



Source Water Risk Management Area Recommendations

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1.0 Introduction

Horizons Regional Council (Horizons) and the region's Territorial Authorities have previously co-sponsored a project reviewing the regions drinking water supplies. An output from the project included reports prepared by Pattle Delamore Partners Limited (PDP) considering source protection management for drinking water supplies in the Horizons Region, including both surface water and groundwater supplies.

As part of the work to delineate the source protection zones, recommendations were made regarding the key risks identified around each supply. Horizons have engaged PDP to provide further advice related to drinking water management and the implications of current and proposed legislation. This project builds on those previous recommendations and covers four main areas:

- ✧ Identifying region wide options for managing activities within each SPZ, allowing for different source types (i.e. surface water, groundwater and riparian takes) (Section 2)
- ✧ Comment on roles and responsibilities for drinking water (Section 3)
- ✧ Comment on how the region wide options relate to the existing controls in the One Plan and other regulatory controls (Section 4)
- ✧ Identifying site specific options for vulnerable supplies (Section 5)
- ✧ Assessing where the source protection zone work sits in terms of giving effect to both the current Drinking Water National Environmental Standards (NES) and the proposed changes to the Drinking Water NES (Section 6), and
- ✧ Providing any further recommendations that arise as an outcome of the three workstreams listed above (Section 7).

Although the One Plan and the Drinking Water NES are key instruments in drinking water management in the Horizons region, they are part of a system of resource management planning documents relating to drinking water management that are currently in flux. Other relevant documents, amongst others, include the National Policy Statement for Freshwater Management (NPS-FM) and the Freshwater NES. Sections 5 and 6 of this report focus on the One Plan and the Drinking Water NES.

2.0 Summary of Region Wide Recommendations

2.1 Background

The source protection management reports¹ include a description of each catchment and a delineation of the source protection zones around each source. The following three source protection zones are defined for each of the water supply takes:

- ✧ Intake Zone (SPZ1), which is the area in the immediate vicinity of the intake structure;
- ✧ Intermediate Zone (SPZ2). For surface water intakes this is a zone where contaminants may reach the supply in 8 hours or less; for groundwater intakes this is a zone sized based on where microbiological contaminants could reach the intake at harmful concentrations;
- ✧ Catchment Zone (SPZ3), defines the remainder of the catchment that contributes water to the intake.

Considerations for source protection management for each supply are based on the consented activities that could be a source of contamination occurring in each zone, including consented discharges and consented land use, historical and current bores, as well as the location of contaminated land (HAIL sites) that could pose a risk to a drinking water supply.

Recommendations for each protection zone are summarised below. The recommendations include a range of approaches that are educational and collaborative, as well as regulatory, from plan changes through reviews of existing resource consents. Whilst a number of these recommendations identify actions for Horizons Regional Council, it is important that the Water Supplier is involved in those actions. The Water Supplier's understanding of their supply, detailed local knowledge and existing relationships with local landowners mean that better outcomes can be achieved through collaboration with the regional council.

A range of activities that are permitted by the One Plan also pose risks of contamination to drinking water. Examples include clean fills, fertilizer discharges, discharges from feed pads, ofal holes and farm dumps, domestic wastewater discharges, and pesticide discharges. In addition, infrastructure services including wastewater and stormwater infrastructure and maintenance of those services pose a potential risk.

Permitted activities were not assessed in detail previously as there are few records detailing their locations, and we note that more could commence in the future without Horizon's oversight. However the recommendations discussed

¹ Various reports and summary sheets outlining the relevant SPZ provided to Horizons between 2019 and 2021.

below include consideration of permitted activities, in part because these are a key consideration of the proposed Drinking Water NES. There is also a risk posed by bores that do not have adequate head protection works or have not been properly decommissioned (though we note the One Plan prohibits unsealed bores).

The majority of these recommendations are derived from the relevant SPZ reports or summary sheets for each supply, where these were common between all sources. Some of the recommendations (such as those around permitted activities as above) have also been modified for consistency with the expected changes to the future Drinking Water NES. In addition, we have made recommendations based on our analysis of the One Plan (Section 4.0 of this report) and from previous drinking water safety work around New Zealand.

2.2 Source Protection Zone 1

2.2.1 Groundwater/Spring sources

- ∴ Fencing around the bores should be maintained to prevent livestock in the area from approaching the bore heads.
- ∴ Some of the recommendations for SPZ1 also make reference to the bore head inspection reports, as maintenance and/or safety issues have been highlighted for most of the groundwater supplies visited. However, it is noted that many of the smaller supplies have not been visited.
- ∴ Horizons and/or the Water Supplier should contact the owners of registered bores within SPZ1 to inform them that their bores are located within a drinking water supply protection zone. Unless Horizons already holds compliance data or bore installation logs, owners of bores should be requested to provide evidence that the bore is sealed so as to prevent ingress of contaminants to the aquifer via the bore head. Prohibited rule 16-15 and the various enforcement provisions in the RMA provide Horizons with regulatory powers to achieve compliance.
- ∴ Permitted, controlled and restricted discretionary rules for land uses (e.g. farming, building) and discharges to land (e.g. fertiliser and pesticide discharges, clean fills and farm dumps) should be reviewed and potentially changed with a view to providing Horizons with greater oversight of these activities where they may contaminate water in SPZ1. Consideration should be given to delineating such land uses and discharges within SPZ1 from those outside, to ensure matters of assessment in any consent process include protection of water supplies and management of risk to them. We also note that, as proposed, the Drinking Water NES will “restrict” activities in the immediate vicinity of intakes (SWRMA1 zones).

- ✧ Records of any stormwater and wastewater infrastructure within SPZ1 should be maintained and ideally regular checks should be made to detect possible leaks. Any maintenance on these infrastructures should be communicated to the Water Supplier. This issue will likely be most pertinent to urban sources.
- ✧ Existing farm management plans for sites with SPZ1 areas should be reviewed and if necessary, changed to include measures to manage risks to groundwater and spring sources.²

2.2.2 Surface water sources

- ✧ To manage risks arising from of potential future land uses and discharges, planning measures described above (section 2.3.1) should also be adopted for surface water sources. Consideration should be given to delineating activities based on their separation from surface water bodies and intakes, as per the changes that are proposed to the Drinking Water NES (i.e. providing for oversight and risk management that is proportionate to the distance from the supply intake).
- ✧ As for groundwater sources, the permitted, controlled and restricted discretionary rules for land uses and discharges should be reviewed and potentially changed.
- ✧ To manage the risk posed by existing activities, landowners whose property is within the area of SPZ1 should be contacted by Horizons and/or the Water Supplier to discuss the management of their land in that area. As above, farm management plans should be reviewed and any issues identified discussed and acted on as part of consent compliance checks;
- ✧ Horizons and/or the Water Supplier should contact the landowners within SPZ1 and identify any permitted and consented discharges in those areas;
- ✧ The waterway within SPZ1 should have a wide appropriately planted riparian buffer from which stock should be excluded;
- ✧ Signposting may be appropriate in some locations to identify the area as an inner source protection zone.

² We have not assessed individual farm management plans but note that many may have requirements for intermitted reviews and possibly approvals by Horizons. In the absence of requirements for consent holders to review farm management plans, it may be possible for Horizons to initiate reviews of consents, and by extension review farm management plans, under section 128 of the RMA.

2.3 Source Protection Zone 2

2.3.1 Groundwater/Spring sources

- ✧ Horizons and/or the Water Supplier should contact the surrounding landowners whose land falls within the areas of zone 2 and inform them that their land is within a drinking water supply protection zone.
- ✧ Horizons and/or the Water Supplier should contact the owners of registered bores within SPZ2 and inform them that their bores are located within a drinking water supply protection zone. As above in section 2.2.1, owners of bores should be required to show compliance with rule 16-15, unless Horizons already holds compliance information. A suite of compliance and enforcement actions are available to address problematic bores.
- ✧ Horizons should inform the Water Supplier of any consent to drill bores in SPZ 2, as well as any new potentially hazardous consented activities or any newly identified contaminated site.
- ✧ Farm management plans for any current farming activities within SPZ2 should be reviewed to ensure they are implemented (or being implemented and providing adequate protection and risk management.
- ✧ A letter drop to residents within the areas of SPZ 2 should be undertaken by Horizons to help identify if any previously unknown bores are present. Any bores identified should be assessed to ensure that they are suitably sealed if they are not in use, with the option to follow up with compliance and enforcement action if bores remain unsealed.
- ✧ We recommend the suite of planning recommendations above (section 2.2) is also extended to SPZ2. Options exist to ensure any planning measures are proportionate to the level of risk and / or protection required in SPZ2, such as the deployment of controlled activities (with matters of control) and restricted discretionary activities (with matters of restricted discretion) to ensure any consent required is not unnecessarily wide in scope.³ We also note that, as proposed, the Drinking Water NES will require permitted activities to be removed from plans if they pose a high risk to supplies and are allowed to occur in the proposed SWRMA 2 zone.
- ✧ Horizons should communicate any water quality data collected as part of the SoE monitoring programme within SPZ2 to the Water Supplier to help identify any trends in water quality within the immediate source area of the supply.

³ We also note that Horizons could adopt (through the Annual Plan or Long Term Plan processes) a fixed charge for any consents required because of the presence of SPZs

2.3.2 Surface water sources

- ∴ Horizons (as part of compliance checks or target letters) and/or the Water Supplier should notify the owners of the farms that drinking water supply protection zones extend onto parts of their land and discuss the management of their land in that area. This could include reviewing farm management plans and discussing any issues identified;
- ∴ Any permitted and consented discharges in the zone should be identified in discussion with landowners and potential mitigation options be put in place;
- ∴ Horizons should notify the Water Supplier of any discharge consents granted within the area of SPZ 2, or of any consented land use changes or any other activity that may pose a risk to the supply; and
- ∴ Stock can present a risk to surface water supplies and we recommend Horizons conducts compliance checks to ensure stock are appropriately excluded from waterways as required by regulations⁴ and any relevant farm management plan. The development of vegetated riparian margins to filter runoff entering streams should also be encouraged.
- ∴ Horizons should verify the status and risk of the HAIL sites within the zone.
- ∴ Planning recommendations for groundwater source management (section 2.3.1) are recommended to apply to surface water sources.
- ∴ Horizons should communicate any water quality data collected as part of the SoE monitoring programme within SPZ2 to the Water Supplier to help identify any trends in water quality within the immediate source area of the supply.

2.4 Source Protection Zone 3

2.4.1 Groundwater/Spring sources

- ∴ Horizons should provide information regarding the general groundwater quality identified in the catchment to the Water Supplier (for example via State of the Environment monitoring and reporting). This should allow for the identification of potential contaminants in the water and changes in these (e.g. microbial pathogens, nitrates, emerging contaminants) before they pose a risk to the water supply bores. Note that some bores do not have an SoE monitoring bore located upgradient of the source. While the supply itself must be monitored by the Water Supplier, additional alternative monitoring may be required for these sources.

⁴ Resource Management (Stock Exclusion) Regulations 2020

- ✧ Horizons should inform the Water Supplier of any changes to land use in SPZ 3 (including deforestation / harvesting) as well as any other activity that may pose a risk to the water supply (e.g. large scale discharges, contaminant spill risks).
- ✧ Samples of water quality from groundwater sources that show elevated iron and manganese concentrations should also be tested for arsenic on an annual basis.
- ✧ Consideration should be given to a review of the One Plan's controls over high risk and widespread land uses or discharges that have the potential to affect groundwater quality on a catchment scale.⁵ Such effects could include those occurring (or potentially occurring) cumulatively (such as from widespread land uses, such as farming), and from point sources such as closed or operating landfills, discharges from wastewater treatment plants or stormwater systems, and other sources.

