

09 March 2015

Greater Wellington Regional Council
2 Fryatt Quay
Pipitea
WELLINGTON 6142

Attention: Mike Thompson

Dear Mike

DRINKING WATER CATCHMENT PROTECTION PEER REVIEW

Further to our recent discussions, please find below a peer review of the drinking water catchment protection rules that Greater Wellington Regional Council (GWRC) are considering for their pending plan change.

SCOPE

Our scope, as outlined in our 12.02.2015 proposal, is detailed below:

1. Review relevant documents provided by GWRC;
2. Provide comment on whether the approach that GWRC is proposing, and the choice of capture zone in particular, is in our view reasonable;
3. Provide comment on whether we think the choice of zone (buffer width, length of watercourse) is either too conservative or permissive given the activities that GWRC are trying to control, the way they intend to control them via the rules, and the types of contaminants they are likely to be dealing with;
4. Suggest any improvements or alternative approaches, if we think they are necessary; and
5. Provide a Peer Review letter, summarising the above assessment.

In addition to our proposal, we understand through phone discussions on 16.02.2015 that GWRC are primarily interested in our views on the adequacy of the proposed zonation and that they have limited opportunity at this stage in Plan development for a wholesale change to a significantly different approach; and thus they are looking more to refine what they already have (if refinement is necessary) and deal with any particular weaknesses in the most practicable way. Our review has therefore put less focus on Task 4 above.

REVIEW

We have reviewed the following documents provided to us by GWRC:

1. Thompson, Mike (December 2014). Unpublished Technical Note: Delineation of Drinking Water Supply Catchment Protection Areas (Surface Water); Proposed method to support the draft Natural Resources Plan;
2. PDP/ESR (November 2005). Methodology for Delineating Drinking Water Catchments. Prepared for MfE; and
3. Relevant draft Natural Resource Plan policies/rules covering these activities.

A review of the Thompson report and a brief commentary on the other documents is provided below:

1. Thompson, Mike (December 2014) Unpublished Technical Note

The Background section of this Unpublished Technical Note gives a good succinct introduction as to why this protection methodology has been developed. However, it would be good to expand it to include the following from the PDP/ESR Report prior to your first paragraph:

The purpose of the National Environmental Standard for Sources of Human Drinking Water (NES) is to reduce the risk of human drinking water sources becoming contaminated. It came into effect on 20 June 2008.

For the purpose of this NES, a human drinking water source is a natural water body such as a lake, river or groundwater, used to supply a community with drinking water. The standard applies to source water before it is treated and only sources used to supply human drinking water i.e., not stock or other animals.

We think that Section 2.1 should mention that the selection criteria is the minimum required under the NES but the main source document for developing protection zones (PDP/ESR, 2005) said a decision was made by the working group that there should be no implied disadvantage resulting from different-sized catchment zones dependent on population that is supplied. But add in your additional email comment to us; *"that all known supply points, including those supplying 500 or less, will be made available to consent officers so that the protection of these supplies is considered case by case."* We have added the words in bold.

Section 2.3 states that *"11 of 13 lie almost entirely within Department of Conservation estate and as such, the risk of contamination at the abstraction points due to human activities is perceived by GWRC as low; and mainly limited to predator and pest management activities (although these are already heavily controlled by the water supply authority???)"*

We consider that further investigation should be carried out on this risk due to the small size of some of these catchments, with numerous tributaries that would be hard to protect with buffers from 1080 poison aerial drops. We are also not sure what is meant by your last sentence regarding *although these are already heavily controlled by the water supply authority???*. However, from further discussions, we understand what this means is that the Wellington Metropolitan areas have multiple water sources to their supplies, so it is possible that catchments that are receiving 1080 can be stood down from collection for a safe-period. We are not aware if this is the case for all water supplies. The methodology in your report is

to provide support to the policies and rules in the Regional Plan, so the NRP needs to be able to cover off poison drops in water supply catchments as 1080 is a risk to human health at relatively low doses. The report needs to be able to assess its pathway and risk if 1080 is directly applied to water or within a buffer zone via an aerial drop. We do not think that the rules (outlined below) at this stage cover the intent of the protection zones as discussed later.

In Section 3.2.1, the approach taken is outlined: *“For simplicity it is proposed that a single capture zone is applied by default to manage activities in drinking water catchments of the Wellington region. The default should be based on the Zone 2 criteria (described in Table 3.1) as this represents an appropriate balance between capturing the highest risk activities in the immediate vicinity of the intake (Zone 1) and the lowest risk activities in the outer margins of the catchment (Zone 3).”*

Comments on Overall Approach Proposed and Conservatism

We consider this approach is appropriate. It is generally conservative, as it includes Zone 1 activities but covering a larger Zone 2 scale. The 8-hours of travel time is the same as recommended in the PDP/ESR Report that was agreed upon by the Peer Review Committee. We consider this is a conservative and appropriate distance to allow for die-off, attenuation and dilution of the type of contaminants of concern in the activities that are proposed to be permitted and controlled. This buffer should be on both main-stem and perennial tributaries, as recommended in the PDP/ESR report. Likewise, the width of the buffer zone of 100 m from the water's edge is also considered appropriate as it provides a reasonable distance for treatment of overland flow (runoff) of contaminants from the listed activities and a buffer for spray drift. Although the Zone 2 buffer zone is conservative and will result in quite long distances upstream, we do not consider it too conservative, as activities only need to be set-back 100 m from the water's edge, and with permitted activities, a cautionary approach is required to protect the health of the water supply users.

