

What are we doing with Water Safety Plans in New Zealand

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New Zealand's first Water Safety Plan (PHRMP)?

Masterton 2003

Cryptosporidium identified in the distribution system

No related cases of illness

A number of significant risks at the treatment plant

Preparation of a Public Health Risk Management Plan was required as part of the response by Masterton District Council (water supplier)



Ministry of Health PHRMP resources

2002

2005

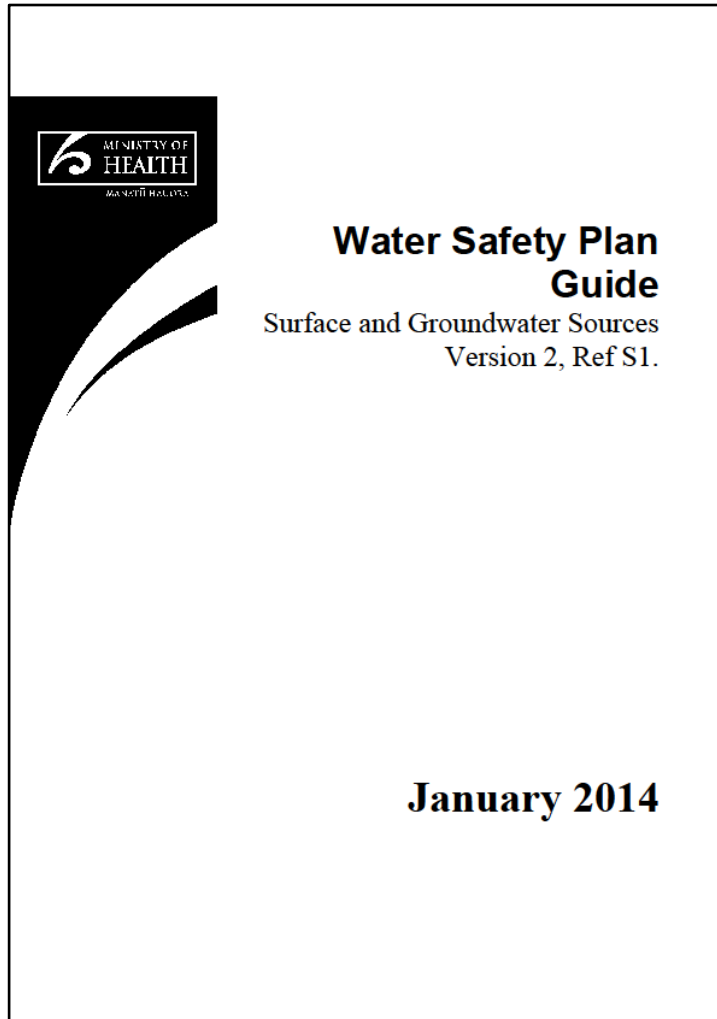
2005

2005, updated 2014

2008 updated 2014

Treatment		
List what could happen that may cause drinking-water to become unsafe (deterioration in water quality)	Is this under control?	If not, judge whether this needs urgent attention. Urgent attention is needed for something that happens a lot and/or could cause significant illness.
7.		
8.		
9.		
10.		
11.		
12.		

