, Silver Fern Farms note that there is no analysis under s32 of the RMA as to why the specified activities should be included. They further note that the supply bores on the Pareora site are managed by Silver Ferm Farms and that the proposed changes by TDC would impose a regulatory burden on Silver Fern Farms to manage the effects of their own activities on their own supply. They also note that vegetation clearance and earthworks within a DWPA would require a consent regardless of the degree to which those activities may interact with a water supply, or the management measures already in place, i.e. the rules are overly 'blunt'.

8.10. In my opinion, the points regarding vegetation and earthworks are reasonable points to raise and I noted in paragraph 7.4 the rule around vegetation clearance is not particularly well defined. The risk from earthworks is particularly applicable to areas around shallow bores because earthworks may remove a relatively large proportion of the overlying protective strata above the bore screened interval.

8.11. One means of addressing this issue could be to set a depth limit, for example specifying that earthworks within a DWPA for a bore screened less than 50 m deep would require consent and/or an area limit. This is because earthworks close to deep bores are unlikely to increase the risk of contaminants reaching the bore screen, but may pose a much greater risk to shallow bores. However, requiring some minimum setback from a drinking water bore of any depth would be prudent. The drinking water guidelines (MfE, 2023) specify the inner protection zone as a radius around a bore of at least 5 m. I have provided further definition of earthworks in Section 9 of my evidence.

Milward Finlay Lobb

8.12. The submission from Millward Finlay Lobb indicates a concern that the approach to defining new DWPA are sourced from the CLWRP, which may change. Therefore, they propose that instead of defining the approach in the proposed Plan, they are replaced with a reference to the CLWRP. This would avoid the need for a plan change if the CLWRP definitions change in the future.

8.13. A further submission by Canterbury Regional Council (183.2FS) supports this suggestion and proposes that the proposed Plan refers to Schedule 1 of the CLWRP which outlines the methodology to define the extent of DWPA

8.14. I generally agree with this approach, and it allows for a methodology to define DWPA around new drinking water sources in the future that is consistent with that in other areas of Canterbury.

Fulton Hogan Limited

8.15. Fulton Hogan Limited submitted both on the original notified plan (170.7), as well as providing a further submission regarding the additional activities proposed by TDC as non-complying. Their original submission noted that a bore mapped at 470 Pleasant Point Highway is not used for drinking water and that the DWPA around the bore should be removed.

8.16. I agree that where a bore is no longer used for drinking water, and that there is no plan to use it for drinking water in the future, it could be deleted from the current DWPA. I understand this is addressed by the evidence of **Mr Kevin Kemp**.

8.17. The further submission from Fulton Hogan (170.1FS) related to including earthworks as a non-complying activity. They propose that a threshold for the depth or volume of earthworks is included to ensure that only activities that pose an actual risk are incorporated into the rules. I have provided a more detailed definition of earthworks in Section 9 where consent would be required if they occur within the DWPA for bores that are screened at a depth of less than 50 m and if other criteria are not met.

Road Metals Company Limited

8.18. The Road Metals Company Limited submission (169.1FS) is identical to the submission from Fulton Hogan and I note that I have provided a more detailed definition of earthworks in Section 9 of my evidence.

Horticulture New Zealand

8.19. The submission from Horticulture NZ (245.4FS and 245.5FS) notes that a non-complying activity consent would be required for horticulture within a DWPA, such as planting trees, and that this requirement is not effects-based.

8.20. In my opinion, horticultural activities can represent some risk to drinking water supply bores, and particularly where those activities occur within the DWPA. These risks could include impacts from chemical use and storage (e.g. herbicides) as well as the risk from nutrient overloading and/or root / stump removal which can create rapid pathways to groundwater. I have provided further definition of vegetation clearance in Section 9 of my evidence.

NZ Pork Industry

8.21. The NZ Pork Industry Board submitted (247.2FS) against the proposed list of activities to be defined as non-complying under the TDC submission on the proposed Plan. The submission included several points, but in terms of groundwater issues, the submission noted that no analysis was provided to support the assertion that the activities pose a risk to drinking water.