2.4.2 Surface water sources

- ✧ Horizons should provide information regarding the general water quality identified in the catchment to the Water Supplier (for example via State of the Environment monitoring and reporting). This should allow for the identification of potential contaminants (e.g. viruses, nitrates, emerging contaminants) before they pose a risk to the water supply.
- ✧ Horizons should inform the Water Supplier of any changes to land use in SPZ 3 (including deforestation / harvesting) as well as any other activity that may pose a risk to the water supply (e.g. large scale discharges, contaminant spill risks).
- ✧ Horizons should inform the Water Supplier of any proposed consent applications for discharge to land and/or water in the zone.
- ✧ Horizons may wish to verify the status and risk of the HAIL sites within the zone.
- ✧ Planning work should be considered to address any possible catchment scale effects and alternative risk management and protection that may be put in place through the planning framework.

3.0 Roles and Responsibilities

Drinking water in New Zealand is managed and regulated under the Water Services Act 2021 (The Act). The Act sets out the regulatory framework for drinking water and sets out the duties of drinking water suppliers, including

⁵ Noting Horizon's obligations under the NPS-FM 2020 to set limits and prepare action plans for achieve environmental outcomes in each freshwater management unit in the region.

requirements for a drinking water safety plan and compliance with legislative requirements, such as the drinking water standards. In addition, the Act sets out a source water risk management framework that works together with the RMA and NPS-FM.

There are a number of different organisations with responsibilities for managing and monitoring drinking water in New Zealand, including regional councils, district councils and other water suppliers, and compliance officers. In addition, the Water Services Regulator Act 2020 established Taumata Arowai as the overall regulator for community drinking-water supplies. This section sets out the general roles and responsibilities of different organisations, but it is not intended to be exhaustive.

Figure 1 shows a general representation of the regulatory framework to protect drinking water in New Zealand.

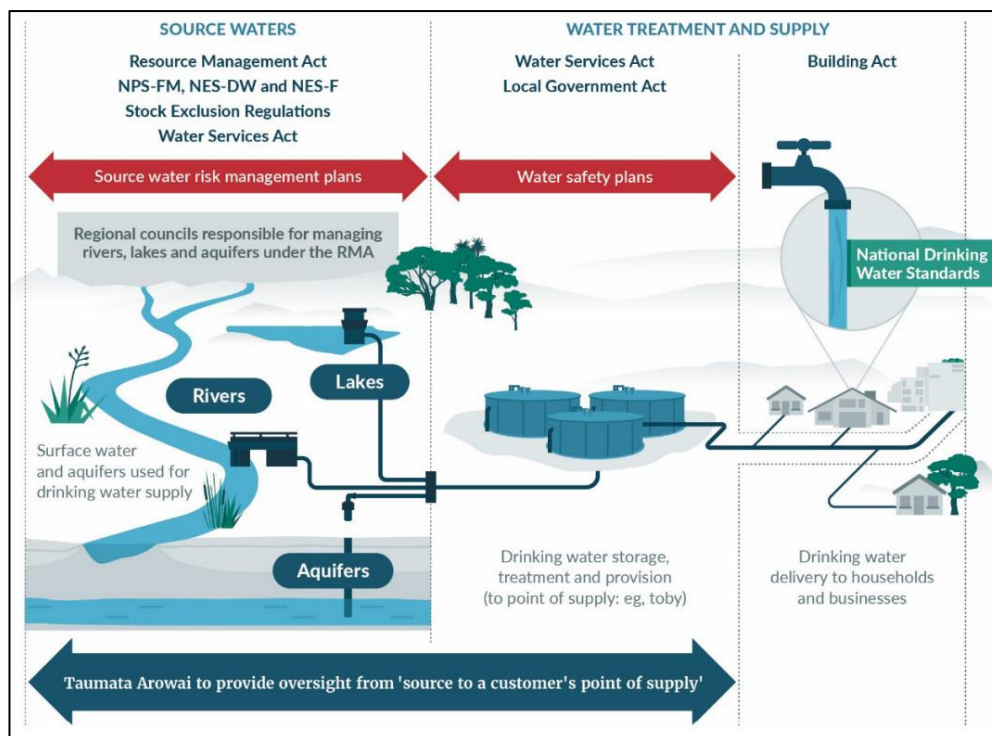


Figure 1: Regulatory framework for drinking water protection in New Zealand (after MfE, 2022).

Role of Taumata Arowai

Taumata Arowai was established as the water services regulator for New Zealand in 2020 under the Taumata Arowai - Water Services Regulator Act 2020. It provides a regulatory role for drinking water in New Zealand and an oversight role for wastewater and stormwater.

Broadly, Taumata Arowai provides national level oversight of drinking water and all drinking water suppliers must register with Taumata Arowai. In addition, Taumata Arowai has functions that require it to monitor and enforce compliance with relevant drinking water legislation and standards.

All drinking water suppliers must submit drinking water safety plans, together with source water risk management plans to Taumata Arowai. Its roles and responsibilities therefore extend across both regulation of source water quality and regulation of water treatment and supply. Part of the intention of Taumata Arowai is that it helps to tie the responsibilities of regional councils and water suppliers together and ensures a collaborative approach to drinking water management across New Zealand.

Responsibilities of Regional Councils

Regional councils have responsibilities pertaining to water quality in the regions under both the Water Services Act, the Resource Management Act (RMA) and also under NES Regulations as well as the NPS-FM. With respect to water quality under the RMA regional councils are responsible for:

- ✧ The use of land for the purposes of maintaining and enhancing the water quality of water in water bodies;
- ✧ The discharge of contaminants into or onto land, air or water and discharges of water into water.

The Water Services Act also requires that regional councils contribute to the Source Water Risk Management Plans that are prepared by Water Suppliers, as well as publishing information regarding source water quality and quantity on an annual basis. This information must be reported to Taumata Arowai and the effectiveness of interventions must be assessed every three years.

When considering an application for a resource consent, the regional council must have regard to relevant national environmental standards. For drinking water supplies the key NES document is *The Resource Management (National Environmental Standards for Sources of Human Drinking Water) Regulations 2007* (NES Regulations). This contains minimum requirements for protecting sources of human drinking water and imposes responsibilities primarily on regional councils. The NES came into force on 20 June 2008 and is discussed in Section 6 of this report. Replacement regulations are due this year (2023).

Responsibilities of District Councils and Other Water Supply Operators

The functions of district councils are narrower than those of regional councils, however they are responsible for creating and implementing district plans, which must not be inconsistent with regional plans. Therefore, their responsibilities overlap with part of the regional council's responsibilities. Other water suppliers' responsibilities are similar to that of district councils and both have

responsibilities as consent holders for water take and use consents and must comply with the conditions of those consents.

District councils and other water supply operators (and regional councils) also have responsibilities under the Water Services Act (2021).

Duties of drinking water suppliers under the Water Services Act include:

- ✧ Duties to supply safe drinking water and to comply with drinking water standards. Note that these standards are now specified as maximum acceptable values in the *Water Services (Drinking Water Standards for New Zealand) Regulations 2022*, and guideline values specified by Taumata Arowai.
- ✧ Duties to supply sufficient quantities of drinking water.
- ✧ Duties to develop drinking water safety plans. Note that under the Water Services Act, the Source Water Risk Management Plans are treated as being a part of the drinking water safety plan.

Other duties are listed in the Act and not all are listed above. In addition, the Act specifies that Taumata Arowai are required to review and monitor any drinking water safety plans and also to monitor compliance with those plans, which may include compliance with any drinking water standards.

Compliance Officers

The Water Services Act enables Taumata Arowai to appoint Compliance Officers who have replaced the Drinking Water Assessors who were empowered under the Health Act 1956 (Section 69, now repealed).

The functions of compliance officers are to:

- ✧ determine whether drinking-water suppliers are complying with the legislative requirements (which deal with drinking water);
- ✧ verify and, if appropriate, approve a drinking-water supplier's drinking water safety plan;
- ✧ ensure that local authorities are complying with undertakings made in a source water risk management plan;
- ✧ respond to serious risks to public health relating to drinking water;
- ✧ investigate anything that might have contaminated drinking water and investigate the commission of offences under the Water Services Act; and
- ✧ bring proceedings in relation to compliance orders, enforceable undertakings or offences under the Water Services Act.

4.0 Existing Regulatory Protection of Water Supplies in the One Plan

Comments are included in Section 2 regarding how the One Plan relates to some of the specific region wide management recommendations, where those are relevant. This section of the report comments on the oversight of drinking water supplies provided by the One Plan more generally and how the One Plan relates to other relevant regulatory documents covering protection of drinking water supplies.

4.1 Background: Relationship between One Plan and other Planning Documents

The One Plan is part of a suite of planning documents and legislation that provide Horizons with oversight of activities that may affect drinking water supplies. These documents are intended to operate as a cascade or hierarchy with the document at each level 'giving effect to' the document above it.

- ✧ Part 2 of the RMA sets out the purpose of sustainable management of natural and physical resources
- ✧ A national policy statement must state objectives and policies for matters of national significance relevant to achieving the purpose of the RMA (s 45A)
- ✧ A regional policy statement must give effect to a national policy statement (s 62)
- ✧ A regional plan must give effect to a regional policy statement and a national policy statement (s 67)

If the cascade is working as intended the lowest order documents 'give effect to' Part 2, and activities undertaken in accordance with those documents accordingly should achieve the purpose of the Resource Management Act (the Act). For example, consented and permitted activities will demonstrably be achieving the purpose of the RMA and be consistent with the higher order documents.

In addition to this cascade of policy documents, National Environmental Standards (NESs) may be imposed centrally and are akin to regional plan rules but applying nationally. NESs provide rules to determine whether activities are permitted, require consent, or are prohibited. They may state the circumstances when consents may be granted or not, but generally do not set out policies to utilise to help determine resource consent applications.

This report is focussed on changes to the Drinking Water NES as they relate to drinking water management in the Horizons region, but other NESs in force at

any one time will also be relevant to the provision of water supplies and source protection.

Current NESs and other legislation relevant to the protection of water supplies and their sources include:

- ✧ Resource Management (National Environmental Standards for Sources of Human Drinking Water) Regulations 2007 (referred to as the Drinking Water NES in this report)
- ✧ Resource Management (National Environmental Standards for Freshwater) Regulations 2020
- ✧ Resource Management (National Environmental Standards for Plantation Forestry) Regulations 2017
- ✧ Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011
- ✧ Resource Management (National Environmental Standards for Storing Tyres Outdoors) Regulations 2021
- ✧ Resource Management (Stock Exclusion) Regulations 2020
- ✧ Water Services Act 2021 and associated regulations.

With the recent development of NESs for management of forestry, freshwater and storage of tyres outdoors and a pending NES for indigenous biodiversity (plus potentially others), the government is amid a process of developing a planning framework that, to some extent, will likely either duplicate or strengthen the management of land uses and discharges in each region.

The enactment of the Water Services Act 2021 (WSA) is also relevant, as this controls registration of currently unregistered supplies and requires the development of water safety plans over time by water suppliers. The WSA also requires regional councils to report annually to Taumata Arowai on the quality and quantity of source water, and to assess the effectiveness of their source water management at least once every three years.

Consequently, the relationship between the pending Drinking Water NES amendments and the One Plan is not monogamous. Rather, the One Plan, the management of land uses and discharges in Horizons region, and the management of water supplies, will all be affected by other new NESs, changes to current NESs, and further future changes to legislation or regulations, including the Drinking Water NES. In addition, the government is creating and amending national policy instruments such as the NPS-FM 2020.

We note that currently and in the future there will be elements of disjointedness, duplication and unnecessary complexity between national and regional planning documents.

This report focusses on the One Plan in its current form and the effect amendments to the Drinking Water NES alone may have on it and management of activities in the Horizons region.

4.2 Oversight of Drinking Water Supplies provided by the One Plan: Elements where strong oversight is present

The One Plan is the lowest order planning document so is the first point of reference for determining whether resource consents are required, for considering consent applications under s 104 of the RMA, and in particular for determining whether proposed activities may affect drinking water supplies.