Ministry of Health PHRMP resources



Causes	Preventive measures	Checking preventive measures		Corrective action
		What to check	Signs that action is needed	
Event: SOURCE WATER RECEIVES SEPTIC TANK DISCHARGES Possible hazards: <i>Germs; chemical determinands (predominantly nitrate and nitrite).</i> Level of risk: High				
S1.1.7 Septic tanks within the source protection zone (see S1.1.2).	<ul style="list-style-type: none"> Develop an understanding of the extent of the source catchment or recharge zone. Identify source protection Zones I, II and III. Obtain information about the number and location of septic tank discharges in the catchment or recharge zone. Liaise with councils to identify all septic tank disposal fields located within source protection Zone II. Request that the council decline new applications for septic tank installation within source protection Zone II. Once the location of septic tank discharges are known, establish a strategy to: <ul style="list-style-type: none"> monitor water quality for evidence of health-significant contaminants¹ develop a plan with the council using monitoring and site inspection to provide 'early-warning' of source contamination in collaboration with councils, provide public information on recommended maintenance and use of septic tank systems identify and carry out measures that can be put in place to control contamination from the existing discharges. 	<ul style="list-style-type: none"> <i>E. coli</i> in raw water (12 consecutive monthly samples). Nitrate. Nitrite. 	<ul style="list-style-type: none"> Median <i>E. coli</i> count over 12 months is more than 500/100ml. Elevated levels of nitrate, nitrite in source water. Reticulated water not compliant with <i>DWSNZ: 2000</i>. Lack of knowledge of catchment/recharge zone, and sources of contamination in the area. No information to allow establishment of satisfactory separation between bores/wells and tanks. 	<ul style="list-style-type: none"> Get more information about catchment or recharge zone. Approach council for information concerning discharge consents for septic tanks in the area. Establish strategy to deal with the effects of any septic tanks that are affecting the source. Consider treatment options (<i>particularly disinfection – see P7 Guide series</i>) or development of a new source.

¹ The monitoring plan should take into account seasonal changes, as lower flows can lead to higher contaminant concentrations. Situations in which contamination is most likely to occur should be identified so that monitoring can be suitably timed.

Health (Drinking Water) Amendment Act 2007



Health (Drinking Water) Amendment Act 2007

Public Act 2007 No 92
Date of assent 17 October 2007
Commencement see section 2

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Every water supplier must prepare a PHRMP (WSP)

