Source Water Protection

Presentation to TANK Meeting of behalf of Havelock North Joint Working Group on Drinking Water Safety

31 May 2018
Introduction & Overview

• Introduction & Scope of Work
• Why do we need RMA provisions to protect drinking water sources?
• Drinking Water Sources in TANK Catchment
• What activities & risks need to be managed?
• How are Source Protection Zones determined?
• Options for Regional Plan provisions

Presentation is for Information Purposes only.
No decisions required from TANK at this meeting
Water is a precious taonga, highly valued in its own right and as a source of human drinking water.

RMA and National Environmental Standard

Board of Inquiry Findings

RPS and RRMP Objectives
The Principles

[31] In light of the evidence it heard, and the varying expression of the principles internationally, the Inquiry has identified the following six fundamental principles of drinking water safety for New Zealand:

- Principle 1: A high standard of care must be embraced
- Principle 2: Protection of source water is of paramount importance
- Principle 3: Maintain multiple barriers against contamination
- Principle 4: Change precedes contamination
- Principle 5: Suppliers must own the safety of drinking water
- Principle 6: Apply a preventive risk management approach

[Image of the Havelock North Drinking Water Inquiry Report]
Board of Inquiry – 6 Principles

**Principle 2: Protection of source water is of paramount importance**

Protection of the source of drinking water provides the first, and most significant, barrier against drinking water contamination and illness. It is of paramount importance that risks to sources of drinking water are understood, managed and addressed appropriately. However, as pathogenic microorganisms are found everywhere, complete protection is impossible and further barriers against contamination are vital.

**Principle 6: Apply a preventive risk management approach**

A preventive risk management approach provides the best protection against waterborne illness. Once contamination is detected, contaminated water may already have been consumed and illness may already have occurred. Accordingly, the focus must always be on preventing contamination. This requires systematic assessment of risks throughout a drinking water supply from source to tap; identification of ways these risks can be managed; and control measures implemented to ensure that management is occurring properly. Adequate monitoring of the performance of each barrier is essential. Each supplier’s risk management approach should be recorded in a living WSP which is utilised on a day to day basis.
RMA & the National Environmental Standard (Sources of Human Drinking Water)

• Source protection included in Part 2, but is implicit, not explicit

“promote the sustainable management of natural and physical resources. .... managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural well-being and for their health and safety”

• National Environmental Standard Sources of Human Drinking Water was an attempt to “plug a legislative gap” and provide statutory recognition of 1st barrier approach
## NES in Summary

<table>
<thead>
<tr>
<th>Registered Supplies</th>
<th>Resource Consents</th>
<th>Regional Plans</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 25 people</td>
<td>NES Does not apply</td>
<td>No restriction on Regional Plan Permitted Activity Rules</td>
</tr>
<tr>
<td>25-500 people</td>
<td>Consider if an event (e.g., spill, heavy rain) MAY lead to significant adverse effect on drinking water quality? If so, condition MUST be imposed requiring notification of event</td>
<td>Regional Rules cannot include Permitted Activities UNLESS SATISFIED not likely to introduce or increase contaminants such that health standard or aesthetic guidelines are not met after existing treatment</td>
</tr>
<tr>
<td>&gt; 500 people</td>
<td>CANNOT Grant Water Permit or Discharge Permit if activity likely to cause health standard or aesthetic guidelines to be exceeded after existing treatment</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Consider if an event (e.g., spill, heavy rain) MAY lead to significant adverse effect on drinking water quality? If so, condition MUST be imposed requiring notification of event</td>
<td></td>
</tr>
</tbody>
</table>
National Environmental Standard

• A Regional Plan may be more restrictive than the NES

• Do not need to immediately amend Regional Plan Rule until
  • Scheduled Plan Change; or
  • A Plan Change that relates to a relevant Rule is introduced
    → TANK Process requires consideration of Permitted Activity Rules that apply upstream of abstraction points for drinking water sources serving more than 500 people.