As with all regional plans, the One Plan has a suite of objectives (outcomes to be achieved), policies (actions to be taken to achieve the objectives) and rules (triggers allowing, prohibiting or requiring oversight of activities via consents). In relation to the protection of drinking water supplies the One Plan's most relevant objective is 14-1 which states:

Objective 14-1: Management of discharges to land and water and land uses affecting groundwater and surface water quality

The management of discharges onto or into land (including those that enter water) or directly into water and land use activities affecting groundwater and surface water quality in a manner that:

- *safeguards the life supporting capacity of water and recognises and provides for the Values and management objectives in Schedule B,*
- *provides for the objectives and policies of Chapter 5 as they relate to surface water and groundwater quality, and*
- *where a discharge is onto or into land, avoids, remedies or mitigates adverse effects on surface water or groundwater.*

Critically, this objective aims to *recognise and provide for* values listed in Schedule B, where "Water Supply" is a value present in a range of water zones and sub zones. The term 'recognise and provide for' is taken from the RMA. It requires decision-makers to make actual provision for listed matters. Thus, in the case of protection of water supply values in listed sub zones, the plan indicates decision makers must make decisions that make that happen. This

objective therefore carries very considerable weight – much more weight than the obligation in section 104 (of the RMA) to ‘have regard to’ environmental effects and policy documents, which requires matters to be given genuine attention though they may be rejected.

Policy 14-1 is the most relevant policy for considering discharges to water to achieve objective 14-1. This policy cross-references to the provisions of Chapter 5 of the One Plan. These policies are not repeated here but can be summarised to have the effect that:

- ∴ Values must be recognised and provided for (i.e. decisions must make actual provision for the protection of water supplies, sources and water supply values)
- ∴ Water quality must be managed so that:
 - Where targets are being met, they must continue to be met
 - Where water quality targets are not being met water quality must be enhanced
 - Where water quality is unknown, decisions have regard to the likely effects on water quality values

In the case of groundwater quality, the same outcomes are to be achieved but through the explicit management of discharges and land use.⁶

When decisions are being made on resource consent applications, Policy 14-1 directs that Policies 5-1 to 5-5 and 5-9 of Chapter five must be ‘specifically considered’.

Collectively these provisions mean that, from a policy perspective, the approach taken by the One Plan is clear and very directive. It is clear that land uses and discharges are to be managed, via consent decisions, so that:

- ∴ specific consideration must be given to maintaining or improving water quality; and
- ∴ water supply values, where indicated as being present in zones or sub-zones, must be recognised and provided for.

From the perspective of the consented activities and their environmental effects, therefore, since the implementation of the One Plan:

⁶ It is not clear why the surface water policies (5-2 – 5-5 and 5-9) refer to the management of water quality in general terms but the groundwater policy (5-6) refers to the management of (in particular) discharges and land use in relation to management of the quality of groundwater. This does not appear to exclude a consideration of land use effects on surface water quality, but could be construed as doing so.

- ✧ Discharges and land uses that may affect water supplies will only be undertaken in a manner that provides for water supplies and the value of water supplies; and
- ✧ Surface and groundwater quality should (at least) be being maintained, and being enhanced where degraded.

In general terms these outcomes and the policies to achieve them are consistent with the higher order documents: the One Plan itself is an integrated regional policy statement and regional plan, and (in respect of its policies) it gives effect to the NPS-FM 2020's policy to maintain and improve water quality (Policy 5).

Achieving these outcomes is supported by the RMA and policy framework in higher order documents. In particular it is supported by the RMA's provision (inserted 2021) in section 104G that:

104G Consideration of activities affecting drinking water supply source water

When considering an application for a resource consent, the consent authority must have regard to—

- (a) the actual or potential effect of the proposed activity on the source of a drinking water supply that is registered under section 55 of the Water Services Act 2021; and*
- (b) any risks that the proposed activity may pose to the source of a drinking water supply that are identified in a source water risk management plan prepared in accordance with the requirements of the Water Services Act 2021.*

This provision applies to all resource consent applications irrespective of whether they are controlled activities or restricted discretionary activities (with the effects on water supplies outside of the matters of control or restricted discretion), or discretionary or non-complying activities where consent authorities have discretion to assess all effects.^{7, 8}

⁷ We note however the Water Services Act 2021 (WSA) carries over existing registrations of water supplies from the prior legislation. For supplies that are not currently registered and need registration under the WSA, applications for registration are required by 2025 and a water safety plan for those supplies needs to be provided to Taumata Arowai by 2028. This gives a significant time window for supplies to remain unknown to Horizons if they are unregistered and are outside of zones or sub-zones with listed water supply values.

⁸ From a policy perspective, it is not clear whether s 104G engages the policies and objectives of the One Plan or NPSFM 2020 as well as the 'effects' of the proposed activity. If not, it will be effects on water supplies in isolation that decision makers must have regard to. Otherwise, engagement of the policy provisions will provide for

Along with the One Plan, this provides a two-stage check for any effects land use and discharges requiring consents may have on a registered water supply and the groundwater or surface water source for that supply.

4.3 Oversight of Drinking Water Supplies provided by the One Plan: Weaker Oversight

Despite the strong policy direction provided by the One Plan, the methods to implement this policy framework include a wide range of rules allowing activities with little or no oversight provided for Horizons. These activities include a range of contaminating discharges and land uses that could be undertaken as permitted or controlled activities.⁹ In the case of controlled activities, section 104G applies and Horizons would need to have regard to an effect on a water supply, but this may not mean that either the consent could be refused or that conditions could be imposed for the particular protection of the water supply.

Examples include:

- ✧ Controlled activity to use land for existing and new intensive farming land uses (rule 14-1 and 14-3) – which commonly discharge nutrients and/or pathogens to water. Currently these could occur as controlled activities adjacent to water supply intakes and within source protection zones.
- ✧ Controlled activity for large scale land disturbance (rule 13-2) – which may disturb sediment and soil-borne contaminants into water
- ✧ Permitted activity to discharge fertilizer to land (rule 14-5) – which may result in direct runoff of fertilizer to water and leaching to water
- ✧ Permitted activity to use land for feed pads (rule 14-6) – which may discharge nutrients and pathogens to land and water
- ✧ Permitted activity for the widespread application of agrichemicals (rule 15-2) – which may result in direct discharges to water close to supply intakes
- ✧ Permitted activity to discharge cleanfill to land (rule 14-21) – where, in the absence of waste acceptance criteria and monitoring, discharges of other materials or contaminated cleanfill may occur without oversight

Throughout chapters 13-17 of the One Plan, effects on water supplies are listed as permitted activity standards under only two rules (15-1 and 15-3) which deal

a more useful decision-making pathway, as they will guide decision makers on the significance of those effects and whether allowing them will provide for planned objectives to still be met.

⁹ In the case of activities also permitted by the NES for Freshwater, clause 75 allows local authorities to charge for monitoring. This could potentially allow for Horizons to increase their oversight of permitted activities, but only in the case of activities permitted by the One Plan and the NES for Freshwater.

with discharges of agrichemicals and pesticides, and seek to prevent discharges onto roofs that supply dwellings with drinking water. Equivalent permitted activity standards for other activities are absent through the rest of the plan.

There are no controlled activity or restricted discretionary rules where effects on water supplies are matters of control or restricted discretion. As a result Horizons will need to have regard to those effects under s 104G (of the RMA), but will not be able to impose particular conditions on consents explicitly to address those effects.

In the case of proposals that breach permitted or controlled activity rules, in most instances these become discretionary or non-complying activities. In these cases Horizons can apply the full suite of potential controls, assessments of effects and policy provisions when considering applications and (if granting consents) applying conditions to protect water supplies, or refusing them if necessary.

4.4 The One Plan as it relates to the current Drinking Water NES

In addition to the One Plan, the Drinking Water NES is relevant and sets out requirements and conditions relating to activities affecting drinking water.

A significant limitation of the current Drinking Water NES is that it is limited in scope and only applicable where applications are made to local authorities for discharge permits (under section s 15 of the RMA) and water permits (under s 14 of the RMA) (refer to section 6.1). Its provisions are not triggered by land use activities (e.g. effluent storage, farming, earthworks). For these types of land uses, the NES will only be engaged if discharge or water permits are required for associated or ancillary activities (e.g. farm dairy effluent discharges, fertilizer discharges or sediment discharges).

While the One Plan's policies and objectives have a scope much wider than the Drinking Water NES, the plan's rule framework narrows the scope by making many activities controlled or permitted, even though they likely pose a risk to water supplies and water supply values in zones or sub-zones (refer section 4.3). In the case of permitted activities, this status gives Horizons almost no oversight of potentially contaminating activities and ensures neither the Drinking Water NES nor section 104G (of the RMA) are engaged. In the case of controlled activities, consents must be granted and despite the Drinking Water NES and section 104G there is very limited scope to impose conditions that protect water supplies or their sources.

Collectively this means the Drinking Water NES in its current form is less likely to be engaged than if potentially contaminating activities were not permitted or controlled in the One Plan.

5.0 Summary of Specific Comments

There are several specific comments and recommendations from previous work by PDP, additional to those in Section 2, for individual drinking water supplies, which are listed in Appendix A, Table 1 (for groundwater sources) and Table 2 (for surface water sources). Where a supply is not noted in the tables within Appendix A, the recommendations identified in Section 2 of this report apply, but it is important to note that the recommendations are based on a desktop review only (and limited site visits to some of the larger supplies) and not all specific risks in each catchment will have been identified for the recommendations.

6.0 Drinking Water NES and Proposed Changes

6.1 Current Drinking Water NES

The current Drinking Water NES was gazetted in 2007 and covers consenting decisions and permitted activities in different circumstances where the activity could impact on a drinking water supply. The current Drinking Water NES mostly applies to supplies serving more than 500 people for at least 60 days a year and generally focuses on restricting activities that could adversely affect the water quality of a supply post-treatment for supplies that currently meet the health criteria.

For supplies that are not tested or do not meet health criteria, the Drinking Water NES seeks to restrict water and discharge permits that could increase contaminant concentrations by more than a minor amount, or cause exceedances of the relevant water quality criteria post-treatment. However, the current Drinking Water NES is limited to water and discharge permits and does not extend to other activities that could impact a water supply such as land use activities. Under the current Drinking Water NES, regional councils must not include rules that allow a permitted activity to occur upstream of an abstraction point that could be contrary to the above requirements.

The Drinking Water NES also covers supplies serving more than 25 people for at least 60 days a year. However, the regulations are much less stringent for these small supplies. The current Drinking Water NES does not specify any treatment requirements for these supplies, and states that for activities that could lead to an event occurring that may have a significant adverse effect on the quality of the water at the abstraction point (i.e. chemical spill), or as a consequence of an event (i.e. unusually heavy rainfall), then a condition shall be placed on the consent to notify the water supply operator in any such event. However, the current Drinking Water NES does not limit such activities within the capture zones of water supply points for small supplies. This is an aspect of the current Drinking Water NES that is not consistent with the principle of protecting source water.

The SPZs delineated for Horizons to date are not strictly required under the current Drinking Water NES, which generally restricts activities 'upstream of an abstraction

point' which is a reasonably broad criterion. However, the SPZs do help to define the areas in which specific consenting decisions as required by the Drinking Water NES should be made. For example:

- ✧ Zone 1 defines the area where activities should be strictly controlled.
- ✧ Zone 2 defines the area where specific land-use activities or discharges could directly contaminate the water source and should be controlled under the regional planning framework.
- ✧ Zone 3 defines the area of the wider capture zone where non-point sources arising from general land use, cumulative effects from small point sources and large-scale discharges can be managed via the setting of regional water quality limits.