8.22. In my opinion the listed activities could pose risks to drinking water, with the greatest risks posed to supplies drawn from shallow bores. For example, the risk from hazardous facilities such as a petrol station presents a risk from fuel spills from underground storage tanks entering groundwater. Silage storage presents a risk to shallow groundwater supplies because of the risk of reducing conditions developing which can result in manganese, iron and arsenic dissolving into groundwater upgradient of a supply, as was demonstrated by the recent contamination incident in the Timaru water supply. Intensive primary production can also present a risk via increased bacterial loading as well as potential nutrient hotpots, both of which can enter groundwater and migrate to a downgradient supply.

8.23. I have provided further comment on intensive primary production in Section 9 of my evidence, but I note that extensive pig farming is specifically excluded from the definition of outdoor intensive primary production.

John Chapman

8.24. John Chapman provided a further submission in support of Maze Pastures (275.3FS) and also submitted against the list of additional activities proposed by TDC (375.4FS). Mr Chapman's submission appears to be based on concerns regarding the drinking water protection area amendment that covers a greater part of his property than was previously the case. I am not aware of the reasons for the amendment and my evidence does not cover that issue.

Dairy Holdings Limited

8.25. Dairy Holdings Limited has submitted against including the list of additional activities proposed by TDC (89.2FS) and the basis that it is not appropriate for the expansion of existing activities to be automatically classified as non complying within a DWPA.

8.26. In keeping with my comments above in paragraph 8.20, the list of activities, with the potential exception of vegetation clearance, could pose a risk to drinking water supplies, with the greatest risks to shallow supplies. I have provided further comment on the activities and their status in Section 9 of my evidence.

Port Blakely Limited

8.27. Port Blakely Limited have submitted (94.1FS) against the inclusion of plantation forestry activities in the list of non complying activities proposed by TDC on the basis that this would be more restrictive than the National Environmental Standards for Plantation Forestry (NES-PF). Whilst I am not qualified to comment on the interaction between the NES-PF and the

district plan rules, I note that forestry, particularly where plantation harvesting occurs, can pose a risk to shallow groundwater supplies, for example by increasing runoff and changing the local flood risk which can pose a risk to groundwater supplies and also surface water supplies. Sediment within runoff from harvested forestry areas can also pose a risk to drinking water supplies, particularly to surface water supplies. Tree stump removal can also affect the thickness of strata overlying a pumped aquifer, or create rapid pathways for contaminant transport, increasing the risk of contamination of groundwater.

8.28. I have provided further comment on plantation forestry in Section 9 of my evidence.

9.0 ACTIVITY DEFINITIONS

9.1 In this section of my evidence I have set out proposed refinements and definitions regarding the proposed activities. These intend to help account for points raised in the submissions discussed in Section 8 of my evidence, as well as providing some further clarification around the risk the activities represent to drinking water sources. I have also commented on where a consent for an activity is already required from Environment Canterbury and whether a consent should still be required from Timaru District Council.

9.2 As highlighted earlier in my evidence, the DWPA that are currently defined are, in many cases, a default zone around a bore rather than a site specific area that reflects the risk to a particular supply. The depth of the screened interval for a particular bore will influence the risk to that bore from surface contaminants, with deeper bores at lower risk compared to shallower bores.

Mining and Quarrying

9.3 Mining and quarrying can both pose risks to drinking water supplies, particularly where excavation of overburden material reduces the thickness of unsaturated strata that overlies an aquifer, or where mining creates a direct pathway from the surface to saturated strata. Backfilling quarried areas is also a potential risk to drinking water supplies, depending on the backfill material.

9.4 Managing these activities within a DWPA is important to protect the security of a supply, and in my opinion it is reasonable that they are scrutinised carefully if they occur within a drinking water protection area. Therefore, setting these activities as non complying is appropriate.

Pipelines for carrying hazardous substances

9.5 Pipelines for carrying hazardous substances have a clear potential to pose a risk to a drinking water supply in the event of a pipe leak or burst. Therefore, this activity should be classified as non complying.

Industrial activities including rural industry

9.6 Industrial activity, including rural industry, includes a very broad range of different activities, which will have varying degrees of risk to drinking water supplies. For example a dairy processing plant could include wastewater discharges which could pose a risk to drinking water if not properly managed. However, the definition could equally include a small scale grain supply for farming which would pose very little risk to a drinking water supply.