We also consider that any activities that may need to be further looked at in the wider Zone 3, would most definitely require resource consent, such as sewage or industrial discharges to water and therefore effects would be assessed through that process. Other wider catchment activities generally of concern, such as intensive dairy or cropping that may cause higher nitrates in groundwater are unlikely to cause issues to surface water takes due to the dilution once groundwater reaches surface water.

Section 3.2.3 states: *“One of the assumptions in the approach described above is that the median flow velocity determined for a single point in the main river can be adopted throughout the upstream catchment. This is a coarse assumption given that hydrological properties vary spatially; depending on channel slope and other properties some tributaries may have a higher median flow rate and others lower. However, adoption of a single value in the absence of more specific information is considered reasonable.”*

We consider this approach may be a little too simplistic, particularly for the rivers that have very low median velocities. Although we are not overly familiar with the rivers in your region, we suggest the following method as a straw man:

1. Calculate the upstream protection distance based on the median velocity at the known point;

2. Look at the river gradient at all three locations (abstraction point, known velocity point and furthest upstream protection point). Standard 1:50,000 topographical maps are of sufficient accuracy for this;
3. Velocity is dependant, among other things, to the square root of slope. Therefore, using the known velocity and slope at the monitoring point, calculate the velocity at the other points;
4. If similar, then leave the protection zone as it is. If vastly different, re-calculate using the average velocity between the two points; see example below.

Velocity Calculation Example

There are some assumptions in this example that may be wrong but the general methodology should be good to use.

1. The known velocity point at the Waikanae River is SH1, the intake is 1 km upstream, and the initial protection zone is 16 km, based on a velocity of 0.55 m /s.
2. Slope at monitoring point is 20 m over 3 km = 0.0067 m/m.
Slope at intake is the same as the monitoring point = 0.0067 m/m.
Slope 16 m upstream of the intake is roughly 20 m in 900 m = 0.022 m/m.
3. \sqrt{S} at the monitoring point is 0.082, with V of 0.55 m/s.
 \sqrt{S} at the upstream protection area is 0.148, giving an equivalent V of 1.8 m/s.
4. Average V is $(0.55+1.8)/2 = 1.2$ m/s. Protection zone therefore needs to be 8 (hrs) x 3,600 (seconds/hr) x 1.2 (average velocity: m/s)= 34.5 km, or the whole of the catchment in this case.

In the Summary, Section 3.3, it is stated: *"For this reason, it is suggested that the default capture zones be used as an 'alert' or 'filtering' mechanism only, rather than in a categorical way to manage land use activities. There may well be activities that fall within the default capture zones that, upon closer analysis, pose little or no risk at the supply point (and conversely, there may be activities in the outer margins of drinking water catchments that need very close scrutiny and management)."*

We agree with this summary; the methodology provides an alert and filtering mechanism. A cautionary approach needs to be followed for Permitted Activities and this cautionary approach can be relaxed for activities that require consent providing the controls or matters of discretion cover effects on drinking water supplies, as required by the NES. The methodology outlined and the policies and rules in the NRP provide this cautionary approach, although some tweaking of rules and protection zone distances is required.

2. PDP/ESR Report

The following is of particular relevance in the PDP/ESR Report. Most of the text below is a repeat of the report's Executive Summary – where repeated, it is shown in italics.

The report included input from a peer review committee comprising experts in groundwater and surface water resources and policy planning drawn mostly from Regional Councils and MfE. These people are well recognised in water quality in New Zealand and therefore have a very large combined experience that should not be ignored.

The purpose of defining catchment zones is to ensure that consideration is always given to impacts on the source water quality of a public drinking water intake when considering resource consent applications and when assessing effects of Permitted Activities within that catchment zone.

National and international literature on catchment delineation were reviewed. Consideration was given to the potential migration of contaminants through both the surface and subsurface environments, in order to assess how it can impact on a raw drinking water intake point.

Of considerable relevance is the common and well accepted method for evaluating contamination risks, based on quantifying:

- *the source of contamination;*
- *the receptor that may be adversely affected by the contamination; and*
- *the pathway that allows the contaminant to reach the receptor.*

The relevant receptor is a drinking water supply intake. For a risk to be present, all three components (i.e. source, pathway and receptor) must be present. A common method for managing risks posed by contamination sources is to eliminate one of these three components – or to make the pathway between source and receptor contain sufficient barriers, (e.g. sufficient attenuation of contaminant concentrations) that the risk of an adverse effect is acceptably low.

The definition of drinking water catchments is all about recognising the characteristics of migration pathways that occur over the land, through surface water and through the subsurface environment so that no contaminant sources will pose an unacceptable risk to a water supply receptor.

Longer pathways induce greater attenuation of the concentration of a contaminant due to naturally occurring processes (see Figure 1 below, from the PDP/ESR report). The naturally occurring processes are:

- *dispersion and dilution;*
- *filtration, adsorption and sedimentation;*
- *bio-degradation and chemical transformation;*
- *evaporation; and*
- *die-off.*

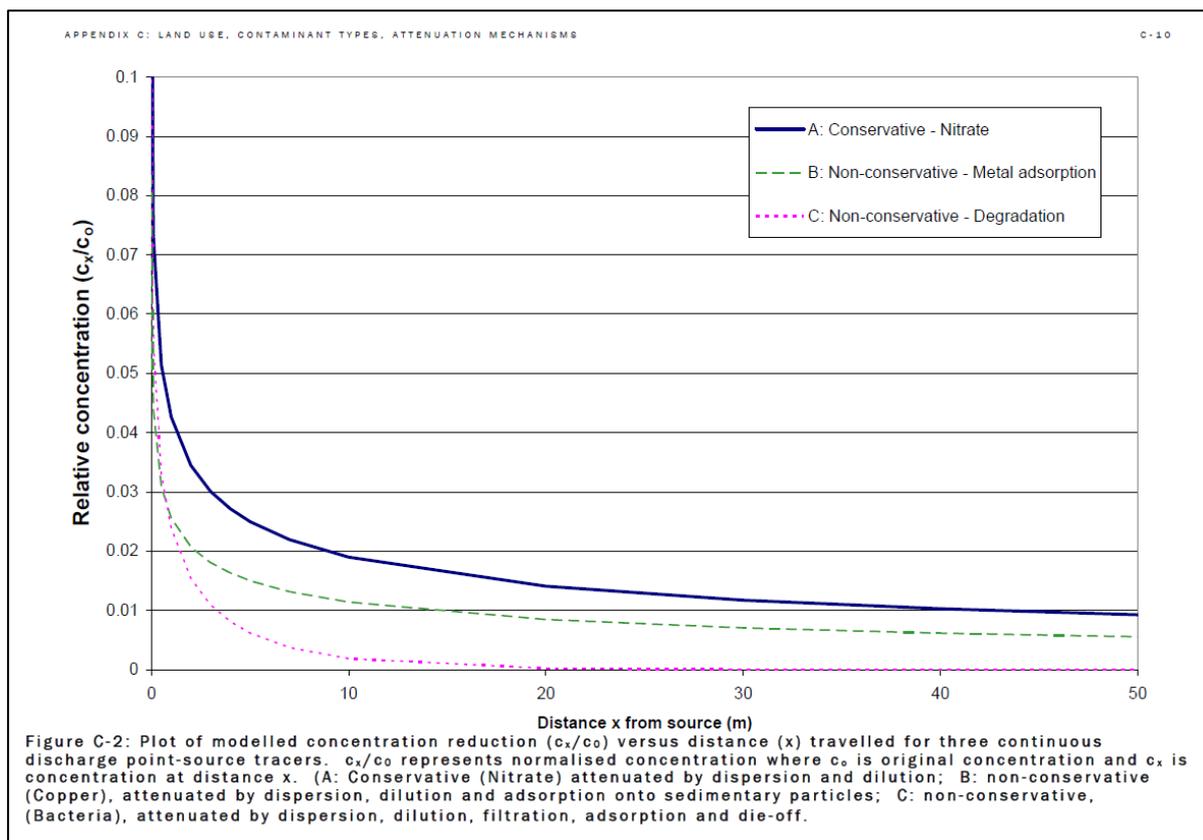


Figure 1: Plot of Concentration vs Distance for three Contaminant Source Types

A balance needs to be struck between the extent of a catchment zone around a water supply intake and the severity of controls imposed in relation to resource consents and Permitted Activity rules.

In a zone close to the water supply intake, more rigorous controls are required, whereas within more distant zones, more flexibility can be allowed because the pathway between contaminant source and water supply intake is not so direct and there is significant attenuation that occurs along the travel path.

The PDP/ESR report proposed three different zones within a water supply catchment, each recognising different degrees of contaminant attenuation that occur along migration pathways. These zones include:

Zone 1 - Intake Zone: Immediately around the water supply intake where contaminants could directly impact on the intake structure. Water supply authorities and territorial authorities may want to strictly control all land use activity in this inner "intake zone."

Zone 2 - Buffer Zone: An intermediate zone where a large range of point and non-point sources could reach and impact on the raw water intake if they were not managed to a high standard via conditions on resource consents and Permitted Activity rules. This would include discharges such as might occur from on-site sewage systems, wastewater discharges, stormwater disposal, chemical spillages or agricultural land use.

Zone 3 – Entire Catchment Zone: The entire catchment of the water supply intake. Within this zone non-point sources arising from general land use (nitrate-nitrogen) and large scale

discharges (such as from large industrial activities or sewage treatment plants) may need to be managed.

Practical generic definitions of the 3 proposed catchment zones have been defined, based on practical experience and theoretical assessment of contaminant migration, as set out below.

Generic Drinking-Water Catchment Zones

Zone	Surface Water Source
Zone 1: Intake Zone	5 m radius around intake point, and 5 m landward of the water's edge for the 1,000 m upstream reach length of surface water
Zone 2: Buffer Zone	<ul style="list-style-type: none"> • 8 hrs travel time to intake (~25 km upstream for a surface flow velocity of just less than 1 m/s) and • 100 m landward of the water's edge for the reach of surface water described in the preceding point
Zone 3: Entire Catchment Zone	The entire surface water catchment

Figure 2 (taken from the PDP/ESR report) shows a schematic of the three protection zones on a map. Note that the Zone 2 buffer (in blue) is depicted as shorter and narrower on the tributaries, however, Section 6 and Figure 3 of the report recommend that tributaries given the same protection. This is also the case in most of the overseas literature they reviewed.