Under the current Drinking Water NES, the consideration of treatment at each source and how the treatment may correspond to different risks within the catchment is a requirement when defining consenting options for a particular activity. However, it should be noted that a central theme in the protection of drinking water is the concept of a multi-barrier approach and therefore it is important that no undue reliance is placed on the presence (or not) of treatment at each source, in terms of management of activities within a source protection zone. Although this is an approach used under the current Drinking Water NES, it is likely that it will be removed under the proposed changes to the Drinking Water NES.

Currently, no database exists that clearly defines the exact treatment processes implemented at water supplies within the Horizons region. However, the findings of the latest prioritisation report (Pattle Delamore Partners Limited, 2021) undertaken for the relevant 2019/2020 compliance reports (produced by the relevant drinking water assessors) has shown that all supplies assessed have some form of treatment process. It is noted that this assessment does not include the majority of small supplies serving less than 500 people, although the treatment processes at these supplies is not strictly required to be considered under the current Drinking Water NES.

It is our understanding that the majority of the supplies assessed for the 2019/2020 Compliance period either have chlorination, filtration, UV treatment or a combination of all three, which is expected to provide treatment for a variety of microbial pathogens dependent on the exact treatment at each source. Some supplies also have additional treatment measures to deal with site specific issues. For example, the Taumarunui water supply has pre-treatment of soda ash and powdered activated carbon to treat both water hardness and taste and odour issues arising from the surface water source on the Whanganui River, before undergoing filtration, UV and chlorination.

In general, chlorination and UV can provide treatment for viruses, bacteria and protozoa, although chlorination alone will not provide effective treatment against protozoa. The treatment processes also need to be sufficiently monitored and

managed so they are operating correctly to provide effective treatment. During the 2019/2020 compliance period, approximately 24 percent of the supplies were found to have treatment but insufficient monitoring. Additionally, approximately 27 percent of the supplies had detections above the relevant Maximum Acceptable Value (MAV) under the Drinking Water Standards for New Zealand (DWSNZ, 2005, revised 2018).

The presence of chlorine or UV treatment will not provide any treatment for contaminants other than microbial contaminants. SPZ2 is generally defined based on a 1 year time of travel for groundwater supplies, or a conservatively large distance so that this zone provides sufficient attenuation for microbial contaminants. As such, the existing treatment processes can provide treatment for activities within this zone that could introduce microbial contaminants into the supply such as effluent discharges or septic tanks, provided the concentrations are sufficiently low.

However, no treatment will be provided for other potentially contaminating activities such as chemicals from spills, HAIL sites or changes in land use (i.e. nutrient discharges). For surface water supplies, it is generally expected that microbial contaminants could be present in the source water and require treatment. However, treatment is just one part of the multi-barrier approach to drinking water protection, and treatment processes need to be regularly monitored and maintained to ensure that the treatment is operating effectively as intended. Therefore, it is critical that no undue reliance is placed on treatment and the protection of water at its source is of paramount importance. This is a common theme of the proposed changes to the Drinking Water NES discussed in the following section of this report.

Overall, the existing source protection zones are consistent with the current Drinking Water NES and also help to provide information around consenting decisions allowing for the treatment of source water.

6.2 Proposed Drinking Water NES

In January 2022, MfE published a consultation document outlining the proposed changes to the Drinking Water NES (Ministry for the Environment, 2022). The consultation document outlines that the current Drinking Water NES is not fit for purpose due to the document being imprecise and difficult to put into practice. The findings of the Havelock North inquiry also identified significant problems with the current Drinking Water NES.

The proposed changes to the Drinking Water NES include amendments in the following areas:

- ✧ How at risk source areas are delineated;
- ✧ How activities within those source areas are regulated and managed; and
- ✧ Protection of all registered water supplies.

These are potentially substantial changes to the way in which risks to drinking water supplies are managed. Consultation on the document is now closed, with submissions

due by 6 March 2022. Each of the three areas discussed as part of the proposed amendments are discussed separately in the following sections of this report.

6.2.1 How at-risk Source Water Areas are Delineated

The consultation document addresses the ambiguity with the current Drinking Water NES which applies to activities 'upstream' of an 'abstraction point' and recommends that a consistent and clear approach is used nationally to define zones, which are now identified as Source Water Risk Management Areas (SWRMA).

Under the proposed changes to the Drinking Water NES, the use of 'upstream' and 'abstraction point' will be replaced with a default methodology for determining SWRMAs. These SWRMAs are expected to be based on the Technical Guidelines for Drinking Water Source Protection Zones (Pattle Delamore Partners Limited, 2018) and are as follows:

SWRMA 1: The immediate area around the intake where there is an immediate risk of contamination.

- ✧ For rivers, this is defined as the river and its bed 1,000 m upstream and 100 downstream of the intake and extending landwards 5 m from the river's edge.
- ✧ For lakes, this is defined as a 500 m radius from the intake, and extending landwards 5 m from the lake edge.
- ✧ For aquifers, a 5 m radius around the bore head.

These recommendations are generally consistent with the Technical Guidelines for Drinking Water Source Protection Zones (2018), although this document also recommended that the 5 m buffers for each source type could be extended to at least 30 m where practical.

The current SPZs defined for the relevant water supplies in the Horizons region are considered to be consistent with the recommended guidelines proposed for the new Drinking Water NES. It is noted that many of the SPZ1 areas completed for Horizons have been extended up to a radius of 30 m, or cover the entire land parcel or currently fenced area where practical. However, while this is greater than the minimum 5 m proposed, this is considered to provide added conservatism and the larger areas should be maintained. Some further consideration may be required depending on future changes to the Drinking Water NES and restrictions on activities.

There are a number of SPZ1 areas that do not meet the 5 m radius requirement in all directions due to site constraints. For example, the Longburn SPZ1 terminates at the adjacent residential dwelling approximately 2 m towards the south-east of the bore and SPZ1 for the Feilding bores terminate in the currently fenced areas, as extending these zones to a 5 m radius would encompass some of

the adjacent road corridor, where it would be very difficult to restrict activities. It is currently not clear from the Drinking Water NES guidance document how this issue will be addressed as part of the final Drinking Water NES. It is expected that this will be a consideration for many water supplies throughout New Zealand that have been placed next to existing infrastructure including adjacent properties and road corridors. If there is no explicit guidance around this is the final changes to the Drinking Water NES, then the zones may need to be extended to a minimum of 5 m for all supplies, regardless of existing constraints.

A question from the consultation document asks why the default of 5 m is different to the stock exclusion regulations that require a 3 m setback from waterways. A question also asks if 5 m is sufficient or if the zone should be extended to 10-30 m. In our opinion, the 5 m requirement is unlikely to be reduced to 3 m to match the stock exclusion regulations, and it is our understanding that 5 m is to be the minimum distance and provides clarity of a definitive number. However, where practical it would be appropriate to extend the zone to 30 m, for example many sites are already fenced within a much larger area so it would be prudent to retain those fences areas as locations where activities are strictly controlled. It is important to consider the implications of all zone changes. For the SPZs currently delineated, a larger zone of up to 30 m was defined where practical (i.e. to encompass a pre-existing fenced area).

SWRMA 2: Area where activities need to be managed, to mitigate more medium-term risks of contamination.

- ∴ For rivers, this is the river and bed from where water travels to the intake within an 8-hour period.
- ∴ For lakes, this is the entire lake area and extending 100 m landward, including tributaries where water travels to the lake within an 8-hour period.
- ∴ For aquifers, this is defined based on a 1-year time of travel, out to a maximum of 2.5 km.

These recommendations are consistent with the Technical Guidelines for Drinking Water Source Protection Zones (2018). The SPZ2 areas delineated in the Horizons region are also generally consistent with the proposed Drinking Water NES methodology. However, it is noted that some of the earlier SPZ2 areas defined for Horizons where there was a lack of sufficient information to calculate a 1 year time-of-travel adopted a default upgradient distance of 2 km, 500 m less than the 2.5 km maximum distance specified in the proposed changes to the Drinking Water NES. Later work in 2021 adopted a distance of 2.5 km upgradient for the spring sources assessed at that time, which is consistent with the default maximum distance specified in the proposed changes to the Drinking Water NES.

A list of the supplies that have had SPZ2 extended to a distance of 2 km upgradient are presented in the following table.

Table 1: Supplies where SPZ2 has been defined based on a maximum upgradient distance of 2 km	
Owner	Supply
Whanganui District Council	Kai Iwi 3
Rangitikei District Council	Bulls Supplementary Bore
Tararua District Council	Pahiatua (McKnight bore)
Kakahi Water Supply Society	Kakahi Springs
Ruapehu Alpine Lifts	Waipuna Spring
Kaupeka Ki Runga Trust	Moawhango Spring
Tararua District Council	Norsewood Bore
Manawatu District Council	Totara Reserve (both bores)
Fonterra	Pahiatua Bore
Tatum Park Holiday Conference Centre	Tatum Park (both bores)

Consideration could be given as to whether some or all of the SPZ2 for these supplies should be extended out to a distance of 2.5 km. This could be based on a review of the local hydrogeology around these supplies to give an indication of whether the current distance of 2 km is likely to be sufficiently conservative to allow for microbial pathogens to die-off and meet the 1 year travel time period as set out in the proposed changes to Drinking Water NES. However, these supplies were typically given a generic zone as there was insufficient hydrogeological information to calculate groundwater travel times and as a result, a prudent approach could be to extend these zones to 2.5 km, consistent with the default zones in the proposed changes to the Drinking Water NES.

SWRMA 3: Entire catchment area for the source water

The proposed changes to the Drinking Water NES define this area as the entire catchment area and note that the management focus is to identify where persistent contaminants and cumulative effects could pose a risk to the water supply. The SPZ work completed for Horizons is consistent with the proposed changes to the Drinking Water NES and encompasses the entire upgradient catchment for all sources for SPZ3 (now SWRMA 3).

Bespoke Methods

The proposed changes to the Drinking Water NES indicate that there will be a mechanism to allow for bespoke SWRMAs to be established where appropriate. Recent work released by the Ministry for the Environment (MfE, January 2022) covers recommended modelling approaches and uncertainty quantification for SWRMAs. A number of groundwater sources, primarily on the Manawatu Plains, had SPZ2 areas defined based on a volumetric approach due to very shallow (near flat) groundwater gradients in the Manawatu Plains, with a general upwards vertical gradient.

In this situation, horizontal distances for a 1 year time of travel are likely to be very small. Therefore, a volumetric approach was used to calculate a fixed radius around each bore. This allows for a conservative balance to be used when considering the likely area around a bore that could contribute water to a bore within less than a year, and also allows for short circuiting from the surface directly to the pumped aquifer (i.e. via poorly sealed or unused bores).

Additionally, for some supplies on the Manawatu Plains, SPZ3 was split into two areas, with SPZ3a representing the upper catchment where natural downwards hydraulic gradients exist and where land surface recharge to groundwater could contribute to the bore under natural conditions. SPZ3b represented the lower catchment on the plains where dominantly upwards vertical hydraulic gradients exist. This represents the groundwater catchment where land surface recharge could contribute to the bores under artificial conditions, i.e. where groundwater pumping could reverse the upwards gradient, which could pose a risk if short circuiting pathways due to boreholes existed.

The guidelines for modelling SWRMAs discuss the different modelling approaches for defining bespoke SWRMAs and the data inputs required for varying model complexities. The report notes that more complex numerical models can provide a better balance between having a zone too large that is overly restrictive, or too small such that it does not provide adequate safety, while noting that avoiding under sizing of the zone should be the priority. However, a numerical model is dependent on having a detailed level of understanding of the conceptual model as well as sufficient data. A numerical model without accurate inputs may produce a result that is worse than more simplistic methods.