• What is meant by “upstream” or “upgradient”? 
Drinking Water Supplies in TANK

<table>
<thead>
<tr>
<th>Supply</th>
<th>Pop. Served</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hastings Urban</td>
<td>64,764</td>
</tr>
<tr>
<td>Napier City</td>
<td>50,804</td>
</tr>
<tr>
<td>Clive</td>
<td>560</td>
</tr>
<tr>
<td>Whakatu</td>
<td>337</td>
</tr>
<tr>
<td>Omahu</td>
<td>126</td>
</tr>
<tr>
<td>Breckenridge</td>
<td>52</td>
</tr>
<tr>
<td>Meeanee, Gavin Back St</td>
<td>33</td>
</tr>
<tr>
<td>Waipatu</td>
<td>30</td>
</tr>
<tr>
<td>McElwee Subdivision</td>
<td>28</td>
</tr>
</tbody>
</table>
Risk Activities

• What sorts of activities are of interest in a water supply protection zone?

From: Guidelines for Drinking Water Quality Management, NZ
Risk Activities

• Board of Inquiry, Stage 2 report, Part 3 – GENERAL RISK LANDSCAPE
  • Baseline vs Event
    • “events typically include flooding and heavy rain, droughts, power failures, or
      organisational factors such as complacency or inadequate resourcing. **Evidence of
      supply safety under baseline conditions is not evidence that this safety
      will be maintained under such event conditions.** Failures can occur at any
time, may occur slowly over time without red flags being raised, and cannot necessarily
be detected in a timely manner to prevent consumer exposure to contamination”

• Aquifer Changes
  • “GNS advised the Inquiry that the **permeability of aquifers and aquitards
    should be considered a dynamic variable** which can change as a result of stress
    and strain.”
Risk Activities

• Board of Inquiry, Stage 2 report, Part 3 – GENERAL RISK LANDSCAPE
  • Bores drilled through aquifer protection layers
  • Sources of human wastewater (disposal areas, wastewater infrastructure)
  • illegal earthworks or connections
  • discharges of nitrates upstream of collection areas or into water sources
  • building piles;
  • use of herbicide /pesticides and, more generally, pollutants from farmland
  • urban land use activities
  • forestry
  • Landfills (closed and operational)
Understanding & Assessing the Risks

- **Source Protection Zone ≠ Eliminating Risks**

  [624] The Inquiry emphasises the need to be precise and careful with the wording that is used for this clarification in ss 6 and 30. Several expert panel members noted the challenge of absolute protection of drinking water sources in the New Zealand context where sources are varied and often part of complex systems. This accords with the risks posed to source water discussed in Part 3. The Inquiry agrees with Dr Mitchell’s sentiment that “protection” needs to encompass identifying and understanding the risks to drinking water sources and addressing and managing them appropriately.

  - **Acceptable risk:** Need to know where activities are occurring so these can be taken into account in Water Safety Plans
  - **Risk Can be Mitigated:** Ensure activities are carried out in an appropriate manner with contingencies in place
  - **Unacceptable risk:** Specific controls need to be in place to mitigate risk, or activity may not be acceptable in Source Protection Zone
## How are Risk Activities Currently Managed?

<table>
<thead>
<tr>
<th>Activity</th>
<th>RRMP</th>
<th>Activity</th>
<th>RRMP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fertiliser application</td>
<td>Permitted</td>
<td>Stormwater</td>
<td>New TANK provisions</td>
</tr>
<tr>
<td>Pesticides / Agrichem</td>
<td>Permitted, GrowSAFE</td>
<td>Vegetation clearance</td>
<td>Permitted (conditions apply)</td>
</tr>
<tr>
<td>Wastewater Disposal</td>
<td>Permitted – Discretionary (depends on scale &amp; system)</td>
<td>Bore drilling</td>
<td>Controlled – consent must be granted</td>
</tr>
<tr>
<td>High Stocking Rates</td>
<td>Feedlots are Permitted (conditions apply)</td>
<td>Abandoned / unmaintained bores</td>
<td>Non-Complying</td>
</tr>
<tr>
<td>Offal Pits or similar</td>
<td>On-property: Permitted</td>
<td>Bore decommissioning</td>
<td>Permitted – no consent required.</td>
</tr>
<tr>
<td>Solid waste disposal</td>
<td>On-property: Permitted Otherwise requires consent</td>
<td>Landfills</td>
<td>Controlled - Discretionary</td>
</tr>
<tr>
<td>Animal Effluent Disposal</td>
<td>Controlled</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hazardous substances</td>
<td>HASNO</td>
<td>Foundation Piles, poles</td>
<td>Building Act ?</td>
</tr>
<tr>
<td>Fuel Storage Tanks</td>
<td>HASNO</td>
<td>Earthworks</td>
<td>District / City Plans</td>
</tr>
<tr>
<td>Mining</td>
<td>District &amp; Regional Plans</td>
<td>Road runoff</td>
<td>District / City Councils / Stormwater Rules</td>
</tr>
<tr>
<td>Wastewater reticulation</td>
<td>District / City Councils</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Determining Source Protection Zones

Capture Zone: TOTAL area that contributes to water that will eventually end up at the abstraction point.

Protection Zone: Area defined by travel time of water to the abstraction point.

Protection zone depends on the contaminants of interest. Typically defined as a Microbial Protection Zone – 1 year travel based on bacteria and virus survival.
HBRC has been applying default 2km radius zone Hastings Urban Method

Data requirements

Numerical Models – additional data requirements
- Appropriate number of layers to represent multi-layer aquifer systems
- Spatial variation in layer thickness
- Spatial variation in aquifer hydraulic properties

AEMs – additional data requirements
- Groundwater recharge
- Hydraulic boundaries
- Surface water levels
- Relevant groundwater level measurements for model calibration

Manual Methods – data requirements
- Location of feature
- Groundwater abstraction or spring flow rate
- Aquifer thickness
- Aquifer porosity
- Groundwater flow direction and hydraulic gradient
- Hydraulic conductivity (some manual methods)

Desktop Review – No hydrological data, except for hydrogeological mapping:
- Geological and topographic maps
- Piezometric surface maps/discrete water level measurement
- Aquifer test data
- Well logs
- Geophysical surveys
- Tracer tests
- Hydrochemistry data

Adequate budget/resources
High level of accuracy

Modest budget/resources
Modest level of accuracy

Limited budget/resources
Low level of accuracy

Very low budget/resources
Very low level of accuracy
Hastings Urban Water SPZs

• Tonkin + Taylor have been developing SPZs for the four main supply bore fields, primarily to support Catchment Sanitary Inspection, assist with risk assessments and support future management.
Options for including SPZs in TANK Plan

Intention is to:
• Provide guidance as to where & what activities may present risks to drinking water sources
• Explicit consideration of effects on drinking water sources
• Obtain better information about what activities are occurring in source zones

Assumptions:
• Registered drinking water supplies only
• Application restricted by TANK Catchment boundaries at present
• SPZs need to be defined to high level before regulatory (Rule) options can be considered
• Likely suite of tools including RMA and non-RMA methods
Options for Including SPZs to TANK Plan

**Option A**
- Objective to protect drinking sources through preventative management
- Policies provide guidance and assessment criteria
- Protection zones not mapped

**Objective & Policies as per Option A**

- Protection zone maps included “for information” or referenced externally from Plan to guide where / when objectives and policies apply

**Option C**
- Objective & Policies as per Option A & B

- Where clearly defined, SPZs included in Schedules
- Some activities may require resource consent within SPZ for risk management.
- Plan Change required to amend / add SPZ

Supported by non-regulatory methods for sharing of information and agency co-ordination and collaboration; Suite of tools including RMA and non-RMA methods
Next Steps

• Feedback from TANK Meeting
• Development & Assessment of Options A, B, C
• Reporting back to JWG and TANK for consideration