9.7 Whilst this broad definition will encompass some activities that will pose only limited risk to drinking water supplies this approach is in keeping with managing the potential source of contaminants rather than identifying specific pathways where contaminants could reach drinking water supplies (see paragraph 6.2).

9.8 However, I am also aware that industrial activities with private water sources and more than 25 staff classify as Self-supplied Buildings and therefore a water supplier under the Water Services Act 2021. Water Suppliers are required to maintain drinking water quality in accordance with Taumata Arowai's Water Quality Rules and Regulations (Drinking Water Quality Assurance Rules 2022, Water Services [Drinking Water Standards for New Zealand] Regulation 2022). Industrial activities currently supplying 25 or more staff from a private water source and operating within a proposed Industrial Zone would be required to achieve and maintain the quality standards required by the Water Services Act 2021. This includes monitoring for E. Coli and Total Coli (quarterly) as well as heavy metal (tri-annually) concentrations of the source.

9.9 Due to the requirement to achieve the Rules and Standards required by the Water Services Act 2021, it is reasonable that existing Industrial Activities within proposed Industrial Zoned land may be exempt from the non-complying activity status for Industrial Activity within a DWPA. The non-complying Industrial Activity rule will apply to new industry proposed to be established within the DWPA.

Hazardous Activities

9.10 Hazardous activities are included in the list of activities that would be a non-complying activity within a DWPA. Hazardous activities are defined in the proposed Plan and in my opinion it is reasonable to classify these activities as being non complying.

Earthworks

9.11 Under the proposed Plan, Earthworks are defined as '*the alteration or disturbance of land, including by moving, removing, placing, blading, cutting, contouring, filling or excavation of earth (or any matter constituting the land including soil, clay, sand and rock); but excludes gardening, cultivation, and disturbance of land for the installation of fence posts'*. That definition is generally reasonable.

9.12 The risk posed by earthworks are that they can reduce the thickness of strata overlying an aquifer and reduce the potential for contaminant attenuation. In some situations, they can also lead to groundwater exposure, which does present an increased risk to groundwater quality.

9.13 Under the CLWRP earthworks are permitted under rule 5.175 if less than 100 m^3 of material is removed, or if more than 100 m^3 of material is removed, then at least 1 m of undisturbed material remains above the highest groundwater level, and the excavation occurs more than 50 m from a surface waterbody.

9.14 As noted previously in my evidence, the risk to a drinking water supply bore is generally reduced where a bore is more than 50 m deep, allowing for a potential range of hydrogeological settings. Furthermore, the risk of small scale earthworks is generally limited, for example, earthworks for the foundations of a house. Therefore, I suggest that under the proposed Plan, the definition of earthworks that are non-complying within a DWPA is amended as follows:

a. for the purposes of the DWP Chapter, earthworks, as defined in the proposed Plan are non-complying where:

   i. the bore covered by the DWPA is less than 50 m deep, and

   ii. The area covered by the earthworks is more than 250 m^2 and

   iii. There is less than 1 m of separation between the base of the earthworks and the highest seasonal groundwater level.

9.15 Alternatively, the above definition thresholds could be included in an activity standard.

9.16 Large scale earthworks (>100 m^3) which could pose a risk around a bore that is more than 50 m deep would be captured by the CLWRP rule 5.176.

Composting facilities

9.17 Composting facilities can pose a risk to drinking water supplies because the compost can contain high concentrations of microbes and nutrients which could leach into the groundwater system beneath a facility and pose a risk to a drinking water supply. Compost can also contain other contaminants which, if they enter groundwater and migrate to a supply point, pose a risk to human health. Small scale composting, for example domestic composting, is likely to pose a much smaller risk compared to larger scale commercial facilities.

9.18 Under the CLWRP, composting is managed under rule 5.38 and 5.39 and if the composting stockpile is more than 20 m^3, and within a community drinking water protection area, or within

50 m of a bore, the activity is non complying. In my opinion a similar threshold approach should be adopted for the proposed Plan

9.19 An amended definition of composting facilities for the purposes of the proposed Plan is '*For the purposes of the DWP Chapter, means: buildings, grounds and equipment used for the receiving of organic material, manufacture of compost, storage and disposal of more than 20 m³ of composted material, but does not include domestic composting activities or where compost of stored on an impervious surface and stormwater runoff is appropriately collected and treated*'.