Overall, the volumetric approach utilised for defining some of the SPZ2 areas is considered to be a suitable approach for these supplies, given that many do not have detailed hydrogeological information such as good quality aquifer tests. Additionally, due to the scale of the number of SWRMAs delineated, these zones are considered to provide a sufficient starting point that could be updated with a more complex model at a later date if desired. The modelling guidelines note that due to the large number of sources required to have SWRMAs, a practical approach may be to prioritise sources. In the Horizons region, this could mean that some of the larger supplies (i.e. Palmerston North, Whanganui and Levin) could be considered for a more detailed model if desired in future.

The proposed changes to the Drinking Water NES also make note of bespoke areas being utilised for conjunctive sources such as a gallery intake in shallow gravels close to a river. For the SWRMAs currently defined, the majority of shallow bores close to rivers have been defined based on the conservative default zones for a groundwater source (i.e. 2 or 2.5 km upgradient, discussed previously). It is currently unclear if these types of supplies would require a conjunctive zone under the new Drinking Water NES, which could also require consideration of a combination of the default groundwater and surface water zones. However, it is important that risks to hydraulically connected groundwater supplies from surface waterways are appropriately managed, so some further review and possible refinement of the zones may be appropriate. We note that some shallow riparian bores (for example the Bulls supply bores) have SWRMA defined based on surface water criteria.

6.2.2 How Activities Within SWRMAs are Regulated and Managed

The second of the proposed changes to the Drinking Water NES relates to how activities within SWRMAs will be managed. The current NES only covers activities involving discharges and water permits, and the proposed changes will widen the criteria. The proposed changes are reasonably high level and do not go into specific details at this stage. There are also a significant number of questions posed in the consultation document. As such, this area is the most uncertain of the proposed changes, and therefore it is difficult to provide final comments on this area of the proposed changes to the Drinking Water NES.

The proposed changes indicate that a range of activities will be managed within SWRMA1, specifically land uses such as bore drilling and earthworks, water permits and discharges (excluding to air). The proposed changes note that maintenance of abstraction points is necessary, and the document appears to suggest that allowances will be made for this.

The consultation documents suggests that for SWRMA2, the intent will be to ensure that no regional council permits activities that pose a high risk to source water. The document identifies direct discharges of contaminants to water and land disturbance over vulnerable aquifers (including drilling construction and maintenance of bores or earthworks that damage aquitards). The consultation document also suggests that all consenting activities in SWRMA2 will need to consider effects on the source water. The majority of the management recommendations in Section 2.3 involve Horizons or the Water Supplier taking a proactive approach and involving land owners to identify potential hazards, however the proposed changes to the Drinking Water NES are likely to make these responsibilities more clearly defined. The consultation document outlines that consideration is being given to:

- ✧ Ensuring an appropriate quality standard applies to drilling, construction and maintenance of bores.
- ✧ Addressing existing bores whose quality of construction is unknown, or known to be of a poor standard, or that are disused.

- ∴ Prohibiting below ground bore heads.

However, it is currently unclear if any of this will be incorporated into the Drinking Water NES, or a stand-alone document and there are currently a number of questions regarding this aspect of the proposed Drinking Water NES. It is likely that once the updated NES is published there will be a clearer picture of how old or abandoned bores are managed, and whether decommissioning will become mandatory (as is currently the case under the One Plan). The proposed Drinking Water NES changes are also brief on how earthworks will be controlled and how vulnerable aquifers will be identified.

Under the proposed changes to the Drinking Water NES, no additional restrictions are proposed for SWRMA3 as the current requirements under the RMA are considered adequate, although the amendments will clarify that the effects of an activity on source water must be considered. One question from the consultation document asked if any additional controls are considered necessary. While the consultation outcome is unknown, the common management recommendations from Section 2.4 that PDP has previously made include that reviewing State of the Environment monitoring data for changes in water quality is recommended, along with identification of land use changes in the catchment. For surface water sources, it has also been recommended that Horizons informs the Water Supplier of consent applications to discharge to land or water in the zone, and they may also wish to verify the status of HAIL sites within this zone. It is generally considered that this will be consistent with the changes to the Drinking Water NES.

The proposed changes to the Drinking Water NES may involve changes to the One Plan, particularly with respect to the permitted activities. However, it is not yet clear whether the final Drinking Water NES will result in a detailed document that will supersede the One Plan (and therefore a plan change could be limited or not required), or whether it will result in a higher level document that will require updates to the One Plan (i.e. a plan change would be required).

6.2.3 Protection of All Registered Water Supplies

The consultation document also addresses the issue of not having a national database of the location of each water supply intake. As part of the proposed changes, all water supplies except for domestic self-supplies will have to register with Taumata Arowai, with supplies currently registered required to be re-registered by November 2022 and unregistered supplies by November 2025.

The consultation document estimates that there could be up to 75,000 small supplies that are currently unregistered. As such, it is expected that there could be a substantial number of water supplies within the Horizons region yet to be registered, that will also have to have SWRMAs defined. It is likely that very little hydrogeological information exists for these supplies, and therefore we expect that most of these supplies would require an adoption of the default SWRMAs

under the proposed updated Drinking Water NES, unless further hydrogeological investigations are undertaken. Given the November 2025 deadline for registering these supplies, mapping of SWRMAs for supplies that did not register earlier would be unable to commence until after this date and would likely need to be undertaken in the late 2020s.

There is considerable overlap with many of the SWRMA3 areas for the zones currently defined, and it is likely this would also be the case for any new small supplies that are added to the register. However, it can be expected that the land area covered by SWRMAs 1 and 2 could increase significantly, depending on the exact number of supplies on the final register.

7.0 Conclusions and Recommendations

7.1 Conclusions

Broadly, the region wide management recommendations in this report are consistent with the One Plan and several of the recommendations are supported by existing rules within the One Plan. There is strong policy direction within the One Plan for protection of water quality, including that relating to drinking water values. Other recommendations may be addressed via other regulatory instruments, such as other National Environment Standards documents.

However, the One Plan does enable a variety of activities which do not need a consent (i.e. permitted activities), some of which could pose a risk to drinking water supplies. Some of these currently permitted activities may need to be reviewed where they occur within the currently defined source protection zones. Further comments on how this issue could be addressed are provided in the recommendations section below.

The source protection zones that have been delineated are consistent with the requirements in the current Drinking Water NES (and go beyond those requirements) and allow for consent decisions to be targeted within the areas 'upstream of a source'. The source protection zones as currently defined are also generally consistent with the likely requirements of the proposed Drinking Water NES, with the exception of a few supplies where default zones were defined that may be smaller than the latest proposals for default zones.

As the proposed Drinking Water NES is not yet finalised, it is not yet clear how it will be implemented and whether broader changes to the One Plan will be required. It is clear that there will be changes to the way in which activities that can currently occur within the source water management areas are considered, with likely further restrictions, but these aspects may be defined and specified within the NES itself, in which case the One Plan could simply refer to the NES, rather than requiring larger scale changes to the One Plan.

Several of the recommendations in this report, as well as those that are likely to be included in the revised Drinking Water NES, are closely associated with the objectives of the NPS-FM. Given that Councils are required to notify changes to regional plans that give effect to the NPS-FM by 2024, this provides an opportunity to ensure that these changes to the One Plan (as required for the NPS-FM) dovetail with changes needed for the proposed Drinking Water NES.

An example of where there is overlap between the NPS-FM and Drinking Water NES is around the requirement in the NPS-FM for ensuring values for drinking water supply and assigning a numeric attribute to that value. In areas where limited monitoring data is available a scoring system based on land use could be developed within the source protection zones / SWRMA, which would address the NPS-FM requirements as well as identifying risks within SWRMA.

It is important to highlight that SWRMA include SPZ3 areas which represent the whole catchment contributing to a supply. Therefore, the following recommendations should be considered in that context.

7.2 Recommendations

There are some key recommendations around region wide approaches to management of activities within the source protection zones that have arisen from this report:

- ∴ Extend all SPZ1 to a minimum of 5 m regardless of existing infrastructure/practicality.
- ∴ Review currently defined default SPZ2 areas that are 2 km upgradient to consider whether they should be extended to 2.5 km, if that is also within the 1 year time of travel area.
- ∴ For permitted activity rules and controlled activity rules relating to discharges, water or land use, consider a two-tier rule framework where:
 - Within zones or sub-zones with water supply values, and inside of SPZ1 and SPZ2 areas:
 - resource consents are required as a restricted discretionary activity
 - matters of restricted discretion are the effects, monitoring of effects, reporting and emergency management measures to protect water supplies or water supply values
 - Outside of zones or sub-zones with water supply values, and outside of SPZ1 and SPZ2 areas, the current permitted or controlled activity rules are retained.

- ∴ Consider, as an alternative and stricter rule framework, for permitted activity rules and controlled activity rules relating to discharges, water or land use, a two-tier rule framework where:
 - Within zones or sub-zones with water supply values, and inside of SPZ1 areas:
 - resource consents are required as a non-complying activity
 - Outside of zones or sub-zones with water supply values, and outside of SPZ1 and SPZ2 areas, the current permitted or controlled activity rules are retained.
- ∴ Consider an accompanying policy that
 - any activity within a SPZ area should avoid adverse effects (including potential effects) on water supplies and water supply values, and
 - that decision makers should recognise and provide for this; and
 - for any consent granted for an activity within an SPZ area, that decision makers should recognise and provide for the monitoring of effects, reporting and emergency management measures to protect water supplies or water supply values.

8.0 Bibliography

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Pattle Delamore Partners Limited. (2018). *Technical Guidelines for Drinking Water Source Protection Zones*. Christchurch: PDP.

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Table 2: Specific Recommendations: Groundwater/Spring Sources			
Source	Recommendations for SPZ1	Recommendations for SPZ2	Recommendations for SPZ3
Whanganui (Aromoho, Blueskin and Heloise)			Note that the SoE bore in the catchment (Horizons bore number 209005) is located downgradient and is also much shallower (i.e. closer to the coast) compared to the drinking water supply bores. Therefore, additional sampling from the drinking water supply bores may be required instead to maintain a watch on general, longer term changes in groundwater quality.
Himatangi Beach		MDC should confirm whether bore 332003 is likely to be used in the future, and if not, then the bore should be properly decommissioned to ensure that no contaminants can migrate downwards through the bore or outside of the casing	Horizons should provide information regarding the general groundwater quality identified in the upper Manawatu Plains and Oroua and Rangitikei River catchments to the Water Supplier (for example via State of the Environment monitoring and reporting) and in particular in deep bores located upgradient of the sources (i.e. between the sources and the Oroua and Rangitikei River valleys and the Ruahine Ranges). Long term changes to water quality should be communicated to the Water Supplier. The four verified HAIL sites with a risk to human health or the environment within SPZ 3 should be considered in more detail. The potential contaminants that could be released by those sites should be identified to determine the risk that they may pose to the groundwater source.
Rangotea	The Water Supplier should investigate the overflow wastewater discharge with SPZ1 to determine the source and type of discharge associated with this consent, and if there is any associated risk to the water supply	The Water Supplier should contact the owner of the sale yards to identify what processes are in place for collecting wastewater discharges from the site (potentially the holding tanks identified above) in order to assess the risk to the Rangotea supply bore. The site owner should be made aware that the yards are located within a drinking water supply protection zone and what potential effects their activities could have on the drinking water source.	Horizons should provide information regarding the general groundwater quality identified in the upper Manawatu Plains and Oroua and Rangitikei River catchments to the Water Supplier (for example via State of the Environment monitoring and reporting) and in particular in deep bores located upgradient of the sources (i.e. between the sources and the Oroua and Rangitikei River valleys and the Ruahine Ranges). Long term changes to water quality should be communicated to the Water Supplier. The four verified HAIL sites with a risk to human health or the environment within SPZ 3 should be considered in more detail. The potential contaminants that could be released by those sites should be identified to determine the risk that they may pose to the groundwater source.
Feilding			The three verified HAIL sites located within 3 km of the supply sources should be considered in more detail. The potential contaminants that could be released by those sites should be identified to determine the risk that they may pose to the groundwater source.