Identify public health risks

Mechanisms for preventing, reducing, eliminating risks

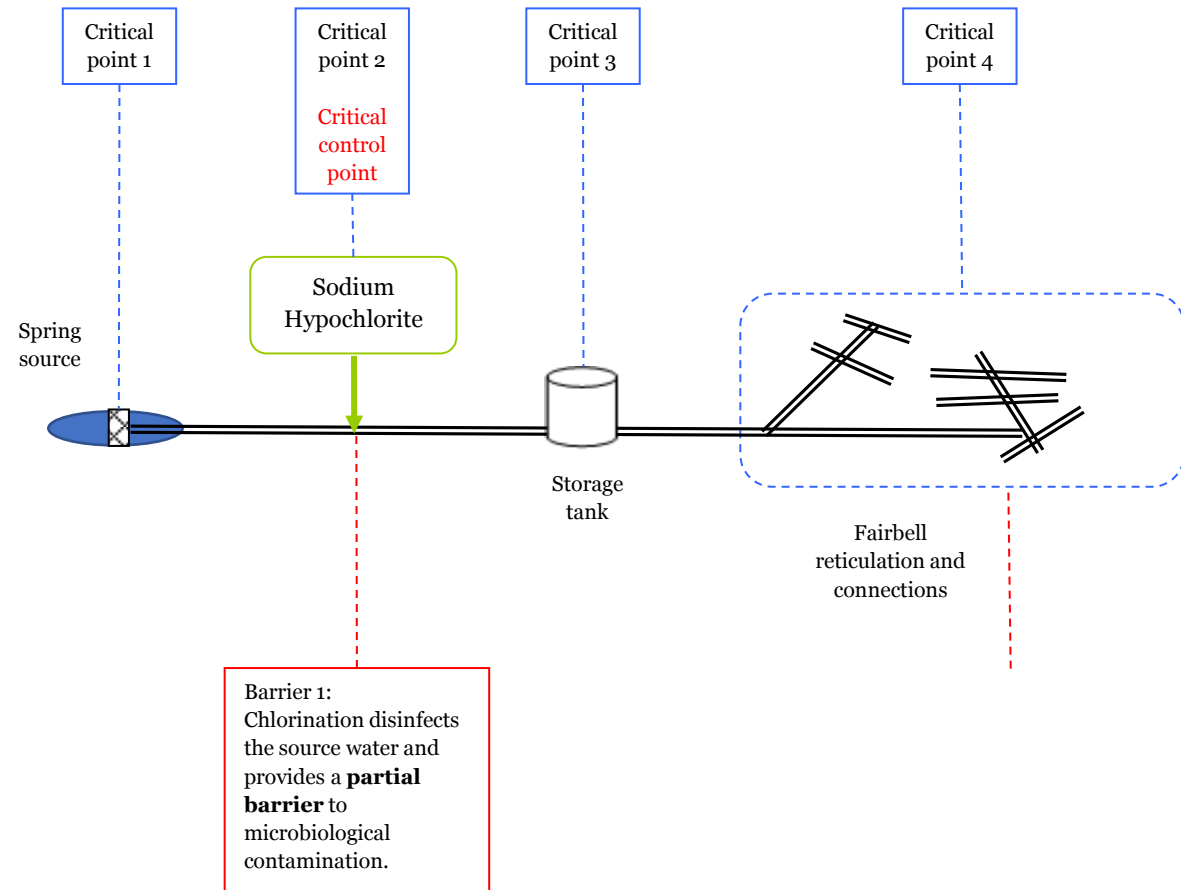
Identify critical points

Information on costs and benefits

Timetable for managing risks

General format of WSPs in New Zealand

- Document version
- Introduction
- Supply description
- Photographs
- Schematic
- Critical points/barriers
- Methodology
- Consultation
- Risk tables
- Contingency plan
- Improvement plan



Hastings/Havelock North drinking-water supply

12 groundwater sources

5 supply zones that could be combined or operated separately

Assessed as complying with the secure bore water criteria of DWSNZ

Three bores in Brookvale Rd are part of the Havelock North supply

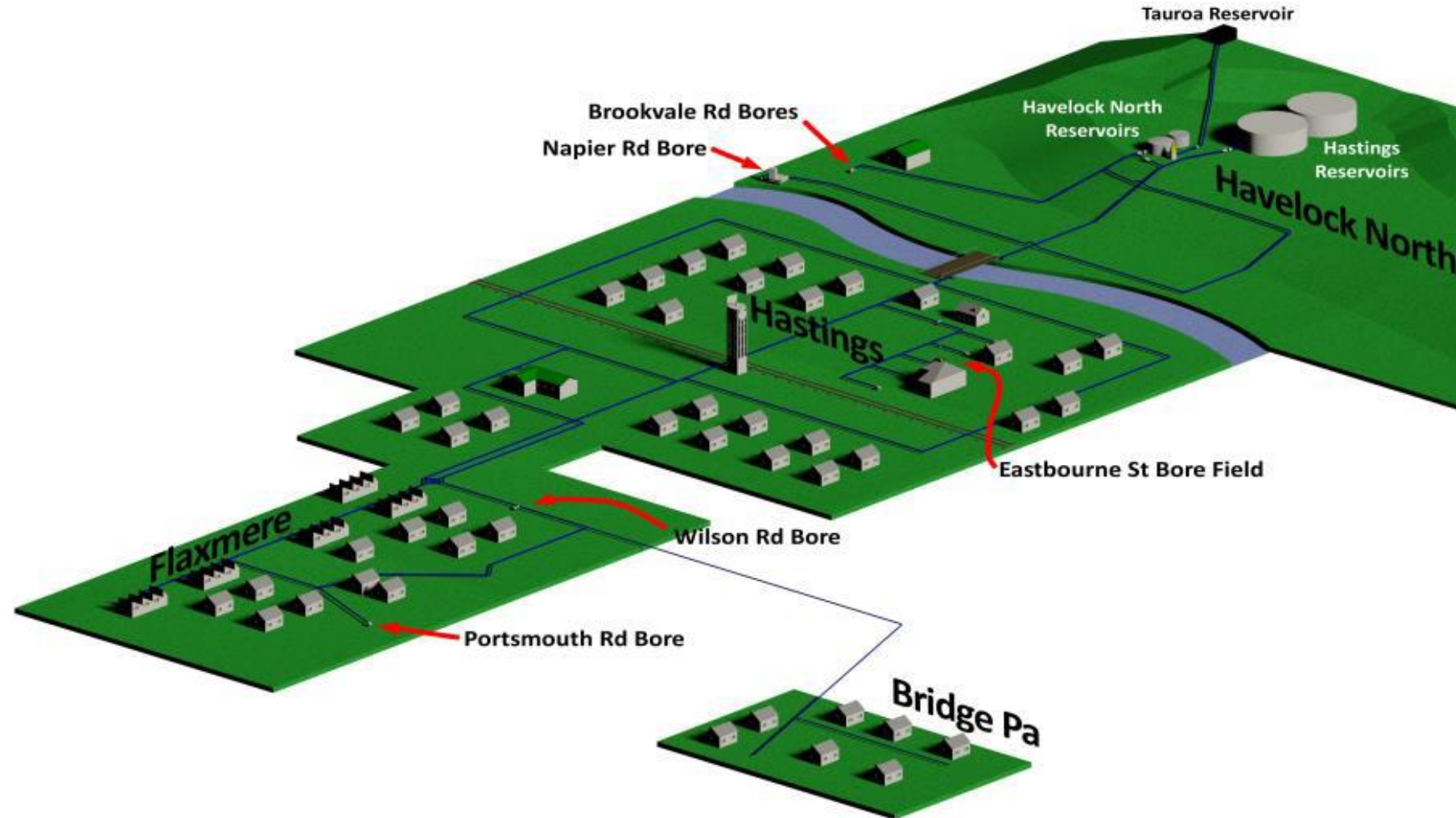
Brookvale bore 3 closed in Sept 2015 due to *E. coli* contamination