9.20 Applying a cutoff where a consent is required would be generally reasonable and the 20 m³ would represent an area of around 4 m x 5 m x 1 m. Commercial composting operations would generally be much larger than that size and allowing some smaller scale composting is much less likely to pose a risk to drinking water supplies. Therefore, I would support a cutoff of 20 m³ in the proposed definition. However, larger composting activities pose a greater risk to water supplies and should be non complying activities within the DWPA.

Buildings that require septic sewerage facilities

9.21 Septic tanks and sewerage facilities pose a risk to drinking water mainly because of the risk of pathogens in the wastewater entering groundwater at high concentrations. Therefore, it is reasonable to require a higher level of scrutiny for these types of activities within the DWPA because those are the areas where there is a higher risk of contaminants reaching a bore.

9.22 I note that on site wastewater disposal systems can be relatively well managed, with controls put in place to minimise potential effects on groundwater and downgradient drinking water supplies. In many situations, the need for an on-site wastewater treatment system is unavoidable and in my opinion a restricted discretionary activity status is appropriate in this situation. Under Rule 5.7 and 5.8 in the CLWRP, on site wastewater disposal systems within DWPA would be restricted discretionary activities. The matters of discretion under rule 5.9 of the CLWRP are listed below, and in my opinion, similar matters of discretion would be appropriate under the proposed Plan:

a. The actual and potential environmental effects of not meeting the condition or conditions of Rule 5.7 for an existing system; and

b. The actual and potential direct and cumulative environmental effects of not meeting the condition or conditions of Rule 5.8 for a new, modified or upgraded system; and

c. The actual and potential environmental effects of the discharge on the quality and safety of human and animal drinking-water; and

d. The effect of on-site wastewater treatment system density in the local area including known on-site wastewater treatment system failures, the material health status of the

community, groundwater quality, the nature of effects of current sewage disposal methods, treatment options available and affordability; and

e. Any adverse effects on Ngāi Tahu values or on sites of significance to Ngāi Tahu, including wāhi tapu and wāhi taonga.

Offal pits

9.23 Offal pits can represent a risk to drinking water quality mainly through leaching of high concentrations of microbes and nutrients. In general, few treatment processes are in place to manage their potential effects on groundwater.

9.24 Under the CLWRP, offal pits are managed under rule 5.24 and 5.25. Under Rule 5.24, offal pits would be a restricted discretionary activity if occurring within a DWPA (and less than 100 m from a bore), but Rule 5.25 would enable burying of a single dead animal, provided it is more than 50 m from a bore used for drinking water. Given that an offal pit for a single animal would likely be a normal part of farm operations, it seems reasonable to enable that activity. However, larger scale offal pits within DWPA should be discouraged because they can present a risk to water quality that is typically not managed in the same manner as, for example, septic tank discharges. Therefore, they should have a non complying activity status.

9.25 For the purposes of a DWP Chapter, an offal pit could be defined as *'a simple pit or trench, dug into the ground for disposing of animal parts or an animal which has died or been killed on the farm, but does not include burial of a single animal provided this complies with the following conditions:*

a. The dead animal results from agricultural production on the same property; and

b. The dead animal is buried in a pit which does not contain any water, and is immediately and completely covered by sufficient soil or plant material so as to prevent discharge of odour to air, or other nuisance; and

c. The burial location is not within any area or zone identified in a proposed or operative district plan for residential, commercial or industrial purposes; and

d. The burial site is at least 50 m from any:

i. surface water body; or

ii. bore used for water abstraction; or

iii. *property boundary.'*

Silage storage

9.26 I have considered silage storage in a similar way to composting facilities because they can pose a similar risk to groundwater quality. However, I note that silage can be wrapped or stored on an impervious surface, where stormwater is collected and managed.

9.27 Under the CLWRP, silage and composting are managed under the same rules (5.38 and 5.39) and silage storage is a non complying activity within DWPA and if the volume of material is more than 20 m^3. Therefore, an appropriate definition for the purposes of the DWP Chapter would be: 'silage storage of more than 20 m^3 where contaminants are able to leach into the ground, and excludes wrapped silage and storage of silage on an impervious surface where stormwater runoff is appropriately collected and treated.'