Table 2: Specific Recommendations: Groundwater/Spring Sources			
Source	Recommendations for SPZ1	Recommendations for SPZ2	Recommendations for SPZ3
Bulls Supplementary		Horizons should provide the results of any monitoring from the landfill upgradient of the source to the Water Supplier and maintain a watching brief on any exceedances of the drinking water standards from analyses from the monitoring bores at the landfill. The bore located adjacent to the quarry to the south-west of the source should be subject to greater scrutiny through compliance checks because it could provide a pathway to contaminants within the ponds located nearby to the pumped aquifer	The three verified HAIL sites located within 3 km of the supply sources should be considered in more detail. The potential contaminants that could be released by those sites should be identified to determine the risk that they may pose to the groundwater source
Marton		Whilst both the unused bores within SPZ2 for the Calico and Tutaenui bores are owned by Rangitikei District Council, if they are no longer used, or only used occasionally, their status should be confirmed by the Water Supplier and/or Horizons to ensure that they are appropriately sealed.	
Ratana		The results of monitoring at the landfill close to the source should be provided to the Water Supplier and notable exceedances of the drinking water standards should be highlighted. Further testing of the water abstracted from the bore, particularly for inorganic parameters should be undertaken if required. Water quality samples from the bore at the time of drilling indicated a reduced groundwater environment with high iron and manganese. Arsenic can also become dissolved in groundwater in reduced environments and water quality analyses taken from the bore should include arsenic as a parameter.	

Table 2: Specific Recommendations: Groundwater/Spring Sources			
Source	Recommendations for SPZ1	Recommendations for SPZ2	Recommendations for SPZ3
Palmerston North		The location of drainage from HAIL sites which occur in a number of the SPZ 2 zones should be identified to ensure that it is not discharging close to any of the bores which may penetrate down into the aquifer.	Horizons should provide information regarding water level trends across the Palmerston North area (zone 3b) to the Water Supplier, who should review and confirm with Horizons where the regional upwards vertical head gradients are being maintained. The five HAIL sites with confirmed contamination should be considered in more detail. If located in the part of the catchment where the deep groundwater levels are not above surface artesian, there is a greater chance of downwards migration into the deeper parts of the aquifer tapped by the water supply bores. If they are located in an area with above surface artesian groundwater conditions, the proximity of their drainage discharge to historical or existing bores should be considered. The potential risk contaminants from these sites may represent to the aquifer should be considered depending on the contaminant longevity and mobility.
Ashhurst	Animals have entered the fenced area around the bore and improved security around the bore should be considered.	The Water Supplier should contact the manager of the Ashhurst Municipal Wastewater leachate pond to inform them that their discharge consents are within a drinking water supply source protection zone and discuss the current management systems to confirm that they provide sufficient protection	Horizons should provide information regarding water level trends across the Palmerston North area (zone 3b) to the Water Supplier, who should review and confirm with Horizons that the regional upwards vertical head gradients are being maintained.
Bunnythorpe		The Water Supplier should contact the manager of the electricity substation and other industrial areas to inform them that they are located within a drinking water supply source protection zone and discuss the current management systems to confirm that they provide sufficient protection.	
Longburn		The Water Supplier should contact Goodman Fielder to inform them that their bores and discharge consents are within a drinking water supply source protection zone and discuss the current management systems to confirm that they provide sufficient protection	The five HAIL sites with confirmed contamination should be considered in more detail. If located in the part of the catchment where the groundwater is not artesian, there is a greater chance of downwards migration into the deeper parts of the aquifer tapped by the Longburn bore. If they are located in an area with artesian groundwater conditions, the proximity of their drainage discharge to historical or existing bores should be considered. The potential risk contaminants from these sites may represent to the aquifer should be considered depending on their relative proximity to the Longburn bore, contaminant longevity and mobility.

Table 2: Specific Recommendations: Groundwater/Spring Sources			
Source	Recommendations for SPZ1	Recommendations for SPZ2	Recommendations for SPZ3
Foxton Beach		The Water Supplier and Horizons should maintain a watching brief on the Horizons coastal monitoring bores to ensure that conductivity levels do not exceed typical levels. The Water Supplier should be informed if unusual patterns are observed in the coastal monitoring network. The wellheads for the two identified bores should be checked to ensure that they are properly sealed and constructed.	The eight HAIL sites located east of the supply sources along the base of the Tararua Range should be considered in more detail. The potential contaminants that could be released by those sites should be identified to determine the risk that they may pose to the groundwater source.
Foxton	HDC should confirm the integrity of their unused bores adjacent to the Harbour Street bore to ensure contaminants are prevented from entering the bore heads. If these bores are not used, they should be properly sealed to prevent contaminants entering deeper strata. Given that the minimum recommended radius of 5 m around the Harbour Street bore intersects a building footprint, the Water Supplier should visit the site to ensure that any runoff from the building hardstand areas does not divert towards the Harbour Street supply bore, and that no potentially hazardous activities are occurring within or around the building	Given the proximity of the HDC operated wastewater discharge around 50 m west of the Clyde Street bore, the Water Supplier should confirm the contents of the discharge to identify any potential contaminant risks to the Clyde Street supply bore. The four bores which are owned by HDC, but may not be used, within the SPZ 2 for the Harbour Street bore, should be sealed and covered if they are not used as they provide a potential contaminant pathway into the aquifer	The eight HAIL sites located east of the supply sources along the base of the Tararua Range should be considered in more detail. The potential contaminants that could be released by those sites should be identified to determine the risk that they may pose to the groundwater source.
Pahiatua	Fencing around the bore should be extended so that the bore head is at least 5 m from the edge of SPZ1.	Shallow groundwater quality samples should be taken from any shallow bores located downgradient of the wastewater treatment ponds to confirm whether those ponds seep to groundwater and whether there is an impact on shallow groundwater quality close to the community supply bore. The exploratory, unregistered bore drilled adjacent to the wastewater treatment ponds should be properly sealed to prevent contaminant entering deeper strata.	The two HAIL sites located within Pahiatua township should be considered in more detail (similar to the recommendations for the Pahiatua surface water source SPZ 3). The potential contaminants that could be released by those sites should be identified to determine the risk that they may pose to the groundwater source.

Table 2: Specific Recommendations: Groundwater/Spring Sources

Source	Recommendations for SPZ1	Recommendations for SPZ2	Recommendations for SPZ3
Adventist College		The two unused bores identified during the site visit should be properly decommissioned.	There are three HAIL sites along the base of the Tararua Ranges within SPZ3a (closer to the bores than the upper catchment of SPZ3a) which should be considered in more detail. The potential contaminants that could be released by those sites should be identified to determine the risk that they may pose to the groundwater source.
Akitio (spring)			Given the unknown depth at which the spring sources water from, water quality sampling should be undertaken to identify any potential contaminants that may pose a risk to the water supply.
Fonterra Longburn		Horizons and/or the Water Supplier should find out more information about the active consents within SPZ2 to ensure that there are no potential impacts on the water supply.	There are three HAIL sites along the base of the Tararua Ranges within SPZ3a (closer to the bores than the upper catchment of SPZ3a) which should be considered in more detail. The potential contaminants that could be released by those sites should be identified to determine the risk that they may pose to the groundwater source.
Fonterra Pahiatua	Fonterra should be aware that the bore likely sources water from nearby waterways, and should investigate the risk posed by the on-site ponds if they are leaky. Fonterra should also identify any on site discharges and ensure that they do not pose a risk to the water supply, and that appropriate treatment barriers are in place.	Horizons and/or the Water Supplier should find out more information about the active consents within SPZ2 to ensure that there are no potential impacts on the water supply.	The three HAIL sites within SPZ3 should be considered in more detail. The potential contaminants that could be released by those sites should be identified to determine the risk that they may pose to the groundwater source. Regular water samples (for general potable water quality parameters in addition to pathogens) should be taken to ensure that changes in the upgradient groundwater source can be identified before they pose a risk to the supply, given the large number of consented agricultural activities in the catchment.
Fordell		The Water Supplier should ensure that stormwater from the adjacent road does not runoff towards the bore.	
Halcombe	The site visit identified a potentially abandoned bore within SPZ1, although it was difficult to assess. This should be investigated in more detail and if found to be a bore, it should be appropriately decommissioned.	The operation of the dairy effluent discharges, wastewater discharges, construction, debris disposal, and forestry within the zone should be very carefully managed and monitored. Horizons and/or the Water Supplier should contact the landowners and operators relevant to these activities to inform them that a drinking water supply surface water intake is located downstream and that a high level of management is required.	Horizons may wish to verify the status and risk of the HAIL sites within the zone. The operation of the two dairy effluent discharges near the supply in the SPZ3 should be very carefully managed and monitored. Horizons and/or the Water Supplier should contact the landowners and operators relevant to these activities to inform them that a drinking water supply surface water intake is located downstream and that a high level of management is required.

Table 2: Specific Recommendations: Groundwater/Spring Sources			
Source	Recommendations for SPZ1	Recommendations for SPZ2	Recommendations for SPZ3
Wanganui (New Kai Iwi Bore)		The Water Supplier should confirm if the nearby investigation bore has been decommissioned. If it has not been decommissioned and the bore is no longer used then it should be appropriately sealed so that it does not pose a contamination risk to the water supply.	
Kaitoke		The Water Supplier should ensure that stormwater from the surrounding hardstand surfaces does not runoff towards the bore. The majority of SPZ2 is within the correctional facility. The Water Supplier should be aware of the impacts certain activities may have on their water supply, and should ensure appropriate storage and handling of any hazardous substances.	
Kakahi (spring)		Horizons and/or the Water Supplier should find out more information surrounding the HAIL site within SPZ2, which is reportedly for a landfill site. The potential contaminants that could be released from this site should be identified to determine the potential risk to the groundwater sources.	Horizons and/or the Water Supplier should find out more information surrounding the HAIL sites within SPZ3, which are reportedly for fuel storage, sawmills and a landfill. The potential contaminants that could be released from these sites should be identified to determine the potential risk to the groundwater sources. Given the unknown depth at which the spring sources water from, water quality sampling should be undertaken to identify any potential contaminants that may pose a risk to the water supply.
Linton Military Camp	The Water Supplier should be aware of the potential impacts on their water supply from the on-site military operations such as hazardous substance storage and use, workshops, fuel refilling stations etc.	Horizons and/or the Water Supplier should find out more information about the active consents within SPZ2 to ensure that there are no potential impacts on the water supply.	There are three HAIL sites along the base of the Tararua Ranges within SPZ3a (closer to the bores than the upper catchment of SPZ3a) which should be considered in more detail. The potential contaminants that could be released by those sites should be identified to determine the risk that they may pose to the water supply bore.
Massey University	The Water Supplier should confirm that the old bore adjacent to bore 336259 has been decommissioned properly.	Horizons and/or the Water Supplier should find out more information about the active consents within SPZ2 to ensure that there are no potential impacts on the water supply.	There are three HAIL sites along the base of the Tararua Ranges within SPZ3a (closer to the bores than the upper catchment of SPZ3a) which should be considered in more detail. The potential contaminants that could be released by those sites should be identified to determine the risk that they may pose to the water supply bore.