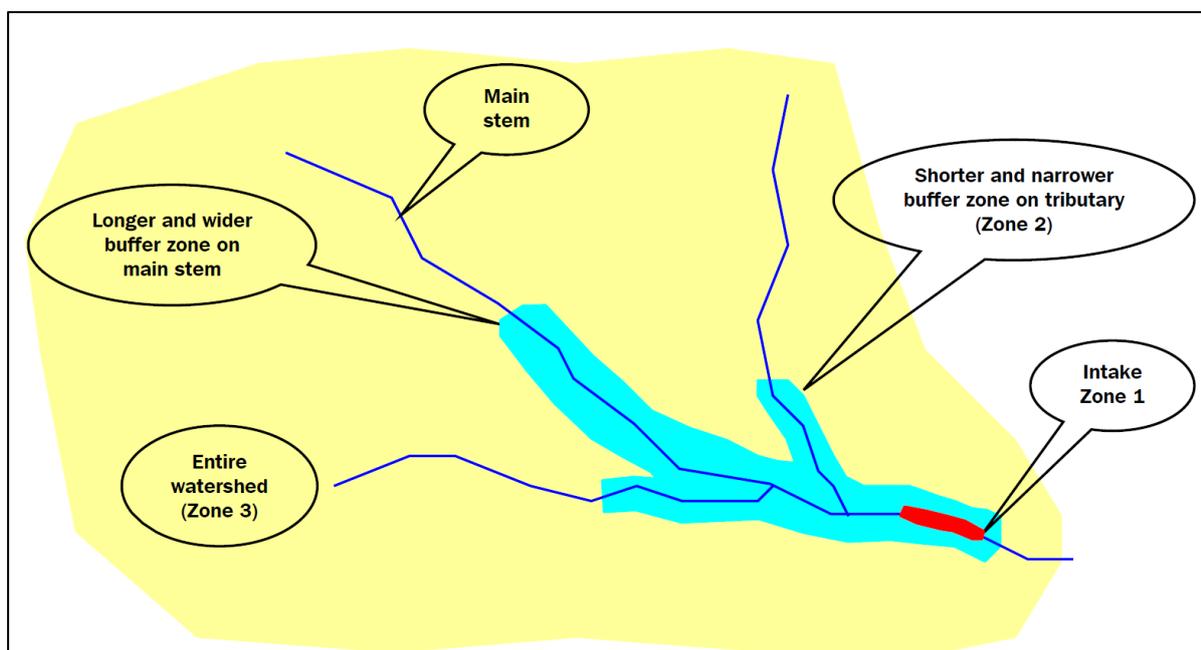


Figure 2: Schematic of Surface Water Catchment Protection Zones (from PDP/ESR, 2005)

Where the generic zones are inappropriate for particular water supply intake configurations and the environment in which they are situated, site specific zones can be defined. Decisions to develop site specific zones must be justified on the basis that relevant controls for resource consents and Permitted Activities will be applied in relation to the potential migration pathway to the water supply intake.

Methods to develop site specific zones will involve an assessment of contamination risk and the monitoring and modelling of contaminant attenuation along migration pathways towards a water supply intake.

The PDP/ESR report developed technical guidelines and considered these would provide:

- *an objective set of national guidelines that can be applied consistently across the country for drinking water supplies derived from surface water and, or groundwater sources;*
- *a technically defensible approach for delineating drinking water catchment areas;*
- *consistent with, and help to achieve compliance with the Drinking Water Standards for New Zealand 2005 (DWSNZ 2005);*
- *consistent with the methodology for and assist with the preparation of Public Health Risk Management Plans;*
- *applicable at both whole catchment scale and for site-specific requirements;*
- *focussed on providing water supply managers with a tool that helps provide a good quality water supply; and*
- *supporting the implementation of the proposed Ministry standard.*

The guidelines show how delineating protection for drinking water supplies requires a parallel assessment of land use and its management. Use of the term 'protection' in this methodology commonly implies use of a land use management or planning tool. The term 'Management zone' implies that a degree of protection is envisaged by means of a management regime or planning tool, such as a monitored and enforced regional plan.

The MfE working group for this project considered the concept, used in some jurisdictions, that larger populations required larger catchment zones, offering a higher level of protection. However, a decision was made by the working group that there should be no implied disadvantage resulting from different-sized catchment zones dependent on population that is supplied.

The working group also considered the question: "Can an allowance be made for the presence and use of a water treatment plant in determining the scale of a management zone?" Treatment as an attenuating mechanism has not been considered for the purposes of this report. Treatment options are the responsibility of the supplier who can make an appropriate decision when considering the management zones in association with the regional authority.

The report provides the working group's outcome regarding generic protection, which is relevant to the GWRC Regional Plan.

3. Relevant draft Natural Resource Plan Policies/Rules covering these activities

The following relevant policies and rules in the draft NRP have been provided by GWRC for inclusion in the review:

Policy LW.P63: Human Drinking-Water Supplies

The adverse effects from discharges to land and water on the quality of community and group drinking-water supplies shall be avoided. Where adverse effects cannot be avoided,

the adverse effects shall be managed by consideration of the following in applications for resource consent:

- (a) water quality in relation to determinands, including aesthetic determinands, at the water supply abstraction point, and*
- (b) the type and concentration of the contaminant(s) in the actual discharge, and*
- (c) soil type, in the case of discharges to land, and*
- (d) travel time and path of contaminants from source to water supply abstraction point, and*
- (e) treatment method, if any, and*
- (f) the risk of accident or an unforeseen event causing significant adverse effects on water quality.*

This shall be done in consultation with the drinking water supply operator and in accordance with the National Environmental Standard for Sources of Human Drinking Water 2007.