9.28 Given the issues around manganese contamination within the Timaru drinking water supply, I consider that silage storage, as defined above, should be a non-complying activity under the proposed Plan.

Vegetation clearance

9.29 Vegetation clearance can be via both chemical or mechanical means. In my opinion, vegetation clearance by mechanical means can pose a risk to groundwater quality and drinking water supplies where it includes the removal of tree stumps and/or root systems, which can provide rapid pathways to groundwater from the surface, and also allows increased soil erosion, which is particularly an issue for surface water supplies and shallow groundwater supplies / galleries located close to a river.

9.30 Vegetation clearance via chemical means can also pose a risk to groundwater quality. A recent consent hearing (CRC222040) that enabled Environment Canterbury to undertake vegetation clearance using spray application anywhere within Canterbury included a review of the potential for herbicides to enter groundwater and travel within groundwater to bores. I was involved with reviewing ECan's application for that consent in terms of the technical groundwater aspects of the application. This indicated that the risk is generally limited because the chemicals used typically bind to soil. Conditions imposed under that consent restricted spraying to a radius of more than 50 m from any drinking water bore. That would be consistent with the DWPA areas for domestic supplies in the proposed Plan.

9.31 However, including all vegetation clearance as non complying is likely to be unreasonable and some exclusions are appropriate. With that in mind, in my opinion, the following definition would be appropriate, which is the same definition as used in the CLWRP:

a. 'Vegetation clearance means removal of vegetation by physical, mechanical, chemical or other means but excludes:

    i. cultivation for the establishment of, or harvesting of, crops or pasture;

    ii. clearance for the establishment or maintenance of utilities or structures;

iii. removal of a species listed in the Biosecurity NZ Register of Unwanted Organisms or the Canterbury Pest Management Strategy;

iv. clearance for the purposes of maintaining existing fence lines, vehicle tracks, firebreaks, drains, ponds, dams or crossings;

v. domestic gardening and the maintenance of amenity planting;

vi. clearance by, or on behalf of, the Canterbury Regional Council for the purposes of maintaining the flood-carrying capacity of a river; or

vii. exotic vegetation clearance by the Department of Conservation or Land Information New Zealand for the purposes of pest management and maintenance of public access

9.32 Given the limited risk from herbicides and other chemicals, in my opinion, it would be reasonable to classify vegetation clearance using chemical means as non complying only within 50 m of a drinking water supply bore. This would enable vegetation clearance via chemical means within parts of the community drinking water supply zones that are more than 50 m from a bore.

Exotic tree planting/plantation forestry

9.33 Plantation forestry in the proposed Plan is defined as 'a forest deliberately established for commercial purposes' and covers an area of 1 ha that will be harvested or replanted although some exclusions are also included, for example shelter belts and nurseries, or trees grown for fruit and nuts, or willows planted for soil conservation.

9.34 In my opinion, plantation forestry itself is unlikely to pose an immediate risk to water quality, although I note that large areas of forestry can impact on the recharge characteristics of a catchment. The greatest risk from plantation forestry is likely to come from the time when harvesting occurs, which can result in associated soil erosion and removal of roots and stumps, which can provide a rapid pathway from the surface to groundwater. Other risks could also include any vegetation clearance to remove undergrowth via chemical application.

9.35 These risks are covered under vegetation clearance, discussed in definitions provided earlier in my evidence. Therefore, my opinion is that plantation forestry itself should not be a non-complying activity within a DWPA.

Intensive primary production

9.36 Intensive primary production is defined in the proposed Plan as indoor primary production, which '*means primary production activities that principally occur within buildings and involve growing fungi, or keeping or rearing livestock (excluding calf-rearing for a specified time period) or poultry*', or outdoor primary production, which means '*primary production*

activities involving the keeping or rearing of livestock that principally occurs outdoors, where the regular feed source for the livestock is substantially provided from off-site sources'. Some exclusions apply to outdoor primary production, including calf rearing, extensive pig production, pig production for domestic self-subsistence use and free range poultry farming.

9.37 My interpretation of the definition is that it would cover intensive farming activities where there is a greater risk of effluent discharge to ground, with associated nutrient hotspots and risk from microbes entering groundwater. These contaminants can travel towards a supply and pose a risk to the drinking water quality.