Table 2: Specific Recommendations: Groundwater/Spring Sources			
Source	Recommendations for SPZ1	Recommendations for SPZ2	Recommendations for SPZ3
Massey University – Haurongo Bore			There are three HAIL sites along the base of the Tararua Ranges within SPZ3a (closer to the bore than the upper catchment of SPZ3a) which should be considered in more detail. The potential contaminants that could be released by those sites should be identified to determine the risk that they may pose to the water supply bore.
Maxwell			The Quarry operators within SPZ3 should be informed that their operations are within a drinking water supply catchment, and should be informed of what risks certain activities (i.e. improper chemical storage, vehicle washing) could pose on the drinking water supply.
Moawhango (spring)		Horizons and/or the Water Supplier should find out more information about the consented discharges and landfill HAIL site within SPZ2 to ensure that there are no potential impacts on the water supply.	Given the unknown depth at which the spring sources water from, water quality sampling should be undertaken to identify any potential contaminants that may pose a risk to the water supply.
Norsewood		Horizons and/or the Water Supplier should find out more information about the active consents within SPZ2 to ensure that there are no potential impacts on the water supply. The contaminated site identified should be considered in more detail. The potential contaminants that could be released from the site should be identified to determine the potential risk to the groundwater source.	
Ohakea Air Force Base Drinking Water Supply	Land use around the riparian bores that provide the water supply poses a potential risk to the supply. In particular, the nearby quarry and associated disused bore should be carefully considered. The bore head inspection identified several issues with the bores, including a lack of a concrete pad and a lack of a sealed cover over the well head. These issues should be urgently remedied by the Water Supplier.	The operation of the dairy effluent discharges, wastewater discharges, stormwater discharge, sediment discharge, cleanfill, landfill, construction, debris disposal, verified HAIL site, ponds, and forestry within the zone should be very carefully managed and monitored. Horizons and/or the Water Supplier should contact the landowners and operators relevant to these activities (via compliance checks or targeted letters) to inform them that a drinking water supply is located downstream and that a high level of management is required. Furthermore the known PFAS plume that exists on site should be carefully monitored to identify its interaction with the water supply.	Horizons may wish to assess the status and risk of the unverified and verified HAIL sites within the zone, this should include the verified HAIL site in the zone near the supply. Horizons and/or the Water Supplier should contact the landowners and operators relevant to the quarry activities near the SPZ1 and SPZ2 on the north side of the Rangitikei River to inform them that a drinking water supply is located downstream and that a high level of management is required.

Table 2: Specific Recommendations: Groundwater/Spring Sources			
Source	Recommendations for SPZ1	Recommendations for SPZ2	Recommendations for SPZ3
Piriaka (spring)			Given the unknown depth at which the spring sources water from, water quality sampling should be undertaken to identify any potential contaminants that may pose a risk to the water supply.
Tatum Park		Horizons and/or the Water Supplier should find out more information surrounding the HAIL sites (and discharges) within SPZ2, which are reportedly for fuel storage sites and an old refuse station. The potential contaminants that could be released from these sites should be identified to determine the potential risk to the groundwater source. The Water Supplier should take regular potable water quality samples to identify any risks to the water source before they eventuate, especially given the large number of consented wastewater discharges within SPZ2. Horizons and/or the Water Supplier should find out more information about the active consents within SPZ2 to ensure that there are no potential impacts on the water supply.	The quarry operator within SPZ3 should be informed that their operations are within a drinking water supply catchment, and should be informed what risks certain activities (i.e. improper chemical storage, vehicle washing) could pose on the drinking water supply. Horizons and/or the Water Supplier should find out more information surrounding the HAIL sites within SPZ3, which are reportedly for fuel storage sites. The potential contaminants that could be released from these sites should be identified to determine the potential risk to the groundwater source.
Totara Reserve	The buried bore should have an appropriate above ground bore head installed.	Horizons and/or the Water Supplier should be aware of the consented wastewater discharge within SPZ2 which appears to be for the reserve facilities, and ensure that there is no risk to the water supply from this discharge or any other on site discharges.	Horizons and/or the Water Supplier should contact the owner of the huts (i.e. DOC) within SPZ3 located in the Ruahine Ranges to identify any associated wastewater discharges within the catchment. The owner of the huts should be informed that the huts are located within the wider catchment of a drinking water supply protection zone.
Waituna West	Bore 306007 should be correctly decommissioned if it is no longer going to be used. Bore 306005 could not be located during the site visit and is listed as an exploration bore. The Water Supplier should confirm if this bore has been correctly decommissioned.		The quarry operators within SPZ3 should be informed that their operations are within a drinking water supply catchment, and should be informed of what risks certain activities (i.e. improper chemical storage, vehicle washing) could pose on the drinking water supply.
Whakapapa Springs			Given the unknown depth at which the spring sources water from, water quality sampling should be undertaken to identify any potential contaminants that may pose a risk to the water supply, particularly given water around Mt Ruapehu can be influenced by volcanic effects.

Table 2: Specific Recommendations: Groundwater/Spring Sources			
Source	Recommendations for SPZ1	Recommendations for SPZ2	Recommendations for SPZ3
Brandlines			There are three HAIL sites along the base of the Tararua Ranges within SPZ3a (closer to the bores than the upper catchment of SPZ3a) which should be considered in more detail. The potential contaminants that could be released by those sites should be identified to determine the risk that they may pose to the water supply bores.
Himatangi Estate			There are nine HAIL sites along the base of the Tararua Ranges within SPZ3a (closer to the bore than the upper catchment of SPZ3a) which should be considered in more detail. The potential contaminants that could be released by those sites should be identified to determine the risk that they may pose to the water supply bores.
Kaiwhaiki Marae (Spring)	Horizons and/or the Water Supplier should confirm the location of the spring, and the location of SPZ1 changed if necessary.	Horizons and/or the Water Supplier should confirm the location of the spring, and the location of SPZ2 changed if necessary. Horizons and/or the Water Supplier should find out more information about the wastewater discharge to land consent within SPZ2, which is reportedly for septic tank effluent. The potential contaminants that could be released from this site, and the flow path of the discharge should be identified to determine the potential risk to the spring source.	Given the unknown depth at which the spring sources water from, water quality sampling should be undertaken to identify any potential contaminants that may pose a risk to the water supply.
Matahiwi Marae (Spring)	Horizons and/or the Water Supplier should confirm the location of the spring, and the location of SPZ1 changed if necessary.	Horizons and/or the Water Supplier should confirm the location of the spring, and the location of SPZ2 changed if necessary. Horizons and/or the Water Supplier should find out more information about any unrecorded septic tank discharges within SPZ2, which is reportedly for septic tank effluent. The potential contaminants that could be released from this site, and the flow path of the discharge should be identified for any septic tanks to determine the potential risk to the spring source.	Given the unknown depth at which the spring sources water from, water quality sampling should be undertaken to identify any potential contaminants that may pose a risk to the water supply.

Table 2: Specific Recommendations: Groundwater/Spring Sources			
Source	Recommendations for SPZ1	Recommendations for SPZ2	Recommendations for SPZ3
Patiarero Marae (Spring)	Horizons and/or the Water Supplier should confirm the location of the spring, and the location of SPZ1 changed if necessary.	Horizons and/or the Water Supplier should confirm the location of the spring, and the location of SPZ2 changed if necessary. Horizons and/or the Water Supplier should find out more information about any unrecorded septic tank discharges within SPZ2, which is reportedly for septic tank effluent. The potential contaminants that could be released from this site, and the flow path of the discharge should be identified for any septic tanks to determine the potential risk to the spring source.	Horizons and/or the Water Supplier should find out more information surrounding the HAIL site within SPZ3, which is reportedly for a landfill. The potential contaminants that could be released from this site should be identified to determine the risk to the spring source. Given the unknown depth at which the spring sources water from, water quality sampling should be undertaken to identify any potential contaminants that may pose a risk to the water supply.
Rānana Marae (Spring)	Horizons and/or the Water Supplier should confirm the location of the spring, and the location of SPZ1 changed if necessary.	Horizons and/or the Water Supplier should confirm the location of the spring, and the location of SPZ2 changed if necessary. Horizons and/or the Water Supplier should find out more information about any unrecorded septic tank discharges within SPZ2, which is reportedly for septic tank effluent. The potential contaminants that could be released from this site, and the flow path of the discharge should be identified for any septic tanks to determine the potential risk to the spring source.	Given the unknown depth at which the spring sources water from, water quality sampling should be undertaken to identify any potential contaminants that may pose a risk to the water supply.

Table 3: Specific Recommendations: Surface water sources			
Source	Recommendations for SPZ1	Recommendations for SPZ2	Recommendations for SPZ3
Bulls Riparian Groundwater		Some further investigation either by Horizons as part of their compliance checks of the contaminated site located upstream of the site should occur, to ensure that the site is suitably bunded to prevent direct movement of contaminants into the river.	
Marton	The Water Supplier should ensure that they are aware of the treated water discharge to land consent and how it is operated including any chemical treatment.		
Levin	The exact location of the sediment pond discharge should be clarified, together with information regarding the quality of the discharge	Horizons and/or the Water Supplier should contact the owner of the dairy shed discharge, perhaps via compliance checks to discuss their discharge to ground in close proximity to the Ohau River. The water quality (and treatment) of the discharge should be understood as well as when the discharge occurs. Likewise, the Water Supplier should contact the owners of the two residential wastewater discharges to land further up the catchment to discuss the water quality and quantity of their discharge to land in close proximity to the Ohau and Makahika Rivers	The Water Supplier should ensure that any chemicals stored near the source intake are suitably protected and that the site is bunded. The Water Supplier should seek further information relating to the huts located within SPZ3, including the South and North Ohau Huts and the Waipehu Hut. Information around any onsite effluent discharges should be gathered from the owners of the huts and the owners should be informed that their huts are within a drinking water supply protection zone.
Shannon	The Water Supplier should ensure that the owner of the forestry area informs them if the forested area is to be harvested and ensure that measures are put in place to minimise the effects of erosion.		Changes to land use in the catchment may be reflected rapidly in water quality characteristics in the river due to the small size of the catchment. Therefore an awareness of any changes to land use in the catchment would be prudent. The land use consent is unlikely to pose an immediate threat to the source water. However, if any turbidity issues arise, particularly during rainfall events, this could be a source for an initial investigation.

Table 3: Specific Recommendations: Surface water sources			
Source	Recommendations for SPZ1	Recommendations for SPZ2	Recommendations for SPZ3
Feilding		Should any clearance of forestry be proposed, the Water Supplier should be informed prior to any works. Appropriate sediment controls will be required to ensure there is no risk to the water supply.	The Water Supplier should seek further information on the potentially contaminated site (landfill discharge) that is located within SPZ 3. The discharge locations of runoff from the site should be identified and logged, together with any information on the potential concentrations of contaminants in the discharge. The Water Supplier should seek further information relating to the huts located within SPZ3, including Iron Gate Hut and Triangle Hut. Information around any onsite effluent discharges should be gathered from the owners of the huts and the owners should be informed that their huts are within a drinking water supply protection zone.
Sanson		Should any clearance of forestry be proposed, the Water Supplier should be informed prior to any works. Appropriate sediment controls will be required to ensure there is no risk to the water supply.	The Water Supplier should seek further information on the potentially contaminated sites that are located within SPZ 3. The discharge locations (if applicable) of runoff from the sites should be identified and logged, together with any information on the potential concentrations of contaminants in the discharge. The Water Supplier should seek further information relating to the huts located within SPZ3. Information around any onsite effluent discharges should be gathered from the owners of the huts and the owners should be informed that their huts are within a drinking water supply protection zone.
Turitea Dam	There is permitted access only to the dam. When issuing permission to access this area all workers should be informed that the dam is a drinking water supply and that care should be used for all activities.		
Taihape		Should any clearance of forestry be proposed, the Water Supplier should be informed prior to any works. Appropriate sediment controls will be required to ensure there is no risk to the water supply.	The Water Supplier should seek further information on the potentially contaminated site that is located within SPZ 3. The discharge locations of runoff from the site should be identified and logged, together with any information on the potential concentrations of contaminants in the discharge.

Table 3: Specific Recommendations: Surface water sources			
Source	Recommendations for SPZ1	Recommendations for SPZ2	Recommendations for SPZ3
Tokamaru	Consideration of the likely human activities including swimming during the summer months at Horseshoe Bend when determining water treatment options. The Water Supplier should ensure that direct access to the intake is restricted	The quarry owner should be visited to ensure quarry activities are managed so as to avoid any impacts on the water supply.	
Pahiatua	The exact location of the process water discharge should be clarified, together with information regarding the quality of the discharge. The location of any stormwater runoff and discharge locations from the Pahiatua township area should be collected based on data available from TDC.	Horizons and/or the Water Supplier should contact the owner of the quarry discharge (Prenters Aggregates Ltd) to discuss their discharge to the Mangatainoka River as part of compliance checks. The water quality of the discharge should be understood as well as when the discharge occurs (for example, if it occurs at low flows). Likewise, the Water Supplier should contact Fonterra to discuss the water quality and timing of their discharge of condensate water to the Mangatainoka River, as well as their wastewater discharge to land further upstream.	The Water Supplier should seek further information on the two contaminated sites that are located within Pahiatua township. The discharge locations of runoff from the sites should be identified and logged, together with any information on the potential concentrations of chemicals in the discharge.
Woodville	The Water Supplier should ensure that the owner of the forestry area informs them if the forested area is to be harvested and ensure that measures are put in place to minimise the effects of erosion.		Given the rapid response to rainfall in the river, changes to land use in the catchment may be reflected rapidly in water quality characteristics in the river. Therefore an awareness of any changes to land use in the catchment would be prudent.
Raetihi	The Water Supplier should monitor the news for any vehicle crashes in the Tohunga Junction area to check that there have been not any spills which may affect the water supply sources.	Signposts should be installed at the trailhead for the Horopito Track to ensure that users are aware that they are within the microbiological protection zone for the downstream community drinking water supply zone. The Water Supplier should contact the owners of the consents to discharge domestic wastewater to land and inform them that they are within a drinking water supply protection zone and provide them with a contact point should any issues arise. The Water Supplier should review any road or rail accidents within the catchment in order to check that spills do not affect the drinking water supply.	Any accidents on the roads or railway which intersect the catchment should be reviewed by the Water Supplier to ensure there are no impacts on the source. Given the rapid response to rainfall in the river, changes to land use in the catchment may be reflected rapidly in water quality characteristics in the river. Therefore an awareness of any changes to land use in the catchment would be prudent. Horizons should inform the Water Supplier of any proposed consents to change the land use in this zone.

Table 3: Specific Recommendations: Surface water sources			
Source	Recommendations for SPZ1	Recommendations for SPZ2	Recommendations for SPZ3
Taumarunui	The campsite manager should be contacted by the Water Supplier to discuss the management of access to the river by campers.	Ruapehu District Council operates consent ATH-1996004041.00 to discharge landfill leachate into water within zone 2. This should be carefully managed and Horizons and/or the Water Supplier should liaise with the manager of the landfill to inform them that drinking water supply intake is located downstream and that a high standard of management is required. Consideration could be given as to whether discharge should be restricted under low flow conditions, although this will dependent on the volumes involved. There are a number of potentially contaminated sites within Zone 2, several of which are within Manunui relatively close to the intake. These sites primarily refer to wood treatment and the storage of fuel and chemicals. The Water Supplier should seek further information regarding the HAIL sites in Manunui and identify the discharge locations for run-off from these sites.	Further information on the HAIL sites in Manunui should be sought by the Water Supplier. The discharge locations of run-off from these sites should be identified. Ruapehu District Council holds two consents to discharge wastewater to water in the upper parts of the catchment. These consents should be carefully managed and the Water Supplier should liaise with the operators to inform them that drinking water supply intake is located downstream. The Water Supplier should seek information on the wastewater treatment/disposal options used at the three huts in the upper parts of the catchment to ensure that the risks are minimal.
Dannevirke		The operation of the dairy shed discharge upstream of the take in SPZ2 should be very carefully managed and monitored. Horizons and/or the Water Supplier should contact the owner of that consent (ATH-1998007397.01)) via compliance checks to inform them that a drinking water supply intake is located downstream and that a high standard of management is required. Consideration should be given as to whether discharge via land irrigation can occur. The owner of the Stanfield Hut should be contacted by the Water Supplier to confirm the wastewater treatment arrangements that occur at that location. The upper part of the catchment, around the west branch of the Tamaki River, is classified as native bush. However there are a number of walking tracks and huts within SPZ2 in that area. Signposts at the start of tracks / trailheads identifying the area as a source protection zone for a drinking water supply should be installed by Tararua District Council.	Given the rapid response to rainfall in the river, changes to land use in the catchment may be reflected rapidly in water quality characteristics in the river. Therefore an awareness of any changes to land use in the catchment would be prudent. The Water Supplier should keep an eye out for any land use changes or excavations occurring within the zone.
Eketahuna Community Drinking Water Supply		The operation of forestry and the quarry within the zone should be very carefully managed and monitored. Horizons and/or the Water Supplier should contact the landowners and operators relevant to these activities to inform them that a drinking water supply surface water intake is located downstream and that a high level of management is required	

Table 3: Specific Recommendations: Surface water sources			
Source	Recommendations for SPZ1	Recommendations for SPZ2	Recommendations for SPZ3
Huntermville Community Drinking Water Supply		The operation of the quarry, landfill, and wastewater discharges as well as forestry activities within the zone should be very carefully managed and monitored. Horizons and/or the Water Supplier should contact the landowners and operators relevant to these activities to inform them that a drinking water supply surface water intake is located downstream and that a high level of management is required.	Horizons may wish to verify the status and risk of the HAIL sites within the zone. The operation of the two quarry land use consents in the zone near the supply should be very carefully managed and monitored. Horizons and/or the Water Supplier should contact the landowners and operators relevant to these activities to inform them that a drinking water supply surface water intake is located downstream and that a high level of management is required.
Kiwitea Community Drinking Water Supply		The operation of the dairy effluent discharges within the zone should be very carefully managed and monitored. Horizons and/or the Water Supplier should contact the landowners and operators relevant to these activities to inform them that a drinking water supply surface water intake is located downstream and that a high level of management is required.	
Mangaweka Community Drinking Water Supply		Horizons should verify the status and risk of the unverified HAIL sites within the zone. The operation of the quarry, landfill, and wastewater discharges as well as construction, earthworks, and forestry activities within the zone should be very carefully managed and monitored. Horizons and/or the Water Supplier should contact the landowners and operators relevant to these activities to inform them that a drinking water supply surface water intake is located downstream and that a high level of management is required.	Horizons may wish to verify the status and risk of the HAIL sites within the zone. The operation of the domestic wastewater and wastewater discharges within the zone near the supply should be very carefully managed and monitored. Horizons and/or the Water Supplier should contact the landowners and operators relevant to these activities to inform them that a drinking water supply surface water intake is located downstream and that a high level of management is required.
Ohura Community Drinking Water Supply		The operation of the animal effluent and wastewater discharges within the zone should be very carefully managed and monitored. The Water Supplier should contact the landowners and operators relevant to these activities to inform them that a drinking water supply surface water intake is located downstream and that a high level of management is required.	Horizons may wish to further investigate the unverified HAIL site within the zone near the supply and communicate to the landowner that the site is in the vicinity of the inner protection zone and that a high level of management is required.

Table 3: Specific Recommendations: Surface water sources			
Source	Recommendations for SPZ1	Recommendations for SPZ2	Recommendations for SPZ3
Oroua Community Drinking Water Supply		The operation of the dairy effluent and wastewater discharges and construction within the zone should be very carefully managed and monitored. Horizons and/or the Water Supplier should contact the landowners and operators relevant to these consents to inform them that a drinking water supply surface water intake is located downstream and that a high level of management is required.	The operation of the dairy effluent and wastewater discharges to land in the zone near the supply should be very carefully managed and monitored. Horizons and/or the Water Supplier should contact the landowners and operators relevant to these consents to inform them that a drinking water supply surface water intake is located downstream and that a high level of management is required.
Owhango Community Drinking Water Supply	Signposting may be appropriate at any potential points of access to identify the area as an inner source protection zone. This may include signposting on the track that is in the immediate vicinity of the SPZ1.	Horizons may wish to seek further information regarding Ten Man Hut within the zone, which may need to be carefully managed and monitored. Horizons and/or the Water Supplier may wish to contact the relevant managers to inform them that a drinking water supply surface water intake is located downstream and that a high level of management of the hut facilities is required.	
Pleckville Community Drinking Water Supply		The operation of the dairy and piggery effluent discharges, other consented wastewater/stormwater discharges, and quarries within the zone should be very carefully managed and monitored. Horizons and/or the Water Supplier should contact the landowners and operators relevant to these activities to inform them that a drinking water supply surface water intake is located downstream and that a high level of management is required.	
Raurimu Community Drinking Water Supply		Horizons should seek further information regarding the unverified HAIL site within the zone, which may need to be carefully managed and monitored. Horizons and/or the Water Supplier may need to contact the relevant landowners to inform them that a drinking water supply surface water intake is located downstream and that a high level of management is required.	Horizons may wish to seek further information regarding the two HAIL sites within the zone and assess the level of risk to the drinking water supply.
Turoa Ski field Community Drinking Water Supply	Landowners managing the ski field activities and native bush within the SPZ1 should be contacted by Horizons and/or the Water Supplier to discuss the management of their land in that area. The operation of the pond associated with the Mangawhero River take and the stormwater discharge within the SPZ1 for the Mangawhero River take should be very carefully managed and monitored. Horizons and/or the Water Supplier should contact the landowners and operators relevant to these activities to inform them that a high level of management is required.	Horizons and/or the Water Supplier may wish to consider signposting at relevant facilities and roads to indicate that they are within a source protection zone.	The operation of the larger pond within the Mangawhero River take SPZ3 should be very carefully managed and monitored. Horizons and/or the Water Supplier should contact the landowners and operators relevant to the pond to inform them that a high level of management is required.

Table 3: Specific Recommendations: Surface water sources			
Source	Recommendations for SPZ1	Recommendations for SPZ2	Recommendations for SPZ3
Waiouru Military Camp Drinking Water Supply – Waiouru Stream	NZDF (operating the activities within the SPZ1) should be contacted by Horizons and/or the Water Supplier to discuss the management of their land in that area. Horizons and/or the Water Supplier should be aware that NZDF activities within the zone could potentially impact surface water quality.	NZDF (operating the activities within the SPZ2) should be contacted by Horizons and/or the Water Supplier to discuss the management of their land in that area. Horizons may wish to consider signposting on the Cade Track and roads in the SPZ2 to indicate that it is within a source protection zone. Horizons and/or the Water Supplier should be aware that NZDF activities within the zone could potentially impact surface water quality.	NZDF (operating the activities within the SPZ3) should be contacted by Horizons and/or the Water Supplier to discuss the management of their land in that area. Horizons and/or the Water Supplier should be aware that NZDF activities within the zone could potentially impact surface water quality.
Waiouru Community Drinking Water Supply – Waitangi Stream	NZDF (operating the activities within the SPZ1) should be contacted by Horizons and/or the Water Supplier to discuss the management of their land in that area. Horizons and/or the Water Supplier should be aware that NZDF activities within the zone could potentially impact surface water quality.	NZDF (operating the activities within the SPZ2) should be contacted by Horizons and/or the Water Supplier to discuss the management of their land in that area. The operation of the landfill and sheep/beef farming within the zone should be very carefully managed and monitored. Horizons and/or the Water Supplier should contact the landowners and operators relevant to these activities to inform them that a drinking water supply surface water intake is located downstream and that a high level of management is required. Horizons and/or the Water Supplier should be aware that NZDF activities within the zone could potentially impact surface water quality.	NZDF (operating the activities within the SPZ3) should be contacted by Horizons and/or the Water Supplier to discuss the management of their land in that area. Horizons and/or the Water Supplier should be aware that NZDF activities within the zone could potentially impact surface water quality.



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