Brookvale Rd bores are located in chambers below ground

Campylobacteriosis outbreak in 1998

Numerous *E. coli* positive results over a number of years

Hastings/Havelock North drinking-water supply



How did contamination of the supply occur?

Most likely

- Mangateretere stream becomes contaminated with sheep faeces after heavy rainfall
- A pond in the stream drains to the aquifer
- Brookvale road bore (11 metres deep) abstracts and supplies contaminated water from the aquifer
- There is no treatment barrier



How did contamination of the supply occur?

Alternate possibility

- Heavy rainfall carries water contaminated with sheep faeces into a drain on Brookvale Rd which floods the bore chambers



Secure bore water status DWSNZ

Residence time testing (>1 year old)

Bore depth greater than 30 metres (10 – 20 metres in some circumstances)

Sanitary bore head

E. coli absent

Stock excluded to 5 metres



Hastings/Havelock North WSP

Source water description

The groundwater obtained for the supply is of high quality and there is no need for any treatment,

The groundwater source is naturally of very high quality,

aquifer is of such a high quality

source water is very high quality

Hastings/Havelock North WSP

Secure bore water

Fortunately having a secure groundwater source.....

....the aquifers are considered secure.

All supply wells in the Hastings & Havelock North area are believed to be capable of achieving secure status under the new DWSNZ 2005, although formal confirmation from the Ministry of Health needs to be sought.

Hastings/Havelock North WSP

Secure bore water

...it has been concluded that the groundwater could be classed as secure.

The HDC believes that all the bores supplying the Hastings supply can be considered secure.

Some supply wells have not yet been granted secure status in accordance with the DWSNZ (2005) by the MoH.

Hastings/Havelock North WSP

Event – Wells not secure

Undertake works to obtain security of all well heads

Event – Contaminated water getting into the bore/ well from the surface

Budget for any well head upgrades that may be needed to meet current DWSNZ Secure groundwater criterion.

Aim to achieve secure bore status on all water sources utilised by the Hastings water supplies

Hastings/Havelock North WSP

Source water contamination risks

By 2018, the HDC is required to find an alternative source or mitigate the effects on the nearby Mangateretere stream.

Unfortunately the HBRC accepted claims that the take had potential adverse effects on the nearby Mangateretere stream, and only granted a 10 year renewal period in 2008.....