9.38 Under the CLWRP, stock holding areas are managed under Rule 5.31 and 5.32. I understand that the definition of a stock holding area is generally similar to the outdoor activities defined under intensive primary production in the proposed Plan, although the proposed Plan definition is broader. Under rule 5.31, use of land for a stock holding area is a discretionary activity if it occurs within community drinking water supply zones, or within 20 m of a bore. Therefore, under the CLWRP, some activities that are similar to outdoor intensive primary production within a DWPA would be a discretionary activity.

9.39 Rules 5.35, 5.36 and 5.37 of the CLWRP also manage discharges of animal effluent, which is relevant for indoor intensive primary production because this may involve the collection and discharge of animal effluent from within an indoor facility. Rule 5.35 enables very small discharges of less than 100 m^3 per year (as permitted activities) and discharges exceeding this volume fall under rule 5.36 as restricted discretionary activities, provided they are not within a community drinking water supply protection zone, or within 20 m of a bore. Discharges of animal effluent within a community drinking water supply area or within 20 m of a bore are non complying activities under rule 5.37.

9.40 Whilst a discharge consent may be required under the CLWRP, I do not believe that this should remove the need for a landuse consent under the proposed Plan. Outdoor intensive primary production does present a risk to groundwater quality and where it occurs within a DWPA it could present a risk to that supply[3]. Indoor intensive primary production is also likely to pose a risk because of the likely requirement to manage any effluent or wastewater that is generated. Although the location of the discharge from an indoor intensive primary production facility may be outside a DWPA, there may also be storage facilities and/or pipework or other ancillary activities which can also present a significant risk to drinking water if a failure occurred, but would not be covered under a discharge consent. These

[3] Refer to the evidence of Mr Grant Hall regarding the potential impact of intensive outdoor primary production on manganese contamination of the Timaru supply

aspects of an indoor intensive primary production facility also need to be considered and in my opinion, warrant a non-complying status.

9.41 Given that the community drinking water supply protection zones represent the area around a supply where contaminants entering groundwater present a relatively high risk to the supply, it would be appropriate for the intensive primary production activity to be non complying within the DWPA given that these are activities are where relatively high concentrations of nutrients and/or microbes can be discharged to groundwater.

10.0 SUMMARY

10.1 Drinking water protection areas represent zones around drinking water supplies where, if a contamination event were to occur, there would be a greater risk to the security of the supply compared to areas outside the protection areas. In my opinion, the most effective means of limiting these risks is to manage or eliminate the source of potential contaminants. I note that some of the zones as currently defined do not directly equate to source water risk management areas as defined in the guidelines (MfE, 2023), particularly those around private supplies. Therefore, there may be some scope to update these zones in future.

10.2 TDC have proposed that a series of specified activities are included in the proposed Plan as non-complying activities, if they occur within drinking water protection area. In my opinion, including these listed activities represents a generally appropriate approach to managing the potential risk to drinking water supplies within the DWPA.

10.3 However, I note that some activities are relatively poorly defined, for example industrial activities (including rural industry) and vegetation clearance, and further clarity could be provided to define the specific risks that these activities seek to control. I have provided some further definitions in Section 9 of my evidence, which intends to help clarify the activities. These definitions also help to address some of the points raised in the submissions on the proposed Plan.

10.4 I have proposed key refinements to four of the proposed activities, including industrial activities, earthworks, vegetation clearance and plantation forestry.

10.5 I have proposed that existing industrial activities should not be non-complying within DWPA that occur within areas that are zoned or proposed to be zoned industrial (or a comparable zone that provides for the existing industrial activities). I have also proposed clarifications around earthworks that provides for small scale earthworks around deeper bores, where the risk to drinking water supplies is lessened. Exemptions regarding vegetation clearance are also proposed and I have suggested

that plantation forestry is not included in the list of non-complying activities, as the risk posed by that activity is captured under the vegetation clearance definition.

10.6 In addition, I have also proposed that 'buildings requiring septic facilities' should be a restricted discretionary activity, because that activity is relatively well understood and can be appropriately managed.

10.7 Some submissions have noted that specifying the outline of future DWPA in the proposed Plan may result in inconsistencies with the Canterbury Land and Water Regional Plan. I agree with this comment, and I support the proposal that future DWPA should be defined as per Schedule 1 of the CLWRP.

Neil Thomas
10 February 2025