We consider the proposed protection method is consistent with and supports the above policy. The protection method sets a 100 m buffer zone for a minimum travel time of 8-hours from source to abstraction (Clause (d) above).

Rule LW.R66: Pit Latrine – Permitted Activity

The discharge of domestic wastewater onto or into land and the discharge of odour from a pit latrine is a permitted activity, provided that the following conditions are met:

- (a) the pit latrine is not located:*
 - (i) within 50 m of a surface water body or the coastal marine area or gully, or*
 - (ii) within a community drinking water supply protection area as shown on Map 30 and Map 31, or*
 - (iii) where a sewer connection is available, and*
- (b) the pit latrine shall be located in silty or clay soils, and*
- (c) the bottom of the pit latrine is 0.6 m above the seasonally highest water table, and*
- (d) stormwater is prevented from entering the pit latrine, and*
- (e) domestic wastewater in the pit latrine does not accumulate to a height closer than 300 mm of the original ground surface, and*
- (f) the discharge of odour is not offensive or objectionable beyond the boundary of the property.*

We consider the proposed protection method is consistent with and supports the above permitted activity rule. As above, the protection method sets a buffer zone around abstraction points via Maps 30 and 31 (Condition (a) (ii)). Further protection is provided outside the mapped buffers through the required 50 m buffer to water ways (Condition (a) (i)).

Rule LW.R70: New or Upgraded On-Site Wastewater Systems – Permitted Activity

The discharge of domestic wastewater, including greywater onto or into land and the discharge of odour from a new or upgraded on-site domestic wastewater treatment and disposal system is a permitted activity provided the following conditions are met:

- (a) *the discharge shall occur on the property where the on-site domestic wastewater treatment and disposal system is located, and*
- (b) *the discharge is not located:*
 - (i) *within 50 m of a surface water body or the coastal marine area or gully, or*
 - (ii) *above the soil surface, or*
 - (iii) *within a community drinking water supply protection area as shown on Maps 6A and 6B, and*
- (c) *the depth of the disposal field is 0.6 m above the seasonally highest water table, and*
- (d) *the discharge does not exceed 14,000 L/week or a maximum daily volume of 2,000 L, and*
- (e) *the effluent is discharged evenly to the entire filtration surface of the disposal field and does not cause ponding or surface runoff from the disposal area, and*
- (f) *the on-site domestic wastewater treatment and disposal system is designed, constructed, operated and maintained in accordance with the AS/NSZ 1547:2012 – On-Site Domestic Wastewater Management, and*
- (g) *the discharge of odour is not offensive or objectionable beyond the boundary of the property.*

We consider the proposed protection method is consistent with and supports the above permitted activity rule. As above, the protection method sets a buffer zone around abstraction points via Maps 6A (30) and 6B (31) (Condition (b) (iii)). Further protection is provided outside the mapped buffers through the required 50 m buffer to water ways (Condition (b) (i)). We consider the rule needs some tidying up and have provided comments in separate correspondence to GWRC.

Rule LW.R71: Application of Aa Biosolids to Land – Permitted Activity

The discharge of Aa grade biosolids onto or into land and the associated discharge of odour is a permitted activity provided the following conditions are met:

- (a) *the discharge is in accordance with The Guideline for the Safe Application of Biosolids to Land in New Zealand, August 2003, and*
- (b) *the discharge is not located within:*
 - (i) *50 m of a surface water body or the coastal marine area or gully, and*
 - (ii) *50 m of a property boundary, and*
 - (iii) *a community drinking water supply protection area as shown on Map 30 and Map 31, and*
- (c) *the field capacity of the soil is not exceeded, and*
- (d) *the discharge shall not result in any contaminant exceeding the soil concentration ranges identified in Schedule O (soil concentrations), and*
- (e) *the discharge shall not result in the creation of a contaminated site, and*
- (f) *the discharge of odour is not offensive or objectionable beyond the boundary of the property.*

We consider the proposed protection method is consistent with and supports the above permitted activity rule. As above, the protection method sets a buffer zone around abstraction points via Maps 30 and 31 (Condition (b) (iii)). Further protection is provided outside the mapped buffers through the required 50 m buffer to water ways (Condition (b) (i)). We consider the rule needs some tidying up and have provided comments in separate correspondence to GWRC.

Rule LW.R72: Application of Biosolids (Ab, Ba, or Bb) to Land – Restricted Discretionary Activity

The discharge of Ab, Ba, Bb grade biosolids onto or into land and the associated discharge of odour is a restricted discretionary activity provided the following conditions are met:

- (a) the discharge is not located within a community drinking water supply protection area as shown on Map 30 and Map 31, and*
- (b) the discharge shall not result in any contaminant exceeding the soil concentration ranges identified in Schedule O (soil concentrations), and*
- (c) the discharge shall not result in the creation of a contaminated site.*

Matters for discretion

- 1. Application rate, volume and location including in relation to:

 - (i) the infiltration rate*
 - (ii) presence of subsurface drainage*
 - (iii) the field capacity of the soil*
 - (iv) nutrient capacity of the soil**
- 2. Effects on the long-term health of the soil resource*
- 3. Storage period and volume for deferred irrigation during periods of prolonged wet weather*
- 4. Public access restrictions to discharge sites*
- 5. Odour*
- 6. Effects on groundwater, surface water bodies and the coastal marine area*

We consider the proposed protection method is consistent with and supports the above restricted discretionary activity rule. As above, the protection method sets a buffer zone around abstraction points via Maps 30 and 31 (Condition (a)). We consider the rule needs some tidying up and have provided comments in separate correspondence to GWRC.

Rule LW.R73: Application of Treated Wastewater to Land – Restricted Discretionary Activity

The discharge of treated wastewater onto or into land, and the associated discharge of odour is a restricted discretionary activity provided the following conditions are met:

- (a) the discharge is not located within a community drinking water supply protection area as shown on Map 30 and Map 31, and*
- (b) the field capacity of the soil is not exceeded.*

Matters for discretion

- 1. Application rate, volume and location including in relation to:

 - (a) the infiltration rate*
 - (b) presence of subsurface drainage*
 - (c) the field capacity of the soil*
 - (d) nutrient capacity of the soil**
- 2. The nature of the contaminants in the discharge and the extent of treatment prior to discharge*
- 3. Effects of contaminants on the long-term health of the soil resource*

4. *Storage period and volume for deferred irrigation during periods of prolonged wet weather*
5. *Odour and spray drift*
6. *Public access restrictions to disposal fields and any other restriction required for public health purposes*
7. *Adverse effects on groundwater, surface water bodies and the coastal marine area*
8. *Monitoring and maintenance requirements of the treatment and disposal system*

We understand that this rule may be replaced by a controlled activity rule.

We consider the proposed protection method is consistent with and supports the above restricted discretionary activity rule. As above, the protection method sets a buffer zone around abstraction points via Maps 30 and 31 (Condition (a)). We consider the rule needs some tidying up and have provided comments in separate correspondence to GWRC.

The LEI report (February 2015) in support of a controlled activity rule includes Section 4.4.15, as below:

4.4.15 Water Supply Protection (NES)

Standard:

Discharges of treated wastewater to land shall not be authorised within any water supply protection area, as addressed in Policy LW. 63 of the draft NRP.

Condition:

Discharges of treated wastewater to land shall not be authorised within any water supply protection area, as addressed in Policy LW. 63 of the draft NRP.

Commentary:

The National Environmental Standard for Sources of Human Drinking Water (2007) imposes a duty on regional councils to protect drinking water quality for supplies servicing more than 500 people. Under the NES, limitations on permitted activity rules (such as for onsite septic systems) are set, for activities upstream of a water supply intake that may detrimentally affect the quality of the water supply to the extent that it would not meet the drinking water standard or if these standards are already not met, not increase the concentration of a determinand by more than "a minor amount."

GWRC has a responsibility to assess the risk of contamination of drinking water quality by a discharge to land. The main contaminants of concern in respect of wastewater discharges are pathogens (virus/bacteria), heavy metals and contaminants of emerging concern. The application of a separation distance (based on the plausible transport time of a contaminant) between wastewater discharge sites and drinking water sources will avoid adverse effects of the discharge on drinking water quality. Separation distances have been calculated by GNS, which has modelled capture zone delineation for GWRC to enable implementation of the NES, based on the best available information. These capture zones are termed "drinking water protection areas" in the regional plan, and serve as buffer areas around drinking water supplies serving more than 500 people. Discharges of treated wastewater to land within these drinking water protection areas will not be authorised as a Controlled Activity.

We consider the proposed protection method is consistent with and supports the standard and condition of the above controlled activity rule.

The conditions in the controlled activity rule need to be more specific, as per other rules above and state the following, rather than referring to the policy:

- (a) the discharge is not located within a community drinking water supply protection area as shown on Map 30 and Map 31

Rule LW.R76: Discharge of Collected Animal Effluent onto or into Land – Controlled Activity

The discharge of collected animal effluent, including sludge onto or into land and the discharge of odour from:

- (a) *dairy farms, and*
- (b) *piggeries, and*
- (c) *poultry farms, and*
- (d) *other premises involving the concentration of animals in a confined area is a controlled activity, provided the following conditions are met:*
 - (i) *the discharge is not located within 20 m of a surface water body, bore or the coastal marine area, and*
 - (ii) *the discharge is not located within 20 m to the boundary of the property, and*
 - (iii) *the discharge is not located within a community drinking water supply protection area as shown on Map 6A (30) and Map 6B (31), and*
 - (iv) *the discharge does not pond or occur on water-logged or flooded land, and*
 - (v) *the discharge of odour is not offensive or objectionable odour beyond the boundary of the property, and*
 - (vi) *the effluent collection, storage and treatment facilities (including, sumps and ponds) are sealed. The permeability of the sealing layer shall not exceed 1×10^{-9} m/s, and*
 - (vii) *the capacity of the effluent storage and treatment facilities (including sumps and ponds) shall be sufficient to provide for deferred or deficit irrigation when the field capacity of the soil is exceeded.*

Matters of control

1. *Effluent application rates and volume, including in relation to the infiltration rate and water storage capacity of the soil*
2. *Maximum herd size of the property*
3. *Nutrient loading rates*
4. *Design, volume, construction and maintenance of the collection, storage and discharge system*
5. *Effluent storage volume to allow for the deferred irrigation during periods of prolonged wet weather*
6. *Desludging the system and applying sludge to land*
7. *Odour*
8. *Contingency plans for prolonged wet weather, mechanical failure or other emergencies*

We consider the proposed protection method is consistent with and supports the above controlled activity rule. As above, the protection method sets a buffer zone around abstraction points via Maps 30 and 31 (Condition (d) (iii)). However, we consider that the

20 m setback to water should be increased to 50 m, to be consistent with other rules. We also consider the rule needs some tidying up and have provided comments in separate correspondence to GWRC.

Rule LW.R80: Agrichemicals – Permitted Activity

The discharge of contaminants into air or onto or into land where it may enter water from an agrichemical is a permitted activity, provided the following conditions are met:

All applications (domestic use and non-domestic):

- (a) the discharge shall not cause noxious, dangerous, offensive or objectionable odour, dust, particulate, smoke, vapours, droplets or ash beyond the boundary of the property, and*
- (b) the discharge shall be in accordance with the rate specified on the agrichemical product label or the manufacturer's instructions, and*
- (c) the agrichemical is in accordance with the Hazardous Substances and New Organisms Act 1996, and*
- (d) there is no aerial spraying in residential areas, and*
- (e) there is no direct discharge into water or within a community drinking water supply protection area, exempt domestic use, except where permitted by Rule LW.R.81*

All non-domestic applications:

- (f) the discharge shall be in accordance with NZS:8409:2004 Management of Agrichemicals, including:
 - (i) Storage – Appendix L4, and*
 - (ii) Use – Part 5.3, and*
 - (iii) Disposal – Appendix S and*
 - (iv) Records – Appendix C9, and**
- (g) the applicator, manager or owner of the property shall prepare a spray plan at least once per annum, and identify:
 - (i) sensitive areas adjacent to where discharges of agrichemical shall occur in accordance with NZS:8409:2004 Management of Agrichemicals: Section 5.3 and Appendix M4, and*
 - (ii) notify adjacent neighbours that a spray plan is available on request at least 7 days before the first discharge, or*
 - (iii) notification is not required if adjoining neighbours agree in writing that notification is not required, and*
 - (iv) a copy of the spray plan is supplied at least 24 hours prior to the discharge of agrichemicals to the owner/occupier of a property identified as a sensitive area or likely to be directly affected by the discharge, or requests a copy, and**
- (h) for ground based applications the principle applicator shall hold either:
 - (i) a current GROWSAFE® Registered Chemical Applicators Certificate, or*
 - (ii) the New Zealand Qualification Authority National Certificate in Agrichemical Application, and**
- (i) for ground based applications where the applicator is not the principal applicator the applicator shall hold either:
 - (i) GROWSAFE® Introductory Certificate, or*
 - (ii) is under direct supervision of a person holding a current GROWSAFE® Register Chemical Applicators Certificate or (iii) the New Zealand Qualification Authority National Certificate in Agrichemical Application, and**

- (j) *for an aerial applications the applicator shall:*
 - (i) *hold a Pilots Agrichemical Rating Certificate issued by the Civil Aviation Authority under Civil Aviation Rule 61, and (ii) the company or operator holds a suitable accreditation for agrichemical application, and*
- (k) *all agrichemicals shall be securely contained and stored in accordance with NZS:8409:2004: Management of Agrichemicals: Appendix L4, and*
- (l) *all mixing and application of agrichemicals shall be conducted in accordance with NZS:8409:2004 Management of Agrichemicals: Appendix F, and*
- (m) *records are in accordance with NZS:8409:2004: Management of Agrichemicals: Appendix C9 and shall be available to the Wellington Regional Council upon request, and*
- (n) *in public amenity areas the applicator shall:*
 - (i) *place signs within the immediate vicinity and prior to the commencement of spraying, and remain in place until the withholding or re-entry period as specified on the product label has expired, and*
 - (ii) *alongside roadways, vehicles associated with spraying of agrichemicals shall display prominent signs (front and back) advising that spraying is in progress, and*
- (o) *for discharges adjacent to a sensitive area a risk assessment prior to the discharge shall be undertaken in accordance with NZS:8409:2004: Management of Agrichemicals:*
 - (i) *Table G1 Draft Hazard Chart, and*
 - (ii) *Appendix Q, and*
 - (iii) *Appendix G.*

We consider the proposed protection method is consistent with and supports the above permitted activity rule. As above, the protection method sets a buffer zone around abstraction points, however, although Condition (e) refers to discharges into community water supply protection zones, we believe it should also refer to Maps 30 and 31 (Condition (d) (iii)). We also consider that "exempt domestic use" needs defining or volume limiting.

Rule LW.R81: Agrichemicals into Water – Permitted Activity

The discharge of contaminants directly into water from an agrichemical is a permitted activity, provided the following conditions are met:

- (a) *the agrichemical and adjuvant are approved by the Environmental Protection Authority for a direct discharge into water, and*
- (b) *the discharge shall be in accordance with NZS:8409:2004 Management of Agrichemicals and NZS:8409:2004 Management of Agrichemicals, Records – Appendix C9, and*
- (c) *for ground based applications the applicator shall hold either:*
 - (i) *a current GROWSAFE® Registered Applicator Certificate with the Aquatic strand, or*
 - (ii) *New Zealand Qualification Authority National Certificate in*
 - (iii) *Agrichemical Application with the Aquatic strand, and*
- (d) *for an aerial application the applicator shall hold either:*
 - (i) *a Pilots Agrichemical Rating Certificate issued by the Civil Aviation Authority under Civil Aviation Rule 61, and*

- (ii) *the company or operator holds a suitable accreditation for agrichemical application, and*
- (e) *the applicator shall notify:*
 - (i) *every person taking water for potable supply within 1 km downstream of the proposed discharge 12 hours prior to the discharge occurring, and*
 - (ii) *each resource consent holder for taking water for community drinking water **within a** supply protection area downstream of the discharge 1 week before the discharge commences, and*
- (f) *in a public amenity area the applicator shall:*
 - (i) *place signs within the immediate vicinity and prior to the commencement of spraying, and remain in place until the withholding or re-entry period as specified on the product label has expired, and*
 - (ii) *alongside roadways, vehicles associated with spraying of agrichemicals shall display prominent signs (front and back) advising that spraying is in progress.*

This rule allows the application of agrichemicals into water within the protection area but only chemicals that are EPA approved and therefore considered safe to use. We consider the proposed protection method is consistent with and supports the above permitted activity rule. The protection method sets a buffer zone around abstraction points, however, although Condition (e) (ii) refers to community drinking water supply protection areas, we believe it should also refer to Maps 30 and 31. We also consider the rule needs some tidying up and have provided comments in separate correspondence to GWRC.

Rule LW.R84: Aerial Application of Vertebrate Toxic Agents – Controlled Activity

*The discharge of a **vertebrate toxic agent** onto or into land and where it may enter water by aerial application is a controlled activity, provided the following conditions are met:*

- (a) *the substance and the application technique or method is approved for use under the Hazardous Substances and New Organisms Act 1996 and the use and discharge of the substance is in accordance with all controls of the approval, and*
- (b) *the discharge is not onto a roof or other structure used to collect drinking water, or*
- (c) **if the discharge is within a community drinking water supply protection area as shown on Map 30 and Map 31, then the Consent Holder shall notify the Water Supply Authority one (1) week prior to the discharge occurring.**

Matters of control

1. *Advice and information to people and authorities in and adjacent to the application area, including flights paths and accidental discharge into water procedures and notifications*
2. *Application methods, systems and management processes to prevent fugitive discharges and the recording of application areas*
3. *Navigational guidance systems*
4. **The ability of the Water Supply Authority to exclude the discharge catchment from its water supply source for a period of ?? weeks.**

Notification

In respect of Rule LW.R84, applications are precluded from public notification, unless special circumstances exist.

This rule allows the application of poison onto land where it may enter water within the protection area but only if controlled activity conditions are met and the substance is approved under the 1996 Act. Although this rule does require a resource consent to be applied for, we do not consider the conditions or matters of control provide sufficient protection to water supplies. We consider the rule needs modifying to make it consistent with the proposed protection method. The rule needs to be more in-line with Rule LW.R81, i.e. protection method sets a buffer zone around abstraction points, so conditions, or matters of control need to refer to community drinking water supply protection areas and Maps 30 and 31.

We have added in Condition (c) and Matters of Control (4) in **bold**.

Rule LW.R85: Farm Refuse Dumps – Permitted Activity

The discharge of contaminants onto or into land and the discharge of odour from a farm refuse dump is a permitted activity, provided the following conditions are met:

- (d) the contents of the farm refuse dump is from the property where the farm dump is located, and*
- (e) the volume of a farm refuse dump shall not exceed 50 m³, and*
- (f) the farm refuse dump is located:*
 - (i) on a property that is over 20 ha, and*
 - (ii) in silty or clay soils, and*
 - (iii) where no kerbside community collection is available or the property is located more than 20 km by road from a transfer station, and*
- (g) the farm refuse dump is not located:*
 - (i) in an area prone to flooding or ponding, or gully, or*
 - (ii) within 50 m of a surface water body, coastal marine area, or boundary of the property, or*
 - (iii) within a community drinking water supply protection area as shown on Map 30 and Map 31, and*
- (h) the base of the farm refuse dump is 0.6 m above the seasonally highest water table, and*
- (i) the discharge does not contain:*
 - (i) hazardous substances, or*
 - (ii) wastewater, offal or dead animal matter, and*
- (j) there is no burning of the contents of a farm refuse dump, and*
- (k) the size and location is recorded, using GPS or mapped to an accuracy of at least 50 m at a scale of 1:50,000; and a copy of this information made available to the Wellington Regional Council upon request, and*
- (l) the discharge of odour is not offensive or objectionable odour beyond the boundary of the property, and*
- (m) the farm refuse dump is re-contoured and re-vegetated to a condition that is compatible with the surrounding land within six months of completion.*

We consider the proposed protection method is consistent with and supports the above controlled activity rule. As above, the protection method sets a buffer zone around abstraction points via Maps 30 and 31 (Condition (d) (iii)). We also consider the rule needs some tidying up and have provided comments in separate correspondence to GWRC.

Alternative Approaches

Although our revised brief was to put less focus on alternative approaches, our review of the PDP/ESR report and the international literature review they undertook has allowed us to assess alternatives as part of our overall review.

We believe the PDP/ESR Report considered alternatives and came up with an appropriate and conservative approach for New Zealand that fits in well with our regulatory framework. In addition, the Steering Committee that was involved with the PDP/ESR report contains a very good mix of well-respected experts in the fields of water quality, hydrogeology and river morphology and they would have canvassed other viable alternatives, if they exist.

We trust this provides the review at the level required. If you require clarification, please contact us.

Yours sincerely

Low Environmental Impact



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