The HDC will continue to pressure the Regional Council to meet its obligations regarding the NES....

Hastings/Havelock North WSP

Risk Register

A risk rating for each possible event has been estimated based on the likelihood of the event occurring and the consequences (or outcome) if it occurs

Event – Source water (aquifer) receives faecal matter from livestock or feral animals

Risk level – Almost certain x Insignificant

Indicators for action - Quality change in water – Source water $\geq 1/100\text{mL } E. coli$ or Nitrate/Nitrite/Sulphate >50% MAV or trending increase

Estimated Mitigated Risk - Low

Hastings/Havelock North WSP

Table 5: Likelihood Rating Scale Applied to Risk Events

Likelihood Frequency	Likelihood Description
Rare	May occur only in exceptional circumstances (once in 100 years)
Unlikely	Could occur (once in 20 years)
Possible	Might occur at some time (once in 5 years)
Likely	Will probably occur (once in 1 or 2 years)
<u>Almost Certain</u>	Is expected to occur in most circumstances

Table 6: Consequence Rating Scale Applied to Risk Events

Consequence Ranking	Impact on Public Health and Safety	Effects on Continuity of Supply
<u>Insignificant</u>	No apparent impact	Up to 8 hours
Minor	Minor illness reported	Up to 24 hours
Moderate	Medical treatment required	Up to 4 days
Major	Hospitalisation required	Long term disruption
Catastrophic	Fatalities	Supply failure

What are the issues that the WSPs highlights?

Communication between organisations

Some infrastructure issues

A lack of clarity about the quality of the source water

A failure to identify, quantify and manage risk

What can we change about how we do WSPs?

Risk management tool or compliance requirement?

Treatment barrier focus or are there other things?

Prepared for us or done with/by us?

Collaboration?

What's missing from New Zealand's WSPs?

Critical Control Point – process control summary

Chlorine operational day-to-day monitoring of control processes	
What	FAC concentration in mg/L.
When	Daily in the distribution system, weekly at the treatment plant.
Where	Daily in the distribution system at a designated sample point, weekly at the treatment plant.
How	Portable spectrophotometer
Who	Whitehouse Contractors operator.
Records	All data are recorded into a log book and held by Council.

What's missing from New Zealand's WSPs?

Process performance criteria at the operational monitoring point.		Correction required if performance criteria are not met.
Target Range	<p>0.4mg/L in distribution zone</p> <p>1 mg/L to 1.2mg/L in water leaving the treatment plant</p>	<p>Operator to adjust chlorine dose rate so that FAC is within target range in water leaving the treatment plant.</p> <p>Operator to adjust chlorine dose rate to above target range in water leaving the treatment plant if FAC in the distribution zone is below target range.</p>
Action Limits	<p>0.3mg/L in distribution zone</p> <p>0.9mg/L in water leaving the treatment plant</p>	<p>Operator to adjust chlorine dose rate so that FAC is within target range in water leaving the treatment plant.</p> <p>Operator to adjust chlorine dose rate to above target range in water leaving the treatment plant if FAC in the distribution zone is below target range.</p> <p>Operator to notify Utilities Manager</p>
Critical Limits	<p>0.2mg/L in distribution zone</p> <p>0.8mg/L in water leaving the treatment plant</p>	<p>Operator to notify Utilities Manager if critical limit is reached in distribution zone or water leaving the treatment plant</p> <p>If a FAC cannot be maintained above 0.2mg in the distribution system, the Utilities Manager must consider issuing a Boil Water Notice in association with the DWA.</p> <p>Operator to adjust chlorine dose rate so that FAC is within target range in water leaving the treatment plant.</p> <p>Operator to adjust chlorine dose rate to above target range in water leaving the treatment plant if FAC in the distribution zone is below target range.</p>

UN Sustainable Development Goals

Universal, not just for developing countries
Supported by the NZ Government

6. Ensure availability and sustainable management of water and sanitation for all.

6.1 By 2030, achieve universal and equitable access to safe and affordable drinking water for all.

6.5 By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate.