



REPORT OF THE HAVELOCK NORTH DRINKING WATER INQUIRY: STAGE 2

DECEMBER 2017

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Plaza Level, AIG Building, 41 Shortland Street, Auckland
PO Box 796, Shortland Street, Auckland 1140

Email: HavelockNorth.Water@dia.govt.nz

Website: www.dia.govt.nz/Government-Inquiry-Into-Havelock-North-Drinking-Water

Phone: 09 363 9537

Author: Government Inquiry into Havelock North Drinking Water

Date of publication: December 2017

Place of publication: Auckland, New Zealand

ISBN: 978-0-473-41904-2

WHAKATAKI

Ko ngā whakamōhiotanga e pā ana ki ngā wai inu o Heretaunga kua tukuna mai, kua wānangahia hoki e ngā hunga e whai pānga ana ki te Tātāritanga.

Kua tae ki te wā me whakamōhio atu ko ngā mahi e tika ana kia tino kore nei e urutā mai anō te mate whēkau nei.

Ehara i te mea kei Heretaunga anake ngā raru kua tātarihia e mātou, heoi anō kei rohe kē hoki i Aotearoa e kitea ana.

Kua whakaaetia e te katoa he taonga te wai inu. Heoi anō rā he nui ngā tūraru e pā ana ki te wai inu me whakakore, me whakaiti rānei.

Me wawe te whakapaipai i te pūnaha waeture, ā, me rerekē hoki ngā mahi a ngā kaitoha wai inu, me ērā atu hoki e whai wāhi ana ki te tukuhanga o te wai e haumarua ana hei inu mā te hapori whānui.

Kei te ripoata nei ā mātou tūtohunga e pā ana ki ēnei take whakahirahira. Me mātua whakatīnana ināiane. He mōrearea rawa te kore e pērā.

The information regarding the drinking water of the Heretaunga has now been provided and discussed by the interested parties with the Inquiry.

Now it is time to report on what steps should be taken to ensure that a gastroenteritis outbreak does not happen again.

The problems we have examined are not limited to Heretaunga but are also evident in other parts of Aotearoa.

All are agreed that drinking water is taonga. But there are many risks or threats to drinking water that must be eliminated or mitigated.

Improvements are urgently required to the regulatory system and changes need to be made by drinking water suppliers and others engaged in the delivery of safe drinking water to the public.

This report contains our recommendations on these important matters. Action is now required. The risks of doing nothing are just too high.

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LEGEND

CCO	Council Controlled Organisation
CEO	Chief Executive Officer
CDWRG	Canterbury Drinking Water Reference Group
DHB	District Health Board
Drinking-water Guidelines	Guidelines for Drinking-water Quality Management for New Zealand
DWA	Drinking Water Assessor
DWSNZ	Drinking-water Standards for New Zealand 2005 (Revised 2008)
ERP	Emergency Response Plan
ESR	Institute of Environmental Science and Research
FTE	Full-time Equivalent
GNS	Institute of Geological and Nuclear Sciences Ltd
HBRC	Hawke's Bay Regional Council
HDC	Hastings District Council
HPO	Health Protection Officer
IANZ	International Accreditation New Zealand
JWG	Joint Working Group
LGNZ	Local Government New Zealand
NES Regulations	Resource Management (National Environmental Standard for Sources of Human Drinking Water) Regulations 2007
NZS 4411	New Zealand Standard 4411:2001 Environmental Standard for Drilling of Soil and Rock
PHU	Public Health Unit
RMA	Resource Management Act 1991
WSP	Water Safety Plan

PART 1 – INTRODUCTION TO STAGE 2 REPORT

Introduction

[1] In August 2016, there was a major outbreak of campylobacteriosis in Havelock North. In September 2016, the Government established this Inquiry to investigate and report on the outbreak. The Inquiry has proceeded in two stages. The first stage focussed on identifying what happened, the cause of the outbreak, and an assessment of the conduct of those responsible for providing safe drinking water to Havelock North. The Inquiry's report on Stage 1 was issued on 8 May 2017 and a copy of it may be accessed from the Inquiry website.¹

Inquiry Processes for Stage 2

[2] On 23 May 2017, the Inquiry issued a List of Issues for Stage 2. This is also available on the Inquiry website.² The list was prepared in light of the Inquiry's terms of reference, the matters emerging from Stage 1, and submissions from interested parties. It comprised 24 different issues. The key matters for consideration in Stage 2 were the improvement of the safety of drinking water in New Zealand, lessons to be learned from the Havelock North outbreak, and changes which should be made to achieve those goals.

[3] The terms of reference required the Inquiry to investigate and make recommendations in respect of:

- (a) Any legal or regulatory changes or additions necessary and desirable to prevent or minimise similar incidents;
- (b) Any changes or additions to operational practices for monitoring, testing, reporting on and management of drinking water supplies, implementation of drinking water standards, contingency planning, and responses by local and central government to address the lessons from this incident; and

¹ Report of the Havelock North Drinking Water Inquiry: Stage 1: [https://www.dia.govt.nz/vwluResources/Report-Havelock-North-Water-Inquiry-Stage-1/\\$file/Report-Havelock-North-Water-Inquiry-Stage-1.pdf](https://www.dia.govt.nz/vwluResources/Report-Havelock-North-Water-Inquiry-Stage-1/$file/Report-Havelock-North-Water-Inquiry-Stage-1.pdf) ("Stage 1 Report").

² www.dia.govt.nz/Government-Inquiry-into-Havelock-North-Drinking-Water.

- (c) Any other matter which the Inquiry believes may promote the safety of drinking water and/or prevent the recurrence of similar incidents.

[4] In addition, as part of Stage 2, the Inquiry further considered the current and ongoing safety of the Havelock North drinking water supply. Because much of this supply was sourced from the Hastings urban bores following the outbreak, the Inquiry necessarily had to investigate aspects of the Hastings supplies as well. The current safety of the supply was reviewed in detail in December 2016, with the Inquiry issuing an Interim Report and recommendations on 15 December 2016.³ The position was updated in June 2017 and again in August 2017. The Inquiry heard extensive evidence on changes which had been made in respect of the Havelock North drinking water supply, including changes to operational practices, collaboration between agencies, monitoring, reporting, treating the water, and planning for the future.

[5] The Inquiry has continued to obtain independent expert advice from Dr Fricker, an international expert in drinking water safety. His advice was of great value to the Inquiry during Stage 2. In addition, the Inquiry benefited greatly from evidence and submissions made by Dr Deere, the drinking water safety expert retained by HDC. Both Dr Fricker and Dr Deere provided the Inquiry with valuable international perspectives and experiences.⁴

[6] The Inquiry directed that an initial three-day hearing be held between 27 and 29 June 2017 to address two issues: the current and ongoing safety of the Havelock North drinking water supply; and the question of collaboration between agencies responsible for drinking water.

[7] Submissions and fact papers on those two issues were filed with the Inquiry and evidence was heard from the CEOs of HDC, HBRC and the Hawke's Bay DHB. Evidence was also heard from Dr Deere, the Chair of the Hawke's Bay JWG, which had been set up in the course of Stage 1 of the Inquiry to provide a vehicle for collaboration between agencies,⁵ and HDC's Group Manager, Asset Management.

[8] On 14 July 2017, the Inquiry issued a further Interim Report and updated recommendations. A copy of that second Interim Report is annexed as **Appendix 1** to

³ Stage 1 Report at Appendix 2.

⁴ See the Inquiry website for their CVs under "Expert Panels".

⁵ Stage 1 Report at [81]–[82].

this report. A more detailed summary of the Inquiry's findings in relation to the two issues considered at the June hearing is set out below in Part 6 (Ongoing Safety of Havelock North Drinking Water) and Part 9 (Collaboration between Agencies).

[9] The remaining Stage 2 issues were addressed by the Inquiry after June 2017 using two main processes. First, written submissions and factual reports were requested and received from interested parties. A list of submitters, and the submissions, are available on the Inquiry website.⁶ Second, the Inquiry held a further hearing between 7 and 11 August 2017. A transcript of that hearing, and the June 2017 hearing, is on the Inquiry website.⁷

[10] At the August hearing, panels of experts were formed and counsel assisting put questions and propositions to the panels for discussion and debate.⁸ Counsel for interested parties were given an opportunity also to question the experts. Submissions from various parties were able to be explored and tested by this process. The Inquiry found this "hot tub" process highly productive and informative. In addition, at the August hearing, the Inquiry heard further evidence from the CEOs of key agencies and from the Director-General of Health, Mr Chuah.

[11] The Inquiry has carefully considered all written submissions, as well as all of the evidence and material produced at the June and August hearings. It acknowledges the high standard of submissions and reports received from interested parties and the high quality of the debate from the expert panels and it has been greatly assisted by these materials.

[12] The Inquiry's findings and recommendations in relation to key Stage 2 issues are set out in this report.

Urgent and Early Action Needed

[13] As contemplated by its terms of reference, some of the Inquiry's recommendations would, if accepted, involve changes to the existing law, and others are likely to require detailed reviews or updates. The Inquiry appreciates that these processes will take time.

⁶ At <https://www.dia.govt.nz/Stage-2-Submissions>.

⁷ At <https://www.dia.govt.nz/Court-Transcripts-for-Stage-2>.

⁸ A summary of the qualifications and experience of those panel members may be found on the Inquiry website under "Expert Panels": <https://www.dia.govt.nz/Government-Inquiry-into-Havelock-North-Drinking-Water-Expert-Panels>.

[14] Other recommendations will not need a change to the law and can be implemented promptly, and without undue difficulty. In light of the public health and safety risks involved, and given the disastrous consequences which can occur following contamination of drinking water, the Inquiry's view is that implementation of such recommended changes should take place as a matter of urgency. Some of these measures have already been accepted as appropriate by interested parties, and are being pursued. The Director of Public Health should oversee this process.

[15] Part 23 below sets out the Inquiry's findings and recommendations in respect of urgent and early steps which are needed to improve the safety of drinking water and to prevent a recurrence of an outbreak of waterborne illness.

Standard of Care and Diligence

[16] Before turning to each of the key issues considered in Stage 2, it is appropriate to record one overarching principle which underpins all of the Inquiry's assessments and recommendations, namely, the very high standard of care and diligence which should apply to the supply of drinking water.

[17] The potential for contamination of drinking water to cause widespread illness and, potentially, deaths was clearly seen from the August 2016 outbreak at Havelock North.⁹ With only slightly different circumstances and/or a different pathogen, the outcomes of this outbreak could have been substantially worse.

[18] The material made available to the Inquiry has impressed on it the extent of harm which can be caused to a community. The Inquiry is satisfied that this, and the risks to public health from unsafe drinking water, justify the application of the highest standards of care. In addition to sickness and suffering on a large scale, an outbreak of waterborne illness also causes substantial financial consequences and disruptions to schools, hospitals, and other workplaces and public facilities generally.

[19] As is discussed later in this report, experts have estimated that, in addition to mass outbreaks, between 18,000 and 100,000 sundry cases of sporadic waterborne

⁹ The Inquiry was advised on 24 October 2017 by the Hawke's Bay DHB that it had identified a fourth death that was likely to have been linked to the August 2016 outbreak. The negative test for campylobacter at the time was a "false negative" due to the antibiotics the person was taking at the time.

illness occur each year. Some thought the true number could be higher.¹⁰ The state of knowledge and awareness of the risks from drinking water has come a long way since Part 2A of the Health Act was debated in the House in 2007. A common theme then was that there was little evidence that New Zealanders have had any problems with water-borne diseases. Subsequent events and a greater awareness of the realities have demonstrated that this is simply not the case. Indeed, this Inquiry has established clearly that the opposite is true.

[20] Very high standards of care are required for providers of services that can make people sick or injure or kill them (for example, surgeons, pilots or operators of dangerous machinery and food processing equipment). The supply of drinking water is no different. Drinking water contamination has the potential to affect extraordinarily large numbers of people and to cause harm at a level which is extremely serious to individuals, communities, businesses, New Zealand's tourism industry and to society as a whole. Drinking water risks are imposed on all consumers, including many who are particularly vulnerable to illness. The Inquiry referred to the need for a high standard of care in its Stage 1 Report; no demur to this was raised in Stage 2 by any party. Moreover, the need for a high standard of care is recognised in Principle 1 of the six principles discussed in Part 2.

[21] In addition to its findings in Stage 1, the Inquiry received credible evidence in Stage 2 indicating that complacency was common within the drinking water supply system in New Zealand. Complacency was a theme permeating the submission of Dr Hrudehy, an international expert in drinking water outbreaks, filed by Water New Zealand. All experts were agreed on this point. The Inquiry has accepted that the risks to drinking water can be sporadic and poorly understood and thus provide fertile ground in which complacency can grow among drinking water suppliers, local body politicians whose councils in many cases own the water infrastructure, as well as health professionals, including DWAs and officials within the Ministry of Health responsible for drinking water. The inherent tendency to complacency also justifies a very high standard of care and diligence.

¹⁰ See **CB230** at paragraph 1.1. Core bundle documents are available on the Inquiry website: <https://www.dia.govt.nz/Core-bundle-documents---Stage-two>. See also the transcript of the August 2017 hearing at pp 43-46. Transcripts from all of the Inquiry's hearings are available on the website: <https://www.dia.govt.nz/Court-Transcripts-for-Stage-2>.

[22] The Inquiry has therefore concluded that all participants in the drinking water system should adhere to the very highest standards of care and diligence and that this should be accepted as an overarching principle informing all issues relating to drinking water supply.

[23] The Inquiry found in the Stage 1 Report that these standards were not met. It urges those responsible for considering and implementing the Inquiry's recommendations to embrace unreservedly the need for high standards of care and diligence by all involved in the drinking water regime.

Self-suppliers

[24] This report records the Inquiry's findings and recommendations in respect of networked supplies. Under s 69G of the Health Act, a networked supplier is defined as a drinking water supplier who supplies drinking water from the place where the supply is to one or more other properties by means of a pipe connecting those properties (but does not include a bulk supplier). However, for many of the issues dealt with in this report, recommended changes should also be considered for those self-suppliers which involve supply beyond a private household. In some cases self-suppliers provide drinking water to significant numbers of people. Examples include some prisons, rural schools, marae, ski fields, Lincoln University and hospitals such as those in Hawke's Bay, Christchurch and Ashburton. The 2017 Register maintained under s 69J records that there are 106,973 people served by specified self-suppliers.

[25] The Inquiry recommends that the Government and the various agencies considering this report, give careful consideration, in the case of each recommended improvement, to whether some definition or category of self-suppliers should also be included in reforms. The Health Act currently recognises a particular category of self-suppliers being those which supply water to community-purpose buildings¹¹ owned by them (specified self-suppliers: s 69J(1)(b)) and this would seem the most obvious level or type of self-supply to be considered. However, there may be other self-suppliers which should be considered for inclusion, such as those providing food or accommodation to the public.¹²

¹¹ An undefined and rather obscure term.

¹² As discussed at [318] and [902] below.

PART 2 – PRINCIPLES OF DRINKING WATER SAFETY

Introduction

[26] Principles of drinking water safety have been developed internationally to address the basic problem for all suppliers – that supply systems are vulnerable in countless ways to contamination and a single vulnerability has the potential to cause widespread illness in consumers.

[27] The Inquiry has concluded that addressing this basic problem in New Zealand requires recognition of six fundamental principles. These principles are ingrained in good practice worldwide and should imbue every aspect of the New Zealand approach to drinking water.

The Evidence

[28] A number of principles permeate the DWSNZ and the Drinking-water Guidelines, including the multiple barrier principle and preventive risk management. These principles are not, however, identified as principles or drawn together in any meaningful way. The New Zealand drinking water regime does not therefore currently explicitly identify a set of fundamental principles to guide decisions on drinking water.

[29] The Inquiry was grateful to receive evidence from Dr Hrudehy, who identified that the Australian Drinking-water Guidelines incorporate six well-established principles for safe drinking water. The principles were developed in 2001 by a working group comprising the World Health Organisation microbial pathogens expert group and the Medical Research Council of Australia. The principles are a key part of the Australian drinking water strategy. Several of these principles are also reflected, though their expression differs, in the World Health Organisation Guidelines for Drinking-water Quality and the drinking water strategies adopted in the United States, Canada and elsewhere.

[30] The Inquiry sought comment on the six Australian drinking water principles from its expert panel comprised of Dr Fricker, Dr Deere, Mr Rabbitts, Dr Nokes, and Mr Graham. The experts were unanimous in their agreement that these principles reflected good international practice.

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 embraced¹³

Unsafe drinking water can cause illness, injury or death on a large-scale. All those involved in supplying drinking water (from operators to politically elected representatives) must therefore embrace a high standard of care akin to that applied in the fields of medicine and aviation where the consequences of a failure are similarly detrimental to public health and safety. Vigilance, diligence and competence are minimum requirements and complacency has no place.

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 3: Maintain multiple barriers against contamination

Any drinking water system must have, and continuously maintain, robust multiple barriers against contamination appropriate to the level of potential contamination. This is because no single barrier is effective against all sources of contamination and any barrier can fail at any time. Barriers with appropriate capabilities are needed at each of the following levels: source protection; effective treatment; secure distribution; effective monitoring; and effective responses to adverse signals. A “source to tap” approach is required.

Principle 4: Change precedes contamination

Contamination is almost always preceded by some kind of change and change must never be ignored. Sudden or extreme changes in water quality, flow or

¹³ This is the overarching principle reflected in the Stage 1 Report and emphasised in Part 1 of this report at [16]–[23].

environmental conditions (for example, heavy rainfall, flooding, earthquakes) should arouse particular suspicion that drinking water might become contaminated. Change of any kind (for example, personnel, governance, equipment) should be monitored and responded to with due diligence.

Principle 5: Suppliers must own the safety of drinking water

Drinking water suppliers must maintain a personal sense of responsibility and dedication to providing consumers with safe water. Knowledgeable, experienced, committed and responsive personnel provide the best assurance of safe drinking water. The personnel, and drinking water supply system, must be able to respond quickly and effectively to adverse monitoring signals. This requires commitment from the highest level of the organisation and accountability by all those with responsibility for drinking water.

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.

[32] The Inquiry recommends that the six fundamental principles of drinking water safety be recorded and promulgated to the industry and used to inform all recommended reforms, as well as the operation of the entire drinking water system.

PART 3 – GENERAL RISK LANDSCAPE

Introduction

[33] This part identifies a number of the known and unknowable risks to New Zealand's drinking water, the difficulties of controlling for such risks, and the reality that these difficulties are likely to increase with climate change, intensification of farming, population growth and urban sprawl. It then explains the serious consequences that arise when these risks materialise in an outbreak or sporadic illness.

[34] A proper appreciation of the nature of the relevant risks is fundamental to understanding the operative regulatory system and the roles of the various participants in it (including water suppliers, local authorities, politicians, regulators and Ministry of Health officials). Such an appreciation drives the Inquiry's conclusions, throughout this report, as to how best to ensure that safe drinking water is provided to New Zealanders.

Pressing Risks

[35] The direct cause of drinking water disease outbreaks is invariably the contamination of drinking water by microbial pathogens from human or animal faecal matter in sufficient numbers to infect humans and cause disease. Faecal sources of pathogens are found anywhere there are people, pets, livestock, birds or wildlife. Due to the large number of microbial pathogens per unit, extremely small quantities of faecal matter may contaminate drinking water to levels capable of causing illness. Across a longer time span, the chemical composition of drinking water may also pose a significant health risk.

[36] Waterborne disease outbreaks and altered chemical composition often arise following some change in circumstance, termed "events". Such 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. For this reason, the safety of a supply or security of a source can never be assumed to remain static even where, at one point in time, reasonable confidence exists.

[37] Other important risks are addressed under the subheadings below.

Groundwater Source Risks

[38] By way of example, a groundwater source cannot reliably be classified as safe from surface contamination. Changes to the aquifer and surrounding hydrology can occur, bores can be placed into the aquifer and the aquitard can be compromised. Prevention of groundwater contamination through any of these mechanisms cannot be guaranteed.

[39] 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. Earthquake shaking, or even more subtle influences, such as earth and ocean tide loadings, can influence groundwater flow pathways in the subsurface, fracture or breach aquitards, and turn confined aquifers to semi-confined as a result of changes in vertical permeability.¹⁴ Given the depth at which these changes can occur, contamination may exist long before a problem is recognised.

[40] In New Zealand, earthquakes pose a particular risk and have the potential to compromise the integrity of wells and reservoirs, alter the flow of an aquifer, cause an aquitard to fail, and damage piped distribution systems. GNS advised that large earthquakes can cause changes to pressure and flow of groundwater in aquifers at distances hundreds and even thousands of kilometres from the epicentre of an earthquake, and that there are many examples where shaking has induced long-term changes to water levels, aquifer performance, turbidity and chemistry, or caused damage to pumps and infrastructure.

[41] This links to the reality that New Zealand aquifers tend to be accessed by a large number of known and unknown bores in addition to the drinking water bores. The more holes drilled in the layer of protection of a secure aquifer, the more likely it is that there will be a failure, and therefore a contamination event. It is difficult for the water supplier to manage risks around bores it does not control. The Havelock North contamination highlighted these difficulties.¹⁵ There were numerous private bores across the catchment, some of them known, some of them not, and some providing

¹⁴ Dr Simon Cox (GNS) "Submission: Preparing for the effects of earthquakes on aquifers" (15 July 2017) at [3]: Fact Paper #20 on the Inquiry website.

¹⁵ See the Stage 1 Report at [354]–[359].

risks of direct contamination pathways. Moreover, the drinking water bores themselves were in a condition typical for their age.

[42] Bores may allow contamination to enter the water, as cracks and holes may form in well casings, concrete seatings and aprons or covers through age, corrosion, seismic events, or wetting and drying cycles. Similarly, seals may fail around sections of bores, cable entries, and inspection covers. Maintenance may also introduce contamination, and the risks with below-ground bore heads are inherently greater, particularly with adverse weather. Loss of bore security, even for minutes, may allow levels of pathogens that are sufficient to cause infection to enter the bore such that waterborne contamination and disease outbreaks arise before that failure is detected. These issues are compounded by the fact New Zealand's public-sector investment in infrastructure has historically been lumpy and many bores are old and poorly maintained, and thus more susceptible to these events occurring.

[43] Each of the above risks primarily arises in respect of groundwater sources that are of good quality. But the risks to source water do not end there.

Additional Risks to Source Water

[44] A wide range of other risks may impact the quality of source water, posing particular difficulties to the supply of safe water. Source water quality can be influenced by both natural and human use factors. Important natural factors include wildlife, climate, topography, geology and vegetation. Human use factors include wastewater or sewage discharges and the fact that sewerage and drinking water assets may be in close proximity.

[45] The Inquiry heard evidence that human sewage is a common source of outbreaks,¹⁶ and a particular risk for New Zealand given the proximity of sewerage and drinking water assets, combined with the earthquake risk. Dr Deere gave evidence at the Inquiry's June 2017 hearing that he was surprised on his visit to Hastings as he had "never seen drinking water bores that close to sewerage assets before, even in developing countries". The risk from the proximity of these assets is exacerbated by the fact the systems are ageing, liable to leakage, and situated underground so that failure is difficult to detect. These assets are also susceptible to damage in an earthquake.

¹⁶ See the Stage 1 Report at Appendix 7.

[46] The risks from the proximity of these two types of assets were exemplified in the 2011 Christchurch earthquake.¹⁷ The city's drinking water and wastewater assets suffered extensive damage and the drinking water supplies were contaminated when sewerage and drinking water pipes cracked causing mixing of sewage and drinking water. Millions of litres of raw untreated sewage also leaked into backyards, rivers and the sea. On a lesser scale, in May 2017, effluent from a Waiheke Island school's on-site wastewater treatment system infiltrated the associated drinking water system through cracking in the storage tanks or distribution system.¹⁸ In each case, fortunately, no outbreak was detected.

[47] Other factors such as illegal, unconsented, or inadequately consented activities in the catchment also impact on the quality of source water. In general, the quality of New Zealand's rivers and streams has been degrading due to human use activities and intense agriculture.¹⁹ Activities such as illegal earthworks or connections; discharges of nitrates upstream of collection areas or into water sources; building piles; the use of herbicide and pesticides and, more generally, pollutants from farmland; urban land use activities; forestry; and the discharge of raw or inadequately treated sewage all pose hazards.

[48] Another potential hazard is landfill sites, either current or disused. As with many of the risks discussed in this part, contamination from landfill sites (particularly to groundwater) may be difficult to detect and the extent of the problem in any particular situation is unknown. What is known is that New Zealand has over 1,000 closed landfills, many of which were poorly constructed and managed, and from which there is a continuing risk of contamination from leachate to ground or surface water sources.²⁰ The consent conditions for current landfills are more stringent but the Ministry for the Environment has acknowledged that non-compliance with consent conditions may not be uncommon.²¹ This is borne out through recent incidents such as the contamination

¹⁷ R Brears "The Effects of the Earthquake on Urban Freshwater Resources in Christchurch" (2010) *American International Journal of Contemporary Research* 2(10) at 145.

¹⁸ Auckland Regional Public Health Service "Submission on Government Inquiry into Havelock North Drinking-Water (Stage 2 issues)" (21 July 2017), p 4.

¹⁹ For further information, see <https://www.mfe.govt.nz/publications/environmental-reporting/our-fresh-water-2017> and <https://www.lawa.org.nz/explore-data/>.

²⁰ Ministry for the Environment "A guide to the management of closed and closing landfills" (May 2001); Auckland Regional Plan, ch 5; Waikato Regional Council "Waste disposal sites": <https://www.waikatoregion.govt.nz/Services/Regional-services/Waste-hazardous-substances-and-contaminated-sites/Solid-waste/What-happens-to-our-waste/Waste-Disposal-Sites/>.

²¹ Ministry for the Environment "Review of the effectiveness of the waste disposal levy 2017" (July 2017), p 62.

of Wellington's Owhiro Stream when a landfill company failed to comply with the conditions of its consent and construct a wetland to capture and treat leachate, or to construct a clean stormwater diversion system.²²

[49] Another risk to drinking water arises from deteriorating infrastructure assets. A recent example occurred in Marton where ageing asbestos cement pipes disintegrated over time and eventually collapsed causing, at the least, severe discolouration of drinking water.²³ Such pipes were common from the 1950s to 1970s and have a lifespan of around 50 years. Water New Zealand has estimated there are currently 9,000 kilometres of similar pipelines in New Zealand (out of a total of 34,436 kilometres) and that many of these are reaching the limit of their lifespan and will need to be replaced.²⁴ The cost of replacement is estimated to be around \$2.2 billion. As the Marton example demonstrates, once these pipelines reach the limit of their lifespan, they may collapse and impact on the quantity or quality of the drinking water supply.

[50] As with the sewage and landfill examples discussed above, many of New Zealand's water sources, storage and distribution systems are located in close proximity to urban and agricultural activities. It may be difficult to limit these potentially polluting activities, given competition for water and pressure for increased development in catchments. This creates increased challenges for treatment, and if no treatment exists, the risks are even greater.

Weather Events

[51] The Inquiry heard evidence that there is a significant association between waterborne outbreaks and severe weather events. This association was demonstrated in the Havelock North outbreak.²⁵ A major storm in Auckland in March 2017 also demonstrated the difficulties that severe weather events pose even for the largest

²² <http://www.stuff.co.nz/environment/87192522/Landfill-firm-under-investigation-after-contaminants-found-in-Owhiro-Stream> (5 December 2016).

²³ <https://www.tvnz.co.nz/one-news/new-zealand/its-absolutely-revolting-marton-residents-fed-up-decades-brown-tap-water> (19 September 2017).

²⁴ [http://www.radionz.co.nz/news/national/300156/\\$2-point-2b-to-replace-nz%27s-asbestos-pipes](http://www.radionz.co.nz/news/national/300156/$2-point-2b-to-replace-nz%27s-asbestos-pipes) (29 March 2016).

²⁵ See the Stage 1 Report at [218] and the list of worldwide outbreaks identified by Dr Hrudey consequent upon significant rainfall or flooding in his "Evidence prepared for Water New Zealand" (16 March 2017), p 36–38.

suppliers.²⁶ The Inquiry heard from the Auckland Regional Public Health Service that the storm severely affected source water quality in the storage lakes in the Hunua ranges and reduced production capacity at the Ardmore water treatment plant. Water from two lakes received very high sediment load from run-off in the catchment, which included felled production forest land. Following a direction to all of Auckland's residents to conserve water, a boil water notice was narrowly avoided.²⁷

[52] Following heavy rain and flooding, surface water sources may become turbid, water quality can decrease due to high sediment load run-off, treatment barriers can fail, production capacity may be reduced, aquitards can fail, and shallow flow paths in an aquifer may allow contaminated water to proceed through to the reticulation unnoticed. Moreover, storms can interrupt electricity or telecommunications (telemetry) networks with devastating effect. The above discussion of the widespread nature of pollutants illustrates why there is such a risk from heavy rain and flooding carrying these pollutants into the water source.

[53] Adverse weather events may cause hazards to arise in an aquifer, or surface water source, that, under ordinary conditions, has a low likelihood of being contaminated by pathogens. If testing does not occur throughout, or the risk is not appreciated, intermittent contamination from a usually safe source may be missed.

Contamination in the Reticulation

[54] Even where the source water is protected from surface influences, or treatment is adequate despite the difficulties of widespread pollutants and adverse weather, separate contamination routes into the reticulation network exist. These include backflow, leakage (as all systems tend to leak), earthquakes fracturing pipes or storage tanks, contamination of storage tanks, or contamination through system maintenance.

The Human Error Factor

[55] As the Stage 1 Report established, the risks arising from inadequately knowledgeable, resourced, and committed personnel cannot be understated. Nor can

²⁶ Auckland Regional Public Health Service "Submission on Government Inquiry into Havelock North Drinking-Water (Stage 2 issues)" (21 July 2017), p 4: <https://www.dia.govt.nz/Stage-2-Submissions>.

²⁷ <http://www.radionz.co.nz/news/national/327264/auckland-water-supply-still-weeks-away-from-normal> (23 March 2017).

the essential public health function of water suppliers and their crucial role in guarding against contamination events be overstated.

[56] The Inquiry received evidence from Dr Hrudehy that a common theme across all of the international outbreaks is one of complacency. Outbreaks are comparatively rare and have a tendency not to be front of mind for public health officials, suppliers or consumers. However, to avoid an outbreak, the ever-present possibility of contamination (and the severity of its effects) must be remembered, lessons learned from outbreaks or close calls, lessons recorded in institutional memory, and practices improved. Human error is inevitable and an adequate system must be in place to guard against it.

[57] The Havelock North outbreak illustrated the risks of human error and complacency. By way of non-exhaustive example, the Inquiry found that HDC did not learn from a similar outbreak in 1998; made errors in its assessments of the risks to its drinking water supply; delayed the preparation of a WSP; did not properly manage the maintenance of plant equipment or keep records of that work; and carried out little or no supervision of necessary follow up work which it contracted out. The consultancy firm MWH Ltd failed competently to assess and report on a central issue, the security of the bore heads of Brookvale Road bores 1 and 2. The DWAs, in turn, failed to press HDC about its failures or require rectification. Although the Inquiry did not find any of these failures were directly causative of the outbreak, it concluded that had any of these failures not occurred, a different outcome may have resulted.

[58] The risk of human error has continued to present itself, despite the learnings available to water suppliers from the Stage 1 Report. In August 2017, Dunedin City Council staff were repairing a reservoir containing untreated water.²⁸ This required the water level in the reservoir to be lowered and raw water was, incorrectly, emptied directly into the reticulation without treatment. The Council was only alerted to the issue when it received complaints about murky water from residents. Upon investigating, the Council concluded that its paperwork incorrectly showed that the pipes into which the reservoir was emptied were not connected to the drinking water system. A boil water notice was then issued.

²⁸ Dunedin City Council “Dunedin boil water notice updated” (17 August 2017): <http://www.dunedin.govt.nz/your-council/latest-news/august-2017/dunedin-city-council-boil-water-notice-update3>.

[59] This exemplifies the need for a water supplier to understand fully its water supply system and to respond quickly and effectively once there is an indication that something is not right. It will be vital that Dunedin City Council learns from this experience, embeds the lesson in its institutional memory, and establishes a system to protect against the inevitability of human error.

The Nature of the Risks

[60] The various risks described in this part, depending upon the applicable circumstances of the water source, extraction, reticulation, storage and delivery, may range from low to serious. But risks they are.

[61] The existence of a particular risk will not invariably lead to disaster because, as the Inquiry recorded in its Stage 1 Report, outbreaks happen when the multiple barriers and safeguards that separate injurious hazards from vulnerable people or assets are breached.²⁹ The multiple barrier approach, which is identified as a fundamental principle of drinking water safety in Part 2 of this report, seeks to guard against the inevitability and ubiquity of risks, including those described in this part. Each time a risk eventuates, a hole is created in the multiple barriers of defence, but a serious event will only occur when holes in each of the necessary multiple barriers align.

[62] It was this alignment, and the inadequate multiplicity of barriers, that combined to cause the Havelock North outbreak.³⁰ As Part 4 below explains, the problem in New Zealand is that there currently exist such widespread “holes” in the limited barriers of defence that their alignment is occurring regularly and making people ill.

[63] Risk management aims to prevent this alignment of holes but it is complicated by the differing levels of knowledge that exist about particular risks and the likelihood of their eventuating. Some risks are known, some are able to be known, and some are neither known nor knowable. For example, the human error factor is a known risk (although how it will manifest is not) and is something that systems and processes ought to guard against. On the other hand, there remains uncertainty around the effect of seismic disturbance of any particular aquifer or aquitard, in any particular earthquake. This difficulty is magnified when aquifers or aquitards at a distance from the epicentre of an earthquake are considered, and by the reality that it is impossible to

²⁹ This is the “Swiss cheese” model of organisational accidents devised by Professor James Reason of Manchester University.

³⁰ See Stage 1 Report at [237]–[238].

see directly what effect, if any, an earthquake has had on an aquifer which is deep underground.

[64] The Inquiry received evidence that the risks to drinking water are increasing. Climate change, extreme weather events, increased intensification of farming, earthquakes, population and urban growth and ageing infrastructure are all increasing the risks described above. Climate change may foster greater extremes in weather, including more frequent and longer spells with much higher peak temperatures, droughts, greater frequency of heavy precipitation and violent storms. This puts a strain on New Zealand's drinking water, wastewater and stormwater infrastructure.³¹

[65] Intensification of farming is likely to increase the risks from faecal sources of pathogens, fertiliser run-off, contamination from nitrates and competition for water. Further, a reduced flow in waterbodies can of itself degrade water quality. For example, in surface water, lower flows may result in higher water temperatures and more algal and cyanobacterial growth, some of which can produce toxins.

[66] An increasing population alongside climate change and intensified farming is likely to place an additional strain on the quantity and quality of water available in the near future. Although this part has primarily focused on the risks of poor quality drinking water, a lack of drinking water is a significant public health risk in itself. Additionally, a larger population increases the risks of pollution from urban stormwater, sewage and other land-use activities. The details of how these predicted increasing risks will play out are, however, not necessarily known.

The Consequences of these Risks

[67] No assessment of the risk landscape would be complete without mentioning the likely effects of an outbreak arising from the materialisation of such risks. International Risk Management Standards (such as ISO 31000:2009 and AS/NZ 31000:2009) recognise that risk is the product of both probability and consequence. Thus even though the probability of a particular risk may be low, if the consequence is high, the risk must be either eliminated or mitigated and monitored.

³¹ Deep South National Science Challenge "Climate Change and Stormwater and Wastewater Systems": http://www.deepsouthchallenge.co.nz/sites/default/files/2017-10/Climate%20Change%20Stormwater%20Wastewater%20Systems_0.pdf.

[68] In the drinking water context, in the past consumers would obtain their water by using a bucket drawn from a private or public well. Engineering and technology advances now enable source to tap delivery of drinking water via a cost effective and efficient distribution system. But it is this very infrastructure that is also the means by which waterborne disease may spread widely and rapidly. Accordingly, the effects to public health can be extremely damaging.

[69] The Havelock North outbreak offers a typical example. Over one third of the inhabitants of the town of 15,000 were struck down by campylobacteriosis. Such impacts are not unusual where E.coli or other pathogens are the source of the waterborne disease. The Inquiry in Stage 1 heard evidence that typically an outbreak of waterborne disease may affect up to 40 per cent or more of the population. By way of example, in 2001 a cryptosporidium outbreak in North Battleford, Canada affected up to 47 per cent of the population (7,100 out of 15,000) and in 2010, in Sweden, an outbreak of cryptosporidiosis affected 45 per cent of the town's population (27,000 out of 60,000).

[70] It is the severe nature of the impacts to the public, and the speed of distribution, that make the risks associated with waterborne disease so concerning. Consequently, the risks simply cannot be ignored or downplayed.

[71] This is particularly so given that waterborne disease outbreaks are not uncommon in New Zealand. Appendix 7 to the Inquiry's Stage 1 Report recorded that in the 10 years preceding the Havelock North outbreak there were 13 other recorded waterborne outbreaks, fortunately on a smaller scale. The costs of such outbreaks nevertheless remain significant. **Appendix 4** to this report is a schedule of media-reported drinking water quality issues in New Zealand. Although this covers only the period of the Inquiry, it contains no less than 50 entries (to 17 November 2017).

[72] Sapere Research Group (contracted by the Ministry of Health) has estimated the total economic costs to society of the Havelock North outbreak to be just above \$21 million.³² The most significant portion of this figure is comprised of household costs (\$12.4 million) which impact on households sourcing alternative drinking water, taking time off normal activities or boiling water. These costs were estimated to be around \$2,440 for each of the 5,088 households affected.

³² Sapere Research Group "The Economic Costs of the Havelock North August 2016 Waterborne Disease Outbreak" (August 2017): **CB231**

[73] There were also significant costs to local government (HDC and HBRC) in the region of \$4.1 million. These costs related primarily to the initial sourcing and confirmation of the outbreak (for example, expert reports, testing, planning and setting up response teams) although residual costs relating to ongoing monitoring, testing, rates rebates, information campaigns and the costs of responding to this Inquiry also featured heavily.

[74] Other significant costs include \$2.5 million in health-related costs (primarily lost productivity and the costs of obtaining medical care) and \$1.3 million in costs to businesses (mostly loss of revenue and out of pocket costs). Additionally, the outbreak is estimated to have cost central government around \$500,000, and non-governmental organisations around \$135,000 (for example, Red Cross and Healthline).

[75] This estimation of the economic costs probably understates the total burden of the outbreak on New Zealand. As Sapere Research Group observed, “not all costs are amenable to quantification and monetisation.” In particular, “public faith in the quality of water is extremely difficult to measure” as is the stress and “scarring” effect of the outbreak on residents.

[76] The Inquiry agrees, and adds that the value of human life, pain and suffering, or the benefits of ensuring New Zealand is a place where there is equal access to safe drinking water (a necessity) cannot adequately be reflected in such economic analyses. Dr Culham, a leading Havelock North General Practitioner with a practice which serves most of the village, recalled that the first Saturday of the outbreak “was the worst day I’ve ever had as a doctor”:

The nature of the disease is that it goes on – 5 days, 7 days. People coped well for the first 48 hours but you can only do it for so long.

We concentrated on those most at risk, the elderly, frail, those with other medical conditions and small children. It became apparent early that the elderly were really suffering and they were a big group of people who needed support.

[77] Additionally, Sapere Research Group did not consider the effect on New Zealand’s international tourism or export market,³³ nor the \$12 million HDC has allocated to spend over the 2017-2018 financial year on upgrading its drinking water supply infrastructure. The same could be said for financial provisioning being made by

³³ See for instance “Water crises damages New Zealand’s clean green image”: <http://www.nzherald.co.nz/index.cfm?objectid=11900771&ref=twitter> (12 August 2017).

other local authorities following the learnings from this Inquiry. Recent events in Napier are a good example of an emerging awareness of the extent of the problems.

[78] On a lesser scale, in 2012, there was an outbreak of campylobacteriosis from drinking water in Darfield with 138 confirmed or probable cases and a best estimate of 1,283 people affected. The costs of lost production were conservatively estimated at \$544,316 but it was acknowledged that the costs may have been as high as \$1.26 million.³⁴ This estimate did not account for intangible costs such as suffering, pain, lost social or leisure options, or any effect on tourism. Sheerin et al did, however, note that whilst Darfield is a small town, it is located on a significant highway close to the Christchurch urban area and there are a large number of people who travel through for work, study and leisure who were also exposed to the contaminated water.

[79] As in Darfield, New Zealand suppliers with the greatest risk of supplying unsafe water tend to be small suppliers responsible for tourist towns. Punakaiki, discussed further in Part 4 of this report, is one such example. Whilst it only has 230 permanent residents, it receives an estimated 500,000 tourists per year and its water supply does not comply with the DWSNZ.

[80] This potential impact on tourism magnifies the cost of the waterborne disease outbreak for New Zealand. A report obtained by the Ministry of Health in 2010 on the costs of the waterborne disease burden from the Law and Economics Consulting Group noted:³⁵

... if an outbreak of disease occurred in New Zealand due to drinking water, and that outbreak were of sufficient size or severity to garner international media attention, that this might affect export markets and potential tourism activity. However, we have not found any studies that estimate the size of the impact that would occur, either for NZ or other countries.

[81] The Inquiry has similarly been unable to identify studies estimating the size of this impact. Nevertheless, the Havelock North outbreak was reported internationally and in the aftermath, University of Auckland lecturers in marketing and business studies highlighted that both New Zealand's tourism and export businesses are dependent on New Zealand's clean, green image.³⁶ Adverse publicity from waterborne

³⁴ I Sheerin, N Bartholomew, C Brunton "Estimated community costs of an outbreak of campylobacteriosis resulting from contamination of a public water supply in Darfield, New Zealand" (2014) 127 NZMJ 13.

³⁵ **CB230.**

³⁶ <http://www.nzherald.co.nz/index.cfm?objectid=11900771&ref=twitter> (12 August 2017).

outbreaks taints this image and may persist for some time.³⁷ Repetitive outbreaks could damage New Zealand's reputation permanently.

[82] The consequences of risks materialising have thus far been explained by reference to the risks of an outbreak. However, as explained in Part 4 of this report, a large proportion, if not the vast majority, of New Zealand's waterborne disease burden arises not from significant outbreak events, as in Havelock North, but from underlying, sporadic waterborne illness that is never linked to a particular outbreak.³⁸ It is estimated that some 18,000 to 100,000 people become ill in this way from consuming drinking water every year and that the economic costs (not to mention the intangible costs relating to the pain and suffering caused) are in the region of \$12.4 million to \$23.7 million per annum.

Concluding Remarks: Relevance of a Proper Understanding of the Risks

[83] The manifold risks outlined in this part and the serious consequences when those risks materialise in an outbreak or illness arising from systemic failure have driven the Inquiry's articulation of the fundamental principles of drinking water safety in Part 2, and its conclusions and recommendations throughout this report.

[84] It follows that New Zealand's drinking water strategy must be informed, at all times, by an appreciation of the ubiquitous nature of the risks to drinking water and the seriousness of the consequences of failing to supply safe drinking water. The existence of these risks and the severity and reach of their consequences provides a significant part of the social policy justification for the necessary improvements to the regulatory regime.

[85] The Inquiry has identified in Part 2 that the overarching principle of safe drinking water is that a high standard of care must be embraced by all those involved in

³⁷ See also **CB230**, p 148-149.

³⁸ F Frost, G Craun and R Calderon "Waterborne disease surveillance" (1996) AWWA 66: <https://www.dia.govt.nz/Stage-Two-Fact-Papers>; J Bartram "Investigation of sporadic waterborne disease" in PR Hunter, M Waite, E Ronchi *Drinking Water and Infectious Disease* (2003, Boca Raton, CRC Press and IWA Publishing); G Fraser and KR Cooke "Endemic giardiasis and municipal water supply" (1991) *American Journal of Public Health* 81(6), p 760-2; J Eberhardt-Phillips and others "Campylobacteriosis in New Zealand: results of a case-control study" (1997) *Journal of Epidemiology and Community Health* 51, p 686-91; M Duncanson and others "Rates of notified cryptosporidiosis and quality of drinking water supplies in Aotearoa, New Zealand" (2000) *Water Research* 14(15), p 3804-12; G Simmons and others "Contamination of potable roof-collected rainwater in Auckland, New Zealand" (2001) *Water Research* 35(6), p 1518-24.

supplying drinking water. The necessity of this high standard of care arises due to the nature of the risks discussed in this part and the potential for serious consequences. Recognition of these risks has driven the Inquiry's conclusions in respect of treatment in Part 5, a water regulator in Part 10, water suppliers in Parts 11 and 16, and the details of that regulation in Parts 17 and 18, as well as DWAs in Part 12, amongst others.

[86] To manage the risks to their supply, water suppliers must apply a high standard of care in the establishment, maintenance and development (when required) of infrastructure assets. Networks must be properly designed, constructed, maintained and extended by competent professionals at all stages. District councils are called upon to make decisions on funding, maintenance and improvements to infrastructure, all of which must be made so as to guard against the risks that have been discussed (see Parts 10 and 16, for instance). Elected officials, particularly at the local level, must be familiar with the risks in order to make informed decisions on these issues. Additionally, elected officials have a vital role in informing the public of the realities of the risks to and from drinking water and the need for treatment (see Part 5).

[87] Similarly, regional councils (including their respective officials and politically elected representatives) have a central role in managing risks to source water through supervising and administering the implementation of the regime under the RMA and the NES Regulations, in particular (see Parts 13 and 14 and the Inquiry's second principle of providing safe drinking water – protection of source water).

[88] The regulatory system itself must also be fit for purpose and capable of ensuring that water suppliers and operators meet the required high standards, such that known risks are eliminated and unknown risks mitigated to the greatest extent possible. Widespread non-compliance must be eliminated. Regulatory officials (currently Ministry of Health officials) with responsibility for administering and enforcing the drinking water parts of the Health Act must do so effectively, and with vigilance and leadership.

[89] Self-evidently such officials must know about and understand the risks. The supply of drinking water is an area involving significant scientific and technological developments. Regulatory officials must understand these developments as they relate to infrastructure and the water supplies. They must ensure that the regulatory system they administer adapts to changing technological, scientific, environmental and

social conditions. Officials must work with industry participants and most importantly, given the risks, actively enforce the regulatory scheme. This responsibility applies equally to DWAs.

PART 4 – NEW ZEALAND COMPLIANCE LEVELS AND DISEASE BURDEN

Introduction

[90] The question of understanding and managing risks to drinking water has been discussed in Part 3. This part adds further context to managing these risks by reference to New Zealand's poor levels of compliance, the large numbers of people who become ill from drinking water every year, and the substantial economic and non-economic costs of this burden.

[91] The Inquiry has observed that there is little understanding amongst the New Zealand public about the number of people who are consuming water that is not demonstrably safe, the large numbers of people who become ill every year, or the burden this places on the country including, at its highest, through lost lives. The costs to communities of implementing further barriers to treatment, and any community opposition to disinfection, cannot be properly weighed in the absence of a better understanding of the significant health and other impacts (often borne by the most vulnerable members of society) that come from maintaining the status quo.

New Zealand Compliance Levels

Compliance with the DWSNZ

[92] The Director-General of Health publishes an annual report on compliance with the DWSNZ by drinking water suppliers serving 101 or more people (supplies larger than a neighbourhood supply). All neighbourhood suppliers or larger must take all practicable steps to comply with the DWSNZ. This obligation, introduced by the 2007 amendment to the Health Act, took effect progressively from 1 July 2012 (for large supplies) to 1 July 2016 (for neighbourhood and rural agricultural supplies).

[93] Data from the Annual Reports published between 2009 and 2016 is summarised in tables at **Appendix 2**. This data shows that nationally, almost 10 years after the 2007 amendments, there are still 759,000 people (20 per cent of the serviced population) who are supplied water that is not demonstrably safe to drink. Of these, 92,000 are at risk of bacterial infection, 681,000 of protozoal infection, and 59,000 at risk from the long-term effects of exposure to chemicals.

[94] Moreover, there has been no marked improvement in the number of suppliers supplying safe drinking water throughout the 2009-2016 period. There has been a 3.7 per cent improvement in overall compliance with the DWSNZ over the last seven years (bringing overall compliance from 76.3 per cent in 2009-2010 to 80 per cent in 2015-2016). There is therefore no evidence that the statutory requirement to comply with the DWSNZ has significantly improved compliance rates in New Zealand. With the exception of medium supplies, which showed a 10.5 per cent increase in compliance in 2012-2013, there is no evidence that compliance improved significantly in the period leading up to the time by which suppliers were required to comply with the DWSNZ, or subsequent to that requirement having taken effect.

[95] These levels of non-compliance with the DWSNZ may be viewed in another way, based on the number of water supplies throughout New Zealand that are not compliant with the standards. In 2015-2016, of the 653 supplies serving more than 100 people, 83 supplies (or 12.7 per cent) were not compliant with the bacteriological standards, 261 supplies (or almost 40 per cent) were not compliant with the protozoal standards, 22 supplies (or 3.3 per cent) were not compliant with the chemical standards, and 64 supplies (or almost 10 per cent) were compliant with neither the bacteriological or protozoal standards.

[96] The Director-General agreed in evidence at the Inquiry's August hearing that the 2015-2016 non-compliance figures were "very troubling" and "unacceptable" for those living in the affected communities. He also commented that the lack of improvement over time was concerning and the Ministry needed to "re-examine [its] approach around trying to support the drinking water suppliers in terms of reaching compliance" and address "why some of them are not making the progress that we would like".

[97] Ms Gilbert, Manager of Environmental and Water Health at the Ministry, and leader of the drinking water team, similarly accepted that the Annual Report figures "raise flags" and that the Ministry needed to "strengthen [its] advice in this area". As will be discussed elsewhere in this report, the Inquiry considers such a limp response does not go nearly far enough.

[98] The compliance data for small supplies is particularly concerning. Whilst 88.8 per cent of large supplies complied with the DWSNZ in 2015-2016, only 25 per cent of small supplies complied. The Ministry of Health does not compile data on the

compliance levels of the, smaller still, neighbourhood supplies. Given the trend in the annual reports whereby smaller supplies are significantly less likely to comply with the standards, it is likely that the compliance rates for neighbourhood supplies are very low.

[99] Viewed by the number of smaller suppliers which are not compliant, the annual report showed that of the 284 small water supplies in New Zealand in 2015-2016, 73 (or 25.7 per cent) failed to meet the bacteriological standards, 204 (or 71.8 per cent) failed to meet the protozoal standards, 5 (or 1.8 per cent) failed to meet the chemical standards, and only 66 (or 23.2 per cent) supplies fully met the DWSNZ.

[100] Mr Chuah accepted that the levels of non-compliance for smaller suppliers were “woeful and worrying”, and that the data showed that “the smaller the suppliers, the greater the difficulty they have achieving of compliance”.

2016-2017 Compliance

[101] The Ministry of Health’s 2016-2017 Annual Report will not be published until 2018. However, the Ministry agreed to make its draft data available to the Inquiry on a preliminary basis. The 2016-2017 data records compliance with the DWSNZ between 1 July 2016 and 1 June 2017. The vast majority of this data therefore reflects compliance levels in the aftermath of the Havelock North outbreak in early August 2016.

[102] The Inquiry considers that it is important to present an up to date picture of compliance in New Zealand and is grateful to the Ministry for making this possible. It is acknowledged that this data may change but, having considered the materials, the Inquiry believes the trends with which it is interested are unlikely to differ to such an extent that comment in this report is unhelpful.

[103] The compliance figures in the 2016-2017 period remain alarmingly low and do not appear to reflect any increased vigilance by suppliers in the aftermath of the Havelock North outbreak. There has been a mere 1.1 per cent overall improvement in the number of New Zealanders receiving water that complies with the DWSNZ (bacterial, protozoal and chemical standards), that is, no appreciable improvement at all. Some 721,000 New Zealanders continue to receive drinking water from reticulated supplies (serving populations of 101 or more people) that is not demonstrably safe.

This figure is likely to be a significant underestimate. It does not account for the large visitor numbers in some of the small, non-compliant, townships. Nor does it account for people receiving water from supplies that supply less than 101 people, self-suppliers and temporary suppliers. The Inquiry received an estimate that some 625,000 New Zealanders obtain their drinking water from such supplies.

[104] Moreover, the overall increase in compliance of 1.1 per cent disguises the fact that compliance with the bacteriological standards has decreased by 1.4 per cent and compliance with the chemical standards has decreased by 1.3 per cent. Only compliance with the protozoal standards has increased, and lifted the overall compliance rate.

[105] The Inquiry found the falling compliance levels with the bacteriological and chemical standards particularly concerning. The decrease in compliance with the bacteriological standards results from an increased number of transgressions, an increased number of supplies with ineffective, delayed or unknown remedial action following transgressions, and an increased number of supplies with inadequate monitoring. Twenty-seven supplies failed entirely to take any remedial action after a transgression. In the aftermath of the bacteriological outbreak in Havelock North, these failures to respond effectively to transgressions or to monitor adequately are surprising and unacceptable.

[106] These figures confirm the Inquiry's observation that over the course of its investigation, there have been near weekly reports of E.coli being detected, boil water notices being issued, alternative supplies adopted, or supplies chlorinated. A table of these media reports and reports of other water quality issues is included at **Appendix 4**. The Inquiry has observed that these media reports reflect a concerning lack of understanding by members of the public or councils (district and regional) of the risks and costs associated with supplying unsafe water.

[107] By way of example, there have been five E.coli positive readings in Napier in 2017. Napier has 10 below-ground bore heads which are known to pose a risk of contamination. Nevertheless, the community response to Napier City Council's decision to chlorinate the supply, conveyed in the media, has been one of outrage, with the implementation of treatment by chlorination being labelled a "travesty" by one politician.

Boil Water Notices

[108] Given the compliance figures, it is unsurprising that a large number of boil water notices are issued every year. In 2015-2016, 44 supply zones had boil water notices issued affecting 15,000 people. Twenty-six of the boil water notices were permanently in place (affecting 7,200 people). This compares well with earlier years. The previous low occurred in the 2013-2014 year with 43,000 people affected by boil water notices as compared to 2011-2012 where, following the Christchurch earthquakes, 281,000 people were affected by boil water notices, of which 9,300 were on a permanent boil water notice. These statistics do not of course take into account the fact that many other people, including tourists, are impacted by the boil water notices.

International Comparison

[109] New Zealand's compliance figures compare poorly internationally. For instance, public supplies in England and Wales, large Finnish supplies, and Scottish Water have all had greater than 99.8 per cent compliance with E.coli standards from 2011-2015. Moreover, in England and Wales there have been virtually no issues with protozoa during the same period. Compliance rates for smaller, private or community supplies in the above countries do remain significantly lower.

Waterborne Disease Burden

[110] The above statistics on non-compliance with the DWSNZ probably significantly understate the number of people actually exposed to unsafe drinking water in New Zealand, a proposition readily accepted in evidence by the Director-General. By way of example, Punakaiki has 230 residents and features in the statistics above as a small supply. It has never complied with either the bacteriological or protozoal standards and is, like five out of the eight supplies in the Buller District, on a permanent boil water notice. However, it is estimated that in recent years Punakaiki has had some 500,000 tourists per year. This is not an isolated example; some of New Zealand's worst outbreaks have, for instance, occurred on ski fields,³⁹ or in small towns located near significant highways with a large travelling public (Darfield).⁴⁰

³⁹ See Stage 1 Report at Appendix 7.

⁴⁰ I Sheerin, N Bartholomew, C Brunton "Estimated community costs of an outbreak of campylobacteriosis resulting from contamination of a public water supply in Darfield, New Zealand" (2014) 127 NZMJ 13.

[111] The Inquiry therefore considers that the above estimate that 759,000 people were exposed to unsafe drinking water in 2015-2016 is likely to be a significant underestimate.

[112] There may be a tendency to discount the significance of the data on New Zealand's low compliance rates on the basis that widespread outbreaks remain relatively uncommon. This would be a mistake. First, waterborne disease outbreaks are not uncommon in New Zealand. The Inquiry's Stage 1 Report (at Appendix 7) recorded that in the 10 years preceding the Havelock North outbreak, there were 13 other waterborne outbreaks. Second, and more significantly, a large proportion, if not the vast majority, of New Zealand's waterborne disease burden arises not from significant outbreak events as in Havelock North but from underlying, sporadic waterborne illness that is never linked to a particular outbreak.⁴¹

[113] Research conducted for the Ministry of Health in 2007 estimated the overall burden of sporadic or underlying drinking water-borne gastrointestinal disease at 18,000 to 34,000 cases per year.⁴² In 2010, the Law and Economics Consulting Group, conducting a cost benefit analysis of raising the quality of New Zealand's reticulated drinking water, estimated there were 35,000 cases of acute gastrointestinal illness contracted from reticulated drinking water per year.⁴³ The Law and Economics Consulting Group acknowledged that this was a conservative estimate and that American estimates of the attribution of gastrointestinal illness to drinking water would put the estimate in excess of 100,000 cases per year amongst those on reticulated

⁴¹ Frost, Craun and Calderon: <https://www.dia.govt.nz/Stage-Two-Fact-Papers>; J Bartram "Investigation of sporadic waterborne disease" in PR Hunter, M Waite, E Ronchi *Drinking Water and Infectious Disease* (2003, Boca Raton, CRC Press and IWA Publishing); G Fraser and KR Cooke "Endemic giardiasis and municipal water supply" (1991) *American Journal of Public Health* 81(6), p 760–2; J Eberhardt-Phillips and others "Campylobacteriosis in New Zealand: results of a case-control study" (1997) *Journal of Epidemiology and Community Health* 51, p 686–91; M Duncanson and others "Rates of notified cryptosporidiosis and quality of drinking water supplies in Aotearoa, New Zealand" (2000) *Water Research* 14(15), p 3804-12; G Simmons and others "Contamination of potable roof-collected rainwater in Auckland, New Zealand" (2001) *Water Research* 35(6), p 1518–24.

⁴² A Ball "Estimation of the Burden of Waterborne Disease in New Zealand: Preliminary report" (ESR, 2007); *Drinking-water Guidelines* at [1.1.3].

⁴³ **CB230** at [1.1].

supplies.⁴⁴ The Inquiry heard evidence that a figure of 100,000 cases plus per year was more likely to be accurate, particularly when small private supplies are included.⁴⁵

[114] The Director-General, upon having these figures drawn to his attention at the Inquiry's August hearing, accepted that "the numbers are alarming and worrying and unacceptable".

[115] The tendency to underestimate the underlying waterborne disease burden arises due to the dual difficulties of linking sporadic cases of gastrointestinal illness to particular sources and to the fact that rates of gastrointestinal illness are generally underestimated. In New Zealand, data on rates of gastrointestinal illness come from the New Zealand notifiable disease database (EpiSurv) which records infection rates for a number of diseases which can be transmitted by the consumption of contaminated water (campylobacteriosis, cryptosporidiosis, giardiasis and some other forms of gastroenteritis). Even where gastrointestinal illness is notifiable, the numbers notified understate the real rates of illness. Lake et al estimated that in New Zealand notified cases of gastrointestinal illness occur at a rate of around 1 to 222 community cases.⁴⁶ This is because some people are infected but asymptomatic, some ill people do not visit a doctor, some doctors do not report a suspected case, some doctors do not request a faecal specimen, some people do not provide a requested faecal specimen and many potential waterborne illnesses are not notifiable.⁴⁷

[116] New Zealand has recorded between 8,927 and 10,778 cases of notifiable gastrointestinal illness per annum over the last nine years and there is no trend towards a decreasing rate of illness.⁴⁸ As noted above, these notified figures significantly underestimate the real rate of gastrointestinal illness in the community which may be as high as 1.4 million cases per year.⁴⁹ The majority of these cases arise through ingestion of faecal matter when swimming, consumption of contaminated

⁴⁴ **CB230** at [1.1]. Calculation based on Reynolds (2008)'s estimate for the contribution of community drinking water supplies to all cases of AGI in the USA.

⁴⁵ Transcript from August 2017 hearing, p 43-46.

⁴⁶ R Lake, B Adlam, S Perera "Acute Gastrointestinal Illness (AGI) Study: Final Study Report" (ESR, 2009); JG Wheeler and others "Study of infectious intestinal disease in England: rates in the community, presenting to general practice, and reported to national surveillance" (1999) *British Medical Journal* 318(7190), p 1046-50 reported that the ratio of cases in the community to cases reaching national surveillance was lower for bacterial pathogens (salmonella 3.2:1, campylobacter 7.6:1) than for viruses (rotavirus 35:1, small round structured viruses 1562:1). See also the Drinking-water Guidelines at p 5.

⁴⁷ Drinking-water Guidelines, p 5.

⁴⁸ See **Appendix 3**.

⁴⁹ Ministry for Primary Industries "Estimated incidence of foodborne illness in New Zealand: Application of overseas models and multipliers" (June 2011), p 1.

food, contact with farm animals and person to person contact for example when attending day care centres. Consumption of untreated water supplies serving individual dwellings is, however, also a common identified cause, and consumption of reticulated drinking water cannot be discounted as a cause of some 18,000 to 100,000 plus cases of sporadic illness.

Costs of the Waterborne Disease Burden

[117] Given the uncertainties involved in estimating the size of New Zealand's underlying sporadic disease burden, along with the impossibility of valuing intangible matters, such as the value of human life, pain and suffering, or the benefits of ensuring New Zealand is a place where there is equal access to safe drinking water (a necessity), it is not possible to put a single figure on the costs of New Zealand's waterborne disease burden. There have, however, been attempts which are enlightening.

[118] As mentioned earlier, the Ministry of Health obtained a cost benefit analysis of raising the quality of New Zealand's networked drinking water from the Law and Economics Consulting Group in 2010.⁵⁰ The Law and Economics Consulting Group estimated that, nationally, if all suppliers larger than a neighbourhood supply were required to comply with the DWSNZ there would be benefits of \$497 million over 40 years (\$12.5 million per year) compared with costs of \$498 million (\$12.5 million).⁵¹ The Law and Economics Consulting Group noted that these figures used lower bound estimates of illness and that when the higher bounds were used there would be benefits of \$949 million over 40 years (\$24 million per year) compared with costs of only \$450 million (\$11.2 million per year).

[119] The Law and Economics Consulting Group analysis did not include the benefits of avoided pain and suffering, the benefits from reduced risk of negative reputational damage in overseas markets due to visitors to New Zealand becoming unwell, the cost of any public inquiry, or disruption costs to businesses (additional to lost productivity from illness).⁵² Nor did it account for the benefits arising from equality of access to a

⁵⁰ **CB230.**

⁵¹ At p 158.

⁵² **CB230**, p 5.

basic human need.⁵³ As the Havelock North outbreak has demonstrated, these costs can be significant.

[120] Estimates of the costs of outbreaks provided in Part 3 above confirm that the burden is likely to be at the higher end of these estimates with the Havelock North outbreak alone costing, at least, \$21 million.

Concluding Remarks

[121] New Zealand has low levels of compliance with the DWSNZ and this compliance has not been improving. Accordingly, more than 759,000 people were exposed to potentially unsafe drinking water in 2015-2016 and some 18,000–100,000 New Zealanders likely became ill. This costs New Zealand between \$12.5 million and \$23.7 million per year, not including the additional costs of an outbreak or the intangible costs of pain, suffering, death and inequality of access to a fundamental need.

[122] This reality should be borne in mind whenever decisions are made on the level of risk from drinking water that New Zealanders are prepared to accept, or are required to accept. Additionally, the poor record of compliance in New Zealand when compared with international benchmarks is highly material when Ministry of Health officials, DWAs and DHB personnel are considering compliance or enforcement action under applicable statutory requirements.

⁵³ Drinking-water Guidelines at p 12.

PART 5 – SHOULD ALL NETWORKED DRINKING WATER BE TREATED?

Introduction

[123] At the time of the August 2016 outbreak, a number of large drinking water supplies in New Zealand were not receiving any treatment. The treatment issue was considered by the Inquiry in relation to all networked supplies, both large and small, as well as self-supplies. Included among the networked supplies were:

Supplier	Registered Population
Christchurch Central	255,500
Hastings City	46,015
Havelock North	11,623
Kaiapoi	12,615
Lower Hutt	95,469
Mosgiel	10,082
Napier	49,910
North West Christchurch	80,000
Rangiora	17,923
Rolleston	12,292
Total	591,429

[124] The above table contains only a broad and approximate view. For example, some treatment had been started on some of Rolleston's bores by August 2016. The Ministry of Health's preliminary figures for its 2016–2017 Annual Report confirm that 600,000 people served by network supplies continue to receive water that is not routinely disinfected. Of particular concern are the 50 networked supplies serving 114,560 people which draw water from non-secure sources and, as such, have no barriers at all against contamination. This raises important issues concerning the understanding of risks and the appropriateness of water suppliers and health officials taking avoidable risks.

[125] During Stage 1, the Inquiry heard evidence and submissions indicating that supplying untreated drinking water was unacceptably risky in today's circumstances, that it was contrary to general international best practice, and that it demonstrated a failure to appreciate the nature and extent of risks involved. For this reason, the

question of requiring suppliers to treat drinking water was a key issue for consideration in Stage 2.

[126] This part examines the position in relation to networked suppliers but the question of treatment for self-supplies is no less important. As recommended elsewhere in this report, the need for regulation, oversight and controls for self-supplies (at least for those over a certain size or involving supply to members of the public) is evident. The Inquiry recommends that at least specified self-suppliers also be required to treat their water and also any other self-suppliers servicing members of the public.

Evidence and Submissions

[127] The Inquiry received many submissions on the question of mandatory treatment including from various district and city councils, DHBs, the Crown (Ministry of Health), Water New Zealand, ESR, LGNZ and a number of individuals. At the August hearing, the issue was put to a panel of experts comprising Dr Fricker, Dr Deere, Dr Nokes, Mr Rabbitts and Mr Graham.

Discussion and Findings

[128] The Inquiry's consideration of the need for universal treatment was informed by the basic principles governing the supply of drinking water as discussed in Part 2 above. In the Inquiry's view, it is indisputable that these principles support a change to mandatory treatment for all supplies.

[129] The Inquiry's assessment of this issue was also informed by its findings in relation to the actual and potential risks to drinking water safety discussed in Part 3 above. These too support the case for universal treatment.

[130] It is important in considering the risks of untreated water to mention again the heavy incidence (up to 100,000 cases per annum) of sporadic illness from water contamination, explained in Part 4 above.

[131] In relation to treatment, the Inquiry's starting point was to acknowledge, and embrace, the well-settled principle that drinking water systems must have, and continuously maintain, robust multiple barriers. This is one of the fundamental

principles of delivery of safe drinking water set out in Part 2, and is clearly established in the Drinking-water Guidelines.

[132] Treating drinking water provides important barriers without which the prevention of contamination is dependent on only one major barrier, namely, protection of the source water. The experts who gave evidence at the August hearing were agreed that, for all typical supplies in New Zealand, it was not possible to have an effective multiple barrier system without treatment. Disinfection treatment is one of the most important barriers making up such a system.

[133] An important lesson to learn from the Havelock North outbreak is that relying on source protection as the only major barrier exposes a supply to unacceptable risk. Dr Hrudehy, speaking in September 2017 at a Water New Zealand conference, said:

Multiple barriers means more than one barrier – an obvious statement that needs to be made given what was allowed to happen in Havelock North.

Reliance on an unverified, demonstrably questionable and possibly unverifiable classification as ‘secure’ groundwater as the only barrier for ensuring safe drinking water should be recognised as seriously inadequate. With the benefit of hindsight, in Havelock North, it was reckless.

[134] The five E.coli positive readings in the Napier supply since February 2017 reinforce this view. So too do the three positive E.coli readings (and numerous total coliforms) in the Hutt Valley supply since December 2016. Mention should also be made of the E.coli reading obtained on 10 February 2017 from Hastings’ Eastbourne Street bore 2⁵⁴ and the frequent occurrence of total coliforms at Brookvale Road bore 3 since the August 2016 outbreak.

[135] Submissions were received that all drinking water supply involves risks and that risks should be managed in a bespoke way for each supply. It was argued that mandatory universal treatment would cut across that approach. The Inquiry acknowledges the concept of risk management, the sixth key principle set out in Part 2 above. However, treatment of all drinking water is a measure which so obviously reduces risk to all supplies in all circumstances, that the Inquiry regards it as an overarching or fundamental measure that should be applied before bespoke risk

⁵⁴ HDC advised the Inquiry that the laboratory had indicated a view that this could have been caused by cross-contamination in the laboratory. This was unable to be resolved and the Inquiry’s firm view was that it must be treated as a valid result since there was no satisfactory evidence to the contrary.

assessments and mitigations are addressed. Other fundamental protective measures are required by the existing regime, and these are not regarded as undermining a risk management approach by each supplier.

[136] The Inquiry also received submissions that some sources of drinking water are sufficiently pure and protected so as to justify no treatment. Submitters on this topic pointed to deep groundwater sources which had not previously produced positive E.coli readings or any other indications of influence from surface water. In addition, water-ageing tests may indicate an absence of any recent or “young” water entering the system.

[137] The Inquiry has concluded that such assumptions about the purity and safety of untreated drinking water are not sound. Prior to August 2016, it was assumed that the Havelock North supply of drinking water came from a “pure” source of aged water. As the outbreak demonstrated, the source at Brookvale Road was neither safe nor pure, and recent reports from GNS about this source have led to a significant level of uncertainty. Similarly, the Napier supply was regarded prior to February 2017 as pure; this must now be seen as demonstrably dubious.

[138] A 2011 report from GNS based on a 2010 sample taken from Brookvale Road bore 3 reported a mean residence time of 49 years and less than 0.005 per cent young water; this complied with the DWSNZ. However, GNS has since advised that current methodology used by it would have resulted in a fail in the 2011 test because the fraction of young water would have exceeded the limit in the DWSNZ of 0.005 per cent. A further GNS report in November 2016 on a sample taken in May 2016 (some three months before the outbreak) from Brookvale Road bore 1 indicated a mean residence time of 4.3 years, a minimum residence time of 0.1 years, and greater than 0.005 per cent young water. This did not comply with the DWSNZ. Further samples were taken from Brookvale Road bore 3 in September and again in November 2016. The results, provided in a report in June 2017, indicated a mean residence time of 41 years and a minimum residence time of 3.7 years. These varying results appear to the Inquiry to confirm the “point in time” difficulty with bore assessments.

[139] At the August hearing, the Inquiry was advised by Mr Palmer, CEO of HBRC, that recent water-ageing information indicated that water is moving through the aquifer underneath the Heretaunga Plains at a faster rate than anyone had previously

appreciated. Some of this information indicated water was moving at up to 200 metres per day in some places.

[140] Some submitters asserted that an absence of past contamination events could be used to dispense with treatment. The Inquiry is satisfied that a good track record is not a reliable indicator of future risk. Reference is again made to Napier's supply. Risks are sporadic in nature and often become much greater after change or abnormal weather events, as discussed in Part 3.

[141] The Inquiry has also observed that the question of treatment should not depend only upon an assessment of the groundwater source. The process of extraction involves risk. The Havelock North outbreak revealed many different risks relating to bores and their equipment. Once water is extracted from the ground, it is then subjected to further risks, including, in particular, risks arising out of the reticulation system and its reservoirs, pipes and other infrastructure. Even with the cleanest and purest groundwater source, these risks come to bear in a significant way during and after extraction. In addition, the risks of ageing infrastructure and other threats, such as backflow in the reticulation, or the co-location with sewerage pipes ought not to be underestimated. The risk of contamination within the reticulation is demonstrated by the six different networked supplies (serving 12,000 people) which detected E.coli in 2016-2017 despite being sourced from supplies rated as secure.

[142] As discussed in Part 3 above, there are myriad ways faecal contamination can enter drinking water. The state of scientific knowledge about pathogens is now considerably greater than it was when the current drinking water regulatory regime was enacted in 2007. In particular, the risk of protozoal infection is now better understood (albeit far from perfectly). The role of viruses in drinking water supplies is not insignificant. Sporadic contamination can occur at any time, even in supposedly pristine water. There are many known ways this can occur but, importantly, there will be ways which are not currently known or able to be foreseen.

[143] The Inquiry acknowledges that, with sufficient diligence, investigation and research, it may be possible to reach a view that a particular drinking water source is free from surface influences and highly unlikely to contain harmful pathogens at a point in time. However, the possibility that these favourable circumstances could change, and quickly, is a very real one. A key insight resulting from the Stage 1 process, and

the further material received by the Inquiry in Stage 2, is that it is impossible to eliminate or foresee all possible adverse changes.

[144] Circumstances can change at any time: in the aquifer containing the source water; in the infrastructure used to extract and deliver water; and in the human factors operating within the supplier. Such a change could come from a sudden or extreme event such as seismic activity (noting also that seismic activity may not always manifest itself on the surface of the earth), an abnormal weather event, or damage to the protective layers above an aquifer caused by activities such as earthworks or drilling or piling. But the risk of an adverse change is not limited to those types of events and it can occur slowly, unpredictably and unnoticeably. This means that an extensive testing regime is not the answer, as it can only be as good as the most recent result, and contamination and illness is likely to have already occurred by the time a troublesome result is reported.

[145] As discussed in Part 15 of this report, the Inquiry has concluded that the concept of a “secure” supply, with that security reliably continuing into the future, is unsafe and unsound. This leads to the conclusion that universal treatment is necessary.

[146] A number of submitters noted that some communities were opposed to treatment, particularly chlorination which is perceived to produce adverse taste and odour effects. On this question, the Inquiry has concluded that, as Dr Hrudey has repeatedly emphasised, there is no compelling or credible evidence that chlorination poses any risks to consumers. By contrast, the “natural” pathogens found in drinking water undoubtedly pose significant risks to human health. As to taste and odour concerns, several experts stated that this perception arises because consumers of untreated water often only experience a chlorinated supply when contamination has recently occurred and consequently the system is dosed at a much higher level than usual; there is organic material in the system with which the chlorine interacts; and the supplier is not experienced at chlorinating a system well. Taste and odour problems will be minimal or non-existent in a properly-run and stabilised chlorination system. This may take some months from when chlorination is first introduced, but consumers quickly adjust and there are simple ways to reduce any taste and odour problems during the initial period (such as leaving drinking water to sit in a refrigerator overnight).

[147] Some submitters argued that the question of treatment should be decided on a democratic basis and that it should not be forced on communities which value their pristine water supplies. The Inquiry has concluded that personal preference and choice should not be decisive. Where public health and safety is involved, it is the responsibility of the government to set appropriate standards and to mandate protective measures.

[148] The Inquiry has noted that, unlike in areas where consumers can make their own assessment of risk, drinking water risks are effectively imposed on all consumers by suppliers. The consumer base will include many people who are vulnerable for various reasons, including old age, youth, and those who are immunocompromised or suffering from ill health. This justifies universal treatment.

[149] Society has accepted this in relation to such matters as seatbelts in cars and helmets for cyclists and motorcyclists. There are innumerable examples of mandatory protective measures in the food, energy and medical sectors, to name but a few. Treatment of drinking water is no different. Accordingly, treatment of drinking water is a matter which should be mandated by law.

[150] The Inquiry acknowledges that, under the Health Act, it is the primary responsibility of a water supplier to ensure the safety of the supply. However, this is not a reason to make treatment optional. Most large and medium water suppliers are district or city councils which can be subjected to significant political and fiscal pressures from their communities. These pressures can result in councils deciding not to spend money on drinking water infrastructure improvements. It has become apparent to the Inquiry that not all water suppliers have an adequate or realistic appreciation of the levels of risk, particularly the risk of adverse future changes. It is important that all consumers of water throughout New Zealand, of both large and small supplies, have the same high level of protection and that there is national consistency on the question of treatment.

[151] Some submitters posited that treating water may create a disincentive to proper assessments and protection of water sources. The Inquiry has not accepted this argument. The fact that there is more than one barrier does not lead to a conclusion or concern that some will be maintained well but others will be relaxed. All barriers obviously need to be maintained effectively. This is the third principle of drinking water safety recorded in Part 2 above.

[152] Submitters did not raise cost specifically in relation to the question of mandatory treatment, but the Inquiry acknowledges that cost has been raised in general terms in response to suggestions for improving the drinking water regime. An assessment of the financial implications of change is beyond the scope of the Inquiry and will need to be considered by interested parties in light of the Inquiry's recommendations in due course. However, the Inquiry received no evidence that the treatment of drinking water was prohibitively expensive. To the contrary, it received evidence that treatment costs in real terms were falling with progress being made in treatment methods. Evidence was received, for example, that chlorination was relatively inexpensive.

[153] The Inquiry has not received evidence on the costs of treatment compared with the costs of large and ongoing levels of sporadic waterborne illness and/or the costs of an outbreak. However, it is axiomatic that there must be a very substantial cost from both sporadic illness and an outbreak. The Inquiry has observed that, while cost is an important issue which must be addressed, it can be addressed in a variety of ways and with a constructive approach. To the extent that cost is a particular issue for small suppliers, one approach is to consider the aggregation of water supplies into larger entities, as examined further in Part 11 below.

[154] Christchurch City Council advised that it did not wish to chlorinate its water supply, except as an emergency response. It stated that it understood this was a higher risk approach than chlorinating but that it mitigated the risk through more frequent testing and rapid response to any E.coli that was detected. The expert evidence was unanimous that testing water samples for E.coli was not an effective or valid way to mitigate risk. International experts said that E.coli testing had never prevented an outbreak and that test results take a minimum of 24 hours after contamination to produce a result, sometimes longer. Thus, by the time a result is obtained, huge quantities of contaminated water may already have travelled through the reticulation to consumers' taps. The Inquiry rejects the notion that diligent testing for E.coli can be a justification for declining to treat.

[155] The Inquiry does not believe it is appropriate to leave the decision on treatment to individual authors of WSPs and/or DWAs to assess from time to time and on an ad hoc basis. The question of treatment is, in the Inquiry's view, a fundamental one which should be put in place by legislation (like other measures which are currently mandated under the Health Act) as a fundamental safety plank in the drinking water regime.

[156] The Inquiry does not see it as appropriate to recommend any specific form of treatment, as the nature and extent of treatment should depend upon the quality and characteristics of the source water, and various other factors. Decisions about treatment methods and processes are operational matters best left to each supplier and its advisors, and to the DWA. The importance of having a residual disinfectant is discussed in Part 6 at [185]–[189] in the context of the ongoing safety of the Havelock North supply. There is currently a range of different treatment methods, and no doubt scientific and technical advances will produce more over time. Thus, it was not appropriate for the Inquiry to determine that any particular form of treatment should be used.

[157] The requirement should be for an appropriate and effective form of treatment to be deployed in all supplies (networked and specified self-supplies), which should include a residual disinfectant in the reticulation. **Appendix 5** records some of the evidence which the Inquiry received about treatment methods and processes in general.

Findings and Recommendations

[158] Having considered all of the submissions, and the evidence at the August hearing, the Inquiry has concluded, firmly and unequivocally, that an appropriate and effective form of treatment of drinking water should be mandated by law (whether through the DWSNZ or by statute) for all networked supplies. It further concludes that treatment should be mandated for specified self-supplies (and potentially extended to other self-supplies supplying more than household numbers). Treatment should include a residual disinfectant in the reticulation. These conclusions are driven by the compelling need to protect the health of all members of the public, but particularly those who are vulnerable, such as the young, elderly and ill.

[159] The Inquiry has accepted that a provision should be made for exemptions. However, only in very limited circumstances should the element of choice to drink untreated water, often claimed by vociferous (but usually small) sections of the public, be preserved. Any supplier seeking such exemption should have to discharge a heavy onus of satisfying an appropriately qualified and experienced body of the present, and ongoing, safety of the particular supply. The Inquiry has accepted the evidence of the witnesses who stressed the importance of the person or entity assessing an application

for exception having adequate expertise and experience to make that assessment safely.

[160] While supporting the concept of an exemption provision, the Inquiry at the same time notes that it is likely rarely to be possible or practicable to satisfy the onus of proof required. The Inquiry acknowledges the theoretical possibility of reaching an adequate level of satisfaction as to the security of a particular supply at a point in time. However, it heard much evidence about the practical difficulty of demonstrating ongoing safety to a standard justifying no treatment. Dr Deere, in particular, pointed to many practical difficulties and indicated that, in his experience, the difficulty and cost of attempting to demonstrate an adequate level of safety were normally insuperable barriers. Dr Fricker also supported this opinion. Other witnesses commented that it should be a very rare or very special exception.

[161] The Inquiry appreciates that legislative change mandating treatment could take some time. Because the risks to the public of untreated drinking water are simply too high to continue with such supplies until legislation mandating universal treatment has been considered and passed, the Inquiry recommends that the Director-General of Health should, in the interests of public safety and welfare, exercise effective and practical leadership to encourage and persuade all water suppliers to use appropriate and effective treatment without delay.

[162] The Inquiry recommends that the Director-General of Health promptly provide firm advice to drinking water suppliers that all supplies should be appropriately and effectively treated pending any change to the law and/or the DWSNZ.

[163] The Inquiry also recommends that the CEOs of DHBs (with PHU responsibilities) advise drinking water suppliers that all supplies should be appropriately and effectively treated pending any change to the law and/or the DWSNZ.

[164] In addition, the Inquiry urges the Minister of Health to give favourable consideration to invoking s 69P(2) of the Health Act to enable an early change to be made to the DWSNZ so as to require treatment of all supplies.

PART 6 – ONGOING SAFETY OF HAVELOCK NORTH DRINKING WATER

Introduction

[165] The Inquiry's terms of reference required it to investigate and report on the current safety of the Havelock North drinking water supply. With further issues emerging, and improvements being put in place during 2017, this investigation continued through most of the course of the Inquiry.

[166] The hearing in December 2016 on this issue and the resultant Interim Report, dated 15 December 2016, were covered in the Inquiry's Stage 1 Report at [75]–[80] and Appendix 2. So too was the development of the Hawke's Bay JWG which was an essential component of the ongoing safety of the supply.⁵⁵ JWGs are dealt with further in Part 9 of this report.

[167] Ongoing safety was further considered at the June 2017 hearing (see [168] and **Appendix 1** to this report. In addition, further evidence from the CEOs of HBRC, HDC and Dr Jones (Medical Officer of Health at the Hawke's Bay DHB) was heard and considered at the August 2017 hearing. Advice has been taken from Dr Fricker throughout. As well, Dr Deere provided much valuable material in relation to the current and ongoing safety of the supply.

[168] In this part, the Inquiry addresses the following elements of the safety of Havelock North's drinking water:

- (a) Brookvale Road bore 3 and treatment plant;
- (b) HDC's WSP and ERP;
- (c) The Havelock North reticulation system;
- (d) Water supplied to Havelock North from Hastings urban bores;
- (e) HDC's drinking water strategy;
- (f) Monitoring programme and results;
- (g) Water supply management within HDC;
- (h) Other safety issues; and
- (i) The DWA's view of the safety of the supply.

⁵⁵ Stage 1 Report at [81]–[95].

[169] Prior to the August 2016 outbreak, the three bores in Brookvale Road supplied all of Havelock North's drinking water. Brookvale Road bore 3 had been inoperative since an E.coli contamination in October 2015, and Brookvale Road bores 1 and 2 had supplied Havelock North since that time. By the August 2017 hearing, the position regarding the Brookvale Road bores was:

- (a) Brookvale Road bore 1 had been permanently decommissioned and HDC confirmed that it would not use that bore again.
- (b) Brookvale Road bore 2: HDC advised that it would not be using this bore for the supply of drinking water either, and it was to be decommissioned.
- (c) Brookvale Road bore 3: By email dated 9 November 2016, the DWA downgraded the status of this bore to non-secure⁵⁶. On 7 March 2017, bore 3 was reactivated and, since that time, it has contributed to the Havelock North supply. It no longer represents the exclusive source of water and much of the supply now comes from the Eastbourne bores in the Hastings urban supply. Before being reactivated, a Log 5 treatment plant was constructed and all water from this bore has been subjected to Log 5 treatment (filtration, UV, chlorination). This is to continue for as long as Brookvale Road bore 3 is used.

[170] In August 2017, the Inquiry was advised by HDC that Brookvale Road bore 3 would only be used for a short further term. Its resource consent will expire on 31 May 2018. HDC plans ultimately to have sufficient supply capability from the Hastings urban bores to supply all of the Havelock North needs, although this will require the installation of new water mains between Hastings and Havelock North. The Inquiry has subsequently become aware (through HDC's August/September 2017 "Water Update")⁵⁷ that HDC will not be terminating use of bore 3 until at least November 2018, and it may seek to keep it open for the 2018-2019 summer.

⁵⁶ **CB093.**

⁵⁷ See <https://www.hastingsdc.govt.nz/assets/Document-Library/Publications/Water-Updates/August-Septemberwaterupdate.pdf>.

Brookvale Road Bore 3 and Treatment Plant

[171] The Inquiry is satisfied that the current supply of drinking water from Brookvale Road bore 3 is being treated to a level which means that the water entering the Havelock North reticulation should be free of harmful pathogens. This groundwater source is now being treated to a standard higher than needed for surface waters in New Zealand and, provided that the treatment plant is monitored and operated correctly, the Havelock North community should have no cause for concern about the quality of drinking water entering the reticulation system from this bore.

[172] The Inquiry worked intensively with the Hawke's Bay JWG and HDC in February and March 2017 to check that every aspect of the new treatment plant for Brookvale Road bore 3 was up to standard before it was commissioned. Subsequent reports from the Council and the DWAs indicate that the plant is working well and that its filtration, UV and chlorine treatment processes are effective. The DWAs have raised no concerns about the plant or the quality of the water entering the reticulation. HDC has support and advice available from the consulting firm, Lutra, and also from Dr Deere. A telemetry system provides real-time monitoring of key parameters. Water supply is stopped if the treatment plant goes out of specification.

[173] Water test results have not demonstrated the presence of E.coli since the bore was reactivated on 7 March 2016. However, total coliforms have been detected on several occasions, indicating that there is infiltration of surface water into the aquifer and that treatment is required.

[174] In relation to Brookvale Road catchment area issues, the Inquiry sought reports on HDC's plans for further aquifer and catchment studies, including dye-tracing tests on Te Mata Mushrooms' neighbouring property. However, given the plans to discontinue use of Brookvale Road bore 3 at an early stage, HDC advised that it did not see it as necessary or a good use of resources to carry out further catchment studies in the vicinity of this bore.

[175] HBRC is independently responsible for HDC's compliance with its consent conditions in relation to boreworks security and fitness and the Inquiry is satisfied that it will discharge that responsibility. In addition, the Hawke's Bay JWG continues to maintain an overview of the safety of Brookvale Road bore 3 and its treatment plant.

HDC's WSP and ERP

[176] Prior to the June 2017 hearing, HDC, with assistance and advice from Dr Deere, produced a revised version of its WSP and this was approved by the DWA on 22 June 2017.

[177] Although the current version of the WSP appears to cover the key requirements of a WSP (with the exception of critical control points), the key to the effectiveness of a WSP is its implementation. The Inquiry considers that regular internal audits should be undertaken (preferably with the assistance of Dr Deere) to ensure that appropriate WSP activities are being pursued properly by HDC.

[178] The key deficiency in HDC's WSP, as at the August hearing, was the lack of any critical control point provisions. Dr Fricker and Dr Deere both advised the Inquiry that these were important and useful provisions in a WSP. Although HDC in its updating submissions acknowledged the importance and need for critical control provisions in its WSP, as at October 2017, this still had not occurred. HDC advised that it did intend to revise the WSP by including critical control points, but this seemed to the Inquiry to be a distinctly leisurely approach in all the circumstances (see Part 17 below).

[179] WSPs are intended to cover the major risks to water safety and should be continually reviewed as new information comes to light following investigations by the water supplier. They should be "living documents". As such, potential issues remain that may require further development of HDC's existing WSP. The Inquiry urges HDC to continue to undertake work to facilitate improved risk management.

[180] In the period following the outbreak, HDC has produced an ERP and this now forms part of the WSP.⁵⁸ This ERP was developed in consultation with the DHB, the DWA and HBRC and advice was received from Dr Deere. HDC's ERP is now a comprehensive document and it includes in Appendix B the important pre-drafted boil water notice and other draft communications. The plan was exposed to a test during an E.coli contamination event at the Waimarama supply in April 2017 and HDC reported that it was invoked successfully and proved to be very useful.

⁵⁸ See **CB202**.

[181] HDC is continuing to add to and refine its ERP and Mr Thew described it as a living document that would be subject to ongoing improvement. Matters which the Inquiry considers still need to be worked on are ERP training and exercises, the possible creation of a quick reference manual, removal of inconsistencies (such as in the instructions for how water should be boiled), clarification about the use of bottled or boiled water for bathing by people with wounds or weak immune systems, and certainty as to the meaning of “widespread” in relation to levels of illness and complaints about taste or odour, as well as “precautionary” boil water or “do not drink” notices which inappropriately devolve decision-making to the public. The Inquiry also suggests that more thought be given to the requirements in the plan where positive E.coli results may be due to intermittent ingress, the conservative nature of the Event Identification Table, the diagrams for each of the water supply systems (which are currently unclear), and options for obtaining external advice. The DWAs should ensure that the ERP which forms part of the WSP is reviewed and improved to include the above matters.

The Havelock North Reticulation System

[182] Given the history of transgressions in the Havelock North reticulation,⁵⁹ one of the recommendations made by the Inquiry in its Interim Report dated 15 December 2016⁶⁰ was that the Hawke’s Bay JWG investigate whether the Havelock North reticulation and distribution systems were fragile or vulnerable, and whether they needed maintenance, repair work or improvements in order to deliver safe drinking water to Havelock North consumers. The JWG later submitted that this task was inappropriate for the JWG and that HDC should be responsible for assessing and maintaining its own assets and infrastructure, and for planning for future improvements. The Inquiry accepted this but asked the JWG to maintain oversight of the reticulation issues.

[183] HDC is undertaking advance renewal planning analysis of its reticulation assets, with assistance from Harmonies and Independent Development Solutions Limited. However, this is a long term approach which will not address current safety issues in the reticulation. The Inquiry’s 15 December 2016 recommendation should be put into effect without delay and the DWA should audit this work in order to ensure that any necessary changes to the WSP cover it appropriately.

⁵⁹ See Stage 1 Report at [471]–[478].

⁶⁰ See Stage 1 Report at Appendix 2.

[184] The ongoing chlorination of water from Brookvale Road bore 3 and the Hastings bores results in a residual chlorine level in the reticulation. This is a partial safeguard against bacterial contamination of the reticulation water from backflow, breakages and other sources.

[185] Earlier in 2017, the Inquiry raised with HDC a number of concerns about the stability of the free available chlorine levels in the reticulation. The application of free available chlorine in order to maintain a residual has been in place since the outbreak in August 2016 and should have resulted in stable chlorine demand throughout the network by the end of 2016. However, as late as September 2017, some test results indicated high levels of total coliforms and sporadic low free available chlorine levels in the reticulation.

[186] The Inquiry considers that HDC should now undertake a thorough review of residual chlorine levels in the distribution system to determine whether adequate and stable free available chlorine is consistently present across the network.

[187] A review of water testing results from the reticulation from 1 September 2016 to 30 September 2017 showed that total coliforms were often found. While the percentage of positive samples is not high, contaminated water has been identified in ten of the thirteen months where data have been examined. The presence of total coliforms can indicate failure of primary disinfection, regrowth of organisms within the distribution system due to an inadequate residual disinfectant level, or ingress/backflow of contaminated water into the system. All of these failings can be rectified if the cause is identified.

[188] The Inquiry has received no information on the responses to these positive findings. During this same period there were over 40 samples taken which had residual chlorine levels that failed to meet the level of residual chlorine required by DWSNZ. While there has been some improvement in residual chlorine levels over the monitoring period, the Inquiry has received advice that HDC should continue to investigate the cause of these low readings.

[189] The Inquiry continues to regard the Havelock North reticulation as vulnerable and posing risks. Maintaining a proper chlorine residual will go some way to addressing the risk, but HDC clearly needs to pursue a programme of assessment and improvement of this reticulation. It is not clear to the Inquiry that HDC's reticulation

work is proceeding as quickly as is desirable. This is a matter which the DWAs should monitor and include as an important component of WSP assessment.

Water Supplied to Havelock North from Hastings Urban Bores

[190] HDC commenced chlorination in all of its Hastings urban bores in August 2016 and treatment by chlorination will be continued indefinitely. The Inquiry has noted with some concern that not all water delivered to consumers' taps has had the recommended chlorine contact time. The Inquiry has found that some improvement to HDC's chlorination processes is needed. Although chlorine is being added to the water, the chlorination process does not meet the DWSNZ or international best practice because of inadequate contact time. Failing proper contact time, an alternative primary disinfection step such as UV or ozone should be applied prior to the addition of chlorine as a secondary disinfectant.

[191] The Inquiry notes with some concern that HDC is still using its fluoridation injection equipment to deliver chlorine to its urban drinking water supplies. The Inquiry had understood that this was to be a temporary measure, put in place to meet the immediate needs of the aftermath of the outbreak; temporary because not only did it deprive the community of fluoride in the water, but more sophisticated and capable automatic chlorine injection systems would be safer, and more fit for purpose.⁶¹ As noted in HDC's WSP (2.3.1) the dosing facilities are "a temporary set up". With HDC now well into the second year after the outbreak, the Inquiry is concerned that, with the exception of Brookvale Road bore 3, it still has not installed appropriate and capable equipment at its urban bores. Dr Fricker advised the Inquiry that disinfection injection systems should be permanent in nature and continuously telemetered, and they should include fully automated dosing with automatic shut-down of the treatment plant if the required disinfectant dose is not achieved. The Inquiry's view is that HDC should install such systems as quickly as possible. The equipment is understood to be relatively inexpensive and the subsequent addition of UV or other treatment systems to supplement chlorination should not interfere or conflict with the recommended installations, or serve to delay them further.

[192] Within the Hastings urban supply, there are 10 bores but HDC advised that only the Eastbourne borefield (comprising five bores) supplies Havelock North.

⁶¹ The Hasting urban water supply has not been fluoridated since August 2016.

[193] In the year since September 2016, HDC has carried out many improvements to bores in its urban borefields, including lifting below-ground boreheads, checking bores and casings, and addressing monitoring and telemetry systems. HDC has approved expenditure of \$12 million in the year ending 30 June 2018 for works to be carried out on the Hastings urban bores.

[194] HBRC is actively engaged in relation to catchment and aquifer studies in relation to the Hastings urban bores and the Hawke's Bay JWG is a vehicle for collaboration between HDC, HBRC, the DWA, the DHB and other agencies on these studies.

[195] Water test results from samples taken at the Hastings urban bores between 1 September 2016 to 30 September 2017 have demonstrated that total coliforms have been present in all of the bores at some time during that period. The Inquiry has received advice from Dr Fricker that, in his opinion, this indicates that all of these bores are potential sources of waterborne disease and that continuing treatment is required.

[196] The DWA by letter dated 25 July 2017⁶² downgraded Frimley Park 1, and Frimley Park 2 to non-secure, confirmed that Wilson Road and Napier Road were non-secure, and noted that Portsmouth would remain under review. Eastbourne bore 2 is provisionally secure (because of the 10 February 2017 E.coli result) but Eastbourne bores 3–5 are still classified as secure.

[197] Regardless of the formal status as classified by the DWA, all Hastings urban bores are being managed as non-secure, as HDC has accepted the Inquiry's 14 July 2017 recommendation⁶³ that all of its urban drinking water bores should be managed as non-secure regardless of their DWSNZ classifications. This should continue indefinitely.

[198] As concerns the Portsmouth bore, this is currently classified as secure but, as stated, test results have indicated levels of total coliforms. In Dr Fricker's view, the presence of total coliforms shows the presence of "young" water and therefore a lack of security. While the DWSNZ do not currently require total coliforms to be measured or actioned (although see the Inquiry's recommendation in this respect in Part 19), and while the secure rating may therefore be justifiable under those standards, the Inquiry

⁶² **CB206.**

⁶³ See **Appendix 1** at [20(b)].

has concluded that the Portsmouth bore should not be regarded as secure. While HDC currently manages all of its bores as non-secure, it is important to record the need for this to continue in the case of Portsmouth.

[199] With regard to the Eastbourne bores, on 10 February 2017 an E.coli detection occurred at Eastbourne bore 2. Moreover, all other Eastbourne bores have also had total coliforms detected. Therefore, the Inquiry also regards all Eastbourne bores as currently non-secure and commends HDC for continuing to manage them on that basis. These examples highlight the desirability of monitoring for total coliforms.

[200] There is, now, generally, a high level of awareness of the risks to the Hastings urban bores. HDC's WSP has been developed into a comprehensive document, (except for the lack of critical control points). The DWAs have intensified their scrutiny and involvement.

[201] Nevertheless, one key area of risk remains. Currently, there is no UV treatment at any of the Hastings urban bores and this raises the question of risk of protozoal infection, because chlorine does not inactivate protozoa, such as cryptosporidium. The Inquiry is concerned that there is currently no treatment in place which would inactivate protozoa should they enter the system.

[202] In groundwater, contamination with protozoa is often sporadic and routine monitoring will often fail to detect it. There is a wide body of evidence in the literature that cryptosporidium outbreaks associated with groundwater supplies can and do occur. Dr Deere in his report for the August hearing confirmed that there is ample evidence that groundwater may contain protozoan contamination and Dr Fricker provided the Inquiry with up to date commentary on this issue.⁶⁴ It was Dr Deere's view that:

If there is the reasonably foreseeable potential for human infectious types of protozoan pathogens to reach production depths of aquifers, or otherwise to enter production bores, then appropriate treatment is required.

[203] In consultation with HDC and Dr Deere, the Inquiry relaxed the protozoa monitoring requirement to fortnightly for bores that are in supply. Samples (1,000L) have yielded no positive protozoan results. While these results are encouraging, they do not provide assurance that protozoan contamination will not take place. Further

⁶⁴ See Fact Paper #6 on the Inquiry website.

work is required to determine the specific protozoa risks arising from abnormal wet weather events.

[204] In Dr Fricker's opinion samples from all of the bores have shown the infiltration of surface water and therefore a route exists for protozoa to enter the water supply. In the Inquiry's view, there is a risk of protozoal contamination in all of the Hastings urban bores. Treatment for protozoa inactivation is the only way that this risk can be mitigated. Given the current state of knowledge of protozoa, the Inquiry believes that the risk of such contamination is sufficient to warrant UV treatment for all bores as soon as practicable. Appropriate UV treatment would also provide a further barrier to bacteriological and viral contamination.

[205] The Inquiry has been advised, and has accepted, that the implementation of UV at all bores for protozoa inactivation is a sound strategy. It notes that the UV system should be of high intensity such that it is able to inactivate bacteria and viruses as well as protozoa. This will also mitigate a current deficiency in the chlorination system where some consumers receive water that has not had adequate contact time with chlorine.

HDC's Drinking Water Strategy

[206] At the June 2017 hearing, the Inquiry identified the lack of any coherent strategy by HDC for future drinking water safety and asked HDC to address this and provide evidence of a committed strategy.

[207] At a Council meeting on 3 August 2017, HDC endorsed a drinking water strategy.⁶⁵ Key elements of this strategy, from the point of view of the Inquiry, were:

- (a) The decision to cease using Brookvale Road bore 3 as soon as possible,⁶⁶
- (b) The decision to find a new groundwater source as soon as possible;
- (c) Provision for a \$12 million expenditure on improvements to the Hastings urban water supply system in the year ending 30 June 2018;

⁶⁵ See **CB210** and **CB212**.

⁶⁶ Although the Inquiry notes the Council's updated position in its August/September 2017 Water Update that this bore may continue to be used for a longer period than initially suggested.

- (d) Construction of a second main pipe between Hastings and Havelock North to facilitate full supply from Hastings;
- (e) Increased abstraction from the Eastbourne borefield; and
- (f) Treatment indefinitely of all water sources across the urban supply;

[208] Notably, however, the strategy presented to the Inquiry did not provide for UV treatment at the Hastings urban bores. This was an unfortunate omission. The Inquiry acknowledges the positive effect on long term safety of the various elements of the strategy, but UV treatment, as soon as possible, needs to be provided for.

Monitoring Programme and Results

[209] The current monitoring programme setting out the required testing of drinking water samples is contained in HDC's WSP at 2.5.2 and 2.7.⁶⁷ Further detail is also set out in the updated recommended monitoring plan embodied in the Inquiry's 14 July 2017 Interim Report (see **Appendix 1**).

[210] HDC has on various occasions pointed out that monitoring is being carried out at levels above those required by the DWSNZ, but the Inquiry notes that those levels are only minima and that no suppliers should treat them as necessarily sufficient. The Inquiry also refers to Part 22 below which deals with the need for a comprehensive overhaul of the DWSNZ.

[211] The monitoring programme should be reviewed at least every six months, and HDC should continue to take expert advice on it. If HDC accepts that all of its water sources need continuous chlorination, then 2L samples monitoring for the presence of E.coli and total coliforms can be discontinued. In Dr Fricker's opinion, even in the absence of positive protozoa results, UV treatment is warranted. The Inquiry has accepted those views.

Water Supply Management within HDC

[212] At the August hearing the Inquiry heard evidence from the CEO of HDC, Mr McLeod, about steps taken with regard to the Havelock North and Hastings water supply management since the release in May 2017 of the Inquiry's Stage 1 Report.

⁶⁷ **CB201.**

Mr McLeod reported positively on the benefits to HDC of the Hawke's Bay JWG regarding water supply issues. He also spoke about the report of the Independent Capacity and Capability Review, involving three external consultants, and undertaken at his request in early 2017. Mr McLeod explained that this Review had given rise to a Change Management Programme, the details of which he described.

[213] HDC was asked by the Inquiry to provide an update of current and proposed resourcing of its water supply activity. In response, HDC advised that the Change Management Programme was ongoing with a substantive report likely to be available in November 2017.

[214] In the meantime, HDC advised that there had been some, albeit modest, changes in personnel. Currently HDC has 31.5 to 33.5 FTE allocated to water supply, comprising a mix of internal staff, consultants and contractors. This compares with historic levels of resourcing of 11.5 FTE. HDC advised this could reduce to a total of 15 to 17 FTE once a new water supply strategy, accelerated capital works programme, and backlog of quality assurance documentation are all completed.

[215] Mr McLeod also advised that HDC had provided the CEO with sufficient resource flexibility and financial support to obtain whatever physical assets and people resources he considers necessary.

[216] The Inquiry is encouraged that some progress has been made by HDC with regard to water supply management and personnel issues. However, on the evidence it received, there is concern about the convoluted and slow processes being used by HDC for change and the lack of decisive action. It is over 15 months since the outbreak, and over four months since HDC received the report of the Independent Review. Progress to date appears limited. The processes appear to be over-complicated. In short, there appears to be a lack of decisive leadership at the executive level in the water supply area.

[217] The Inquiry is also concerned to note the likely continued heavy use by HDC of external resources for roles which should be core capabilities for a water supplier. The Inquiry appreciates that recruiting some specialist skills may be problematic, but joint arrangements with neighbouring water suppliers may provide other opportunities, should recruitment prove difficult.

Other Safety Issues

[218] While there has been an improvement in the understanding of the catchment since the events of August 2016, there is still work to do in understanding the risks posed by the potential for contamination of the aquifer. The white paper being produced for the Hawke's Bay JWG will address aquifer and catchment matters.

[219] HBRC is continuing with its comprehensive aquifer investigations as part of a proposed change to the Hawke's Bay Regional Resource Management Plan. This program of work is known as "TANK" and is addressing a wide range of water resource issues. Water quality is one of the matters being investigated and this comprehensive program should add substantively to the understanding of drinking water source protection issues.⁶⁸

[220] There are a considerable number of bores, other than those operated by HDC, that penetrate the aquitard. The security of these bores and their potential to lead to contamination needs to be assessed. The Inquiry recognises that this is a significant task but it is of considerable importance in understanding the real risks. Furthermore, there are sewerage pipes in close proximity to abstraction points and the condition of these needs to be assessed in order to determine any risks from that source.

[221] The Inquiry has heard evidence that water age-testing subsequent to the August 2016 event has shown that the proportion of "young water" is higher than previously thought in the vicinity of the Hastings urban bores. This indicates that surface water is accessing the aquifer, potentially bringing with it pathogens. The finding that "young water" is present in the aquifer indicates that the risk of contamination from surface water is higher than previously thought.

[222] Data has been presented to the Inquiry that shows that many waterborne outbreaks of disease have been preceded by high rainfall and that there are many reasons for that. HDC has been advised that monitoring of raw water immediately after such events is of paramount importance to the understanding of risk from surface water contamination. The Inquiry's 15 December 2016 Interim Report at (j)(vii) recommended

⁶⁸ An update on the TANK program as supplied by HBRC to the Inquiry is on the website as Fact Paper #24.

that the Hawke's Bay JWG define and prescribe wet weather events and extra testing during them. The 14 July 2017 Further Interim Report⁶⁹ reiterated this.

[223] To date the Inquiry has received no analytical data acquired by HDC after such adverse weather events. Such data is critical to the understanding of the potential risks from rapid surface water infiltration into the aquifer. Dr Fricker has advised the Inquiry that the identification of wet weather events that should trigger sampling is a relatively simple issue and does not require extensive scientific investigation. Dr Deere has advised that monitoring requirements after wet weather events should be set at such a level that is triggered two to three times per year. Regrettably, HDC has not yet adopted this approach, despite Dr Deere's clear guidance. The Inquiry is concerned that this simple but very important measure has not been decisively actioned for the better part of a year. This is also a matter the DWA should follow up on.

[224] In Part 19 of this report, sampling and laboratory competency are discussed. The Inquiry is cognisant of the importance of both of these activities and their potential to negatively impact public health. It therefore records that HDC must do all that it can to satisfy itself that all analytical procedures and sampling techniques are being performed in line with international best practice.

[225] HDC makes chlorine-free water available to its consumers through specific taps located in public areas. Chlorine is removed by passing the water through granulated activated carbon. When properly maintained, such taps should have no negative health effects, despite the fact that bacteria will grow within the carbon and the water will be of a lower microbiological standard. The Inquiry has been advised that Wellington Water has installed UV disinfection systems at chlorine-free sites within its geographical area. While not recommending that HDC necessarily needs to do the same, that the Inquiry commends it as a matter for consideration. In any event, a robust maintenance and monitoring program should be in place at all times for these chlorine-free taps.

The DWA's View of Safety

[226] The DWAs provided the Inquiry with a report on changes to their systems following the Stage 1 Report. This advised of a deeper and more effective input from them to transgression investigations, WSP production, and implementation and liaison

⁶⁹ **Appendix 1** to this report.

generally with HDC. Subject to the DWA resources being boosted urgently, these developments will enhance safety.

[227] A report was received from the DWAs (through Mr Wood) on their view of the current safety at the Havelock North supply. Mr Wood's detailed report was satisfactory overall, but he did note as a prominent risk factor the lack of UV treatment for all of the Hastings urban bores with the consequent ongoing protozoa risk. He also noted that the inclusion of critical control points into the WSP was underway, although it was taking much longer than desirable to complete. In addition, the state of the reticulation also gave concern and particular attention to adequate and stable free available chlorine levels was required.

[228] The DWA's concerns (which mirror those of the Inquiry) should result in a high level of vigilance and oversight by the DWAs of HDC's supply for the foreseeable future.

PART 7 – PROBLEMS WITH CURRENT REGIME

Introduction

[229] One of the issues in the Inquiry's Stage 2 Issues List was the role of agencies in relation to drinking water, including whether there should be a single drinking water regulator. As a logical precursor, the Inquiry first addressed the question of systemic problems with the current agencies administering the drinking water system. (A particular aspect of this, DWAs, is covered primarily in Part 12 below).

[230] These issues were debated at the August hearing by a panel comprising Dr Fricker, Dr Deere, Mr Rabbitts, Dr Nokes and Mr Graham.

[231] The current drinking water regime is fragmented with many different agencies and persons responsible for various aspects of it.⁷⁰ This is, to a large extent, unavoidable given the involvement of local government (as the majority of sizeable suppliers) and in addition their regulatory role for environmental protection. The health authorities, such as DHBs, PHUs and DWAs also have a regulatory role in respect of health interests in the supply of safe drinking water. This multi-disciplinary system gives rise to issues concerning co-operation and collaboration between agencies, a topic covered in the Stage 1 Report at [123] to [127], and separately in Part 9 below.

Leadership Needed

[232] The multi-faceted system gives rise to another important consideration, namely, leadership. This term is used in a broad way and encompasses a range of roles including thought leadership, strategic planning, coordination of agencies, promoting collaboration between agencies, publishing updates of templates and guidelines, maintaining centres of expertise, providing data, reports and updates on various industry indicators, pursuing research, overseeing and providing guidance in relation to compliance and enforcement, maintaining links with international bodies and keeping abreast of international practice, and assessing and, where desirable, promoting changes.

[233] All of these aspects are important and pulling the diverse threads together is not straightforward. However, the Inquiry sees as critical the central ownership of administrative responsibilities for the delivery of safe drinking water to the public. Excellence in discharging these responsibilities requires first class leadership.

⁷⁰ See Stage 1 Report at Appendix 4.

Ministry of Health

[234] Under the current regime, the agency naturally fitting this leadership role is the Ministry of Health, with the Director-General as its head. In giving evidence to the Inquiry on 10 August 2017, the Director-General of Health, Mr Chuah, accepted that his Ministry had the standing and status to be influential in drinking water matters, quite apart from its statutory powers. He also accepted that the industry looked to him as a leader and he accepted that many of the items in the above list of leadership qualities were appropriate for the Ministry of Health.

[235] In considering whether a new dedicated drinking water regulator would improve current industry leadership, the Inquiry has reviewed the Ministry of Health's performance as a past and current leader in the field of drinking water safety.

Leadership Role of Ministry and Director-General

[236] The fundamental purpose and responsibility of the Ministry of Health is to improve, promote and protect public health (s 3A of the Health Act). To this end, the Health Act requires the Director-General and the Ministry of Health to carry out a range of drinking water responsibilities. These include maintaining a register of all drinking water suppliers (ss 69K, 69L, 69N and 69ZZA), advising the Minister on drinking water standards and amending the DWSNZ (ss 69A, 69P and 69R), preparing and publishing an annual report on compliance by suppliers (s 69ZZZB), appointing persons as DWAs on any terms or conditions considered appropriate (s 69ZK), specifying functions and duties of DWAs (s 69ZL), maintaining accountability of DWAs (s 69SM), maintaining a register of agencies appointed as DWAs (s 69ZX), receiving or requesting information or records from DWAs or designated officers about compliance (ss 69ZL and 69ZP), requesting or receiving information or records from DWAs about discharge of their statutory functions (ss 69ZM and 69ZL), recognising accredited laboratories on whatever terms and conditions are considered appropriate (s 69ZY), maintaining a register of recognised laboratories and keeping laboratory registers open for public inspection (ss 69ZY and 69ZZA), overseeing compliance and enforcement powers by DWAs or designated officers, and declaring drinking water emergencies in some circumstances (ss 69ZZA and 69ZZB).

[237] In addition, the Director-General designates suitable persons as HPOs or Medical Officers of Health (s 7A).

[238] Providing effective leadership involves much more than the essentially functional elements in the list of statutory duties above. Mr Chuah accepted that the Ministry's leadership role involved a wide range of leadership elements. For example, he accepted that the Ministry should assume responsibility for advising the drinking water industry of best practices and also for promoting collaboration between drinking water agencies. Mr Chuah also accepted that, although some functions were contracted to other entities, the Ministry retained ultimate statutory responsibility for them and therefore needed to monitor and supervise the contractual performance of those responsibilities adequately.

[239] Of the responsibilities listed above, registration, oversight, and prescription of terms in relation to DWAs, laboratories and designated officers represent some of the most important elements in the supply of safe drinking water. Administration of these aspects of the system needs to be undertaken by suitably qualified officials who understand drinking water infrastructure and the risks inherent in the delivery of safe drinking water from source to tap.

[240] In relation to drinking water suppliers, the current regime does not involve the granting of operating licences or specification of standards and qualifications. However, the Director-General does have the power to impose by notice in writing additional requirements as to the content and format of WSPs (s 69Z of the Health Act) and by that avenue could have a significant level of direct control over a water supplier's activities.

[241] Thus, the Ministry, and the Director-General, have a central and important role in the current regime, and one which inherently requires leadership in order to address the systemic issues raised by this Inquiry.

Director of Public Health

[242] The Director-General was questioned about the statutory role of the Director of Public Health, an officer appointed under ss 3B and 3D of the Health Act. Under these statutory provisions, the Director of Public Health has the function of advising the Director-General on matters relating to public health and may, in some circumstances, report directly to the Minister of Health.

[243] This is clearly an important statutory role and one of potential benefit and importance to the drinking water regime. It was put to Mr Chuah that the Director of

Public Health may be the appropriate person to lead a programme to address many of the problems of the drinking water regime. He agreed.

[244] In the Inquiry's view, prior to August 2017, the Ministry made insufficient use of the Director of Public Health to address problems with the drinking water system. However, Mr Chuah stated at the hearing:

She has the authority, delegated from me, to actually exercise directions and instructions to any entity where in her view that it is necessary for the powers to be exercised and I have complete confidence and trust in our current Director of Public Health.

He said she would have his complete support if she were to take initiatives to improve the drinking water system.

[245] It is the Inquiry's view that the role of Director of Public Health has been inadequately utilised or recognised by the Ministry of Health in relation to drinking water issues in the past. Pending consideration of the need for a dedicated drinking water regulator, this should change.

Ministry Resources

[246] In order to provide effective leadership for New Zealand's drinking water industry, the Ministry would need to have sufficient resources. The Inquiry was advised that only 3.5 FTE staff were responsible for drinking water within the Ministry. The time allocations making up this modest figure were spread among five staff, two of whom worked full time on drinking water and three of whom devoted approximately half of their time to drinking water. In addition, Ms Gilbert normally spends approximately 0.2 FTE on drinking water.

[247] The Inquiry acknowledges that the Ministry contracts with ESR for the provision of scientific advisory services and Allen & Clarke for the provision of technical advice and coordination services. It also contracts its public health service responsibilities to DHBs and PHUs. However, the core elements of leadership identified by the Inquiry remain with the Director-General and the Ministry of Health. In the Inquiry's view, the scale and scope of those leadership elements require proper resourcing.

[248] Many parties submitted that the Ministry's resources applied to drinking water administration were inadequate. Submitters asserted that the Ministry's resources appear stretched and that this has an impact on its staff's ability to maintain effective links with the water industry. A common refrain was that the Ministry lacked the

necessary engineering skills and experience to understand the water infrastructure assets needed for accessing, storing and treating drinking water. Other submitters spoke of the Ministry's lack of specialist drinking water expertise and observed that there is a need to provide DWAs with further support. Overall, it was submitted that the Ministry has inadequate capacity to maintain effective leadership.

[249] Mr Chuah did not accept these submissions and he indicated that these views had not been raised with him or the Ministry.

[250] Despite Mr Chuah's denial, the Inquiry has concluded that the Ministry's drinking water resources are seriously inadequate. The question of whether DHBs had complained to the Ministry about its resources is a different matter and did not throw any light on whether the resources are in fact adequate. All experts on the panel at the August hearing agreed that 3.5 FTE was nowhere near adequate to properly discharge the statutory functions, let alone also provide effective leadership.

[251] In a further submission dated 7 November 2017, Crown Law referred to Mr Chuah's evidence that he would be "receptive to hearing requests for extra resources (including from Ministry specialist staff)" and that he would look into resourcing. The Inquiry notes that these indications did not go beyond a willingness to consider any submissions or requests that might be put to him; its view is that there is ample evidence of under-resourcing now available to the Director-General and that he should promptly instigate steps to increase resources.

Adequacy of Ministry Leadership

[252] The Inquiry has considered whether the Ministry of Health provided adequate leadership prior to and following the Havelock North outbreak. Acknowledging the very limited resources normally deployed within the Ministry on drinking water matters, the Inquiry has nevertheless examined whether available staff, and the Director-General, were proactive and responsive to the event, and whether the Ministry has provided at least some of the elements of leadership discussed above.

[253] One of the experts giving evidence at the August hearing expressed a view that there was "an enormous vacuum of leadership". The Inquiry agrees with this view and has concluded that substantially greater and better leadership should have been provided by the Ministry. Across its whole range of activities, the Inquiry found that, both prior to the outbreak, and in 2017, the Ministry discharged few of its

responsibilities well, and many not at all. Some examples are given under the subheadings below to explain why the Inquiry has reached this conclusion.

[254] It should be noted that the Inquiry did not, and does not, criticise the Ministry's immediate response to the Havelock North outbreak.⁷¹ What is of concern, however, is the inaction and lack of energy by officials, in the period after September 2016. The fact that the Government had established this Inquiry did not absolve the Ministry from the duty to discharge its obligations, given the various problems which were plainly evident in the wider water industry, as discussed in Part 4 at [92]–[100].

Response after the Outbreak

[255] The nature and scale of the outbreak, and the issues which it raised, should have mobilised the Ministry of Health into concerted action in the period following the outbreak. It was the responsibility of the Director-General and the Ministry to provide leadership and to take positive steps to ensure the ongoing safety of drinking water for Havelock North, and nationally. The Inquiry has found that the Ministry's level of response was inadequate in that regard.

[256] The Inquiry acknowledges that, in the period preceding publication of its Stage 1 Report on 8 May 2017, many aspects of the Havelock North outbreak remained undetermined. Nevertheless, in that eight month period, there was no reason why the Ministry could not have set up a drinking water task force with proper resources and expertise. Even though the Inquiry was proceeding with Stage 1, many matters generally concerning the safety of drinking water were, or should have been, known to the Ministry. Mr Chuah accepted in evidence that maintaining good links with the industry was an appropriate aspect of leadership.

[257] Such a task force could have investigated, for example, compliance levels by suppliers throughout New Zealand, the state of the DWA force, whether powers under the legislation should be invoked, and a range of other matters which obviously had the potential to impact upon drinking water safety. It could also have engaged with Water New Zealand and other industry participants to address known problems.

[258] Despite the need for positive action, the Inquiry has found that there was no constructive engagement with the industry in the year following the August 2016 event. The Hawke's Bay JWG had requested participation by the Ministry of Health but, by letter dated 4 May 2017, the Director of Public Health on behalf of the Ministry declined

⁷¹ See Stage 1 Report at [603].

to be involved. Participation would have given the Ministry not only local insight but also valuable clues as to the types of issues that were likely to be relevant to JWGs elsewhere in New Zealand. The Inquiry found that decision surprising and is pleased to record that in September 2017 the Ministry agreed to attend JWG meetings as appropriate.

[259] The Inquiry considers that, at least from May 2017 when its Stage 1 Report was released, there was a basis for the Director-General to conclude that there were obvious public health risks from untreated supplies, and that the systemic problems identified in the Stage 1 Report needed to be addressed. A task force was certainly needed at this stage. Despite this, the Inquiry has concluded that the Ministry again failed from May 2017 to demonstrate leadership or to take a range of simple steps to address these issues.

[260] The Inquiry's Stage 1 Report made it plain that there were systemic problems within, for example, HDC and also the DWAs. There was also the question of many large or medium untreated supplies and the significant risks these posed to the health and welfare of large numbers of people, including through sporadic illnesses. Problems had been identified in relation to provisions of the DWSNZ and the systems for ensuring security of bores, sources and reticulation.

[261] Despite these circumstances, the Inquiry received no evidence that Ministry officials, or the Director-General, had used available statutory and other powers in relation to any of these matters. Nor did the Ministry encourage or promote the exercise of powers by designated officers and DWAs employed by DHBs. When questioned on the use of statutory or other powers at the August hearing, the Director-General indicated on a number of occasions that he had not been requested by his officials to use such powers, or that he would need to take advice on the point. This suggests that matters that ought to have been advanced by officials were not being escalated appropriately.

[262] At the June 2017 hearing, the Inquiry explicitly urged the Ministry of Health to take a leadership role. A specific request was made for the Ministry to provide to the Inquiry constructive proposals for change to improve the safety of drinking water, an invitation that was repeated later in correspondence by counsel assisting the Inquiry.

[263] Despite this, the submissions, fact papers and evidence of Ms Gilbert produced by the Ministry ahead of the August hearing were almost entirely bereft of any

proposals or evidence of constructive initiatives by the Ministry. In many cases, the Ministry declined to respond to an issue on the basis that it wanted to await the outcome of the Inquiry, that the relevant issue would involve policy consideration, or that various matters had been under review. Given the Ministry's central role, its statutory responsibilities and the existence of risks on a day to day basis, these reasons for inaction were not valid or reasonable.

[264] In the Inquiry's view, the Ministry of Health was uniquely placed to demonstrate thought leadership and a strategic approach in its responses to the Inquiry, and to assist the Inquiry with a series of positive proposals addressing the deficiencies recorded in the Stage 1 Report. Its failure to do so suggests both substantial under-resourcing and a lack of necessary skill levels within the drinking water section of the Ministry.

Poor Compliance Levels

[265] On the question of compliance levels by suppliers, the Inquiry has concluded that the Ministry has done nothing effective to improve compliance levels, not only over the last year, but well before that. Compliance levels have been addressed in detail in Part 4. The Inquiry also previously issued a paper on drinking water safety and compliance levels in New Zealand and a copy of it is annexed as **Appendix 2**. This paper was provided to the parties, including the Ministry of Health, on 14 July 2017.⁷²

[266] At the August hearing, Mr Chuah was questioned about his awareness of compliance levels. He had not read the Inquiry's paper. It was put to him that the annual report published by the Ministry of Health for the year ended 30 June 2016 recorded that only 80 per cent of drinking water suppliers serving more than 101 people met all requirements of the DWSNZ. It was put to Mr Chuah that this represented some 759,000 people of whom 92,000 were at risk of bacterial infection, 681,000 at risk of protozoal infection and 59,000 at risk from the long term effects of exposure to chemicals. Mr Chuah was not aware of these numbers. He accepted that they were troubling. It was further put to him that, over the last seven years, there had been only a very gradual improvement in overall compliance of 3.7 per cent.

[267] By contrast, it was put to him that compliance figures in the United Kingdom were vastly superior with some aspects of compliance running at 99.9 per cent, that is, practically full compliance. Mr Chuah accepted that compliance rates in New Zealand

⁷² The version in **Appendix 2** is revised from that previously posted on the Inquiry website. The compliance figures put to Mr Chuah remain unchanged.

needed to be improved. Dr Fricker said that New Zealand's transgression record (which is only one form of non-compliance) was some 10 times worse than the United Kingdom's.

[268] The compliance issues paper in **Appendix 2** records that the compliance levels of smaller suppliers were dramatically worse than those for large suppliers. Compliance levels for small suppliers have been as low as 16.2 per cent over the last seven years, and are currently sitting at approximately 25 per cent. The paper also demonstrates that many suppliers simply do not carry out the required protozoa sampling and testing and that there are a significant number of suppliers whose non-compliance record remains the same, year upon year.

[269] Mr Chuah accepted that compliance rates at these levels were unacceptable. He accepted that the Ministry should strive to achieve a higher compliance rate. The persistent high levels of non-compliance, in the Inquiry's view, cried out for effective action by the Ministry, but the Inquiry has been unable to discern any leadership activity by the Ministry, at any time, in relation to those continuing breaches. The Inquiry sees this as particularly unsatisfactory in the year following the Havelock North outbreak. The (provisional) compliance figures for the 2016-2017 year show little change. While there has been a minimal improvement in compliance by large suppliers, as discussed in Part 4, the preliminary compliance figures in the 2016-2017 Annual Report remain regrettably disappointing. It seems the Havelock North outbreak, despite its seriousness, has not yet led to any change by suppliers, or the Ministry, in relation to compliance.

Enforcement Policy

[270] Many submitters were critical about the Ministry's enforcement policy. They referred to a "softly, softly" enforcement approach under which DWAs were enjoined by the Ministry to take a lenient, cajoling and cooperative approach on all occasions, rather than to escalate matters into the realm of enforcement steps. A similar message was provided by the Ministry to designated officers (whose function it was to exercise enforcement powers). All consideration of this issue needs to take into account that the Ministry had made it clear that it required all proposed enforcement action to be referred to it for advice and instruction.

[271] No compliance orders have been issued and no prosecutions have been launched since Part 2A of the Health Act was enacted in 2007. This provides support

for the views expressed by some submitters that there was in fact no effective enforcement at all in the period from 1 July 2012 (when Part 2A became mandatory for large supplies) to 2017.

[272] Submitters spoke about the central importance of an effective enforcement policy and the need for designated officers to take appropriate and timely enforcement action in the knowledge that this would be supported by the Ministry of Health. Water New Zealand, in particular, submitted the “softly, softly” compliance approach had not been effective, had compromised the ability for DWAs to be effective, had contributed to inconsistency nationally due to a lack of guidance, and had left designated officers unclear as to their enforcement roles. Dr Jones stated that the Ministry of Health had explained that it did not want actions taken that could be overturned in Court because that could have a negative impact and set a negative precedent.

[273] The Ministry’s enforcement policy was contained in a section headed “Implementing Legislation” within the document “Criteria for Appointment of Statutory Officers”.⁷³ This was not a prominent or particularly accessible location for such an important policy. The relevant framework was described as a “problem solving philosophy for compliance and enforcement” and was premised upon education and persuasion providing the best outcomes. Further guidance from the Ministry was contained within the Environmental Health Protection Manual. This contained general provisions relating to all Ministry compliance and enforcement activity, but nothing of specific use or guidance to DWAs considering what to do about persistent non-compliance with drinking water requirements.

[274] Confusion about the Ministry’s enforcement policy was evident from the evidence of Ms Gilbert and Mr Chuah respectively. Ms Gilbert stated that the “softly, softly” approach had stopped in 2014 and that this was communicated to DWAs through a training course. She stated that, in 2014, “we made a very deliberate change to the training to strengthen (it), really promoting compliance activity and enforcement activity”. However, Ms Gilbert confirmed that no specific written instruction on this change of policy was ever issued by the Ministry.

[275] It was clear from submissions and evidence provided to the Inquiry that many in the industry continued to believe the lenient enforcement approach was operative as at August 2017. For example, Dr Jones did not know there had been any change. The Director-General stated in evidence that he had heard of the soft enforcement policy

⁷³ **CB223.**

and that he understood it had been longstanding, predating his appointment as (at that time acting) Director-General on 9 November 2013. Mr Chuah stated that he had not made any change to the policy. It was put to Mr Chuah that the non-compliance data cried out for a different enforcement policy and he accepted that.

[276] In an attempt to clarify the confusion about the Ministry's enforcement policy, the Inquiry requested copies of training materials illustrating the change from the soft approach which Ms Gilbert said was communicated to DWAs at a training course in 2014. The Ministry provided copies of the 2014 training materials and observed that the training materials for 2013 and 2015 did not materially differ. The Inquiry also reviewed the 2012 materials.

[277] The Inquiry did not consider the 2014 training materials to provide any direction to the DWAs that the Ministry was no longer advocating a 'softly, softly' enforcement approach. In particular, the Inquiry noted that the 2014 training materials (in identical terms to those in 2012) accompanied their discussion on implementation with the quote "Speak softly and carry a big stick; you will go far". The 2014 materials do provide guidance on the use of compliance orders, described as "a last resort before prosecution", but state as the "take home message" that if a prosecution, serious breach, search warrant or emergency is being considered the Ministry will be the "lead investigator".

[278] Moreover, the Hawke's Bay DWAs advised they had not received all the 2014 training materials provided by the Ministry to the Inquiry. They noted that in 2014 students were split into two training streams – one for DWAs and the other for Medical Officers of Health and HPOs. The DWAs reiterated that they did not understand from the 2014 training they received that the Ministry had changed its enforcement policy.

[279] The Inquiry could not discern in the evidence any support for the "very deliberate change" referred to by Ms Gilbert. On this point the Inquiry found her evidence unpersuasive and unreliable.

[280] In summary the Inquiry has concluded that the Ministry of Health failed in its responsibility to promulgate an effective and useful enforcement policy from 2007 to 2017. Moreover, despite the August 2016 outbreak, and the work of the Inquiry, there was still a lack of clarity at the August 2017 hearing as to what the policy was and whether it had been changed. As will be discussed below, the attempt by the Ministry

following the hearing to communicate an effective enforcement policy was equally inept.

[281] In Part 8 below, the Inquiry deals with some of the difficulties with the duties for suppliers under the Health Act including, in particular, the “all practicable steps” test which, in effect, makes compliance discretionary in many cases. The Inquiry also acknowledges that s 69ZZS provides that it shall be a defence to prosecutions for offences that the defendant took all practical steps to prevent the commission of the offence, and also that the defendant did not intend to commit the offence. It is acknowledged that the provisions of the Health Act would make prosecutions difficult in many cases and that these weak and discretionary statutory provisions provided some justification for a cautious approach to enforcement. But to rely on these weaknesses to have, in effect, no real enforcement, was patently unacceptable and unjustified.

[282] Prosecutions, and the prospect of possible defences to prosecutions, are matters which should only arise in the last stages of enforcement. The ability to issue compliance orders remained a powerful tool and the Ministry’s apparent reluctance to promote the use of compliance orders was not justifiable. Nor should prosecutions (or the threat of them) have been completely disregarded. In cases where suppliers had refused to comply with legal requirements year after year, there was, at the least, a prima facie basis for considering prosecution.

[283] Following criticism of the enforcement policy at the August hearing, the Ministry of Health, on 18 August 2017, wrote a six page letter to all PHU managers setting out its views on enforcement and compliance.⁷⁴ This letter was prolix and convoluted and contained much background information. Regrettably, the Inquiry was unable to discern any clear and concise statement that the previous lenient enforcement policy was at an end. Equally, there was no firm statement of the need to pursue a new and more vigorous enforcement approach. Nor did the letter make reference to the continuing lack of compliance by many suppliers, as context for enforcement steps.

[284] Designated officers have a great deal of discretion as to when to take enforcement action, and what type of action to take. Dr Jones spoke of the difficulty facing a designated officer as to how and when to exercise that discretion. The Inquiry did not see in the Ministry’s 18 August 2017 letter any useful guidance on how the discretion should be exercised.

⁷⁴ **CB233.**

[285] On 14 September 2017, Dr Jones wrote to the Ministry of Health indicating that he had read the Ministry's 18 August 2017 letter but was still not clear about enforcement. He sought clarification on the status of the current Ministry enforcement and compliance policy. His letter posed a series of questions about how the policy had changed, what guidance could be provided to statutory officers, and clarification of the roles of the Ministry and statutory officers respectively.

[286] Following this letter, there was a conference call between the Ministry and the DHB and an exchange of emails culminating in one from the Director of Public Health, dated 24 October 2017. Having reviewed this material, the Inquiry has concluded that the Ministry continues to demonstrate a marked reluctance (or inability) to provide clear or pithy advice to the DHB on the practical application of its enforcement and compliance policy. Nor has the Ministry answered questions put to it about the policy, questions which the Inquiry thought reasonable and pertinent. This seems to the Inquiry to have left the DHB in an unsatisfactory position. It is reasonable to assume that all other DHBs in New Zealand may also be bereft of proper guidance.

[287] The Ministry's performance in relation to enforcement has been, and in the Inquiry's clear view remains, seriously deficient. The quality and accessibility of guidance has been poor. The Ministry required designated officers to refer all proposed enforcement action to it, but it effectively negated firm and effective compliance and enforcement action.

DWAs – Reporting and Accountability

[288] As noted, the Director-General has a prime role in relation to DWAs. On 18 May 2017, the CEO of the Hawke's Bay DHB, Dr Snee, wrote to the Director-General about the lack of direct local accountability in respect of the DWA service. Dr Snee proposed that there should be a clear line of accountability from the Director-General through the CEO as provider of the service.⁷⁵ Underpinning this letter was the difficulty of DWAs serving two masters. DWAs are employed by the DHB but the Director-General has legal responsibility for them, and DWAs have statutory accountability to him.

[289] The Director-General responded by email on 22 May 2017 indicating that he had delegated the response to Dr Jessamine, the Director of Protection, Regulation and Assurance within the Ministry. On 1 June 2017, Dr Snee wrote further to the

⁷⁵ **CB203.**

Ministry with more particular proposals.⁷⁶ On 6 June 2017, Dr Jessamine responded in very broad and general terms without resolving the issue.⁷⁷ At the August hearing, the Inquiry learned that no further progress had been made and that no changes had been put in place in relation to this matter. In evidence, Mr Chuah accepted that no progress had been made, but indicated that it was necessary to consider the matter on a national basis. He accepted that DWA accountability required clarification and that it was still a “work in progress”. For a matter first raised on 18 May 2017, this did not seem to the Inquiry to be a response indicating any real commitment.

[290] A progress report from the Ministry of Health provided to the Inquiry on 22 September 2017⁷⁸ did not advise of any particular progress in terms of clarifying accountabilities of DWAs. The report did not even refer to the correspondence with Dr Snee but indicated that further discussion of the issue would take place at a Health Protection Managers’ meeting on 3 October 2017. As at November 2017, the Inquiry was advised that Dr Snee’s initiatives had still not resulted in any changes (although the DHB itself had taken some steps internally to try to alleviate the difficulties). DWAs continue to serve two masters. The opportunity for improvement has not been grasped in any useful way by the Ministry.

[291] It seems to the Inquiry that this is an issue which, in all the circumstances, should have been addressed by the Ministry more promptly and effectively. It is an issue which should have been capable of prompt and decisive consideration. Dr Snee’s proposals, initiated on 18 May 2017, appeared to the Inquiry to be practical and sensible and to have offered the prospect of a substantial improvement in the accountability of DWAs, for very little change or burden. Despite this, it appears that the matter is likely to remain “under discussion” by the Ministry of Health for some time to come.

DWAs - Resourcing

[292] The Inquiry heard much evidence that the DWAs were seriously under-resourced and that there had been intractable problems in recruiting sufficient DWAs.

[293] A particular problem referred to by submitters was the Ministry of Health’s administrative requirement that all DWAs must be qualified as HPOs. This additional

⁷⁶ **CB204.**

⁷⁷ **CB205.**

⁷⁸ See the Inquiry website tab “Ministry of Health Responses to Requests”.

and relatively burdensome requirement was said to be an impediment to recruitment. The HPO requirement is an internal requirement set by the Ministry and not contained in legislation. Submitters said there was no need for it.

[294] This issue is dealt with more fully in Part 12 below. However, in the present context, the Inquiry observed that, by 22 September 2017, despite clear urging from the Inquiry, the Ministry and the Director-General, had not removed or modified the requirement for HPO qualifications, and appear unlikely to do so.

[295] Having reviewed the evidence and submissions concerning problems faced by the DWAs service, the Inquiry has concluded that the Ministry has failed to exercise sufficient leadership in relation to these problems. There have been serious shortages of DWA resources but the Ministry has done nothing effective to address these. Even though DWAs are employed by DHBs, the Director-General remains responsible for DWAs in various important ways under the Health Act. This is a prime example of deficiencies in a fundamental element of the drinking water system where the Ministry could exercise leadership and take active steps to assist and promote improvements.

[296] On the broader DWA questions of training, quality control, funding, resources, national consistency and collaboration (and the like) the Inquiry has also not discerned any useful leadership from the Ministry. If the Ministry's view is that DHBs should be fully responsible for all such matters (despite ss 69ZL and 69ZM of the Act), then Dr Snee's proposed changes should have been put in place promptly. Urgent improvements to many aspects of the DWA service are needed. These will be achieved most quickly and effectively by one master.

Responsibility for Laboratories and Samplers

[297] In relation to accountability for laboratories, HDC (through Mr Thew) wrote to the Director-General on 17 July 2017 setting out serious concerns about one of the laboratories it had used after the outbreak. Mr Thew referred to a fundamental error the laboratory made which invalidated 1,318 results from an important post-outbreak period.⁷⁹ Mr Thew expressed his concern that HDC could not rely on recognition of accredited laboratories by the Ministry of Health.

[298] The response from the Ministry (through Dr Jessamine), dated 31 July 2017, effectively disavowed any responsibility for the problem, indicating that the Director-General did not monitor or guarantee the individual performance of

⁷⁹ See the Stage 1 Report at [96]–[102].

laboratories and that IANZ was responsible for monitoring laboratory performance when conducting audits.⁸⁰

[299] In the Inquiry's view, this response from the Ministry represented a regrettable failure to accept ownership of the problem or to exercise any leadership. The response omitted any acknowledgement of s 69ZY(3) of the Health Act which provides that a laboratory may be recognised on whatever terms and conditions the Director-General considers appropriate. But, more fundamentally, it was a rejection of an opportunity, in the post-outbreak period, to exercise beneficial leadership in an important matter.

[300] In the Inquiry's view, this was a matter on which the Ministry could have been expected to demonstrate clear leadership and to take ownership of the issue. Its failure to do so was notable.

[301] In the period following the August 2017 hearing, the Ministry took steps to improve certain aspects of the regime for laboratories and samplers. Some of the steps taken indicate good progress, particularly the joint action taken by IANZ and the Ministry, where IANZ has shown much initiative within the bounds of the current regime. Some areas require greater attention, and much more urgency than the Ministry has proposed. This topic is discussed in more detail in Part 19 and **Appendix 8**.

Provision of Advice

[302] The Ministry advised that it makes scientific and technological advice available through ESR. As with other issues, there appears to be a significant disconnect between the understandings of the Ministry and the statutory officers on the question of accessing ESR advice and assistance. The Hawke's Bay DHB said that there were several processes which a DWA was required to follow before obtaining approval and access to ESR. These presented bureaucratic obstacles and tended to put busy DWAs off accessing the advice and expertise of ESR.

[303] The Inquiry was also advised of a National Drinking Water Advice and Coordination Service which provides technical, policy and regulatory advice. The Ministry advised that this Service was one of the ways in which it provided national direction and support for PHUs. The Ministry contracts private firm Allen & Clarke to operate this Service and submitted that the Service has a range of expertise available including DWAs, engineers, an international drinking water regulator, drinking water

⁸⁰ See **CB209** and **CB215**.

operators and other technical advisers. The Service was stated to be available to DWAs on request, and is said to be tailored to address any specific DHB/DWA inquiry. The Service is provided by way of logging into a database (the H2O Health Source Database) which enables previous questions and answers to be reviewed. Direct access is possible in urgent cases.

[304] The information provided by the Ministry described what is, on its face, a comprehensive advisory service and a potentially powerful tool available to DWAs and suppliers. However, other evidence and submissions were received that indicated that, in practice, the Service is slow, access may be declined, and answers may be unhelpful or unusable from the perspective of the requestor. For an advisory service to be effective it needs to be readily accessible, and provide timely advice of a high quality. Speaking about the Service the Hawke's Bay DHB submitted:

[It] lacks the structure and clarity of function to provide DWAs with the necessary oversight and leadership, or to co-ordinate them in exercising their statutory functions in any meaningful way. DWAs need access to expert advice and experience in a number of specialist fields. While to a limited extent this is available presently, via ESR and the [Service], it is ad hoc and irregular.

[305] The Inquiry was unable to make any assessment of the quality of advice provided by the Service. It noted that Allen & Clarke subcontract some aspects of the Service to Mr Hewer-Hewitt, a drinking water engineer, who can provide assistance to PHUs in relation to small supplies. A division of the Canterbury DHB, Community in Public Health, is also contracted to answer public health focussed requests.

[306] The material received by the Inquiry on this Service has lead the Inquiry to the conclusion that the Ministry has set up a service which is, in concept, valuable and appropriate, and a potentially useful form of guidance to the industry. However, there is a significant disconnect between the Ministry and the water industry about the availability of the Service, the quality of its output, and the use which has been made of it. There are unresolved questions about the degree of expertise and specialist knowledge which the Service is able to provide.

Promoting Changes

[307] The drinking water regime overseen by the Ministry involves many technical and scientific elements which develop at a significant rate. It also involves other elements which are naturally amenable to change over time. The Ministry should have a proactive approach to changing circumstances, and it should have programmes for

promoting and bringing about changes where appropriate. Changes which can be made by the Ministry without amending the DWSNZ or the law could and should be actioned promptly. No evidence was received indicating such programmes existed in any effective form.

Other Leadership Deficiencies

[308] The Inquiry acknowledges that a number of programmes of review and update are being pursued by the Ministry in relation to the DWSNZ, WSP templates, minor aspects of the Health Act, revision of public health contracts, and the like. However, it has observed that some of these programmes have been running for a long time and that all of them are proceeding slowly. The Inquiry was surprised to learn that the Ministry had stopped pursuing some of these programmes when the Inquiry commenced; this was unnecessary and not conducive to improvement.

[309] The Ministry also recently updated the drinking water database Drinking Water Online. This was intended to reduce duplication and enable better analysis of drinking water data. The New Zealand Public Service Association submitted that Drinking Water Online has limited functionality and remains difficult for DWAs to use. Similarly, the Hawke's Bay DHB expressed concerns about the design and functionality of the system. The Inquiry acknowledges that this new system is in its early days but is concerned by the submissions it heard that the database does not currently serve the needs of its primary users.

Recent Improvements

[310] It is appropriate to record that, since the August 2017 hearing, at the Inquiry's urging, the Ministry of Health has taken a number of beneficial steps including:

- (a) Steps to establish an expert advisory panel for drinking water;
- (b) Writing to DWAs regarding improvements to the content of WSPs;
- (c) Participating in the Sampling and Monitoring Caucus set up by the Inquiry during the August hearing and agreeing to constructive implementation of recommended changes by that Caucus;
- (d) Steps to review accreditation of laboratories;
- (e) Steps to review and improve the resources of the DWA service; and

- (f) Steps to require further information to be recorded in the Drinking Water Register of suppliers.

[311] The Director-General when giving evidence provided many commitments for review and improvement, and he accepted that the statistics about compliance levels which had been put to him were troubling and needed to be addressed. Since the August hearing Ministry officials have undertaken various workstreams identified by the Inquiry or by counsel assisting. A report on progress was supplied to the Inquiry on 22 September 2017.

[312] While the Inquiry commends the Ministry for the steps taken at the Inquiry's request following the August 2017 hearing, there are continuing concerns. In relation to particular areas the Inquiry makes the following observations:

- (a) With respect to laboratories and sampling, many of the improvements to the laboratories and sampling regime are intended to be addressed through the review of the DWSNZ and through future programmed workstreams. The Inquiry considers that the Ministry, particularly armed with the guidance of the international experts and the clear indications that certain parts of the existing system need an "immediate fix", could be making more rapid progress within the current regime to address the pressing concerns in relation to laboratories and sampling practices.
- (b) In relation to WSPs, the evidence of Dr Fricker and Dr Deere at the August hearing confirmed that the existing templates needed major revision. Since then the Ministry has produced a lengthy 23 page WSP framework but it contains no templates, is too complex, and is of no practical use to its intended audience. The lack of templates addressing the absence of critical control points is particularly troubling. Both international experts said this work could be completed in short order and, generously, offered to draft the templates for the Ministry, an offer which was not taken up.
- (c) There has been no progress on removal of the HPO qualification. This is a simple and obvious step and there has been no adequate explanation why it has not been implemented.
- (d) As discussed above, the Ministry's enforcement policy and implementation is inept.

- (e) The appointment of the expert advisory panel proceeded too slowly. While terms of reference were settled reasonably quickly, the Inquiry did not receive advice of proposed appointments until 15 November 2017.

[313] The Inquiry acknowledges the positive steps taken by the Ministry, and the assurances provided by the Director-General, at the August hearing, but has concluded that fundamental problems and shortcomings remain in relation to technical capability, staffing and resources, as well as in the capacity for leadership. There are also inherent difficulties for a large Ministry which is responsible for multifarious issues, in focussing adequately on all issues concerning the supply of drinking water.

[314] The Ministry and the Director-General were given an opportunity to make submissions in relation to intended adverse comments by the Inquiry. In a submission dated 7 November 2017 from Crown Law, the Ministry indicated that it did not agree that any adverse comments were justified. The Ministry submitted, inter alia, (as it had earlier) that its resources were adequate, that there was no plain evidence of systemic problems in the drinking water industry, and that there had been no deficiencies in leadership. The Inquiry carefully reviewed these submissions, but was unable to agree with them.

[315] The Inquiry is satisfied that all matters which have been canvassed in this part of the report are within the terms of reference. The actions, or inactions, of the Ministry of Health and the Director-General in relation to drinking water under the current regime are absolutely central to the Inquiry, particularly the prevention of recurrences of similar incidents. It has been not only beneficial to review the capacity and capabilities of the Ministry, but in fact vital to do so.

[316] The Inquiry has considered all adverse comments in the report concerning the Ministry and the Director-General in the light of the Ministry's submissions. The Inquiry is satisfied that they are all based on probative and reliable evidence and, in many cases, a clear documentary record. The various submissions from interested parties which criticised the Ministry were tested by panel debate at the hearings, and by questioning the Director-General, and were later subjected to critical analysis by the Inquiry.

[317] The Inquiry regards its criticisms of the Ministry as the starting point in a quest for a much better and safer drinking water system in New Zealand. It would be regrettable if the Ministry's only reaction was a defensive one. The Director General

accepted repeatedly in his evidence that there was a need for substantial improvement. Even in the most recent submissions filed by Crown Law, it is acknowledged that “further and ongoing work is required to ensure the provision of safe drinking water to New Zealand communities”.

Self-suppliers

[318] It was beyond the scope of the Inquiry to investigate the self-supplier regime. However, as briefly mentioned at [24]–[25] above, the Inquiry is concerned that some 106,973 people are being served by specified self-suppliers which are subject to little or no regulatory oversight or compliance regime, and which are not required to comply with the DWSNZ. There are likely to be greater numbers of members of the public exposed to untreated and unregulated drinking water. The Inquiry notes that the Building Act may provide some protection by consent conditions requiring potable water to be supplied, but “potable” is not defined in the Building Act⁸¹ and the Inquiry doubts that there are effective or adequate protections or quality requirements in respect of many self-suppliers. This is a matter which should be considered by Government and reviewers of the recommendations in this report.

Concluding Remarks

[319] As a result of the above analysis, the Inquiry makes the following findings regarding the discharge by the Ministry of its regulatory functions:

- (a) The Ministry’s drinking water team is under-resourced and structured ineffectively. It is too small and is spread over too many officials who individually and collectively lack the skills and expertise needed to administer effectively and enforce properly the current regulatory regime. Furthermore, the structure does not facilitate adequate strategic monitoring of international best practice or instigating changes where international best practice calls for that.
- (b) The officials concerned do not have an adequate appreciation of the range of risks discussed in Parts 3 and 4 relevant to the delivery of safe drinking water to the public from source to tap. This finding is inevitable, given the lack of expertise within the Ministry about engineering and technical elements of drinking water infrastructure assets including bores, reticulation, storage and treatment of drinking water. It is no

⁸¹ It is defined in s 69G of the Health Act.

answer to say such expertise can be “contracted in”. The system currently used by the Ministry to contract a range of services, including those available for DWAs, DHBs and water suppliers, is cumbersome and does not meet the needs of either the Ministry or the industry.

- (c) Most of the deficiencies can be traced to the lack of (relevantly) skilled officials and the systemic way in which the drinking water team is organised within the Ministry. It is not necessarily the fault of the individuals concerned who appear to be earnest and well intentioned.
- (d) It follows that the current regulatory regime governing drinking water is not being effectively administered and the statutory obligations applying to water suppliers are not being properly enforced.
- (e) There has been a complete failure of leadership and stewardship within the Ministry of the type discussed above. The Inquiry considers this is required, to a very high standard, given the importance of delivering safe drinking water to the community, and given the public health and other risks of not doing so.

[320] As a result of these findings, the Inquiry makes the following two recommendations.

[321] The Ministry, via the DWAs and Medical Officers of Health, should take urgent steps to administer and enforce the existing regulatory regime, having regard to the findings and recommendations in this Stage 2 Report.

[322] Pending the creation of a drinking water regulator, a Drinking Water Regulation Establishment Unit should be set up to address the matters set out below:

- (a) Maintain momentum;
- (b) Facilitate the establishment of a drinking water regulator; and
- (c) Facilitate the hand-over to a drinking water regulator.

The Ministry of Health’s current disaggregated resources do not possess the necessary skills and attributes and should not be used for this purpose.

PART 8 – ACCOUNTABILITY OF DRINKING WATER SUPPLIERS

Introduction

[323] As a further precursor to the question of whether there should be a dedicated drinking water regulator, the Inquiry considered the question of accountability of drinking water suppliers. The high standards required will be no more than an abstraction, unless there is accountability for them.

[324] Suppliers are subject to a suite of legal obligations under Part 2A of the Health Act.⁸² In Stage 2, the Inquiry considered some key weaknesses in the legal regime governing the responsibilities of water suppliers. These are addressed under the subheadings below.

Discretionary Compliance

[325] The accountability of suppliers needs to be assessed in light of the wide discretions afforded to them under the legislation in relation to compliance with the DWSNZ. It also needs to be viewed in light of the practical difficulties faced by DWAs in reporting on compliance and implementation of WSPs.

[326] The Inquiry has found that the legislation allows suppliers too much scope to avoid full compliance with the DWSNZ, and with the Health Act duties to protect the source of drinking water and take remedial actions.

[327] The first, and most serious, weakness is the lack of any absolute obligation by suppliers to comply with the DWSNZ. Section 69V of the Health Act requires only that a supplier take “all practicable steps” to ensure that the drinking water supplied complies with the DWSNZ.

[328] Section 69H sets out how the “all practical steps” test may be met. The terms of s 69H are wide and general and give a supplier a great deal of discretion. Suppliers may have particular regard to the availability of steps, and to the affordability of steps, in light of the particular supplier’s financial position. The supplier may also have regard to: the nature and severity of harm that may be suffered if the result is not achieved; the current state of knowledge about the likelihood that harm of that nature and severity

⁸² Stage 1 Report at Appendix 4, at [4.14]–[4.24].

will be suffered; the current state of knowledge about harm of that nature; and the current state of knowledge about the means available to achieve the result and about the likely efficacy of each. Each of these many criteria can give rise to assessments and choices and value judgments. It is self-evident that these criteria can give rise to extensive argument and doubt and uncertainty.

[329] The stringency of the test is further diluted by s 69H(2) which provides that a person is only required to take all practicable steps in respect of circumstances that he or she knows about, or ought reasonably to know about.

[330] Submitters said that the combined terms of ss 69H and 69V meant that there was very little rigour in the duty to comply with the DWSNZ and that, given the breadth of the discretion in s 69H, it would be impossible to successfully prosecute a supplier for failing to comply with the DWSNZ. Submitters also posited that the terms of s 69H were too broad and relied upon a series of uncertain value judgments and assessments which would be very hard for a DWA or designated officer to negate. The Inquiry agrees with both those submissions.

[331] It is clear that the “affordability” component of s 69H is effectively unworkable as part of a legislative regime providing for safe drinking water and has absorbed a great deal of attention, correspondence and statements of opinion by the Ministry of Health from 2012 onwards. The correspondence and documents issued by the Ministry are too numerous to review here but one example will be given.

[332] On 25 January 2012, the Mayor of Tasman, Mr Kempthorne, wrote to the Associate Minister for Health, the Hon Jo Goodhew.⁸³ The Mayor, writing on behalf of all South Island councils, raised the affordability test in s 69H and sought clarity from the Associate Minister. The letter indicated that councils were experiencing real difficulty in understanding how to define and apply the affordability test.

[333] The response from the Associate Minister, dated 7 February 2013,⁸⁴ conveyed a view of the affordability test, indicating that it was up to councils to decide whether they could afford to comply with the DWSNZ. The letter also referred to the role of WSPs. The Associate Minister passed on the Ministry’s view that a DWA could not refuse to approve a WSP if “potential upgrades” may be taking place over a lengthy

⁸³ CB214.

⁸⁴ CB215.

period, provided there were risk mitigation steps recorded. DWAs had been advised that simply including reference to water safety improvements in a Long Term Plan was considered to meet the “all practicable steps” requirement.

[334] In the Inquiry’s view, this response exemplified the great difficulties inherent in the regulatory regime and the Ministry’s approach to it.

[335] The above exchange demonstrates why the concept of affordability should be removed from the legislation. While well-intentioned at the time, and perhaps an understandable response to the vigorous opposition from local bodies to the proposed Health Act amendments in 2007, the concept is in the Inquiry’s view misconceived in light of current knowledge and understanding. It is a concept absent from other fields involving public safety and welfare, for example, acute medical need, aviation and food. It is a concept which, in practical application, has negated the intent of the legislation. It is worth observing, as mentioned elsewhere in this report, that the true cost of treatment has reduced and is now relatively inexpensive, and also that opportunities for bulk-buying may well be available to larger aggregated dedicated suppliers.

[336] Although the Ministry of Health has attempted to grapple with the issue in a number of circulars and advisories to the water industry, the difficulties remain because the wording of the relevant provisions is inherently unworkable. Not only are the particular terms of s 69H difficult to define and apply, the underlying concept must now be regarded as completely unacceptable. That concept, the idea that councils can decide whether or not to comply with the DWSNZ, in practical effect makes the drinking water regime optional and voluntary. These provisions alone render the present regulatory scheme not fit for purpose.

[337] Section 69V(2) represents another key weakness in the statute. It enables suppliers to bypass the “all practicable steps” elements in s 69H. It provides that a drinking water supplier will comply with the obligation to take all practicable steps if that supplier implements the provisions of its approved WSP relating to the DWSNZ. This means that, as long as a supplier has a WSP, and the WSP has provisions relating to the DWSNZ, and it is approved, the statutory duty will be complied with if the supplier implements those provisions.

[338] The concept of “implementation” in this context involves considerable difficulty. Canterbury and Nelson Marlborough DHBs submitted that:

It is not uncommon for a water supplier to fail to undertake all 'promises and obligations' as outlined in their WSP within the timeframes that have been specified in the WSP. The DWA is then required to make a judgment regarding whether the WSP can still be considered 'implemented'.

[339] This need for judgement will be greater where there is ambiguity in the "promises" in a WSP. For instance, if the supplier needs to implement treatment in order to meet the DWSNZ and, as a first step, plans to requisition a report on treatment options, it is unclear which, if any, of the steps towards obtaining the report constitute implementation. The Institution of Professional Engineers New Zealand (now Engineering New Zealand) submitted that these difficulties may be aggravated by the fact that DWAs are not well placed to assess whether a WSP has been implemented, as they lack the requisite specialist technical and operational knowledge and skill.

[340] Even if a WSP is implemented, the Inquiry heard this provides a misleading indicator of the degree to which public health risks are being managed. This is because a WSP improvements timetable can be scheduled when the supplier has available resources to address the particular risk. There is a great deal of room for long and slow timings. A WSP can therefore be "implemented" if the schedule is complied with, despite the fact the public health risk may not be addressed for a long time.

[341] As all suppliers are required to have WSPs, the practical reality is that a supplier need consider the question of compliance with DWSNZ no further than "implementing" the contents of its WSP. While the Ministry of Health provides some templates and guidelines for the contents of WSPs, there is no guaranteed minimum obligation in a WSP in relation to the DWSNZ and, provided a DWA is prepared to approve a WSP, compliance with s 69V can occur by that means.

[342] While the WSP pathway to compliance does involve some safeguards, the Inquiry believes it is wrong in principle to use the implementation of a WSP as the primary criterion for compliance with the DWSNZ. Even the most competent and thorough WSP cannot make at-risk water safe. And not all WSPs will be of the highest standard; the Inquiry has observed many deficiencies in the WSP scheme to date. These include substantial variations in the quality and stringency of WSPs; varying levels of professionalism brought to bear on the risk assessment element of WSPs; some 60 lapsed WSPs as at 30 June 2016; and variations in the approaches of DWAs to the approval and implementation of WSPs. Evidence received by the Inquiry at the

August hearing indicated that critical control points were the most important aspect of a useful and usable WSP and yet it seems that few WSPs in New Zealand contain these provisions.

[343] Section 69V(2) therefore lacks any objective standards or criteria by which to measure compliance. It leaves the question of compliance with the DWSNZ to the discretion of the supplier and the DWA in each case.

[344] A similar weakness exists in s 69ZF: duty to take remedial action if DWSNZ breached. This provides that, if a drinking water supplier becomes aware that its water is not meeting the DWSNZ, its obligation is only to take “all practicable steps” to carry out appropriate remedial action or to correct the problem.

[345] A further example of the weak “all practicable steps” formula is found in the statutory defences to a prosecution. Section 69ZZS(2) provides that it is a defence to a prosecution under ss 69ZZQ or 69ZZR if the defendant proves that it took “all practicable steps” to prevent the commission of the offence. As s 69ZZR encompasses most of the duties under the Act, this provision on its face potentially opens up practically any enforcement action to a defence based on the affordability test and the other hedging and excusing provisions in s 69H.

[346] It should also be noted that s 69ZZS(2)(a) provides a second defence to a prosecution, namely if the defendant did not intend to commit the offence. Limiting prosecutions to cases of intentional breach is a further weakness in the regime and it is inconsistent with the general trend in New Zealand for public safety offences to be based on strict liability.

[347] The nature of the duty under s 69U to contribute to the protection of sources of drinking water is even less onerous. The obligation in that section is to take “all reasonable steps”, a term which is not defined but which is, on its face, less onerous than “all practicable steps”. This test also provides suppliers with a wide spectrum of discretion.

[348] The hedged and discretionary nature of the above duties has inevitably led to weak compliance. Many suppliers have taken advantage of the lack of rigour in the legislation to treat compliance as a discretionary activity rather than a mandatory legal requirement. Any supplier who does not want to incur the cost or burden of full

compliance can have recourse to s 69H as a shelter. DWAs, and the Ministry, have never issued a compliance order or a prosecution under Part 2A of the Health Act. The Inquiry accepts that the terms of the legislation would make any prosecutions difficult and, in some cases, impossible.

Monitoring

[349] There is one exception to the discretions allowed in ss 69U, 69V and 69ZF. Section 69Y provides that every drinking water supplier must monitor the drinking water supplied to determine whether it complies with the DWSNZ and to detect and assess public health risks generally. It further states that monitoring must be carried out in accordance with the DWSNZ. This is expressed as a mandatory duty. However, the Inquiry heard no evidence that the industry generally understood this. Furthermore, there is clear evidence that many suppliers are blatantly ignoring this requirement.

[350] There appeared to be no clear recognition of the difference between s 69Y and the other non-mandatory provisions. At least in terms of monitoring, DWAs and, if necessary, designated officers, can take effective compliance steps against defaulting suppliers. The extent of non-compliance with protozoa monitoring recorded in the Annual Reports indicates that s 69Y is not being applied properly by those tasked with enforcing statutory obligations. However, some caution is needed in relation to any prosecution in relation to s 69Y; s 69ZZS(2)(b) could provide an “all practicable steps” defence, as discussed above.

WSPs as a Form of Accountability

[351] Leaving aside the question of compliance with the DWSNZ, a level of accountability exists in relation to the WSP regime. Suppliers are required by s 69Z to prepare WSPs and to obtain approval of them from a DWA. The Inquiry has noted however, that the obligation to obtain approval is weakened by being subject to the same pervading “all practicable steps” test: s 69Z(8). In addition to approving WSPs, DWAs carry out WSP implementation checks and prepare reports on implementation.

[352] The Inquiry in Stage 1 heard evidence of a rote approach to WSP risk assessments and it views effective accountability via the WSP regime as only arising if and when suppliers have an actual understanding of the extent of risks recorded in WSPs, as well as a real appreciation of the potential consequences of those risks.

[353] Pursuant to s 69Z(2)(a)(vi), the Director-General may by notice in writing issue additional requirements to a DWA as to the content and format of WSPs, and the supplier is obliged to comply with those requirements. The Director-General does provide guidance in the form of WSP templates. However, these guidance documents do not in the Inquiry's view fall within the meaning of s 69Z(2)(a)(vi) as they are not "requirements imposed by the Director by notice in writing given to the supplier". That provision contemplates mandatory requirements, rather than general guidance documents in the form of templates. The Inquiry received no evidence to suggest that the Director-General had ever issued written requirements to DWAs.

[354] At the August hearing, the Inquiry raised with the Ministry its concern that WSPs in New Zealand do not appear to contain any critical control point provisions and that all experts at the hearing stated this was important and desirable. In this context, the Inquiry asked the Director-General to consider issuing a requirement by notice in writing under s 69Z(2)(a)(vi).

[355] On 22 September 2017, the Inquiry received from the Ministry advice that the Director-General had not issued any such requirement. The Ministry, on 18 August 2017, did write to all DWAs urging them to require critical control provisions in WSPs. However, the Ministry's advice to DWAs was not, in the Inquiry's view, constructive or useful. The Inquiry has not received any evidence as to why the Director-General has not taken the straightforward and effective step of issuing critical control requirements under the statutory power to do so.

DWA Implementation and Compliance Duties

[356] In addition to approval of WSPs, DWAs also have an obligation under s 69ZL(1)(a) to assess the performance of drinking water suppliers, to determine whether or not they are complying with the Health Act and the requirements of the DWSNZ, and implementing their WSPs.

[357] In practice, DWAs issue separate reports in respect of these implementation and compliance requirements. However, the statutory obligation to assess compliance with the DWSNZ will inevitably, in the case of any non-compliance (other than in respect of monitoring), lead a DWA to the difficult and weak terms of ss 69V, 69ZF and 69H. DWAs expressed difficulty with the proposition that they were qualified or

equipped to make sound assessments of affordability and the other exculpatory matters in s 69H.

Backflow

[358] Another example of limited accountability in the Health Act is s 69ZZZ: protecting water supplies from risk of backflow. This section contains a number of provisions in relation to installation of backflow prevention systems, both on the network side of the point of supply and on the side of property owners. However, these provisions only apply if the supplier considers it “desirable or necessary”. It thus places complete discretion with the supplier and it provides no guidance on when backflow protections should be put in place. Nor does it contain mandatory provisions.

[359] The Inquiry has concluded that many suppliers, particularly smaller ones, do not have the knowledge or access to advice to determine whether it is “desirable or necessary” to apply the terms of s 69ZZZ. A legislative provision in these terms is effectively useless.

[360] Although WSPs may contain provisions in relation to backflow, it is not one of the matters specifically required as WSP content under s 69Z(2) and the Inquiry understands that DWAs do not routinely include compliance with s 69ZZZ in compliance reports. Mr Wood said that he found the wording of s 69ZZZ very difficult to apply. The Inquiry accepts the submission from the New Zealand Public Service Association that the wording in s 69ZZZ needs tightening if compliance is to be audited in any meaningful way.

[361] Given the nature and extent of risk from backflow, which is considerable, and ubiquitous, the Inquiry has found the terms of s 69ZZZ to be unacceptably weak.

Annual Report

[362] Section 69ZZZB provides that the Director-General must publish an annual report on drinking water that includes information on the quality of drinking water supplied by each drinking water supplier (other than neighbourhood drinking water suppliers) and the compliance or non-compliance of those drinking water suppliers with Part 2A of the Health Act and the DWSNZ.⁸⁵ Section 69ZZZC complements this requirement and provides that the Director-General may publish statements relating to

⁸⁵ These reports may be found at www.health.govt.nz/publication.

drinking water emergencies and the performance or non-performance of the Health Act duties by water suppliers, for the purpose of protecting the public.

[363] Sections 69ZZZB and 69ZZZC were introduced by the 2007 amendment to the Health Act. There was no explicit comment on these provisions during the legislative process but the provisions reflect a longstanding (but not statutorily required) practice by the Ministry of Health of providing annual reports on the safety of New Zealand's drinking water. Such reports had been published annually since at least 1995, with less frequent reports produced from the 1991-1992 period.

[364] The Inquiry has viewed a number of the Ministry's historic annual reports. These reports demonstrate the potential power of an annual report and at least some level of the accountability that ss 69ZZZB and 69ZZZC were intended to provide. The Ministry's practice with the pre-2007 reports was to provide clear, thoughtful and directive recommendations. By way of example, the 2005 Annual Report (published in 2006, during the period the 2007 amendments were being considered) included recommendations that:

- Urgent attention be given to ensuring that water suppliers who presently fail to take appropriate corrective action immediately following E.coli transgressions be reminded of their responsibilities.
- The Waiheke Health Trust should remedy the cause of the continued faecal contamination in its water supply, which is the absence of disinfection treatment. The water supplier should give urgent priority to the installation of automatic disinfection treatment at these supplies. In the interim period, temporary disinfection should be implemented until continuous disinfection treatment is installed.

[365] These recommendations identified by name suppliers who were failing to comply with their relevant (voluntary) obligations, identified how the suppliers could remedy the failings, and directed follow up with suppliers who were not meeting their responsibilities. To similar effect, the 2005 Annual Report noted that some water suppliers were attempting to avoid scrutiny by failing to monitor (and have their E.coli results reported). The Ministry addressed the issue upfront, identified the misperception that "water that is shown to contain E.coli is a greater risk than water that is not tested", and observed that:

To discourage the practice ... details of the supplies that ceased monitoring in 2005 are given in Appendix 2.

[366] Past annual reports also utilised a number of other mechanisms which, in the Inquiry's view, gave them the potential to be effective advocacy tools for accountability and transparency. Thus the Ministry also included sections addressed directly to consumers (until 2003). These informed consumers of factors which might indicate doubt about the safety of their local drinking water and how they could address any concerns with their local council. Data was presented, not merely by percentage of compliance but, clearly, by the population affected by non-compliant supplies. The 2005 report, for instance, stated:

Approximately 980,000 (24%) of New Zealanders were supplied with drinking-water that failed to comply bacteriologically with the criteria of the DWSNZ:2000 or were self-supplied.

[367] The report then further explained the causes of non-compliance which made up the 980,000 figure, including unacceptable levels of E.coli or failing to take appropriate corrective action after E.coli was detected.

[368] Additionally, the Ministry reported on the number of suppliers using disinfection, the types of disinfection being used, and the compliance rates of supplies using disinfection compared to those who were not.

[369] Some of these practices continued in modified, and less informative terms, until the 2009–2010 Annual Report was published in 2011. Then, just as suppliers' obligations to comply with the DWSNZ and the Health Act were becoming compulsory, the Ministry stopped engaging in these valuable practices that sought to hold suppliers accountable and provided a degree of transparency for consumers.

[370] The Inquiry has considered whether the more recent Annual Reports on Drinking Water Quality issued by the Ministry of Health represent a meaningful form of accountability by suppliers. Recent reports, in their appendices, set out achievement against the standards for each supplier and for each supply controlled by that supplier. The recent Annual Reports, which are publicly available,⁸⁶ therefore provide a supply-by-supply level of transparency in terms of compliance with bacteriological, protozoal and chemical standards.

[371] Despite the theoretical accountability resulting from the recent form of annual reports, the Inquiry has concluded that it appears to have had limited practical effect in

⁸⁶ See www.health.govt.nz/publication.

recent years. The reports appear to attract little public, political or media attention. The extent of compliance recorded in the Annual Reports has improved only slightly over the last seven years. For example, although only received in draft, the 2016–2017 Annual Report disclosed only a negligible improvement in total compliance over the previous year of 1.1 per cent. Although the reports in recent years publicly set out high rates of non-compliance (indeed very high rates in the case of smaller suppliers), this has not led DWAs, designated officers or the Ministry of Health to take any effective steps to seek to require water suppliers to remedy their defaults. Nor have these abysmal results led to any effective enforcement action (such as the issuing of compliance orders under s69ZZH of the Health Act). Examination of the Annual Reports over the last five years demonstrates that defaults remain year after year at a more or less static level.

[372] The extent of compliance remains unacceptably low and the Inquiry saw no evidence that “naming and shaming” suppliers in the annual report was having any real effect on recalcitrant water suppliers. Accordingly, the current form of the annual report does not in the Inquiry’s view offer any meaningful form of accountability for water suppliers.

[373] Moreover, the Inquiry considers the annual reporting methodology is fundamentally flawed. The Ministry of Health’s preliminary annual report data for 2016-2017 shows the Havelock North supply as compliant with the DWSNZ, despite the outbreak. The Inquiry was advised by ESR that the Havelock North supply was assessed as compliant because the assessment is of compliance at the reticulation level. E.coli was initially detected in the bore head and the reticulation. By the time the reticulation was tested extensively, it had been flushed out, chlorinated and replaced with Hastings water and was therefore compliant. The Inquiry found the assessment of Havelock North as compliant with the DWSNZ when 5,500 people became ill from consuming water in the reticulation to be an outrageous example of the inadequacies of the Ministry’s reporting.

[374] The second notable feature of recent annual reports is that they are not user-friendly. While this may not matter to large drinking water suppliers (who are likely to have the necessary expertise to understand the complicated statistical presentation), the same cannot be said for small suppliers or members of the public. They are the people most affected by any failings by water suppliers and the annual report could be a valuable means of helping the public to understand which suppliers

have been in breach of their statutory obligations, in what manner, and for how long. In other words the report could offer important information dissemination, transparency and advocacy functions.

[375] The Inquiry has concluded the Ministry can, and should, be using s 69ZZZB and s 69ZZZC to hold suppliers accountable, and to name and shame the worst offenders, in a meaningful and direct way. The Ministry has historically done this, despite the previous absence of statutory powers. The Inquiry considers this history assists in interpreting the broad powers given to the Director-General in ss 69ZZZB and 69ZZZC. These provisions were plainly intended to both empower and require the Director-General to report to the public in a useful way on the safety of their drinking water. Suppliers with woeful records were intended to be held to account, consumers were intended to be able to easily access information on their water supplies, and the Ministry was intended to provide suggestions, analysis and direction to the nation's suppliers arising out of these reports.

[376] This is not currently happening. The Inquiry has concluded that it should happen. It therefore recommends that the Ministry, and the Director-General, in particular, should use these important statutory powers in ss 69ZZZB and 69ZZZC more effectively and in the manner Parliament intended.

Enforcement Policy

[377] Reference has been made in Part 7 above to the lenient enforcement policy pursued by the Ministry of Health to date and to the lack of any compliance orders or prosecutions during the life of Part 2A of the Health Act. The Inquiry has concluded that there has been no effective accountability from enforcement. It follows that actions by water suppliers in failing to comply with the obligations under the DWSNZ go unpunished year after year.

Accountability to Regulator

[378] In terms of accountability to a regulator, the Inquiry has noted that there has to date been no system for licensing drinking water suppliers and no formal qualification or accreditation system for suppliers or their key personnel. This is an area of accountability which is lacking but which is dealt with more fully in Part 16 below.

Grading System

[379] The Inquiry considered the grading system⁸⁷ which was pursued voluntarily by some suppliers from 1993. A grading specification was released by the Ministry of Health in 1993 with an updated version in 2003. Grading has since fallen into disuse. Grades from A (excellent) to E (substandard) were allocated to water supplies. Grading took place in two parts, first in terms of safety of the source (after any treatment) and second in relation to the management of water quality within the distribution system. Grades still appear against some water suppliers in the Drinking Water Register of Suppliers on the Water Information New Zealand website, although many of them show as ungraded.

[380] A number of submitters, and witnesses, indicated that they saw real merit in the grading system. It was a simple and public statement of the overall quality of a supply. Water suppliers saw benefit in the process (at least those holding good grades). However, other submitters opposed any mandatory grading system on the basis that it was too crude and tended to condone unsatisfactory operators by allowing a “pass rate” even for suppliers with significant deficiencies.

[381] The Inquiry acknowledges the potential benefits of a grading system. However, it has concluded that this is an issue which should properly be considered by a drinking water regulator and/or by those carrying out a review of the DWSNZ and the legislation. If a grading system is to be revived, then it should be considered in the context of a revised regulatory scheme as a whole.

[382] The Inquiry notes that simplicity and clarity should be key elements of any future regulatory scheme, and that adding a grading system to the regime would add an element of process, cost and complexity. The Inquiry also sees mandatory and effective compliance with legal requirements as paramount and would be concerned if any grading system derogated from that or communicated a spurious sense of assurance.

[383] The Inquiry also notes that there should be a certain minimum level of drinking water safety standards and that, provided these are attained, the utility of gradings

⁸⁷ For a detailed description of the grading system, see: www.drinkingwater.esr.cri.nz/general/grading.asp.

above that minimum level may be limited. Once consumers are assured of the safety of their drinking water, gradations above that safety level may serve little purpose.

Local Government Accountability

[384] The medium and large networked suppliers in New Zealand are all local government entities, either councils or a CCO. Many of the minor, small and neighbourhood supplies are also operated by local authorities.

[385] In 2011, the Government's National Infrastructure Plan ranked the water infrastructure sector as lowest amongst all infrastructure sectors for accountability, resilience, investment analysis, funding mechanisms and performance, and regulation.⁸⁸ LGNZ subsequently reviewed the sector as part of its 3 Waters Project. LGNZ submitted to the Inquiry that the findings of this project have confirmed that the "local government sector faces current and future challenges" in providing water that meets the regulatory standards.

[386] The Department of Internal Affairs through two Crown fact papers made comprehensive and helpful submissions about the accountability processes within local government. These included provisions relating to decision-making principles and processes, consultation, Long Term Plans, Annual Plans, annual reports and pre-election reports. In addition, it referred the Inquiry to a series of provisions relating to CCOs in respect of decision-making, statements of intent and progress, and annual reporting.

[387] Of particular relevance, the Department of Internal Affairs explained that ss 125 and 126 of the Local Government Act 2002 ("Local Government Act") impose requirements upon a territorial authority to assess the provision within its district of water services, including in relation to the health risks to communities and the extent to which drinking water meets applicable regulatory standards.

[388] Reference was also made to the Department of Internal Affairs' Non-financial Performance Rules issued in 2003. These Rules became mandatory only from the 2015-2016 annual reports. Under these Rules, local authorities are required to report, in their annual reports, on certain performance measures. One such measure is the extent to which a local authority's drinking water supply complies with Parts 4

⁸⁸ See Appendix 2 to the LGNZ Stage 2 Submission (3 July 2017).

(bacteriological compliance criteria) and 5 (protozoal compliance criteria) of the DWSNZ.

[389] In addition, Performance Measure 4 relates to the number of complaints received by local authorities about certain drinking water issues, including taste, odour and clarity, and the local authority's response to any of those issues.

[390] These Rules are intended to provide a standard set of measures which local authorities can use when reporting to their communities. They are designed to enable communities to assess the level of service provided in their area as compared with other local authorities.

[391] However, although the Rules require local authorities to measure various things, they do not include mandatory performance levels which must be met. It is for each local authority, in consultation with its ratepayers, to determine the level of service it intends to provide.

[392] The Inquiry acknowledges the introduction of the need to report on drinking water but considers the inherent limitations of the Non-Financial Performance Rules mean they are unlikely to achieve substantial levels of accountability in respect of ensuring safe drinking water.

[393] Returning to an example used throughout this report, the Inquiry has viewed the reporting on drinking water in Napier District Council's 2015-2016 Annual Report. This report records that in 2015 the local authority did not comply with the bacteriological or protozoal standards, but that it was expected to do so in 2016. The report (despite recording the failures to comply with these standards due to failures to test in 2015) stated:

Water is drawn from the Heretaunga Plains aquifer, is free from harmful contamination and no water treatment is required. Our testing exceeds the drinking water standards.

[394] The Inquiry considers that the variance between the above information contained in the annual report and the risks facing the Napier supply illustrate the inadequacy of such reporting as a measure of accountability. So too do the matters addressed by the Inquiry in Parts 3 and 4 of this report. There is an inadequate appreciation of the risks to drinking water, and the economic and health consequences

of these risks, by both local government suppliers, and the public to whom those suppliers are accountable.

[395] Whilst political and community accountability is valuable in theory, the Inquiry considers that the state of New Zealand's compliance statistics demonstrates that such mechanisms are currently failing to provide appropriate accountability.

Concluding Remarks

[396] The Health Act provisions in relation to compliance are so weak as to make compliance with the DWSNZ (other than in relation to monitoring) effectively discretionary at the behest of water suppliers. The legislation needs to be amended to make compliance mandatory, as is the case with other areas involving public health and safety. The Inquiry has concluded that the weak state of the legislation is inappropriate and unacceptable in the light of the known risks faced in the delivery of safe drinking water, and given today's knowledge of drinking water safety. A more enlightened approach to safety may be seen in the recent legislation governing safety in the workplace, the Health and Safety at Work Act 2015. The provisions of this legislation provide a remarkable contrast to those in the Health Act and yet naturally there are many more consumers of drinking water than working persons.

[397] As concerns the WSP and DWA regimes, the elements are in place for a good level of accountability. However, many improvements in those regimes are required, as set out elsewhere in this report.

[398] The Inquiry's view is that current knowledge and circumstances call for a much greater level of accountability for drinking water suppliers. The Inquiry's recommendations elsewhere in this report in respect of DWAs, the Health Act, the DWSNZ, a dedicated drinking water regulator, and a licencing and qualifications regime for suppliers address aspects of accountability and ways to achieve improvements in it.

PART 9 – COLLABORATION BETWEEN AGENCIES

Introduction

[399] In its Stage 1 Report, the Inquiry referred to the range of agencies involved in the supply of drinking water and noted the pivotal importance of partnerships and collaboration between those agencies.⁸⁹ That report also set out circumstances in which there had been a lack of collaboration and where safety of the drinking water supply had been adversely affected as a result.

[400] This Stage 2 Report proceeds on the basis that collaboration between drinking water agencies is necessary and important, and that it has been recognised and accepted by all parties as a cornerstone of a safe drinking water regime. The issues that were considered in Stage 2 therefore focussed on the best ways to achieve collaboration.

[401] The Stage 1 Report recorded that a Hawke's Bay JWG had been set up with representatives from HDC, HBRC, Hawke's Bay DHB and the DWAs. Subsequently, representatives from the Napier City Council also joined the JWG.

[402] Most of the Inquiry's consideration of collaboration has focussed on the workings of the Hawke's Bay JWG. During the course of the Inquiry, the JWG served as a vehicle for monitoring the current safety of the Havelock North drinking water supply, for implementing recommendations made by the Inquiry and for reporting to the Inquiry. As the work of the JWG proceeded, the minutes of its meetings and action plans were provided to the Inquiry. By agreement, such minutes and action plans were posted on the Inquiry website in the interests of transparency. The Inquiry acknowledges with gratitude the work and diligence of the independent Chair of the Hawke's Bay JWG, Mr Tremain. Much of the success of the JWG to date can be attributed to him.

[403] In Stage 2, the primary focus has been on ways to make the JWG concept durable and to maximise its effectiveness and usefulness to the member agencies. The Inquiry has concluded that some form of JWG is the best collaborative vehicle in this context. The Inquiry notes that agencies in the Canterbury region formed their own JWG, the CDWRG. It was formed voluntarily as a result of, and shortly after, the

⁸⁹ See Stage 1 Report at [123]–[128].

Havelock North outbreak. The CDWRG includes representatives from all 10 Canterbury territorial authorities, Environment Canterbury, and the Canterbury DHB Medical Officer of Health and DWAs.

Submissions and Evidence

[404] Submissions in relation to the Hawke's Bay JWG were unanimous in supporting its concept and its operation. Submissions were also received from the CDWRG members extolling its benefits. Members of the CDWRG believed that the group had enhanced relationships, improved understanding and accelerated some actions, while focussing on key priorities in a robust and agile manner.

[405] Water New Zealand submitted that there should be a formal requirement for collaboration, although there would need to be sufficient flexibility to allow the best collaborative model to be adopted for particular circumstances. Water New Zealand noted that New Zealand has 67 council suppliers, 20 DHBs, 16 regional councils and seven government ministries that have a role in relation to the supply of safe drinking water. It submitted that a stronger and more direct focus on collaboration and partnerships within the entire industry was needed. DWAs already tended to interact reasonably closely with suppliers and the greater need for collaboration lay between regional councils and district council suppliers. Following the Havelock North outbreak, Water New Zealand reported increased collaborative meetings in the Waikato and Bay of Plenty regions. In Wellington, it pointed to Wellington Water as a joint entity which inherently involved much collaboration between its members. It submitted that the Ministry of Health should take a leadership role in relation to collaboration. It submitted that JWGs are regionally based and should therefore be accountable to their local communities.⁹⁰

[406] In its submission, the Crown pointed out that s 14(1)(e) of the Local Government Act requires a local authority to "actively seek to collaborate and co-operate with other local authorities and bodies to improve the effectiveness and efficiency with which it achieves its identified priorities and desired outcomes". It also referred to a range of other provisions in the Local Government Act, although these are all general, do not mandate any particular form of collaboration, and give local

⁹⁰ Water New Zealand's 20 June 2017 Fact Paper in relation to collaboration is on the Inquiry's website and it contains much further detail.

authorities a great deal of discretion as to whether and when they will collaborate and co-operate.

[407] The Crown pointed out specific mechanisms which can be used for collaboration including a joint committee constituted under Schedule 7 to the Local Government Act. The Crown also pointed to Wellington Water as an example of a collaborative organisation, as well as collaboration between the three territorial authorities in the Taranaki region in relation to water supply services, and joint arrangements between the Nelson and Tasman District Councils. The Crown paper also referred to joint arrangements between the Hamilton City Council, Waipa District Council and Waikato District Council. The Waikato example is still a proposal (first mooted some five years ago - but yet to be finalised). The Department of Internal Affairs, which administers the Local Government Act, has produced a fact sheet on collaboration.⁹¹ The Crown also referred to collaborative provisions in the RMA.⁹²

[408] The Inquiry was grateful for the depth and detail of the Crown fact paper in relation to collaboration. While the various provisions cited were not specifically referable to a drinking water JWG, they were all generally enabling and supportive of the idea of collaboration between local government agencies. The Inquiry notes that if the vehicle of a Joint Committee of more than one local authority is used, there are a number of limitations, including a three year term. Overcoming such limitations would need to be addressed. As discussed in Part 11, the establishment of jointly-owned CCOs has in the past been extremely difficult.

[409] At the June 2017 hearing, the Inquiry heard evidence from Mr Tremain. At the August hearing it heard further from the heads of HDC, HBRC and the DHB in relation to the JWG. These witnesses were unanimous in stating that the Hawke's Bay JWG had been a valuable development. In the months between December 2016 and June 2017 the JWG was strongly focussed on implementing the interim recommendations in the Inquiry's 15 December 2016 Report, on the process of planning and putting into operation the new treatment plant at Brookvale road 3 and in meeting ongoing requests from the Inquiry for information and output. By June 2017, however, the JWG was taking stock of its operations and an appropriate future course.

⁹¹ A copy is in the "Fact Papers" tab on the Inquiry's website.

⁹² A copy of the Ministry for the Environment's draft guide to collaborative planning processes is on the Inquiry's website. See also www.mfe.govt.nz/rma/resources/about-collaboration.

[410] A key development by mid-year 2017 was an identified need to set up a JWG governance committee. The various members of the JWG felt that a more durable and accountable structure was needed. The workings of the JWG in its first few months had been purely operational with little focus on governance and accountability, beyond that provided by reporting to the Inquiry.

[411] By the August 2017 hearing, a terms of reference had been drawn up, and agreed in principle between the councillors of the HDC and HBRC, Napier City Council and the Board of the Hawke's Bay DHB. These core members of the Hawke's Bay JWG intend to proceed with a governance committee as the body overseeing and directing the work of the JWG. Moreover, this committee will ensure proper accountability to each organisation. Beneath that committee, the operational work of the JWG will continue with the current representatives of each body.

[412] The Hawke's Bay JWG invited the Ministry of Health to participate in the group but the Ministry by letter, dated 18 May 2017, declined to do so indicating that it saw it as appropriate to remain clear of operational matters. The JWG has renewed its invitation to the Ministry of Health and, following some discussion of this issue with the Director-General at the hearing in August 2017, the Inquiry is hopeful that the Ministry will in fact participate, albeit naturally at a lesser level than the local members. The Inquiry considers that the Ministry could derive much benefit and knowledge that could be applied to the system as a whole from participating in the JWG.

[413] A common theme in the evidence received at the June and August hearings was that JWGs need a clear purpose and a shared need and desire to work together. Without these, JWGs tend to peter out and to lose momentum and support. Specific outputs were required in order to give focus to the Group's proceedings. Key attributes of successful collaboration were having shared goals and a willingness to work with each other. The respective roles and requirements of each agency had to be acknowledged and respected, and collaboration needed strong leadership and support from the top. Collaborative vehicles should also be appropriately resourced.

[414] Witnesses also spoke of the need for a governance commitment to a JWG, linked with accountability back to each member's managers and governors. Several witnesses supported a two-tier approach with a governance committee overseeing technical working groups. This is the model towards which the Hawke's Bay JWG is

now moving. Witnesses also spoke of the need for JWG outcomes to be fed into the necessary Local Government Act or RMA processes.

[415] The Hawke's Bay DHB submitted that, while the Hawke's Bay JWG had made good headway, deep system and process change was required going forward, along with proper resourcing. It submitted that leadership and guidance from the relevant Government Ministries was important, but had been hitherto lacking.

[416] Mr Tremain thought that an independent Chair would be beneficial in any JWG model, given the inherent differences between the agencies and the potential for tension between, for example, a regional council and a district council. There will also tend to be natural tensions between JWG members in terms of who should be responsible for what levels of expenditure, or for various investigative or other projects.

Discussion and Findings

[417] The Inquiry received comprehensive submissions and evidence about collaboration and JWG issues and the above summary of submissions and evidence does not do justice to the breadth of material received. The Inquiry has concluded that certain basic matters have emerged as clear. However, it would not be appropriate or helpful to attempt a comprehensive review of all possible forms of JWG in this report. The Inquiry agrees with the submission that sufficient flexibility should be available to enable each region to put in place a JWG that meets its needs.

[418] The Inquiry is satisfied that the safety of drinking water would be significantly enhanced if the following measures were put in place to promote collaboration.

[419] First, the Inquiry has concluded that collaboration groups (for convenience, referred to as JWGs) should be mandated by law. The Inquiry has observed that, as the creation of the JWG in Hawke's Bay and the CDWRG shows, no structural or legislative change is needed to enable JWGs to be voluntarily established. Accordingly, the Inquiry recommends that DHBs (with PHUs) establish as soon as practicable (with the assistance of the Ministry of Health), one or more JWGs responsible for the oversight of drinking water safety in their respective regions. Such JWGs should operate along the lines of the Hawke's Bay JWG and/or the CDWRG. However, in the longer term, it is necessary to mandate JWGs to ensure not only that

they are set up but also maintained. They are too important, and too vulnerable to slippage and dwindling commitment, to leave as a voluntary measure.

[420] While the Inquiry acknowledges the existence of the current general provisions within the Local Government Act, and the RMA, it recommends that a simple, stand-alone legislative provision be directed towards the establishment and operation of drinking water JWG's. The Inquiry sees no reason in principle why such a provision would cause any difficulty with existing general legislative provisions in respect of collaboration. More detailed consideration and review will be needed by Government to determine the precise terms and scope of such a provision, but the Inquiry's view is that it should remain at a high level and that flexibility should be allowed in terms of the structural and functional details of JWG's. How JWG's are configured should also depend on relevant local and regional circumstances.

[421] The size of supplier required to set up and participate in a JWG is also a matter for further review. However the Inquiry indicates that, at a minimum, it should be required for all large and medium supplies. In principle, all suppliers, large and small, should collaborate, and it would be desirable for all networked suppliers to have some participation in a JWG. This issue leads, as do so many issues, to the merits of dedicated suppliers of a combined large size.

[422] Whether there should be a mandatory requirement for an independent Chair is a matter best left to those drafting the legislation. For its part, the Inquiry endorses the view of Mr Tremain that the inherent potential for tensions and differences is sufficient to warrant an independent Chair.

[423] The Inquiry recommends that JWG's be accountable to their communities through the governance of each member. In practice, this is likely to require governance along the lines of those proposed for the Hawke's Bay JWG Governance Committee. The Inquiry also endorses the concept of transparency as an important form of accountability. JWG minutes and action plans should be made public.

[424] The Inquiry accepts the evidence that JWG's need specific outputs in order to continue as a healthy functioning entity. It will be a matter for each JWG to set its own agendas and goals having regard to local issues and other contextual requirements. Generally, the Inquiry sees merit in a JWG normally having (at least) the following functions and purposes:

- (a) Liaison and relationship and confidence building, a general vehicle for interchange between agencies;
- (b) Information sharing, preferably in due course by way of databases and other more formalised systems;
- (c) Making recommendations in relation to drinking water;
- (d) Negotiating or mediating outcomes on issues involving drinking water;
- (e) Monitoring test results, and aquifer investigations, and other indicators of drinking water safety;
- (f) Reviewing compliance levels and taking steps to achieve full compliance; and
- (g) Overseeing and/or conducting research or investigations.

[425] The above list of goals is not exhaustive and is no more than an indication of the types of roles which a JWG should pursue. The Inquiry has referred elsewhere in this report to the need for leadership within the Industry. If the Inquiry's recommendations in relation to a new drinking water regulator are accepted, then it would expect the regulator to provide guidance and leadership to JWGs nationally. In the meantime, however, the Ministry of Health should, in the Inquiry's view, participate at some appropriate level in the Hawke's Bay JWG. The benefits to the JWG are likely to be worthwhile and the learnings for Ministry officials from doing so could be significant.

[426] If dedicated drinking water suppliers are formed, and particularly if there is an aggregation of suppliers, this may reduce the number of JWGs needed. Such aggregation would go some way to addressing the question of collaboration between councils but it would not dispense with the need for collaboration with the health and environmental entities.

PART 10 – SHOULD THERE BE A DEDICATED DRINKING WATER REGULATOR?

Introduction

[427] The Inquiry's Stage 2 List of Issues included the question of whether there should be a single drinking water regulator. This topic has been addressed only at a conceptual level. The Inquiry recognised that the structuring and form of a dedicated drinking water regulator would need to be the subject of proper consideration by Government. Thus the Inquiry's role was limited to recommending whether a dedicated drinking water regulator would improve the safety of drinking water and whether it could reduce the prospects of another outbreak.

[428] To put this question in context, it is necessary to consider the matters for which a regulator might be responsible. The Inquiry considered the concept of a regulator which would be responsible for at least the administration and regulation of the following agencies and elements in the drinking water system:

- (a) The DWAs;
- (b) Water suppliers, including licensing or other regulation of suppliers (if introduced);
- (c) Compliance and enforcement;
- (d) Samplers and laboratories;
- (e) WSPs; and
- (f) Leadership for all elements of the industry.

Submissions and Evidence

[429] Submissions on this topic were received from interested parties and it was exposed to debate at the August 2017 hearing with a panel comprising Dr Fricker, Dr Deere, Dr Nokes, Mr Rabbitts and Mr Graham.

[430] LGNZ advised the Inquiry that it had previously recommended the establishment of a single co-regulatory body, similar to the Gas Industry Company operating under Part 4A of the Gas Act 1992. This would be an industry body with a

board comprising independent members as well as industry representatives. Christchurch City Council supported in principle a single national drinking water regulator similar to those existing in the United Kingdom, Australia and Scotland.⁹³

[431] Some limited submissions were received from various DHBs; these generally did not support the concept of a single drinking water regulator. The DHBs' submissions (other than the Hawke's Bay DHB) evidenced a common theme relevant to the regulator issue, namely a concern about detaching DWAs from employment by, and location within, DHBs.

[432] In its submission, the New Zealand Public Service Association advised of an OECD Report⁹⁴ which highlighted that, of the 17 countries surveyed, New Zealand had the second highest number of central government authorities involved in the provision (14) and regulation (7) of water. The New Zealand Public Service Association submitted that this complicated water governance landscape has contributed to a lack of coordinated responsibility towards drinking water. It therefore saw simplification as a benefit. Infrastructure New Zealand spoke of the benefits of having an independent body serving as regulator. It pointed out the benefits of a single-focus body, noting that regional and district councils and the Ministry of Health undertake multiple activities, of which drinking water is only one.

[433] Water New Zealand supported the idea of a dedicated regulator. It submitted that there was a current lack of consistent national approaches to drinking water issues and a lack of coordination between agencies, a lack of resources applied to drinking water by DHBs and the Ministry of Health, and the need for guidance and leadership from one entity.

[434] Other submitters suggested that, if the Ministry of Health's resources and functionality were substantially improved, there may be no need for a dedicated regulator.

[435] Mr Graham, who supported the concept of a dedicated regulator, submitted that this would greatly improve resourcing, WSP assessments, compliance, consistency,

⁹³ The Inquiry notes that some overseas drinking water regulatory regimes include price regulation. The Inquiry did not consider pricing regulation as its focus was on the quality and safety of drinking water.

⁹⁴ OECD "Water Governance in OECD Countries: A Multi-level Approach" (OECD Publishing, 2011).

and timely assessment of compliance with the DWSNZ. He saw a dedicated regulator enabling quality controls and an overview from one organisation rather than many. He suggested there would be an improvement in technical competence, improved efficiency, a better career path for its officers, and an organisation that had the gravitas and systems to effectively intervene when it was clear that suppliers were failing to manage risks to public health. In his view, the Ministry of Health could continue to have a limited role in preparing and issuing the DWSNZ and developing policy.

[436] In Dr Fricker's view, the appropriate role for a drinking water regulator is to produce standards and best practices and to ensure that suppliers meet them. He saw an effective and consistent enforcement policy as very important and noted a correlation, in his experience, between that and compliance rates.⁹⁵ He spoke of the substantial benefits which he had seen accruing from the Drinking Water Inspectorate system in the United Kingdom. His empirical experience with this system is that it works very well. The Drinking Water Inspectorate system makes it clear to water utilities what they should be doing and to what standard they should be supplying water. He pointed to the virtually total compliance levels of England and Wales as being among the best in the world. The Inquiry's findings in Part 7 concerning the serious deficiencies in the Ministry of Health's performance in respect of enforcement lend substantial support to the need for an independent regulator which would be responsible for enforcement.

[437] Dr Deere concurred with Dr Fricker and added that he saw independence as important. In his view, water regulation should be divorced from any political or other outside influences. Public safety and public health should be the exclusive goals of the regulator and these should not be compromised by the need to placate other interests or to deal with competing financial or resource claims. Dr Deere also stated that, in his experience, many water suppliers welcome clear and firm edicts from a water regulator, particularly in the case of local councils where water supply staff may encounter difficulty or resistance at the governance or political level.

[438] Dr Nokes submitted that it would be important to ensure that any regulator would employ (or have access to) experts who could provide guidance and advice to

⁹⁵ Refer to the Inquiry's criticisms of the Ministry's enforcement policy and its approach to guidance on it in [269]–[286] above.

the water industry. He also noted the potential for a conflict of interest between a regulator responsible for both enforcement and leadership.

[439] All experts were agreed that leadership was important and a key part of the benefits from a regulator. Dr Deere indicated that, in Australia, water utilities go out of their way to seek to engage with the regulator because they need and want leadership.

[440] The experts were also agreed that any regulator should be responsible for the DWA service as this would enable the current difficulties with the DWAs (referred to in Parts 7 and 12) to be addressed and resolved.

[441] In relation to the question of licensing and qualifications for water suppliers and their staff, discussed in Part 16 below, the experts were agreed that, if such a system were implemented, a regulator would be needed to administer it and to ensure compliance with it (for example, in relation to continuing professional development and ongoing competency training).

Discussion and Findings

[442] There was a general preponderance of support for a drinking water regulator from submitters and from the evidence heard at the August 2017 hearing. The Inquiry has concluded that a dedicated drinking water regulator which can oversee all other reforms should be established.

[443] A drinking water regulator should have as its primary focus the quality of drinking water and the safety and excellence of all elements of the supply chain.⁹⁶ An independent regulator has worked well in England, Wales, Scotland, Ireland and Australia. In the Inquiry's view, there is no reason why it would not work well in New Zealand.

[444] A properly-resourced regulator, with a high level of expertise, presents as the best vehicle for bringing about the improvements which the Inquiry has, in other parts of this report, found are needed. Without defining or limiting the matters for which a regulator might be responsible, a regulator should have responsibility for DWAs, samplers and laboratories, compliance and enforcement, the standards and practices

⁹⁶ As noted earlier, pricing could also be a responsibility of a regulator but this was not considered by the Inquiry.

of water suppliers, and the approval and monitoring of WSPs. These aspects would all benefit greatly from the coherent focus and compliance powers which a dedicated regulator could bring to bear.

[445] In addition, the crucial element of leadership should be pursued by one body which has an overview of the industry and the standing, resources, expertise and authority to exercise that leadership. The Ministry of Health does not currently possess those attributes. A new regulator would also bring a fresh approach, free from past attitudes and mindsets.

[446] The panel of experts at the August hearing raised many points in support of a dedicated regulator, as summarised above, and the Inquiry has accepted their evidence. Apart from the question of whether DWAs should remain within the DHBs, there was no submission or evidence actively opposing the formation of a new regulator.

[447] As concerns employment of DWAs, the Inquiry has concluded that the greatest benefit would lie in having the DWAs employed by and accountable to a regulator. Their beneficial links with the health system could and should be maintained without their actually being employed by DHBs.

[448] The events in Havelock North in August 2016, and, it is hoped, the work of the Inquiry, have led to a greater awareness of the need for higher standards in the New Zealand drinking water system. This report records the need for change and improvement across a wide range of elements of the drinking water system, particularly in the areas of setting and reviewing standards, training, qualifications and other forms of best practice.

[449] The formation of a dedicated drinking water regulator would create an ideal vehicle to pursue necessary changes. As Mr Rabbitts observed, a good regulator would drive necessary change and reform within the industry. Counsel assisting put it to the experts that, if there was to be a dedicated regulator, this should be addressed first and early so that the regulator could investigate, plan, and take ownership of the various issues within its portfolio, formulate appropriate strategies for achieving change, and then take responsibility for achieving beneficial results. The experts agreed with that proposition. Dr Deere, in particular, indicated that where a regulator

can come in early and set up the framework, it will have ownership of it and will make it work.

[450] The Inquiry agrees, and has concluded that, if there is to be any consideration of a new regulator, this should take place as early as possible. The Inquiry has also concluded that, pending any legislative change on the creation of a drinking water regulator, a Drinking Water Regulation Establishment Unit should be set up to address the following matters:

- (a) Maintain momentum;
- (b) Facilitate the establishment of a drinking water regulator; and
- (c) Facilitate the hand-over to a drinking water regulator.

[451] The Ministry of Health's current disaggregated drinking water resources, discussed in Part 7, do not possess the necessary skills and attributes and should not be used for this purpose.

[452] The details of the structure of a new regulator are beyond the scope of the Inquiry and the Inquiry does not consider that it is required to make any findings on whether a co-regulator structure would be appropriate as suggested by LGNZ. The Inquiry has observed, however, that any regulator would need to operate independently of suppliers and other participants in the industry. As this report illustrates, the water industry comprises many disparate elements. A firm and effective regulator that acts decisively and, when required, promptly is needed. The Inquiry doubts that a co-regulator model would meet these needs.

Concluding Remarks

[453] The Inquiry has found that the establishment of a dedicated drinking water regulator would, if properly resourced financially and with expertise and competence, significantly enhance the quality and coherence of the drinking water system. It would substantially reduce the risk of another major outbreak, reduce fragmentation, and represent a vehicle for addressing many of the problems identified by the Inquiry in this report, particularly in Part 7 above and in Parts 12 (DWAs), 16 (Licensing of Suppliers) and 19 (Monitoring and Testing).

[454] Details of how such a regulator should be constituted, which Ministry would be responsible for it, and the metes and bounds of its jurisdiction are all matters to be properly considered by the Government in light of the Inquiry's recommendations. The Inquiry notes only that the important fundamental characteristics of a drinking water regulator in its view should include:

- (a) Independence⁹⁷ and freedom from conflicts of interest;
- (b) A sufficient level of resourcing; and
- (c) Proper expertise in relation to all relevant disciplines necessary for the delivery of safe drinking water.

⁹⁷ The reference to independence does not connote a need to constitute a regulator outside Government. One possible model is the Civil Aviation Authority, a Crown entity that reports to a Minister but is governed independently of the Ministry of Transport by a five member board.

PART 11 – DEDICATED DRINKING WATER SUPPLIERS

Introduction

[455] Issue 7 in the Stage 2 Inquiry List was whether there should be dedicated drinking water supply entities. As at 4 April 2017 (the most recent update), there are some 977 water suppliers recorded on the Drinking Water Register, 284 of which are networked (the rest being self-suppliers). Of these, 67 are district or city councils.

[456] In relation to networked suppliers, the Inquiry has considered the merits of dedicated entities managing and operating the local body supplies, or some of them. Of the 67 council suppliers, 28 have fewer than 10,000 occupied private dwellings and 38 have fewer than 15,000 occupied dwellings. Fifty councils (or about 65 per cent of local authorities) have fewer than 20,000 occupied dwellings.⁹⁸ These statistics raise obvious issues about the affordability of improvements needed to achieve full compliance.

[457] A submission from Mr Watson of Beca assisted in demonstrating the true importance of this issue. He set out an estimate of likely costs of improving water infrastructure and stated that it would be simply impossible for many smaller suppliers to meet the required cost,⁹⁹ given their present sizes and population bases. He submitted that the formation of dedicated water supply entities was the only way that a tighter regulatory regime could be successfully implemented. The Inquiry agrees, and would add that the same applies to achieving full compliance even under the present regulatory regime.

[458] At the August hearing, a panel comprising Dr Fricker, Dr Deere, Dr Nokes, Mr Rabbitts and Mr Graham considered a range of issues concerning dedicated suppliers. The basic proposition was that dedicated suppliers may be able to enhance the safety of drinking water by taking advantage of economies of scale, obtaining access to greater resources, developing greater competence, and producing better accountability.

⁹⁸ Refer Statistics New Zealand website.

⁹⁹ Refer to Mr Watson's submission on the Inquiry website and also, under "Fact Papers", the paper he refers to: P La Roche, AW Watson and C Freeman "Water Treatment for Small Supplies- balancing risks and costs" (Water New Zealand Conference and Expo 2017).

[459] The Inquiry focussed on the question of dedicated suppliers at a conceptual level. It did not consider particular structures or arrangements. One of the exclusions in the Inquiry's terms of reference was structural arrangements for local government and the Inquiry therefore did not enter into consideration of any such arrangements. The Crown fact paper helpfully set out a range of options for the management and delivery of drinking water. Many of these involved CCOs, but these structural issues will all be matters for future consideration, should the concept of dedicated water suppliers be accepted.

[460] The Inquiry did, however, note that there was substantial scope for setting up a dedicated supplier without altering the structural arrangements for local government. And it was clear from the terms of reference that the Inquiry was required to consider any changes to the management of drinking water supplies and any lessons to be learned, and improvements that could be made more broadly across New Zealand in the management of water supplies.

[461] The Inquiry did not enter into the question of whether a dedicated supplier might also be responsible for waste water. This is a common feature of dedicated suppliers in overseas systems and the Crown fact paper set out some New Zealand examples showing the advantages of combining the two, but it was not necessary or appropriate to explore that possibility, as the merits of a dedicated drinking water supplier apply regardless of a single or dual function.

[462] One of the lessons to be learned from the Havelock North outbreak was to recognise the limitations of, and constraints upon, a relatively small local government drinking water supplier (albeit one classified as "large" under the Health Act). The Inquiry saw the consideration of dedicated suppliers as an important component of the future safety of drinking water in New Zealand.

[463] If the Inquiry's positive recommendations in relation to dedicated suppliers are accepted, it will be a matter for Government to consider the nature and extent of any changes needed to set up dedicated supply entities. Given that the improvements in drinking water safety would accrue largely, if not exclusively from the dedicated *management* and *operation* of the supply, it may be that no ownership or structural changes are needed in order to set up, and reap the benefits of, a dedicated supply entity. Wellington Water was cited as an example of a dedicated supplier that involved no legislative change or change of ownership of assets. At a conceptual level, a

dedicated water entity could be responsible for running more than just the supplies of the relevant local authorities. Water supplies to prisons or the military could also be included. For example, a dedicated water entity in the Manawatu/Rangitikei could also manage the water supplies to Manawatu and Kaitoke Prisons as well as the Waiouru, Ohakea and Linton Military camps. Collectively, this would create an additional customer base of more than 10,000. There are also numerous rural schools which are self-suppliers in the area and several Department of Conservation supplies.

[464] The Inquiry noted that the debate about improved institutional arrangements for water supply is not new and that it has been on the public policy programme in New Zealand for more than 25 years. A brief and selective summary of the history of this issue in New Zealand is set out in **Appendix 3**.

[465] The Inquiry received submissions from local government entities indicating substantial opposition to any alteration in the current control and management of drinking water supply by councils. In the Inquiry's view, this sector opposition, coupled with a review of the long, but largely unsuccessful, history of this issue in New Zealand, indicate a need for a fresh and objective assessment. If it is accepted that the concept of dedicated suppliers has merit, firm leadership by Government and decisive action would be warranted. The potential for the issue to be simply shelved for another long period is significant, and the Inquiry believes that the time has come for decisive and definitive steps to be taken.

Submissions and Evidence

[466] Submissions for and against the concept of dedicated suppliers tended to be polarised between LGNZ and some of the local bodies on the one hand, and Water New Zealand and a number of other independent submitters on the other. There was a distinct resistance from LGNZ's members to the idea of setting up dedicated suppliers and it was clear to the Inquiry that local bodies generally had a strong desire to retain all aspects of the supply of drinking water.

[467] The basis for this desire was less than clear, but the Inquiry considers that some part of it may relate to the revenue earned from drinking water supply, or to the share of overheads spread across the activity. Other parts may relate to an inbuilt resistance to giving up control or possession of assets or services and other parts may involve a concern at having to interact with a new entity. Other concerns may involve a

resistance to losing the value of the relevant assets and infrastructure (although ownership of this need not necessarily change). Loss of “sovereignty” has also been mentioned. However, with the exception of Christchurch City Council, submitters did not oppose a dedicated supply entity on the basis that current suppliers have ample resources, expert advice, financial resources or systems, or that their infrastructure needed no investment.

[468] The concept of a dedicated operator of water services is already partially in effect with some councils outside the Watercare and Wellington Water example. These councils have their water services managed or operated for them (to greater or lesser extents) by a number of consultancies and service providers, for example Stantec (formerly MWH Ltd), Veolia, Downer and City Care. It seemed to the Inquiry that these examples represented proof of the potential benefits of dedicated management of supply and that a dedicated full drinking water supplier was only an extension of this concept.

[469] Some opposing submitters saw collaboration as being an alternative to dedicated suppliers. Water New Zealand referred to the existence of shared service arrangements between some councils, with resultant benefits. For example, in one case, this enabled the employment of a shared compliance officer. A better level of community engagement with local bodies was also raised as justifying no change, as was the proposition that some local bodies had already “lifted their game” following the Havelock North outbreak. LGNZ submitted that decisions about a dedicated entity are most appropriately left to individual communities to be made through the democratic process. There was reference to concerns about remote communities having to cede control to distant suppliers, and to existing local body suppliers bringing cross-benefits to drinking water supply in the form of coordination with other council infrastructure and assets.

[470] Water New Zealand made a strong submission in support of dedicated suppliers, as did other independent submitters. It identified that competence was fundamental to the safe delivery of drinking water, that critical mass was an important element of ensuring competence and that this could only be achieved by some level of consolidation for many water suppliers. It further observed that, as the size of a water supplier increases, so generally does its capacity and competence. Larger size allows for specialisation among staff, enhanced career opportunities, as well as employment of backup staff. As scale increases, performance improves. Infrastructure New

Zealand made similar submissions with useful detail and examples. In addition, the expert panel members' consideration of this issue was substantially in support of the concept.

[471] The Inquiry discerned two main strands of support. The first was based upon the poor compliance levels. The smaller suppliers are the worst offenders, but by no means the only ones. It was submitted that these troubling levels of compliance demonstrated a need for greater resources and capabilities for non-compliant suppliers, an improvement that could only efficiently come about by aggregating a number of smaller suppliers into a larger dedicated drinking water supply entity.

[472] Evidence was received that the complexity of safe supply had increased, even for small supplies, thus making access to expert advice more important. Smaller supplies often have no choice but to contract out various functions or to use consultants. These resources are prohibitively expensive for some suppliers, and in all cases remove levels of "ownership" and knowledge of the supply from the supplier. This comes back to the fifth principle of drinking water safety set out in Part 2: "Suppliers must own the Safety of Drinking Water".

[473] One of the least attainable goals for small or struggling suppliers is investment in drinking water infrastructure. Deferred investment is common amongst provincial suppliers. An aggregated and dedicated supplier could access funds more easily.

[474] The second strand of support was based upon the range of advantages which would accrue to all suppliers, including those currently compliant, or substantially so. Regardless of the current state of compliance, a dedicated supplier was seen to offer major benefits in the form of cost-saving, resources, efficiency and quality of service.

[475] The supporting submitters said the benefits of a dedicated supply entity were obvious and manifold compared with the existing council supplier paradigm. They referred to economies of scale, the benefit of a single focus on an essential service, immunity from having to deal with conflicting priorities for expenditure, and enhanced accountability. In addition, they spoke of consequential benefits, including greater resources on all fronts, the ability to recruit and retain qualified staff, obtain greater access to internal and external expert advice, more rigorous risk management, quality assurance and investment disciplines, the ability to secure long term funding, and the ability to carry out long term planning.

[476] Supporting submitters pointed to the benefits seen in recent years from the formation of Watercare in the Auckland region and Wellington Water. Each of these entities uses different structural models. Watercare was created by legislation, is a CCO, 100 per cent owned by Auckland Council, and it operates drinking water and waste water.

[477] In the case of Wellington Water, four city councils (Wellington, Porirua, Lower Hutt and Upper Hutt), together with the Greater Wellington Regional Council, created a jointly-owned CCO to manage all three waters: drinking water, waste water and stormwater. Structural changes within local government were not needed. Wellington Water provides investment and prioritisation advice to the councils, as well as operating the bulk water system. The five councils continue to own the assets and they decide what to invest in.

[478] Given the Inquiry's terms of reference, its consideration of Watercare and Wellington Water focussed on the conceptual merits accruing from an aggregation of services and a dedicated focus, and not on their particular structures. Submitters said that Watercare had led to economies of scale, the aggregation of resources, and much improved quality and service for some of the outlier suppliers in the Auckland area (such as Franklin¹⁰⁰ and Rodney). It was held up as an organisation with substantial resources and capability and high standards. Similar benefits have been accruing in the case of Wellington Water. Compliance levels have risen in both cases.

[479] Submitters and witnesses brought to the Inquiry's attention reforms in international jurisdictions with cultural, geographic, demographic and population densities relevant to New Zealand. These include Victoria and Tasmania in Australia, and Scotland¹⁰¹.

[480] Common feature of these reforms are:

- (a) Public ownership;
- (b) A corporate structure with governance based on skill not representation;
- (c) Enhanced accountability for governance and management;

¹⁰⁰ See submission of Auckland Regional Public Health Service, p 4.

¹⁰¹ Mr Mackie's submission usefully annexed a paper in relation the Scottish water experience.

- (d) Larger units to provide the critical mass necessary for capability, capacity and economies of scale; and
- (e) Common pricing policies over large areas.

[481] Demonstrated outcomes of these reforms have included:

- (a) Addressing and resolving decades of deferred investment to meet modern standards, particularly in areas of lower population density;
- (b) Sustainable long-term financing;
- (c) Significant cost reduction (40 per cent in real terms in Scotland within 10 years at the same time as addressing all deferred investment);
- (d) Improved environmental outcomes;
- (e) Improved customer satisfaction; and
- (f) Improved accountability.

[482] Submitters pointed to a general trend in the United Kingdom and Australia towards aggregation and dedication of drinking water supply. Scotland was raised as an example of a successful aggregation of many small and struggling suppliers into (ultimately) one single dedicated supplier. In Scotland, the result has been improved compliance, improved quality of supply and resources, as well as a common (and relatively inexpensive) pricing policy throughout the whole country, which is of similar size to New Zealand.

[483] Although pricing was not a matter directly within the Inquiry's terms of reference, it was noted by submitters that dedicated suppliers, particularly on a large or national scale, have the ability to maintain common pricing for all users, and that this was a further substantial benefit for small and remote supplies which have few funds and limited ability to spread costs.

Discussion and Findings

[484] In its Stage 1 Report, the Inquiry noted a number of areas of deficiency in the drinking water supply by HDC prior to the Havelock North outbreak. It has concluded, after considering all of the material on this issue, that most of these deficiencies would

probably not exist in the case of a dedicated drinking water supplier, particularly one of a larger size.

[485] While recognising the efforts many suppliers have made since August 2016, the Inquiry has concluded that inherent difficulties with local body suppliers remain. Considered against the poor compliance levels evidenced in the Annual Report to 30 June 2016 (and seen also in the preliminary figures for the 2016- 2017 Annual Report), the Inquiry has concluded that a compelling case exists for dedicated suppliers, as an effective means to improve compliance and competence.

[486] While the case is particularly strong in relation to aggregation of smaller suppliers, the Inquiry concludes that a case in support exists regardless of the size of a supplier, and also regardless of whether it would involve aggregating two or more suppliers together. The primary reasons for this are the substantial benefits of single focus and dedicated resources. These are benefits of direct and substantial effect on the safety and robustness of drinking water supplies.

Advantages to Smaller Suppliers

[487] The affordability of improvements to the drinking water systems operated by 67 councils is a matter of crucial importance. The Inquiry acknowledges that its recommendations will lead to additional cost for some suppliers (although it expresses real caution about the suggestions that this cost will be very high in all cases) and that ways of meeting these costs need to be found. It is clear from the evidence given to the Inquiry that substantial deficiencies currently exist in many of the smaller networked suppliers in New Zealand and that they generally have fewer resources and capabilities than HDC had in 2016.

[488] One example is Southland District Council which has 22 distributions zones (none of which are compliant for protozoa) and a serviced population of only 14,645. Another example is Thames Coromandel District Council which has 12 zones with a serviced population of 20,587 (only 6 zones of which are compliant for bacteria, and none of which are protozoa compliant). There are many other examples, a good number of which are completely non-compliant for protozoa requirements.

[489] The Inquiry notes the concerns expressed by both the Auditor-General¹⁰² and the National Infrastructure Unit¹⁰³ about growing deferred investment. There was a solid body of evidence that, for many smaller suppliers, it was simply not affordable to improve their supplies.

[490] Even with larger supplies, the Inquiry has received much evidence of inconsistent standards and, in some cases clear deficiencies in the supply operation. One example of this is the Napier City Council which operates a “large” supply (as defined). Napier experienced five positive E.coli readings in the period February to May 2017 and documents produced to the Inquiry in relation to the transgressions showed an infrastructure in need of considerable attention, a range of unresolved problems with the supply, and a supplier in need of expert advice. See also Napier Mail article 6 September 2017 for a general description of problems facing this supply and the DWA.¹⁰⁴

[491] The Inquiry did not consider that potential detriments for remote communities were serious enough to negate the concept of a larger (and more remote) dedicated supplier. A dedicated supplier could make effective arrangements for local liaison and supervision. Dr Deere gave evidence that larger organisations can better deploy remote automated equipment using modern communications technology. One such example he gave was that every facility in Western Australia, even the most remote, are continuously monitored by the Water Corporation (a State-wide dedicated entity). He observed that this provided a much greater level of monitoring and compliance than previous (local management) practice. The benefit to a remote community of having affordable high-quality drinking water would eclipse any difficulties arising from remoteness.

Single Focus

[492] Local councils have potentially conflicting interests. Drinking water is only one council activity and councils face myriad competing demands for capital investment as well as operating expenses. Local bodies also face many other demands on their time and attention and resources.

¹⁰² Office of the Auditor-General, Water and Roads: Funding and Management Challenges 2014.

¹⁰³ National Infrastructure Unit Facts and Issues Drinking Water February 2012: www.infrastructure.govt.nz/plan/2010development/ifi/24.htm/?searchterms=stocktake.

¹⁰⁴ See Fact Papers on the Inquiry website.

[493] The Inquiry sees much benefit flowing from detaching the water supply entity from these competing influences and demands and making drinking water the supplier's core (and indeed only) business. If a dedicated supplier had substantial independence from competing financial and management demands, and also political influences, the safety of the supply would be enhanced.

Efficiency and Cost Savings

[494] Currently, with the council suppliers, it is necessary for at least 67 WSPs to be prepared and implemented and audited by DWAs. Likewise, there must be 67 ERPs, monitoring contracts, sampling crews to be trained and deployed, interactions with DWAs and so on.

[495] With fewer dedicated suppliers, the potential for efficiencies, and the avoidance of duplication are considerable. In addition, costs savings will logically flow from the aggregation of suppliers. The Inquiry heard evidence of such savings being achieved by Watercare and Wellington Water.

[496] Savings and efficiencies in terms of dealings with the DWA service would also follow, with many fewer separate WSPs needing to be approved and audited, and supplier specific issues and steps needed by DWAs.¹⁰⁵ The nature and extent of regulator resource required is likely to be less for a small number of larger suppliers than for the current 67 suppliers.

Resourcing

[497] A large supplier has resources to progress beyond purely reactive activities. Large size can enable more proactive and strategic activity, such as refresher and further education for staff, more sophisticated risk management programmes, strategic planning, and providing buffers against emergencies, breakdowns, staff absences, training needs and myriad other demands on an organisation. By contrast, many, if not most, smaller suppliers do not have the resources for these things and operate on a purely reactive and day to day level. With adequate resources, benefits such as good retention of institutional memory, internal training, and collaboration with other agencies will all be available at a much better level than that attainable by smaller suppliers.

¹⁰⁵ Submission of the Auckland Regional Public Health Service, p 10.

Economies of Scale and Affordability

[498] Both the LGNZ 3 Waters Project and Water New Zealand's National Performance Review¹⁰⁶ showed the economies of scale in providing water services. The LGNZ project noted:

At the risk of generalising, smaller rural and provincial councils tend to face greater challenges than larger metropolitan areas. Metropolitan areas usually have a more substantial and growing number of connections to their networks and so can achieve scale benefits.

[499] Water New Zealand's review stated that the "The highest proportion of household income spent on 3 waters services occurs amongst regions with the lowest average household incomes". These regions also have the lowest population densities.

[500] Securing the benefits of economies of scale was seen by the Inquiry as not only important, but in fact crucial for all of the smaller suppliers within New Zealand which are currently reporting poor compliance figures and which do not have the resources either in financial or people terms, or in available advice, to produce, and maintain into the future, a high quality drinking water supply.

[501] The Inquiry reviewed submissions expressing concern at the cost of producing safe water supply. Concern about cost had reached a peak in the opposition to the proposed Health Act amendment in 2007 and, in the Inquiry's view, resulted in a compromised and unsatisfactory legislative regime. As observed elsewhere in this report, the Inquiry's firm view is that public health and safety should not be compromised for financial reasons and that, if a supplier cannot meet required standards because of financial constraints, then it should aggregate with other suppliers to form a financially viable unit.

[502] The benefits of the economies of scale accrue across the whole spectrum of a drinking water supply: the quality of staff and management; implementation of good quality assurance and quality control measures; access to internal and external technical and scientific resource;, the ability to acquire and maintain treatment plant; the ability to make capital investment in infrastructure; and, most importantly, the ability for proper resources to be applied to small communities and remote communities.

¹⁰⁶ Water New Zealand National Performance Review 2015-2016:
<http://www.waternz.org.nz/NationalPerformanceReview>

[503] The Inquiry heard of two sundry examples of the economies of scale which can accrue. First, the substantial improvement of the relatively remote Franklin and Rodney supplies under the aegis of Watercare in the Auckland region. Second, Christchurch City Council's investment of some \$90 million in the Bank's Peninsula water and sewerage networks following amalgamation of the Bank's Peninsula District Council with the Christchurch City Council. These improvements and investments would not have occurred prior to aggregation. Many similar examples can reasonably be expected if dedicated suppliers are formed.

[504] It is ironic that in the two largest population areas, Auckland and Wellington, the need for, and benefits of, special purpose entities have been recognised, even though existing resources were among the strongest in New Zealand, and yet the ability to meet the DWSNZ and the future affordability problems identified in the LGNZ 3 Waters Project and Water New Zealand's Annual Performance Review are worse in provincial New Zealand.

Community Engagement

[505] As concerns community engagement and coordination with other council facilities, these could and should still occur with a dedicated supplier – collaboration between agencies has been mentioned at some length by the Inquiry as necessary in this report and in the Stage 1 Report.

Accountability

[506] A lack of accountability underlies the current poor compliance levels prevalent throughout New Zealand. In many cases, these have continued for many years with no apparent sanction or accountability. The Inquiry concludes that accountability is likely to be more direct, more transparent and more effective in the case of a limited company operating as a dedicated supplier. Management and governance will be inherently more transparent and traceable than is currently the case with local government suppliers. Directors' duties in law provide clear accountability.

[507] Political accountability by elected councillors may be seen as an advantage in local body suppliers but the Inquiry has concluded that, in practical reality, such accountability is ineffectual. For example, the Inquiry received evidence of a South Island water manager who, after being questioned by the Medical Officer of Health, determined that he could not be assured of the safety of some 80,000 citizens drinking

untreated water and, accordingly, recommended to his council that it be chlorinated. However, the councillors, despite being told of the risks, overrode that recommendation and decided that it would not be treated. A company director and senior company managers simply cannot ignore advice and take risks in that way (at least without direct accountability). Nor would they be easily subject to local political pressure.

Better Collaboration as an Alternative to Dedicated Suppliers?

[508] The Inquiry considered whether better levels of collaboration were a viable alternative to forming dedicated supplies, as some submitters had contended. Local authorities are required to, under s 14(1)(e) of the Local Government Act:

Actively seek to collaborate and co-operate with other local authorities and bodies to improve the effectiveness and efficiency with which it achieves its identified priorities and desired outcomes.

[509] Notwithstanding this statutory obligation, the Inquiry believes that co-operation at a combined or shared operational level between suppliers is not readily achievable. Although the legislation may in principle encourage joint arrangements, there are a number of practical and statutory limitations which can make the creation and maintenance of them problematic. Joint arrangements of uncertain tenure are not suitable where the entity wishes to engage staff, or enter into contracts for service. Employment and commercial contracts require some legal entity and the best option available to local authorities is the CCO.

[510] Evidence of extensive operational collaboration between suppliers (current or planned) was not forthcoming. These concerns are echoed in the general policy statement prefacing the Local Government Act 2002 Amendment Bill (No 2) which stated; “*The current legislation provides only limited support for shared and integrated services, which is insufficient to enhance scale and capability for water, ...*.” The Inquiry has concluded that something more structured and durable is needed, than merely collaborating.

[511] There are also a number of statutory limitations on the creation of CCOs, which make the creation of CCOs, and particularly jointly owned ones very difficult. If a local authority wishes to establish or become a shareholder in a CCO it must formally consult with its community.¹⁰⁷ If more than one local authority is involved, each must

¹⁰⁷ Local Government Act, s 56.

independently consult with its own community. There are also limitations on guarantees that councils may give any CCO.

[512] The effect of these limitations is that attempts at establishment of a CCO inevitably become politicised and polarised, the employment of staff is problematic, and external parties are often unwilling to enter into contracts with any entity with limited capital backing and no parent guarantee.

[513] The proposed establishment of a joint CCO in the Waikato region shows the difficulties. Originally proposed in 2012, and despite numerous costly reports, one of which estimated financial benefits in the range of \$107 million to \$141 million in the first 10 years (a saving of up to 10 per cent water and wastewater rates),¹⁰⁸ the proposal has yet to achieve any tangible progress. Public consultation has resulted in the proposal being a local election issue in both the 2013 and 2016 elections, and remains contentious. The beneficial opportunities have apparently been overwhelmed by the politics.

[514] To conclude, the Inquiry has found that a compelling case for dedicated and aggregated suppliers being set up as an effective and affordable means to improve compliance, competence and accountability has been established. The Government should make a decisive and definitive assessment of whether to mandate, or persuade, suppliers to establish aggregated dedicated water suppliers.

[515] If necessary, this should be mandated, but there seems to the Inquiry to be substantial scope, with effective leadership, for suppliers to be persuaded to subscribe to the idea, and for it to occur without legislative or structural changes. While there has been staunch political opposition to the idea for some 25 years or more, the under-resourced and non-compliant state of many suppliers today makes it critically important to address the idea again. Given the long history of equivocation on this issue (see **Appendix 3**), a review and decision by the Government should be actioned as soon as practicable. The risk to public health of another sizable outbreak to the economy, tourism and New Zealand's international reputation of not doing so is simply too high.

¹⁰⁸ Cranleigh et al, Business Case for Water Services – Delivery Options 6 May 2015 <http://www.waterstudywaikato.org.nz/uploads/files/Part%20B%20-%20Final.pdf>.

PART 12 – DRINKING WATER ASSESSORS

Introduction

[516] A significant portion of Stage 2 of the Inquiry was taken up with issues concerning the DWAs. In terms of regulation, oversight and compliance, the DWAs occupy a frontline position. They interact with drinking water suppliers and have the most direct role in overseeing the safety of drinking water and compliance with the law.

[517] Under s 69ZL of the Health Act, the key functions of a DWA are to assess the performance of drinking water suppliers to determine whether they are complying with the Act and the DWSNZ, and whether they are implementing their WSPs.¹⁰⁹ Under s 69ZM of the Health Act, DWAs are accountable to the Director-General of Health for the discharge of their statutory functions. The Director-General has the power to specify by notice in writing any other functions and duties in relation to the assessment of drinking water.

[518] In practice, DWAs carry out their statutory responsibilities by three main processes:

- (a) Approving WSPs and preparing WSP adequacy reports;
- (b) Investigating and reporting to suppliers on implementation of WSP provisions; and
- (c) Investigating and reporting to suppliers on compliance with the DWSNZ.

[519] These processes are each generally carried out once a year and are the primary method of supervising compliance by drinking water suppliers. The reports above are provided only to the supplier. DWAs provide information to the Ministry of Health to enable compilation of the annual report. They also respond when transgressions occur.

[520] In the Stage 1 Report, the Inquiry found in relation to the Havelock North outbreak that there had been serious deficiencies in relation to the DWA system. The statutory provisions applicable to DWAs, and the DWA processes in place in August 2016, were ineffectual in preventing breaches of the DWSNZ, a deficient WSP,

¹⁰⁹ The responsibilities of DWAs are more fully set out in the Stage 1 Report at Appendix 4.

non-secure bores, poor management within the water supplier, and in ensuring appropriate remedial steps were taken after transgressions. HDC had a troubling and persistent record of non-compliance and the DWAs responses to such non-compliance were inappropriate and ineffectual.

[521] Undoubtedly substantial improvements to the DWA system are needed to enhance the safety of New Zealand's drinking water. Greater demands on the DWAs have already arisen in recent times. Compliance with the DWSNZ was required of small suppliers by 1 July 2015 and neighbourhood suppliers by 1 July 2016, both requiring a high level of DWA input. As a result of the Havelock North outbreak, there has, since September 2016, been a generally greater level of diligence and attention to drinking water supplies and this too has increased the workloads of DWAs.

[522] In considering DWA issues, and the required capacity, the Inquiry has also been mindful of the fact that, if it is accepted that significant change and additional rigour are necessary, even greater resources and capability by the DWAs will be needed in future. As but one example, the Inquiry recommends that DWAs be meaningfully involved in collaboration between agencies, an activity that will take significant time.

[523] At the June hearing, Mr Wood gave evidence about the shortage of DWAs and lack of resources. The Ministry was asked to contribute to the DWA issues in the Inquiry. DWA issues were explored further at the August 2017 hearing with a panel comprising Dr Fricker, Dr Deere, Dr Jones, Ms Gilbert and Mr Wood.

Problems with the DWA System

Duality of Responsibility: Submissions and Evidence

[524] One problem raised by submitters concerned the fact that DWAs serve two masters. Under s 69ZM of the Health Act the sole statutory accountability is to the Director-General and he/she is responsible under s 69ZK for appointing suitably qualified DWAs. However, DWAs are employed by DHBs and are also accountable to them as their employer.

[525] Complaints about the difficulties inherent in the dual role were made in submissions both from DHBs and from DWAs and their union, the New Zealand Public

Service Association. There was a substantial body of evidence that serving two masters created a range of practical difficulties, that it was messy and at times confusing, and that recent attempts to clarify accountability had not produced any satisfactory outcome.

[526] Mr Wood said that it was not an easy position to be in, reporting to a team leader, and then a line manager, within the DHB, but also being accountable to the Director-General who is in another organisation to which there was no direct reporting line. In practice, this meant “doing quite a lot of things twice” and DWAs were required to discharge statutory accountability as well as employment accountability.

[527] The problem was exacerbated by the Ministry of Health declining to interact directly with DWAs. The Inquiry received evidence and submissions that there was insufficient active engagement by the Ministry of Health with the DWAs, either at an operational level or in terms of policy and guidance. Several submitters said DWAs were not supported by the Ministry. In response, Ministry officials suggested operational matters were the responsibility of the DHBs.

[528] Mr Wood indicated that the DWAs were aware that the Ministry set policy in respect of drinking water matters, but that this policy was communicated to DWAs only indirectly through the DHB. On some matters, DWAs were unaware of any policy. As an example of a void, some submitters pointed to the lack of any guidance from the Ministry in respect of s 69ZD (duty to keep records and make them available), a section which DWAs found difficult to interpret and apply.

[529] The Hawke’s Bay DHB submitted that the current regime was difficult for DWAs to work in: they had statutory accountability to the Director-General but only ad hoc and irregular involvement with the Ministry of Health. Other submitters complained of a lack of clear direction with regard to application of the Health Act and the lack of national leadership of DWAs. The Ministry’s primary manual for DWAs, the “National Drinking Water Assessors’ Technical Manual”¹¹⁰ is dated 1 September 2009, although some parts have been revised up to 2014. It was said to be overdue for a thorough revision, something which was to have been done by the end of 2015. A particular problem was seen with the Ministry’s enforcement policy.

¹¹⁰ See **CB054**.

[530] The Ministry of Health has a National Drinking Water Advice and Coordination Service. The evidence suggested, however, that this was of limited benefit to DWAs, that accessing scientific and technical advice from ESR via the Ministry was cumbersome and off-putting, and that the Ministry discouraged direct contact between Ministry staff and DWAs. Having to communicate with the Ministry through DHB PHU managers was said to stifle effective communication, and to be inefficient, slow and unwieldy.

[531] At the June 2017 hearing, Dr Snee spoke about the need for simplifying accountabilities of DWAs and referred to his letter of 18 May 2017 to the Director-General.¹¹¹ The Ministry's 6 June 2017 response to Dr Snee did not go very far in resolving matters, nor did the Ministry's further letter dated 30 June 2017.¹¹² This exchange is dealt with more fully in Part 7 above at [289]–[291]. The issue remained unresolved as at November 2017.

Duality of Responsibility: Discussion and Findings

[532] The Inquiry accepted the evidence and submissions setting out the multiple difficulties faced by a DWA serving two masters. The combined effect of this material from both DWAs and DHBs was weighty and it was not satisfactorily answered by the Ministry of Health.

[533] The Inquiry has concluded that the present system for accountability and responsibility is unnecessarily complex and that it has raised many practical difficulties. Lines of accountability should be direct and clear. DWAs should be supported by their employer and, in general, accountable only to their employer. Their employer should be actively engaged with them and should make available to them the resources necessary to carry out their functions. To the extent that DWAs are required to follow policy, that policy should be clear and comprehensive and it should be communicated directly to DWAs by their employer. The present regulatory system governing DWAs does not achieve these simple goals.

[534] The current problems in relation to accountability and responsibility could be resolved in an effective and durable way if a dedicated water regulator were set up. As recommended in Part 10, the Inquiry considers that this is highly desirable and that

¹¹¹ See **CB203**.

¹¹² See **CB2014** and **CB218**.

providing a single and independent employer of DWAs would go a long way in its own right to resolving current deficiencies.

[535] Regardless of the outcome of the Inquiry's recommendation in respect of a new regulator, and in the short term, the Inquiry concludes that the proposals by Dr Snee to simplify accountability should be refined as appropriate and then adopted. In essence, Dr Snee's proposal was that the DHB, as the DWAs employer, could take full responsibility for all aspects of the DWA service. The DHB would provide support, guidance, and resources directly. It would be responsible for communicating policy to the DWAs.

[536] In the Inquiry's view, the need to improve the current dual arrangement is pressing and obvious; the current arrangement is messy and is not facilitating or promoting an efficient and effective DWA service. The Inquiry can see no reason in principle why DHBs cannot enter into appropriate contractual arrangements with the Director-General to reflect a changed arrangement, pending a review of the Health Act provisions relating to the appointment, functions and accountability of DWAs.

[537] The Inquiry therefore recommends that the Ministry of Health should accord some urgency to addressing those proposals.

Qualifications, Training and Accreditation: Submissions and Evidence

[538] The Inquiry heard evidence that there was a serious shortage of DWAs and that the current requirements for eligibility and qualification of DWAs were unduly restrictive. The Inquiry also considered the wider question of whether the qualifications, training and accreditation of DWAs were adequate and appropriate to current conditions.

[539] One issue was whether DWAs should be health professionals, or exclusively so. Currently, any candidate is required to be a HPO to be eligible to become a DWA. The HPO requirement is an internal requirement set by the Ministry and is not contained in legislation. In practice, it is a relatively onerous additional qualification that is not specifically referable to drinking water.¹¹³ It is thought by various submitters to be a key impediment to recruitment. Many submitters asserted that the HPO requirement should be abolished.

¹¹³ The Health Act does not specify qualifications for appointment as a HPO (s 7A). The Director-General of Health has identified core competencies of a HPO which are summarised in Appendix 1 of **CB223**.

[540] As against this, the Ministry of Health's submission to the Inquiry disagreed with the suggestion that the HPO qualification be removed, arguing:

This would be a significant change in the workforce and would shift DWAs from being health professionals, with science degrees and expertise and experience in public health risk assessment, to being water technicians with experience in the operation of a water supply.

[541] The Inquiry received submissions from DWAs, DHBs, the New Zealand Public Service Association and Water New Zealand on this issue. All said that there was no need to insist upon the HPO qualification for DWAs. The experts giving evidence at the August hearing concurred with this and pointed to successful DWA (equivalent) regimes overseas which did not require that type of qualification.

[542] The Inquiry heard evidence from Dr Fricker that, in the UK, the majority of Drinking Water Inspectors (the equivalent to DWAs in New Zealand) are former water supplier personnel, and their expertise and experience is predominantly in water treatment plants and the supply side of drinking water. Dr Fricker was critical of the proposition that DWAs should be exclusively health professionals. His view was that a thorough understanding of water treatment practices was indispensable for a person responsible for assessing and approving WSPs, and reporting on their implementation. He stated that it was simply not possible to perform DWA duties without a good level of understanding of water treatment.

[543] The Inquiry observed a mindset from New Zealand witnesses and submitters that only health officers should be DWAs. However, there is a strong argument to the contrary. The opposing contention is that the primary focus for DWAs should be on the systems and processes for ensuring safe supply. They should have a strong understanding of all aspects of extraction, treatment and supply. These matters involve microbiological, engineering, treatment and environmental/source protection elements more than health issues.

[544] Dr Deere referred to an international scheme for qualifying as a DWA, the Exemplar Global scheme. Under this scheme, a DWA must have a degree or equivalent in medicine, public health or engineering or science or equivalent. Public health skills were one of the qualifications which could enable entry but engineering or science qualifications were equally acceptable. Notably, a substantial minimum experience period (seven years) in the relevant field was also required.

[545] A number of witnesses spoke of the advantages of a multi-disciplinary group of DWAs, some of whom had public health qualifications and others of whom were more versed in the areas of water treatment and supply. Dr Deere in his evidence said that best practice was to have a team of people covering the various disciplines of source protection/environmental management, engineering, water treatment, microbiology and health.

[546] An allied, but separate, question is whether DWAs should continue to be employed by, and located within, DHBs. There was widespread support from both DWAs and DHBs for retention of the current arrangement. They submitted that links with the public health functions of the DHB were valuable and important. The Hawke's Bay DHB submitted that significant practical difficulties would arise if DWAs were moved out of DHBs. The DHB submitted that a reduction in DWAs (who are also HPOs) would significantly affect the DHB's ability to perform its health protection functions.

[547] A further theme emerging from submissions and evidence was that the current DWA training and qualification regime is deficient and needs to be reviewed. Reference was made to wide variations in quality of DWAs and to an over-emphasis on public health considerations rather than those more directly relevant to the delivery of safe drinking water and competent WSPs. Moreover, the future composition of this qualification is uncertain. There will be a change in provider and qualification from 2018. The Inquiry received a submission from Opus that the new qualification is currently unfunded and there are no advanced plans on how and when the qualification will be offered.

[548] The question of accreditation of DWAs was also considered by the Inquiry. Section 69ZK(2)(b) of the Health Act provides that the Director-General must be satisfied that a DWA or agency is "accredited to internationally accepted standards for inspection bodies" to perform the functions specified in s 69ZL. In practice, this is achieved by requiring accreditation from IANZ.

[549] Submitters and witnesses were divided on this issue. A number contended that accreditation was an unnecessary burden, that it had not removed inconsistencies and variable quality among DWAs, that it had not prevented the matters criticised by the Inquiry in its Stage 1 Report, and that it did little to ensure competence and acceptable standards. Ms Gilbert observed that accreditation could place an unnecessary focus

on conformances and on accredited functions and processes, with a loss of attention to the overall objective of safe drinking water.

[550] Others (notably DWAs) told the Inquiry that they valued the IANZ accreditation process and had received substantial benefit from it. Mr Wood spoke of a continual refining of what DWAs knew through the accreditation process. He said it provided further tools for improvement and another pair of eyes that could look at things from a different point of view. He saw it as a safeguard against undesirable habits.

Qualifications, Training and Accreditation: Discussion and Findings

[551] The starting point in considering these issues is the question of whether the HPO requirement should be abolished. Having considered all of the evidence and submissions, the Inquiry has no hesitation in recommending the immediate abolition of that requirement. It notes that this is something which can be achieved without any delay by the Director-General simply removing that requirement as an administrative measure. He was asked to address this at the August hearing.

[552] The Inquiry saw little merit in the proposition that only health professionals should be DWAs (and that the HPO qualification should remain mandatory). Even the Hawke's Bay DHB, whilst recognising that removing the HPO requirement would cause some practical difficulties if it resulted in a reduction in HPOs at the DHB, submitted that DWAs should not be required to be HPOs. Similarly, the New Zealand Public Service Association, for the DWAs, submitted that the HPO requirement should be removed to improve personnel resourcing issues. The Inquiry has observed that, unless a harmful pathogen enters a water supply, clinical health and medical concerns do not arise. DWAs are not called upon to make clinical decisions and responsibility for public health lies with the DHBs. The Inquiry believes that the primary focus for DWAs should be on the infrastructure systems and processes (including treatment) for ensuring safe supply. These concern microbiological, engineering, technical and environmental/source protection elements much more than public health issues.

[553] The Inquiry reviewed the evidence which Mr Wood produced at all stages of the Inquiry. He covered a raft of matters, including WSPs (preparation, risk assessment and implementation); implementation visits to drinking water suppliers; transgressions (assessment of causes, appropriate remedial actions, compliance with the DWSNZ requirements, need for chlorination); bores (construction, security, infrastructure,

compliance with the DWSNZ, NZS 4411, and Drinking-water Guidelines); whether more frequent residence time tests are needed; whether to require a borehead security report, and reading such reports; treatment processes availability and being deployed; supplier infrastructure, supplier management; chlorine contact time; Water Information New Zealand databases, and so on.

[554] Of the seven requirements relating to DWAs in the DWSNZ (at pp 43, 45, 46), none requires public health expertise per se. Naturally, in the case of an outbreak, public health issues come to the fore. In that case, the DWA's role, although important, is not to manage the health response - that is the responsibility of the DHB.

[555] For these reasons, the Inquiry has concluded that the HPO qualification should be removed as a requirement. It also records its concern at the lack of knowledge and training of many current DWAs in the fields of water treatment and water plant operation. These are critical to the functions a DWA is required to perform. Although these topics are included in the training curriculum for the DWA (the National Diploma in Drinking Water), evidence received by the Inquiry indicated that many current DWAs do not have any meaningful experience or adequate understanding of the plant and operations of suppliers. The Inquiry has concluded that further and more intensive training in these fields should be provided to current DWAs.

[556] The Inquiry does not accept that the role of DWAs makes it essential for them to have close physical and employment links with DHBs. It is possible to maintain useful links with health officials, even if not employed by a DHB. Effective collaboration between different agencies has been identified by the Inquiry as a feature which is fundamental to safe supply; the Inquiry sees no reason why DWAs could not liaise as fully as necessary with DHBs without being employed by them. The Inquiry sees obvious value in DWAs having a level of public health knowledge, but the role of a DWA, and the prime functions carried out by DWAs, make knowledge of WSPs, water supply operations and water treatment of more value and importance.

[557] The Inquiry accepted the evidence of Dr Fricker that DWAs should unquestionably have a good understanding of water treatment processes, practices and plants; it seems to the Inquiry that this is indispensable for any person assessing and monitoring WSPs, transgressions and compliance with the DWSNZ. Careful consideration of the Exemplar Global scheme referred to by Dr Deere would appear desirable.

[558] The Inquiry gave careful consideration to Ms Gilbert's views on the need for HPO qualifications but found the Ministry's explanations unsatisfactory. The matter was also put to the Director-General, Mr Chuah, when he gave evidence. He was pressed by some questions on whether he would agree to the removal of the HPO requirement. Despite all of the prior submissions on this point, Mr Chuah was unfortunately not briefed on the matter and was unable to contribute to the debate in giving evidence. Certainly, he provided no sound justification for the Ministry's position.

[559] The Inquiry was receptive to the idea of a group or unit of DWAs being comprised of persons with different experiences and skillsets. It has accepted the evidence of Dr Deere that international best practice is to have a team of persons covering the various disciplines involved in the supply of drinking water.

[560] The Inquiry notes that some DWA units currently employ former water supply operators or engineers and that they are classified as "drinking water technicians". Under current Ministry of Health criteria, such persons are not eligible to be DWAs. They have a DWA qualification, are IANZ-accredited and perform a full role, but need a DWA to sign off on all of their work. This seemed to the Inquiry a de facto recognition of the need for a mixture of disciplines. Mr Wood advised that his DWA unit had recruited water treatment and supply personnel to strengthen a recognised weakness in the DWA's service. This is a matter which any employer of DWAs should address and aim to achieve.

[561] The Inquiry accepted in general terms the evidence and submissions indicating that training and qualification of DWAs needs review and that it could be improved. If the Inquiry's views and recommendations, as set out above, are accepted, that will inform significantly the required approach to training. If the DWA service is made up of people with different experience and backgrounds, the need for different modules of training and/or for bespoke training presents itself. It was beyond the Inquiry's scope and resources to venture further into the details of appropriate training and qualifications. These will depend upon how the DWA workforce is structured and managed in future.

[562] The Inquiry has concluded that it would be premature to make a definitive finding on the desirability of retaining an accreditation scheme for DWAs. All things being equal, the Inquiry could accept the proposition that accreditation confers benefits. However, given the need to allocate precious resources for maximum benefit, the

Inquiry considers that the cost and time and effort involved in accreditation may be better applied to initial training and follow-up training (or continuing professional development) of DWAs, and also to the formation of a strong and capable employer in the form of a dedicated water regulator. If those recommendations are accepted, the Inquiry would see the benefits accruing from accreditation as fewer than at present. It also notes that abolition of accreditation would remove one layer of complexity in an already fragmented and complex system.

[563] Until or unless s 69ZK(2)(b) of the Health Act is amended, however, accreditation will be required. The Inquiry's view is that the question of accreditation should be reviewed once the questions of structure, employment, accountability and qualifications are resolved. At that point, a more informed assessment of the accreditation system could be made.

[564] It is probable that accreditation was required in 2007 when Part 2A of the Health Act was enacted because the Director-General and the Ministry did not have the resources or systems to be involved in qualifying, training and quality-checking DWAs. The Inquiry's proposals, if accepted, would lead to those functions being carried out directly by a dedicated drinking water regulator as the DWA's employer. Therefore, while recommending that the accreditation issue be reviewed later, the Inquiry also observed that it may well not be needed under an improved system.

Enforcement and Compliance Functions of DWAs: Evidence and Submissions

[565] In its Stage 1 Report, the Inquiry found that the DWAs in Hawke's Bay had been too lenient, that they had not taken effective action in relation to ongoing abnormally high levels of transgressions and that their compliance and enforcement performance had been seriously deficient. Material received in Stage 2 demonstrated that these were not problems confined only to Hawke's Bay in 2016; they were (and are) endemic throughout much of New Zealand.

[566] Mr Wood said that his unit had identified a need to be less lenient before the Havelock North outbreak. He had personally been working on a DWA's escalation policy. Yet he had received no guidance or comment from the Ministry on enforcement, following the Stage 1 Report. DWAs and DHBs provided many submissions about the problems they perceived with the current enforcement system. Under the Health Act, designated officers are the persons primarily charged with carrying out enforcement

functions. A designated officer is either a Medical Officer of Health or a HPO (s 69G). The nomenclatures used in the statute are less than clear or simple. For example, currently, all DWAs are also HPOs, but DWAs do not feel free to act in a dual capacity, at least in respect of enforcement. Some enforcement powers are given to designated officers only (s 69ZO); others are given to both DWAs and designated officers (s 69ZP). Designated officers are generally charged with ensuring that the provisions of Part 2A of the Health Act are complied with and, in particular, that any requirement imposed, or direction given, by a DWA is complied with. There are various powers to take immediate action or to require suppliers to stop supplying.¹¹⁴

[567] However, short of exercising specific powers given to designated officers, which seldom occurs (if at all), the primary burden of enforcement falls on DWAs. They are required to detect non-compliances and to assess whether to escalate those to a designated officer or to take other compliance actions, such as informing the Director General (s 69ZL(c) and (d)), calling for documents or records, carrying out inspections, investigations or entry on to premises, or other powers set out in ss 69ZP to 69ZV. Examples of other DWA powers include a power to require more frequent residence time tests, or borehead security reports.

[568] It was put to Dr Jones that, under s 69ZZH(1)(b), wide powers existed to issue compliance orders in situations where there was no current breach of the Health Act or the DWSNZ, but where a Medical Officer of Health nevertheless believed on reasonable grounds that something was necessary to prevent, remedy or mitigate any risk to public health in respect of a drinking water supply. Dr Jones could not recall any occasion on which that provision had been invoked, despite the fact that HDC's E.coli transgression record was the worst in New Zealand at relevant times, and despite a troubling recent history of a series of transgressions at Napier.

[569] The Inquiry received submissions that the enforcement powers in the legislation should be reviewed and amended. Mr Wood referred to ss 69ZO (Powers of Designated Officers) and 69ZP (Powers of DWAs and Designated Officers). He submitted that there was no reason why the two sets of powers should be kept separate. He advocated for a DWA to have all of the powers currently contained in ss 69ZO and 69ZP (bearing in mind that, currently, all DWAs are HPOs and thus designated officers in any event). Mr Wood also argued that, while none currently

¹¹⁴ See Stage 1 Report at Appendix 4, at [4.27]–[4.29].

exists, it would be valuable to have an infringement notice system, with a DWA having the power to issue an infringement notice. However, he thought it appropriate to maintain s 69ZZH which provides that only a Medical Officer of Health may serve a compliance order.

[570] Another important aspect of compliance work by the DWAs is their involvement in transgressions and remedial actions. This is an aspect of compliance, but one which can require urgent and intensive involvement by DWAs to ensure suppliers are complying with all DWSNZ obligations following a transgression. In practice, DWAs need to monitor and follow up all actions being taken by the drinking water supplier in response to a transgression. They are, or should be, effectively part of the response. The DWA may need to exercise powers, such as to require an investigation. He/she may also need to escalate matters to a designated officer and otherwise liaise with the DHB.

[571] It was a common complaint by DWAs and DHBs that their ability to carry out effective enforcement was undermined and in most cases negated by the Ministry of Health's enforcement policy. This policy, which has been described as a "softly, softly" approach, has been dealt with earlier at [271]–[288] in Part 7 above.

[572] The Inquiry sought clarification from the Ministry about the nature and scope of its vetting process in relation to enforcement actions by DWAs, particularly prosecutions. Through the Crown Law Office, the Ministry responded that the provision of assistance and advice by legal counsel does not pose a barrier to enforcement action being undertaken. Rather, it is an important part of ensuring that any prosecution complies with the Solicitor-General's Prosecution Guidelines and is properly brought. Some examples and helpful elaboration were provided.

[573] The Inquiry readily accepted that some oversight of difficult legal and factual matters is necessary by legally trained officials and plainly it is reasonable that such guidance be located within the Ministry. But the perception among DWAs and Medical Officers of Health was that the advice from within the Ministry was a barrier to enforcement action of the various types. The Inquiry can appreciate why these perceptions existed. Because of the views the Inquiry has taken on enforcement policy generally, no further elaboration is required.

[574] More broadly, the prevailing view from the evidence and submissions of DWAs and DHBs was that the Ministry's current enforcement policy, in addition to being weak, was lacking in clarity and did not provide sufficient guidance.¹¹⁵ Reference has already been made to the fact that no compliance orders and no prosecution actions have been issued since Part 2A of the Health Act came into force. Under this system, DWAs have, they say, been left with the Ministry's required "cajoling and co-operating" approach which has proved ineffectual. DWAs say that they are uncertain of what enforcement action is expected of them. The advice, at least implicitly, was that the instruction of the Ministry of Health was required in any case where enforcement was contemplated.

[575] The weaknesses in the statutory regime, especially the "all practicable steps" provision in s 69V (and elsewhere) are referred to earlier in this report at [328] and following in Part 7. These provisions compound the difficulties faced by DWAs in enforcement. DWAs do not have training or experience or resources to be able to assess the economic and other aspects included in the s 69H "all practicable steps" test.

[576] Given the potential for backflow to cause contamination, several submitters suggested that DWAs should specifically address and report on compliance with s 69ZZZ (Protecting water supplies from risk of backflow). This does not currently occur in a direct form in the compliance report, although it may in some cases appear in WSPs and in the adequacy or implementation reports on them. The New Zealand Public Service Association submitted that the wording in s 69ZZZ would need to be tightened if compliance were to be audited in any meaningful way, as currently suppliers are given a discretion to implement backflow protection where the supplier itself considers this "desirable or necessary".

[577] Although the DWSNZ are silent on whose responsibility it is to classify and downgrade bores (this being another area of uncertainty for DWAs), the DWAs dealing with the Hawke's Bay supplies since August 2016 have been commendably pro-active in downgrading bores that are plainly not secure. However, this is yet another area

¹¹⁵ No policy document, as such, exists and the Ministry's only statement on the topic is embedded within its document *Criteria for the Appointment of Statutory Officers (CB223)*. For diagram and some notes on enforcement, see page 9–11 of that document.

relevant to compliance which is unclear and not straightforward for DWAs to administer.¹¹⁶

[578] Dr Fricker spoke of the crucial importance of an effective enforcement system in overseas jurisdictions with which he was familiar. He indicated that there was effective and active enforcement in the UK and that this led to better compliance, better standards, and a high level of certainty within the industry. In his view, enforcement was an area which required strong and clear leadership. He did not believe this existed in New Zealand.

Enforcement and Compliance Functions of DWAs: Discussion and Findings

[579] The Inquiry acknowledges that, in 2007 when Part 2A of the Health Act came into force, there were concerns about the ability of the drinking water industry to comply with the DWSNZ and the Health Act within a short timeframe. At least arguably, a lenient enforcement policy may have been appropriate at that time.

[580] However, the Inquiry has firmly concluded that the time has come to dispense with the soft enforcement approach which has until now been pursued by the Ministry. The Inquiry has been unable, on the conflicting evidence before it, to determine whether that lenient policy was in fact abolished in 2014. No clear or obvious communication to that effect has been provided. The evidence received by the Inquiry would indicate that DWAs and suppliers had no awareness of a stricter policy, or that one had been implemented. The position today, however, is clear: the drinking water industry needs a firm and effective compliance and enforcement policy. The Inquiry accepted the evidence that this would produce substantial benefits in terms of compliance.

[581] The Inquiry has concluded that it is unnecessary and inappropriate to attempt to spell out all elements of an appropriate policy. It acknowledges the obvious merit of a graduated series of enforcement measures which could include formal warnings, making adverse reports public, compliance orders, infringement notices, as well as prosecutions. Some (limited) legislative change would be needed, for example, to put in place an infringement notice regime.

¹¹⁶ Mr Wood referred to s 69ZL(1)(a)(ii) as providing broad power to classify bores but this would involve a liberal interpretation and a specific provision would be preferable.

[582] The need for a much more effective enforcement policy is demonstrated by the widespread non-compliances recorded in the Ministry's 2015-2016 annual report on Drinking Water. These included lapsed WSPs in 60 cases. There were also many cases of suppliers failing to take required protozoa and/or chemical samples and significant numbers of bacteriological non-compliance (see **Appendix 2**). The Inquiry is unaware of any reason why those suppliers have been permitted by the DWAs to continue, year upon year, to ignore the DWSNZ requirements. The 2016-2017 Annual Report (supplied in draft to the Inquiry) shows a slight improvement, but the reality is that New Zealand's record of compliance, compared with overseas supplies, remains woeful. A much stronger and more aggressive enforcement approach is urgently needed.

[583] The creation of a dedicated water regulator would provide an excellent platform for a review and a reform of current enforcement policy.

[584] The weight of the evidence and submissions was that, apart from the lack of an infringement notice system, and some potential for refinements, the existing powers within the Health Act and the DWSNZ were generally sufficient. However, the Inquiry can see no good reason why the powers in s 69ZO should be kept separate from the powers in s 69ZP, or why DWAs should have some powers but not others. The Inquiry has concluded that all such powers should be given directly to DWAs as well as designated officers.

[585] On the question of issuing compliance orders, the Inquiry accepted that there is a benefit in having a person other than a DWA take that more formal step. The Inquiry concurs with Mr Wood's view that s 69ZZH should continue in its present form such that Medical Officers of Health issue compliance orders. In practice, the Inquiry would expect this to occur with the benefit of advice from a DWA.

[586] Legislative change is not needed for the Director-General to promptly modify the current (or perceived) soft enforcement policy and he was invited to do this at the August 2017 hearing. Ms Gilbert wrote to all PHUs on 18 August 2017 on the question of enforcement under the present regime but, from the DWAs perspective, this letter shed little light on how the enforcement process would operate. As discussed in Part 7, what was needed was a short, crisp and clear statement that the previous soft enforcement policy was at an end and that, in its place, DWAs and designated officers were henceforth to use all available enforcement tools under the Health Act to drive

compliance by water suppliers with their obligations under the DWSNZ and the Health Act.

[587] The Inquiry has concluded that an enforcement policy with teeth, and which is respected by the industry, would breathe new life into the role of the DWA. A realisation that effective enforcement action will follow, unless compliance is achieved, must inevitably change the mindset of drinking water suppliers. Diligent and competent water suppliers need have no concerns about such a policy change. Decision makers needing to justify changes to existing water treatment processes, monitoring or other aspects of a supply will be able to refer to the prospect of imminent enforcement action in order to justify their recommendations. In this way, the Inquiry sees a firm enforcement policy as a beneficial, rather than a negative, change for all suppliers committed to drinking water safety.

Structure of DWA Service: Evidence and Submissions

[588] The Health Act does not prescribe any structure for the DWA service. The legal regime simply provides for a number of DWAs to be appointed by the Director-General. In practice, they are employed by DHBs. However, there is no formal or common management or administrative structure for DWAs throughout New Zealand, and they are all accountable individually to their managers within the DHB organisation.

[589] Recognising the benefits of grouping together the resources of small specialist units within DHBs, a number of DHB PHUs have formed drinking water assessment units, two of which are amalgamated. One goal was to alleviate a sense of professional isolation. The Central North Island Drinking Water Assessment Unit comprises a group of PHUs from Mid-Central, Hawke's Bay, Tairāwhiti, Taranaki, and Wellington. This unit has grown to the point where it operates in much of the area between Tauranga and Wellington. It has a Napier branch dealing with Hawke's Bay matters. The South Island Drinking Water Assessment Unit is made up of the South Island PHUs. There are three other individual PHUs which operate a DWA unit: Northland, Waikato and Auckland.

[590] Within the two amalgamated units, a national coordination team has been set up. In addition, these units pool and aggregate technical expertise and resources across all of the relevant regions. They have a training function. As Technical Manager, Mr Wood carries out a mentoring role. They are able to obtain IANZ

accreditation on a combined basis, thereby saving cost and achieving efficiencies. They attempt to bring clarity and consistency to compliance and enforcement activities (such as they are). Although the two amalgamated units have formal contractual arrangements between the participating PHUs, all of these administrative structures have been put in place on a voluntary basis.

[591] The current voluntary amalgamations produce obvious benefits, but they do not have any management hierarchy or governance structures. Rather, they operate in an informal and collegial way. Nor do they have any statutory recognition. The Inquiry heard evidence and submissions that the current “flat” structure did not provide attractive career paths, and did not promote staff retention. Rather than reporting to their own DWA manager, DWAs have to report to a DHB manager and that person may, in some cases, have little familiarity with the DWA’s work or current issues arising in respect of suppliers. Mr Wood said this has caused difficulty in practice. It was submitted that there is considerable scope for structuring the DWA service in a way which is more effective and coherent.

[592] Section 69ZK of the Health Act provides that agencies as well as individuals may be appointed as DWAs, although no agency has ever been appointed by the Director General (and in fact an amendment to the Health Act to remove this provision was promoted in 2011, an amendment which was not pursued). This raises the possibility that a suitably qualified private company could provide DWA services.

Structure of DWA Service: Discussion and Findings

[593] The Inquiry accepted that the structure and organisation of DWA services needs to be improved. The formation of the Central North Island and the South Island Drinking Water Assessment Units demonstrates that many DHBs have already accepted the benefits of aggregation and pooling of resources and capabilities.

[594] The Inquiry accepted the proposition that the DWA service should be structured and managed in a way which takes advantage of group resources and which produces consistency and excellence across the country, and also provides better opportunities for career progression.

[595] The Inquiry has found that the formation of a dedicated drinking water regulator would provide the ideal vehicle with which to resolve the issues concerning the most beneficial structuring of the DWA service and it so recommends.

Lack of Resources: Evidence and Submissions

[596] Permeating all of the above problems was a common theme: there are not enough DWAs, nor is there sufficient funding for the DWA service. In addition, other resources such as ready access to technical and scientific expertise are lacking.

[597] Thirty-four DWAs were recorded in the register of DWAs at the time of the August hearing¹¹⁷ but this statistic does not indicate the time devoted to DWA duties.

[598] In its Stage 1 Report, the Inquiry found that the Hawke's Bay DWAs did not spend sufficient time liaising with the supplier. This was primarily due to lack of resources. A number of the other deficiencies recorded in that report can also be attributed, at least to some extent, to lack of resources.

[599] Evidence was received of a shortage of DWAs employed by DHBs across New Zealand. This has led to a number of qualified contractors being retained as DWAs and for the need to share DWAs across regions and drinking water assessment units. At the Inquiry's request, Mr Wood carried out an estimate of the minimum number of DWAs needed in New Zealand at present. Although his calculation was subject to many variables and assumptions, the indicative number he produced was 45 FTE. He believed that an increase in DWA numbers of some 30 per cent (at least) was needed.

[600] As HPOs, DWAs normally devote only part of their time to drinking water with the rest of the time taken up with other health concerns. To secure HPO time, drinking water must compete with any number of unrelated health issues within a DHB's region. The estimate of a typical allocation being 10 per cent on drinking water has been mentioned. Mr Wood accepted that it would be preferable for DWAs to be engaged exclusively on drinking water.

[601] This situation is exemplified in the Hawke's Bay area. In the year following the Havelock North outbreak, there has been no DWA resident in Hawke's Bay. Coverage

¹¹⁷ Since increased to 36.

has been obtained from Mr Wood, who has been seconded from the Central North Island Drinking Water Assessment Unit in Palmerston North, and the services of a private contractor, Mr Molloy, who resides in Nelson and who travels to Hawke's Bay for one week a month. He provides DWA services from a distance for a second week thus providing a half-time equivalent. Mr Wood confirmed that he could not continue indefinitely to service DWA needs in Hawke's Bay from his base in Palmerston North (though he has been doing so since late August 2016). He said this was not sustainable; that it was a "band aid". Mr Wood estimated that at least 2.6 FTE was needed in Hawke's Bay alone. Currently, the total coverage by persons from Palmerston North and Nelson is only approximately 0.9 FTE.

Lack of Resources: Discussion and Findings

[602] The current shortage of DWAs is a serious problem as proper DWA services are a crucial element in the safe delivery of drinking water, and in the anticipation of problems that may arise within a system. The DWA service can only be effective if deployed in a holistic manner.

[603] At the June 2017 hearing, the Inquiry indicated to all counsel that it was seriously concerned at the dire shortage of DWA resources in Hawke's Bay, and it requested that this be addressed as a matter of urgency. By the August hearing, no improvements had been made, and, as at the date of this report, the Inquiry understands that there has still been no improvement; Mr Molloy continues to provide 0.5 FTE (with only one week a month in the area) and Mr Wood still provides approximately 0.4 FTE, travelling from Palmerston North as required. This indicates to the Inquiry that concerted measures should be adopted, and that the DWAs' problems require a review at a fundamental level.

[604] DWAs need to have the resources to visit water suppliers as frequently as may be appropriate. They need to have the resources to properly investigate and follow through on transgressions. They should not have to regularly travel out of their own regions and they should have time to keep up with current training and technical and scientific developments. Their working conditions and terms should be such as to promote, rather than deter recruitment. The Inquiry acknowledges the substantial efforts by the Hawke's Bay DHB over the last year to recruit DWAs; unfortunately these have been in vain.

[605] As with virtually every current problem with the DWA service, the formation of a dedicated water regulator as the DWAs' employer would naturally lead to resourcing matters being addressed in a direct and effective way.

[606] The Inquiry has considered whether the resources applied to accreditation could be better applied to both initial training and CPD follow-up. While there was little empirical evidence about the effect of accreditation, it can safely be observed that that system did not prevent the deficiencies recorded by the Inquiry in its Stage 1 Report.

[607] If the Ministry sets up a panel of experts, as suggested to Mr Chuah in evidence, and accepted by him as beneficial, this panel could provide valuable advice and support to DWAs. This should be available directly and freely.

PART 13 – FIRST BARRIER PROTECTION UNDER THE RMA

Introduction

[608] The RMA is the primary mechanism for recognition of the Inquiry's second principle of drinking water safety, that protection of source water is of paramount importance.

[609] The experts assembled for panel discussion on RMA matters, Dr Mitchell, Dr Nokes, Mr Maxwell, Mr Thew and Mr Bryden (from the Ministry for the Environment), were unanimous in their agreement as to the importance of this principle.

[610] The Inquiry has considered the nature of the recognition of the principle, commonly known as "first barrier protection", in the existing regime and considers it to be inadequate. This is particularly in the context of the risk landscape discussed earlier in Part 3. Many of the risks outlined that are relevant to source water need to be accounted for and managed and addressed as far as possible in the resource management regime.

[611] The Inquiry therefore makes recommendations for improvements to first barrier protection, in particular in the short term.

Issue Identified

[612] The RMA does, in its current form, afford protection to sources of drinking water. The Act's sustainable management purpose relevantly includes providing for the health and safety of people and communities, while safeguarding the life-supporting capacity of water.¹¹⁸

[613] However, as all expert panel members agreed, that protection is implicit in the current regime. There is no express or specific reference anywhere in the primary legislation to the protection of drinking water sources.

[614] The RMA is a comprehensive and complex piece of legislation. The Inquiry heard from Dr Mitchell about its cascading structure, under which national direction in

¹¹⁸ RMA, s 5.

Part 2 of the Act, the “engine room”, guides the development of national, regional and district planning documents. The “rubber then hits the road” through permitted activities or activities requiring resource consent, which are assessed against the provisions of those planning documents.

[615] As Mr Maxwell explained, the interpretation and implementation of Part 2 often depends on the individual regulator at the regional or district level. The August 2016 outbreak raised the collective consciousness of the importance of source water for the provision of safe drinking water. However, the Inquiry considers that of all the aspects of sustainable management, protection of drinking water sources was, before the outbreak, not necessarily “front of mind” for all RMA decision makers.

[616] The Inquiry observed the clear sentiment from the expert panel members that in the absence of specific recognition, the protection of drinking water sources could easily be overtaken by competing pressures.

Discussion and Findings

[617] The Inquiry considers it essential that the protection of drinking water sources be expressly recognised in the primary resource management legislation. As the RMA regime already affords such protection, it would simply be a matter of clarification to make that protection express.

[618] The Inquiry recommends that s6 of the RMA be amended to expressly recognise the protection and management of drinking water sources as a matter of national importance. When asked whether the protection of drinking water sources was a matter of national importance, Dr Mitchell answered “unequivocally, yes”.

[619] The benefit of clarification to the higher order guidance of the RMA would be to, as Mr Maxwell put it, “sharpen the focus” of policy makers within regional and district councils. Those applying the legislation could then refer to specific national direction, rather than relying on implied guidance within the broader sustainable management purpose. Both Mr Maxwell and Dr Mitchell described it as a “no brainer”. Mr Bryden accepted that there would be benefit from adding the clarification.

[620] As time passes, knowledge of the circumstances of the August 2016 outbreak will fade and its immediate impact will be lost. The Inquiry views express recognition

as essential so that the protection of drinking water sources remains front and centre and visible in future.

[621] The Inquiry recommends that express recognition should be a high priority and an urgent focus for the Ministry for the Environment. While previous amendments or attempted amendments to s 6 sought to recast the paradigm of the matters of national importance, this proposal is in the category of codification of an existing principle. No wholesale review of the RMA would be required. Express recognition in s 6 could be achieved through a straightforward amendment to the Act, as has been the case with a number of its 26 amendments since enactment.

[622] The Inquiry also recommends that s 30 of the RMA be amended to expressly recognise the protection and management of drinking water sources as a specific function of regional councils. The Inquiry heard evidence that there would be much benefit in removing any ambiguity and adding clarity for regional councils in terms of their existing functions.

[623] The Inquiry suggests that the amendments to ss 6 and 30 be considered for processing, if appropriate, through the statute amendments bill process on the basis that they are matters of clarification and do not alter any substantive law.

[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.

[625] The Inquiry has considered a RMA options paper produced by counsel assisting. A copy of the "Discussion Paper by Counsel Assisting dealing with RMA

Issues” is annexed as **Appendix 6**.¹¹⁹ This raised the important question of whether other changes to the RMA regime might be required.

[626] Dr Mitchell considered that, if the Inquiry’s recommended clarifications to s 6 and 30 are implemented, they are the only measure required. The Inquiry agrees with Dr Mitchell’s views. The Inquiry anticipates that the clear national guidance would be driven through the cascading RMA structure such that drinking water sources would be afforded appropriate protection.

[627] However, if the recommended clarifications are not implemented, the Inquiry firmly considers that there would be a pressing need for other changes. The NES Regulations alone do not provide adequate direction, particularly in their current form, as discussed in the next section. The Ministry for the Environment may need to consider stronger National Policy Statement-type guidance for regional and district council policy and decision makers.

[628] The Inquiry heard evidence from Dr Mitchell that the development of such guidance could take several years. This would not meet the urgent requirement for express recognition of the protection of drinking water sources in the resource management regime. The Inquiry considers that the risks to source water are too great to warrant any such delay in response to its findings.

[629] Accordingly the Inquiry’s clear preference is for the simple clarification it has recommended to s 6 and 30 of the RMA.

¹¹⁹ The appendix to the Discussion Paper, which sets out examples of specific objectives and policies in regional plans to ensure management/protection of drinking water sources is available on the Inquiry’s website in the “Stage 2 Fact Papers” section.

PART 14 –NES REGULATIONS

Introduction

[630] The NES Regulations came into effect in June 2008. They were, as Mr Bryden described at the August hearing, the Ministry for the Environment’s “response to first barrier protection”, which was gaining increasing recognition worldwide at the time.

[631] The NES Regulations were intended to plug the legislative gap in the resource management regime, which had no express recognition of the need for protection and management of drinking water sources. The intention was to remove the “no responsibility” mindset and bring the issue of drinking water source protection “front and centre” for regional and district council decision makers.

[632] In its Stage 1 Report, the Inquiry set out the background to the development of the NES Regulations, explained their application, and commented on the limited extent to which HBRC had embraced and implemented them.¹²⁰

[633] In Stage Two, the Inquiry has considered more broadly the content of the NES Regulations and their effectiveness in promoting first barrier protection.

[634] In submissions, and in evidence provided by the RMA expert panel at the August hearing, there was a clear message that the NES Regulations had not achieved their intended purpose. The Inquiry has concluded that there remains a gap in the resource management regime in respect of first barrier protection.

[635] The Inquiry received much valuable material from users of the NES Regulations through submissions and the evidence from the RMA expert panel at the August hearing. The Inquiry records below the key issues and concerns identified and urges that these matters be addressed in the upcoming review of the Regulations.

[636] The Inquiry emphasises, as Mr Bryden accepted at the August hearing, that a comprehensive review is required. This should start with a “clean sheet”. The Inquiry considers that mere “tinkering” will not suffice to address the issues and concerns raised.

¹²⁰ See the Stage 1 Report at [119]–[121] and [389]–[404] and Appendix 4.

Current Form of NES Regulations

[637] The NES Regulations have three components. First, provisions applying to decisions on resource consents; second, permitted activity rules in regional plans; and third, emergency notification conditions for resource consents:

- (a) Under Regulations 7 and 8, a regional council must not grant a water permit or discharge permit for an activity that will occur upstream of a drinking water abstraction point if the activity is likely to introduce or increase the concentration of determinands in the drinking water by a certain amount. An activity proposed upstream of an abstraction point must not result in a need for a higher level of treatment of that drinking water source.
- (b) Under Regulation 10, a regional council must not include or amend a rule in its regional plan to allow a permitted activity upstream of a drinking water abstraction point if the activity is likely to introduce or increase the concentration of determinands in the drinking water by a certain amount. Again, activities permitted upstream of abstraction points must not result in a need for a higher level of treatment of that drinking water source.
- (c) Under Regulation 12, regional and district councils when assessing resource consent applications must consider two things. First, whether the proposed activity might itself lead to an event occurring that may have a significant effect on the quality of water at any abstraction point. Secondly, whether an external event could cause the activity to have a significant effect on the quality of water at any abstraction point. If either of those circumstances apply, the regional or district council must impose a condition on the resource consent requiring emergency notification of any such event to the drinking water supplier and the regional or district council.

Problems with the Regulations

[638] Based on the submissions and evidence received, the Inquiry has identified a number of significant problems with the NES Regulations in their current form. These are explained in turn.

Terminology: Upstream and Abstraction Point

[639] Regulations 7, 8 and 10 apply to activities proposed to occur upstream of a drinking water abstraction point. The Inquiry received submissions and heard evidence that the terms “upstream” and “abstraction point” are problematic to apply.

[640] As Dr Mitchell explained at the August hearing, “upstream” can be applied easily to a surface water source. For example, it would clearly apply where a discharge permit sought to discharge industrial waste into a river upstream of where a drinking water supplier took water from the river. However, it is not naturally applied to a groundwater source. It can be extremely difficult to establish the direct effects of a proposed activity on an aquifer. Activities downstream or down-gradient of an abstraction point, particularly for groundwater, can, in some cases, impact on a drinking water source. For example, the “zone of influence” resulting from the pumping action of a bore can entrain water from downstream into the bore.

[641] Submissions noted that “upstream” could potentially cover a large area, some of which may be too distant, or otherwise not connected enough with the abstraction point to be relevant to managing the risks posed to a drinking water source.

[642] Several submissions stated that the interpretation of “abstraction point” is uncertain because it is often unclear at what point abstraction actually occurs. For example, as demonstrated by the evidence given by Mr Lew at the Inquiry’s Stage One hearing in January 2017, opinions differ on whether an abstraction point is the screens in the casing of a bore, or whether it is in fact a wider area, such as the “zone of influence”.

[643] There is also no accurate register of information about drinking water sources and abstraction points and, specifically, a disconnect between bore locations in consent databases and the register of drinking water supply bores.

[644] Furthermore, the current wording makes it unclear whether the NES Regulations should apply to a drinking water supplier’s own water take permit. The NES Regulations do not appear to address the abstraction of water itself, whether for a water supplier’s purposes or other uses. Abstraction has the potential to affect the quality of the remaining water in a source. As flow rates decrease, the temperature and concentration of nutrients (particularly nitrogen and phosphorous) can increase.

This can result in increased algal growth, and some algae produce toxic compounds or compounds that affect taste and create odour. It is essential that the NES Regulations address the potential effects of abstraction activities and reduced flows on drinking water sources.

[645] The Inquiry agrees with all of the above concerns. The NES Regulations need to be re-written to ensure that any activity which could affect the drinking water source is captured. The current terminology does not achieve that.

[646] A number of submissions, including the detailed submission by ESR, suggested replacing the use of “upstream” and “abstraction point” with a spatial criterion relating to activities located within a source protection zone. Source protection zones are already used successfully by some regional councils in their regional plans. The Inquiry heard evidence that the use of source protection zones would remove the need for individual, and costly, analysis by consent applicants and consent authorities as to whether the NES Regulations apply to a particular activity. Instead, their application would be objective and direct.

[647] The Inquiry agrees with these submissions and urges that the use of a spatial criterion, such as source protection zones, be considered in the review of the NES Regulations.

[648] The Inquiry also observed that it was the Ministry’s policy objective in introducing the NES Regulations in 2008 to “ensure a catchment component to managing human drinking water”.¹²¹ The Inquiry considers that the use of a spatial criterion, rather than application effectively on an individual basis, better accords with that policy objective.

Trigger: Existing Level of Treatment

[649] Regulations 7, 8 and 10 apply if a proposed activity is likely to introduce or increase the concentration of determinands in the drinking water by a certain amount. The application of these regulations is thus effectively tied to the existing level of treatment of the drinking water, and seeks to ensure that a proposed activity will not result in a need for greater treatment. This immediately raises the questions: how do

¹²¹ CB076.

applicants or a regional council determine what is the existing concentration of determinands? Then, how do they determine whether greater treatment is needed?

[650] The Inquiry received submissions and evidence that users find it difficult to assess whether a proposed activity will introduce or increase a determinand level because of the nature, accuracy and amount of information needed. Knowledge of drinking water treatment systems and capability is not typically within the expertise of the regional council staff who assess consent applications, and there is no database containing relevant and accurate information. The assessment therefore adds expense for consent applicants and consent authorities, and leaves room for individual interpretation and error in its application.

[651] The assessment is also based only on those determinands that are required to be tested under the DWSNZ, with no consideration for those that are not required to be tested but that might also present risks to a drinking water source, such as Protozoa.

[652] Several submissions suggested that the use of source protection zones would also remove the need for the application of the NES Regulations to be tied to existing levels of treatment. The Inquiry agrees with these submissions and concludes that the existing trigger needs to be changed.

Application to Land Use Activities

[653] Regulations 7 and 8 apply only to water and discharge permits. They do not apply to land use activities. Dr Mitchell explained at the August hearing that this was another example of the NES Regulations applying naturally to surface water sources, but not addressing the significant risks posed to groundwater sources by land use activities.

[654] Dr Mitchell, Dr Nokes, Mr Maxwell and Mr Thew, as well as a number of submitters, were unanimous in their agreement that the NES Regulations must be extended to relate to land use activities in order to address these risks. The view of these RMA experts and users was that the existing limitation on the scope of the NES Regulations has clearly reduced their effectiveness.

[655] The Inquiry accepts this overwhelming sentiment. The Inquiry urges that this clear evidence and direction from users be given effect to in the review of the NES Regulations.

Prospective Application

[656] Regulations 7 and 8 apply only to future applications for water and discharge permits. They have no implications for existing consents and activities. Various submitters suggested that the NES Regulations should seek to address existing activities that might be adversely impacting on a drinking water source. The Inquiry agrees with these observations and considers that they are important matters for the upcoming review.

[657] A related matter is the situation where a new drinking water source needs to be established, for example to supply a residential subdivision, and there are existing activities in the catchment that might present risks to the source. The Inquiry suggests that mechanisms be considered to address these risks in the review of the NES Regulations. This is pertinent given the comments by the expert panel members about affording priority to the allocation of water for drinking water supply, and the amendments suggested in Part 13 of this report to ss 6 and 30 of the RMA to raise visibility of drinking water source protection.

Rules in Regional Plans

[658] Regulation 10 applies only to rules in regional plans. It does cover all activities governed by regional rules, and so is not restricted in the same way that Regulations 7 and 8 apply only to water and discharge permits. However, as Dr Mitchell explained at the August hearing, activities that are governed by district rules in district plans can pose just as much risk to drinking water sources. This is particularly the case for groundwater sources. Based on this evidence, the Inquiry considers it critical that the scope of Regulation 10 be amended so that it applies to rules in district plans.

[659] Regulation 10 applies only to permitted activities. The Hawke's Bay DHB submitted that it should also apply to controlled and restricted discretionary activities. This would significantly expand the scope of the current regulation and the Inquiry appreciates that this may present some difficulties in its application. However, the Inquiry agrees with the intention of the submission, which is to extend the protection afforded by Regulation 10 to controlled and restricted discretionary activities. The Inquiry considers that this should be a matter for consideration in the upcoming review. For example, the NES Regulations could require mandatory consideration of drinking water source protection in the assessment of relevant controlled and restricted

discretionary activities. This could be achieved through the specification of matters of control or discretion relating to drinking water source protection.

Size of Supply

[660] Regulations 7, 8 and 10 only apply to activities with the potential to affect a registered drinking water supply that supplies no fewer than 501 people for not less than 60 days in a calendar year. The expert panel and submitters were adamant that the size of a drinking water supply should not determine the level of first barrier protection. The Inquiry firmly accepts this view. All consumers should have the benefits and protections of the NES Regulations. Moreover, some suppliers with only small recorded numbers of serviced population in fact are used by much greater numbers, for example in areas heavily visited by tourists or holidaymakers.

[661] Dr Nokes explained his view at the August hearing that smaller suppliers, ie those that supply to fewer than 501 people, are not necessarily more vulnerable to contamination events. However, smaller suppliers are generally less well-resourced, including in terms of treatment and monitoring. Accordingly, it is imperative that their source water attains the first barrier protection afforded by Regulations 7, 8 and 10.

[662] Several submissions suggested that the scope of Regulations 7, 8 and 10 should be increased so that they apply to activities with the potential to affect all drinking water supplies to no fewer than 26 people for not less than 60 days in a calendar year, because the benefit of ensuring a wider and greater level of protection for the community outweighs the associated costs. The Inquiry agrees with those submissions and reasoning.

Emergency Notification

[663] Regulation 12 requires the imposition of an emergency notification condition on resource consents in certain circumstances. Under the condition, a drinking water supplier is required to notify the relevant drinking water supplier and regional or district council of any emergency event that might have a significant effect on the quality of water at an abstraction point.

[664] Submitters observed that the requirement for notification was essentially futile. Once an emergency event had happened, the damage was done. The quality of water at the abstraction point was already affected. It was suggested that the regulation

should instead require the implementation of preventive measures to reduce the likelihood of such emergency events. The Inquiry again accepts the sentiment of this submission. While Regulation 12 is intended to a certain extent to cover external events, or “acts of God”, the Inquiry considers that there would be much benefit in re-framing the regulation to take a more proactive and preventative approach to potential emergency events.

[665] The Inquiry would nevertheless keep the existing condition on the basis that immediate notification to both the regional and district councils and the supplier may produce some benefits in terms of containing a contamination or achieving shut-off earlier, or enabling boil water notices to be issued sooner.

Notification of Relevant Applications

[666] The submissions by HBRC and the Northland DHB made a useful suggestion about an additional matter that should be included in the NES Regulations. The submissions suggested that the relevant water supplier, the DHB, and the DWA should be informed of all resource consent applications with the potential to affect a drinking water source. The Inquiry agrees. The Inquiry considers that there would be much benefit in such information sharing to enable those groups to better manage potential risks to the drinking water source. Those groups also hold important knowledge about the drinking water source, which could be provided to assist the assessment of the proposed activity. Where a JWG exists, that could be the appropriate vehicle to be notified of applications.

Users' Guide and Information

[667] The Inquiry received submissions and evidence that were critical of the fact that the Ministry's NES Draft Users' Guide, which was produced in May 2009, is still in draft form more than eight years later. Submissions noted that it was unclear whether it provided final guidance and whether that guidance was up to date for the current environmental context. Dr Mitchell said that the Draft Users' Guide had not been thoroughly “road-tested”, and the fact that it was still in draft did not send the “right signal”. He also said that, while comprehensive, it was quite a technical document and that aspects could be improved to enable it to be more widely applicable and useful to a readership beyond water treatment engineers.

[668] The Inquiry recommends that, as part of the upcoming review and release of revised NES Regulations, the Draft Users' Guide be updated and finalised. It should also be simplified to become, as its name suggests, an appropriate guide for users.

[669] The HBRC submission suggested that the NES Regulations should be able to stand on their own and not require any accompanying guidance document. Dr Mitchell also said that the fact the NES Regulations need a 90 page document (the Draft Users' Guide) to tell people how to implement them means they are, quite frankly, "not fit for purpose". The Inquiry agrees, in the sense that the NES Regulations should be simple and easy to interpret and apply. If this is able to be achieved through the upcoming review, it may be that a guidance document is not required. In any case, any effective guidance document needs to be concise, up to date and final.

Conclusion on Problem Areas

[670] The Inquiry has identified a number of significant problem areas with the current NES Regulations. It is critical that these are acted on in the upcoming review. It would be disappointing if the valuable material provided to the Inquiry by RMA experts and everyday users were disregarded.

[671] The Inquiry accepts, as pointed out by Mr Bryden at the August hearing, that the present drafting of the NES Regulations was determined through a cost-benefit process and that the new NES Regulations will need to undergo that same process.

[672] Protection of source water from the risks identified in Parts 3 and 4 of this report is fundamental to a safe drinking water supply. As a result of the Havelock North outbreak, and also much learning internationally over the last decade, the risks to source water are undoubtedly better understood. The need to mitigate such risks is now more pressing than when the NES Regulations were developed almost a decade ago. The Inquiry emphasises the need for the new NES Regulations to better address the various risks in a straightforward and comprehensive manner.

Interim Measures

[673] The Inquiry is conscious that the review of the NES Regulations may take some time, although it is hoped that the Inquiry's work will enable prompt and early progress. In that respect, the Inquiry recommends that the review be accelerated and that

consideration be given to re-writing the Regulations as a matter of high priority and that they should address the specific problems identified in this Stage 2 Report.

[674] Some of the expert panel members at the August hearing suggested that there might be interim “fixes” to the existing NES Regulations to address more pressing matters, such as the construction and maintenance of bores, while the review is undertaken. The Inquiry urges the Ministry for the Environment to consider potential interim measures within the current framework to address these matters.

[675] The Inquiry acknowledges that, following the Inquiry’s Stage 1 findings, the Ministry wrote to all regional councils to remind them of their obligations under the NES Regulations, the importance of first barrier protection, and the importance of collaboration between all parties in the supply of drinking water. The Ministry has also advised that it is continuing to contact councils about their processes to give effect to the NES Regulations. The Inquiry commends the Ministry for these initiatives and endorses this approach.

Awareness and Education

[676] The Inquiry concluded in its Stage 1 Report that the Ministry pursued a reasonably comprehensive educational programme when the NES Regulations were first developed. However, as time has progressed, awareness of the NES regulations has diminished.

[677] Mr Maxwell explained at the August hearing that, in his experience, the implementation and visibility of the NES Regulations has been varied. He said there are differing views as to their importance. He said further that they are not a topic of much discussion amongst regional council staff, and that they have not been a focus of the Ministry for the Environment’s regular presentations on policy direction, updates, and programmes of review.

[678] Since the August 2016 outbreak the NES Regulations have, of course, had greater prominence. However, the risk is that the immediate lessons from the outbreak will fade and its impact on the status of the NES Regulations will be lost over time.

[679] The Inquiry considers that greater awareness and education is needed relating to the NES Regulations. The Inquiry recommends that the Ministry ensure that the

outcome of the review of the NES Regulations is accompanied by a comprehensive and ongoing programme of implementation and guidance. Despite the Ministry's educative efforts with the existing Regulations, the lack of fulsome uptake by the industry would suggest that even greater efforts would be justified this time. This should include providing councils with the information they require to implement the NES Regulations properly. It should also include better mechanisms for information input and information sharing between councils. When JVGs exist, the information sharing aspect of the NES Regulations should form a core part of their activities.

[680] Overall, the Ministry should be encouraged to emphasise and draw attention to the importance of first barrier protection of drinking water sources, the risks identified in Parts 3 and 4 of this report, and the NES Regulations.

PART 15 –SECURE CLASSIFICATION: SHOULD IT BE ABOLISHED?

Introduction

[681] The DWSNZ at section 4.5 provide for the concept of “secure bore water”. Once so classified, water from that bore does not need to be treated and a less onerous monitoring regime is permitted.¹²² These are consequences of great moment to public health and welfare. In Stage 1, the Inquiry identified a number of problems with the relevant DWSNZ provisions including ambiguity, complexity, poor organisation, being difficult to follow, and omissions. The most important DWSNZ issue considered by the Inquiry in Stage 2 was whether the secure classification should be abolished.

The DWSNZ Provisions

[682] The DWSNZ provisions for establishing the “secure” status are complicated and there is no need to traverse them all in this report, in order to address the principal issue. In brief, the DWSNZ set out a series of three criteria that must be satisfied in order to have bore water classified as secure (in practice by the DWA). These may be summarised (simplistically) as follows.

[683] The first criterion involves attempting to establish that bore water is not directly affected by surface or climate influences and this criterion is normally satisfied by water-ageing or “residence time” tests. These tests address the residence time or the proportion of “young water” in the source. The second criterion is that the bore head must provide satisfactory protection by being sealed at the surface. The third criterion is satisfied by demonstrating an absence of past E.coli positive results. Water drawn from confined aquifers that satisfies the three criteria will be considered secure bore water. The “confined” criterion in the DWSNZ is a further element which is assumed to be satisfied by criterion 1.

Submissions and Evidence

[684] The question of whether the secure classification should be abolished was put to an expert panel at the August hearing comprising Dr Fricker, Dr Nokes, Dr Deere, Mr Rabbitts and Mr Graham.

¹²² For example, for a 10–30m deep bore classified as secure, only one monthly E.coli test is required.

[685] The principal basis for complaint from submitters was that the “secure bore water” system gave a false sense of security and created a mindset which assumed that there were no significant risks from bore water holding this classification. This mindset was said to be shared by the supplier, the DWA, the DHB, the Ministry of Health and, it is assumed, by the public.

[686] While some suppliers with secure classifications did treat their water,¹²³ a substantial number have relied on the classification to operate without disinfection. ESR submitted that, once secure status had been assigned to a groundwater, there was a tendency for signals that should alert the supplier to a water quality problem (for example, E.coli detection) to be disregarded or not given appropriate attention. Others submitted that relying on a secure status in order not to treat was antithetical to the multi-barrier principle. It was also submitted that the criteria in the DWSNZ for achieving secure classification did not adequately address the real risks of contamination, particularly sporadic risks.

[687] The Crown submitted that the concept of a secure classification was acceptable but referred to difficulties in its application, and an inadequate understanding by suppliers of their local aquifers. As against this, Water New Zealand submitted that the “secure” system overstates assumed knowledge about aquifers because geology is never homogenous - to imply zero or very low risk for something as uncertain as the geological subsurface is “absolutely unwarranted”. The Inquiry notes that it received a significant amount of information showing that New Zealand is geologically unstable.¹²⁴ This is discussed above in Part 3.

Discussion and Reasons

[688] Having assessed all of the material put to it on this issue, the Inquiry has concluded that the secure classification system in section 4.5 of the DWSNZ should be abolished. The Inquiry’s conclusion is based on the following reasons. The secure classification conveys a clear message that the relevant bore water is subject to no appreciable level of risk and that it may be regarded as highly unlikely to be contaminated by pathogens, to the extent that treatment is not required. The Inquiry views this as erroneous and misleading.

¹²³ ESR reported 40 out of 82 “secure-rated” suppliers did not treat (the number of bores is not given).

¹²⁴ Refer, for example, to GNS’ report dated 15 July 2017 on earthquakes and aquifers contained on the Inquiry website (Fact Paper #20).

[689] The Inquiry accepted the views of the experts that the concept of “secure” groundwater is inherently unsafe. While there will be varying degrees of quality of groundwater, and while some groundwater may be of high quality, the word “secure” and the connotations flowing from it are misleading in a way that has practical adverse effects.

[690] Reliance on a secure classification does not fulfil the requirement (promulgated by the Ministry of Health in its Drinking-water Guidelines and recorded as the third principle of drinking water safety in Part 2 above) to have in place a multi-barrier system to protect drinking water.

[691] All experts at the August hearing agreed that the secure classification should not remain. Dr Deere pointed out that recent reviews by Health Canada and by the National Health and Medical Research Council in Australia and the Water Services Association of Australia had formed the same conclusion. ESR submitted that classifying a source as secure essentially removes any (further) checks on the safety of the water. The Inquiry accepted these views.

[692] The Health Act, and the WSP regime require an assessment of risk by the supplier in respect of each bore. Classifying a bore as “secure” under the DWSNZ is apt to undermine and/or cut-across the WSP process of assessing risk in each case. The bespoke risk assessment required under a WSP for each bore obviates the need for such a classification. The correct place for assessment of risk is in the preparation and implementation of the WSP, as approved by the DWA.

[693] The water-ageing and bore head tests and reports are required far too infrequently. The water-ageing test is required only once every five years (DWSNZ, section 4.5.4) (or earlier if the DWA specifies it as necessary) and delays of up to several months following the taking of the water sample were commonly encountered before the result was available. Likewise, the bore head report is only required every five years (DWSNZ, section 4.5.4).

[694] Moreover, regardless of the frequency of these tests, they cannot safely provide any assurance beyond the point in time at which they are carried out. The water-ageing and bore head results each only speak to a single point-in-time and do not cater for future adverse changes over what could be a five year period. As noted below in the discussion about bores and casings in Part 20, Australian studies have revealed

surprisingly large failure rates in bores and casings and those considering security in Australia have concluded that even the best codes of practice, construction techniques, inspection and maintenance cannot guarantee security under all circumstances. Dr Deere stated that he regarded the point-in-time problem as the most important issue in relation to having secure bores.¹²⁵ ESR also raised this as a problem. On these bases, the Inquiry rejects the notion that more frequent age-tests or bore head tests, or multiple qualifying tests, are an answer.

[695] An absence of E.coli readings as prescribed by the third criterion does not provide any guarantee against the presence of other harmful organisms, such as protozoa or viruses. Nor does it address total coliforms, a useful indicator of influences from soil or surface water. And Napier is an example of a supply which until February 2017 easily complied with criterion 3, but then experienced five E.coli transgressions over a few months.

Brookvale Road Experience

[696] In the Stage 1 Report, the Inquiry found that, although the DWA had not yet classified Brookvale Road bores 1 and 2 as secure, the necessary tests and reports had been, or were being, obtained by HDC, and both the DWA and the supplier were operating on the basis that the bores were secure and that the criteria in the DWSNZ could be met. On this basis, treatment was not required by the DWA.

[697] The fact that the supplier and the DWA assumed or accepted that the Brookvale Road bores could comply with the secure criteria is in itself an illuminating criticism of the “secure” regime. The bores were in fact not secure (in August 2016) and this had disastrous consequences for some 5,500 people, and, probably, fatal consequences for four Havelock north residents. The bores were subject to the influence of surface water and they were not sealed as required by criterion 2.

[698] Dr Fricker pointed to the Havelock North facts as exemplifying his objection to the secure classification system as providing a false sense of security. He pointed out that the requisite water-ageing test sample had been taken at Brookvale Road in May 2016, but, as at August 2016, the results were still not available. More than five years had passed since the last water-ageing report from GNS which was dated March 2011.

¹²⁵ His report dated 24 July 2017 discusses this at 2.1.4.1 and 2.1.4.2. See Inquiry website “Submissions”.

The result, which was obtained later in August 2016, after the outbreak, and five years and five months after the last report, indicated a greater level of young water than previously reported. By then, great harm had been done.

[699] In Dr Fricker's view, water-ageing results are generally of little benefit in terms of drinking water safety because they provide no more than a snapshot at a given point in time and because the relevant datum figures used by GNS were, in his view, arbitrary figures. In view of its conclusions about the need for abolition of the secure classification, the Inquiry has not seen it as necessary to enter into any assessment of the uses and benefits of water age-testing in other contexts.

[700] As concerns criterion 2 for the Brookvale Road bores, a bore head security report advising of compliance had been produced, albeit in stages, over a period of more than two years, but it had not yet been finalised and presented to the DWA as a basis for classification of the bores. Although commissioned from an engineering consultancy, the report was not competently prepared and its conclusions were incorrect.¹²⁶ Brookvale Road bores' 1 and 2 history of E.coli results complied with the third criterion provisions in the DWSNZ.

[701] Although full compliance with the DWSNZ had not occurred, the supplier and the DWA were proceeding as though there was compliance. It is likely that, within a short time after August 2016, the DWA would in fact have classified the bores as secure.

[702] In respect of Brookvale Road bores 1 and 2, the Inquiry agrees that the secure classification system conferred no benefit and, in fact, created a harmful false sense of security. The water was not being treated because it was from bores which were assumed to meet the secure criteria in the DWSNZ. A lesson to be learned from Brookvale Road is that these circumstances could easily apply elsewhere in New Zealand.

Re-write the Criteria?

[703] The current criteria for obtaining the secure rating are not sufficiently rigorous to properly assess risk levels. They are broad and generic and do not adequately

¹²⁶ See Stage 1 Report at [482]–[526].

address the risks at a particular bore. They are limited to a point-in-time view. The Inquiry concludes these problems cannot be cured by re-drafting the terms.

[704] Dr Deere stated that serious attempts had been made to draft acceptable rules for a secure ground water category in the Australian guidelines, but that no one had been able to achieve that to the satisfaction of the hydrogeologists and the engineers who were experts in this area. Attempts to define such a category had been abandoned in Australia. He added that the risks were much higher in New Zealand for two reasons. First, New Zealand has much more seismic activity and second, more groundwater in Australia is in protected catchments where there is no visible or very little visible co-located sewerage pipe systems or other undesirable potential inputs. New Zealand groundwater sources are generally far less protected.

[705] Other experts agreed that the practical difficulties confronting any attempt to rewrite the criteria were formidable. The Inquiry has concluded that the concept of a secure classification is fundamentally unacceptable and that this cannot be cured by rewriting the criteria.

Problems with Current Provisions

[706] For completeness, and as further support for abolition of the secure classification, mention may be made of the following further particular difficulties with the existing provisions: Section 4.5.1 of the DWSNZ refers to water drawn from “confined aquifers”. There is no definition of that term (although there is one for “unconfined aquifers”). The bore head security criteria are in some respects unclear; they refer to NZS 4411 which does not contain useful details for drinking water bores. For existing bores, they do not effectively require proof of grouting and other safeguards at the time of construction and yet these are fundamental to the question of whether the bore is truly sealed. The process for judging bores satisfactory is unclear, as are the required qualifications of the person carrying out that assessment.

[707] Following the evidence heard in Stage 1, the Inquiry has concluded that below-ground bore heads are usually unacceptably risky and yet the DWSNZ (and NZS 4411) do not prohibit or even mention them. The monitoring requirements for 10 to 30 metre deep bores (monthly E.coli) are clearly deficient. Bore water drawn between 10 and 30 metres deep does not need to demonstrate criterion 1 (residence

time) – this is anomalous, given that deeper (and usually safer) bores below 30m do need to satisfy criterion 1.

[708] In addition, the responsibility for checking and issuing a secure classification is not set out in the DWSNZ and DWAs have carried out this function on a de facto basis.

Hastings Bores Being Managed as Non-secure

[709] In its further Interim Report dated 14 July 2017 (see **Appendix 1**), the Inquiry recommended that all urban bores from which HDC draws drinking water for supply to Havelock North or Hastings be managed as non-secure and potentially subject to the influence of surface water and/or at the risk of contamination from defects in the sewerage systems, until or unless all four members of the Hawke’s Bay JWG and Dr Deere (or equivalent expert advisor) unanimously agree that any bore may be managed as secure. That recommendation was accepted by HDC.

[710] In addition, by letter dated 25 July 2017,¹²⁷ the DWA reclassified further Hastings bores as non-secure and confirmed that the status of all bores was under active review and they would all be managed as though they were non-secure. The Inquiry’s view is that all parties with any role in the determination of the status of drinking water bores throughout New Zealand should adopt this approach pending any change to the DWSNZ.

Conclusions and Recommendations

[711] In light of the above discussion, the Inquiry recommends that:

- (a) The secure classification system in section 4.5 of the DWSNZ be abolished. This should happen urgently. The concept of a secure classification is fundamentally flawed as it does not provide a sound or safe basis for dispensing with treatment or reducing monitoring requirements and provides an erroneous and misleading message that the bore water is safe.
- (b) The Director-General of Health urgently encourage and persuade suppliers and DWAs not to rely on any current “secure” bore water

¹²⁷ **CB206.**

classifications. To this end, the Director-General should give consideration, inter alia, to publishing a statement relating to the performance of the duty imposed on suppliers under the Health Act in s 69U and/or s 69W.

- (c) Section 4.5 of the DWSNZ be removed urgently with such other consequential changes as may be needed (for example, amendments to sections 3.1 (Compliance and Transgressions), 3.3.1 (Determinands), 4.3.8.2 (Free Available Chlorine Disinfection), 4.3.9 (Response to Transgressions), 5 (Protozoal Compliance), 10.3.2 and Table 10.1 (Microbial Treatment Requirements)).
- (d) In respect of the changes to the DWSNZ identified above, the Minister of Health should utilise the powers in s 69P(2) to dispense with the s 69P(1) requirement for three years of consultation before amending the DWSNZ on the basis the Minister can be satisfied that the amendment is needed urgently.

[712] The Inquiry notes with concern ESR's report that the proportion of suppliers drawing from groundwater sources classified as secure has increased since 2009 and that large suppliers have a higher proportion of all of their water sourced from "secure" supplies. This would indicate that the number of people potentially put at risk from the misleading "secure" classification will be high.

[713] The Inquiry considers that abolition of the "secure" status provisions should not be deferred pending a general review of the DWSNZ. The risks of maintaining the system are too high, given that a significant number of suppliers still rely on the "secure" system, and this affects hundreds of thousands of consumers.

[714] The Inquiry sees the secure classification issue as distinct from the broader question of whether all drinking water should be treated and has concluded that a clear case has been made out for abolition of the secure classification regardless of what is decided on the wider issue of treatment. Nevertheless, under the existing DWSNZ, if the secure classification is removed, then the water must be treated.

[715] While some submitters saw benefit in keeping a "secure" rating, regardless of the question of treatment or monitoring, the Inquiry's view is that the concept of

attaching a label indicating safety by means of a set of arbitrary criteria in the DWSNZ is now outdated and unacceptable. The proper place for assessing risk is the WSP system as audited by the DWAs.

PART 16 – LICENSING AND TRAINING OF DRINKING WATER SUPPLIERS

Introduction

[716] The events of August 2016 raised issues about the qualifications and competence of water suppliers as organisations, and also their staff who operate the supply system. In New Zealand, there is no licensing or mandatory qualification system for water suppliers or their staff.

[717] Although the Health Act and (in the case of councils) the Local Government Act impose duties on drinking water suppliers, there is no requirement that they be licensed or that minimum qualifications by staff members be obtained. Voluntary training courses are available and many drinking water suppliers require their staff to attend these training courses. However, there is no legal requirement that they do so.

[718] The question of licensing and qualifying water suppliers and their staff was discussed at the August 2017 hearing with a panel comprising Dr Fricker, Dr Deere, Mr Graham, Mr Rabbitts and Mr Cunis (General Manager, Service Delivery for Watercare).

[719] A person who intends to supply drinking water must apply to the Director-General for registration on the Drinking Water Register (s 69K of the Health Act). Section 69J provides that the Director-General must maintain a register of persons who are drinking water suppliers. Only basic identifying details are required to be recorded in the register.

[720] Section 69J(3)(f) refers to other particulars which may be required under Part 2A or by regulations made under s 69ZZY. Although s 69ZZY provides for regulations to be made prescribing “*required competencies and other requirements in relation to the management, operation and maintenance of drinking water supply systems or components of those systems*”, no such regulations have been made.

[721] Section 69J(5), contains a general power under which the Director-General may require such information relevant to a drinking water supplier as the Director-General considers appropriate. Although this provision would enable the Director-General to require a great deal more information, the Inquiry was advised that, in practice, this does not happen.

[722] Accordingly, the current system comprises only a register containing basic information. There is no need to satisfy any training, competency or quality criteria. No licence is issued containing terms and conditions directed towards competency and fitness for purpose. The competence and capability of drinking water suppliers and their staff are not regulated or supervised by any regulator (although suppliers are audited by DWAs in terms of their output: compliance with the DWSNZ and the production and implementation of WSPs).

Licensing: Submissions and Evidence

[723] Submitters said that it is important that all entities and persons with responsibility for supplying drinking water be required to establish competence and fitness for purpose and that a licensing system would be the appropriate way to achieve and control that.

[724] All members of the panel discussing these issues were unanimous in supporting the need for a licensing system. They pointed out that the supply of drinking water was increasingly a complex and demanding operation, requiring many different skills. Technology continues to develop and water treatment plants are becoming more complicated. Although water treatment systems work well most of the time, when they fail or malfunction, it is vital to have people who are properly trained and qualified to the right levels, to identify and correct the problems. At present, although many staff employed by water suppliers may have adequate skills, there is no way of establishing or monitoring skill and competence levels.

[725] Several witnesses drew parallels with other areas in society where persons undertake potentially dangerous or risky tasks. There are myriad situations where such persons have to establish a level of competence and become licensed. It was submitted that it was anomalous that drinking water suppliers, who can have an enormous impact on the community if there is a failure, are not licensed and have no requirement to demonstrate competence by way of formal qualifications.

[726] It was pointed out that, by maintaining the current register, the Director-General was implicitly representing to the public that the listed drinking water suppliers had been assessed as competent and fit for purpose. That is not the case.

[727] The register governed by s 69J was criticised for lumping together suppliers of many different types and sizes, and the extent of information required on the register was also criticised as inadequate. However, the proposal to licence drinking water

suppliers would involve a separate and different system from the s 69J drinking water register (although the fact of being licensed should be noted on any register).

[728] The expert panel discussed what an applicant for a licence should be required to establish. It was noted that in some jurisdictions there are comprehensive criteria which need to be fulfilled before obtaining a licence. These can include proof of adequate ownership structures, governance, financial resources, a satisfactory state of assets and infrastructure, good asset management practices, security of long term funding, adequate insurance, backup resources in the event of failures, and qualifications and competency of senior staff. Other criteria included demonstration of forward planning, contingency planning, together with the ability to structure, train and maintain a workforce and replace staff.

[729] Dr Fricker pointed to the low levels of compliance in New Zealand and stated his belief that many people were getting sick every day (up to possibly 100,000 people a year) due to consuming poor quality drinking water. He saw a licensing and qualification system as fundamental to lifting standards across the industry.

[730] The overseas licensing systems described by the panel members required a high level of proof of reliability and competence by a water supplier in order to obtain and hold a licence. Dr Deere indicated that, in his experience, applications for an operating licence were substantial documents which were normally made available to the public (except for any confidential material).

[731] Expert witnesses were asked about the cost and time burdens of a licensing qualification, and a continuing audit system. Their view was that the risks were too high, and the consequences of contamination too great, to justify continuing with the present unregulated system on the grounds of cost.

[732] Other commentators submitted that a licensing system would not be unduly onerous and that, once levels were raised and practices improved, the cost of maintaining those would be moderate. They also pointed to a significant level of cost which is already undertaken in respect of voluntary training programmes.

[733] For any organisation that has insufficient resources to satisfy licensing criteria, a number of witnesses had no hesitation in expressing the view that they needed to be part of a larger organisation that did have the resources. The concept of dedicated drinking water suppliers is discussed in Part 11.

[734] Another feature of a licensing system discussed by the expert panel was the need for regular audits and checks by a regulator to ensure that licence terms were being complied with. It was also inherent in the licensing system that licences could be revoked in the event of non-compliance. In addition, licences could be transferred to other operators. As Dr Deere put it, licences in Australia tend to have some teeth and he referred to licences which have step-in powers by third parties in certain circumstances.

Licensing: Discussion and Findings

[735] The Inquiry accepts that the time has come for a licensing system to be a key part of the drinking water system in New Zealand. The lack of it is a glaring omission in the current drinking water regime.

[736] It is anomalous that society requires licences in myriad fields where public safety and welfare are involved but not in the case of drinking water suppliers, even though they can cause harm on a scale well beyond many other licensed suppliers and operators in society. A licensing and qualification system would materially contribute to the safety of the drinking water system in New Zealand.

[737] Both consumers, and a regulator on behalf of consumers are entitled to have the assurance that every networked water supplier is competent and fit for the supply it operates. Water suppliers need to accept that there is a need to attain, and then maintain, minimum verifiable standards of competence and capability. These standards should be applied consistently throughout New Zealand.

[738] While the detail of any licensing system should be worked out after a more detailed review, the Inquiry recommends that it include, at a minimum, organisational capability (such as governance, finance, backup, management, insurance and the like) as well as the training and competence of key staff members.

Qualifications: Submissions and Evidence

[739] One important component of licensing criteria should be the qualification of key staff. The training curriculum is currently set by Conexus as an Industry Training Organisation, with approval for unit standards being given by New Zealand Qualifications Authority. The Ministry of Health has input into the training content. The current qualifications expire in 2018 and there has recently been a review of training content.

[740] Mr Graham submitted there was a need to substantially improve and upgrade the content of training courses. Curricula and content of training courses were beyond the scope of the Inquiry and will need to be considered in detail by Government in due course. The Inquiry observes only that this is an appropriate time for a fundamental review of training. For present purposes, the Inquiry has focussed on the basic proposition that qualifications should be required in order to obtain and hold a licence.

[741] To the extent that a water supplier utilises the services of contractors or consultants as part of its supply operation, some commentators saw a need to require their qualifications and competence to also be regulated as part of the licence system or at least for the supplier to be responsible for them (depending on the scope and nature of services provided).

[742] Some commentators submitted that both internal and external quality controls and quality assurance programmes should be required in order to be licensed. Reference was made to the ISO accreditations. ISO 9001 was referred to, as well as ISO 22000 which covers Hazard Analysis and Critical Control Point measures. Some members of the expert panel saw only limited value in ISO accreditation because it represented only a check that organisations comply with their own procedures but was not, in itself, a quality control.

[743] Accepting that the process of preparing and implementing a WSP is an existing quality assurance measure, additional quality assurance and quality control measures were seen by witnesses and submitters as desirable in relation to any aspects of the water treatment and supply system which a WSP does not cover.

Qualifications: Discussion and Findings

[744] Given the importance of their work in terms of public safety, and the risks inherent in drinking water supply, key staff operating a drinking water supply should be properly qualified. A mandatory training and qualification system is needed, and qualification of staff should be one of the criteria applicable to a supplier for obtaining, and holding, a licence. As indicated, it is beyond the scope of this Inquiry to enter into the detail of training and qualification requirements but some general observations are appropriate.

[745] In the Inquiry's view, the question of continuing training and development is an important component of any qualification system and it should be provided for.

[746] Although the current curricula for the National Diploma and National Certificate have recently been reviewed in advance of their expiry in 2018, the Inquiry recommends that a more penetrating review be carried out with a view to setting up a programme of qualifications that addresses the different disciplines involved in supply. The qualifications should reflect current knowledge and best practice. They should be amenable to review periodically.

[747] The Inquiry recognises that there are different levels of drinking water supplier ranging from large (more than 10,000 people for at least 60 days per year) to small (between 101 and 500 people for at least 60 days per year) and then to neighbourhood (between 25 and 100 people for at least 60 days per year) with intermediate sizes in between. In addition, there are many suppliers which are not district or city councils. The operations of these water suppliers range from very small and simple to large and complex. Some form of qualification should be required for all, but the levels of qualification required under any licensing system should be matched to the complexity and scale of the relevant supply.

[748] The need to tailor qualifications is recognised to a limited extent in the present system where there is a two-level training system with, first, the National Certificate and, second, the National Diploma in Water Treatment. The Diploma is the higher level. The current qualification system operates primarily at water operator level and the Inquiry sees a need for managers and supervisors to be qualified as well.

[749] It is acknowledged that one of the key challenges for the institution of a licensing and qualification scheme is to make it appropriate for all levels and types of water supplier. Nevertheless, that should be attainable and, in the Inquiry's view, a consumer in a neighbourhood supply has just as much interest in a licensed and properly-qualified supplier as a consumer in a large supply.

[750] While the detail of any licensing and qualification programmes must be a matter for review by Government and others, the Inquiry notes that such a review need not necessarily start from scratch. Mr Cunis has devoted a great deal of time and thought to the creation of a white paper setting out a certification scheme with three main components: qualifications, experience and continued professional development. This covered three levels of staff: operator, supervisor and manager.

[751] This paper was supplied to Water New Zealand, and modified somewhat by it, and a copy of it is on the Inquiry's website.¹²⁸ While there has been some feedback on the paper through the members of Water New Zealand, the Inquiry has observed that it is inevitable with any such scheme that leadership and direction will be required either from Government (or, if constituted) a new water regulator. It is neither appropriate nor realistic to expect all water suppliers in New Zealand to agree all of the content of such a paper.

[752] The Inquiry has not reviewed and analysed the paper to an extent where it is appropriate to comment in detail and it will need to be the subject of further industry consultation. Nevertheless, it commends to future reviewers careful study of the paper as it is obviously a product of much experience and thought.

[753] The Inquiry recommends that changes involving licensing and qualification should apply to all existing suppliers. A licensing and qualification system applying to existing suppliers and their staff would have to be phased in and managed in a way that did not create undue burden. If dedicated suppliers are formed, licensing could be integrated, or co-ordinated, with that process. Licensing requirements could inform decisions on aggregation into large supply entities.

Interim Improvements to the Register

[754] Legislative change will be needed to put in place a licensing system. Pending that, the Director-General has, as set out above, power under the current legislation to require a great deal more information from water suppliers and the Inquiry sees this as a valuable precursor to any licensing system. Although the provisions of s 69K arguably apply to initial registration, the terms of s 69J(5) would, in the Inquiry's view, permit the Director-General to now require further information from existing registrants.

[755] At the August 2017 hearing, the Ministry of Health was urged to consider issuing a requirement for registered suppliers to provide a great deal more information. In response, the Ministry advised that the matter is under consideration. A draft proposal was sent to Dr Fricker, Dr Deere, Water New Zealand and Ms Unwins-England (a former Queensland drinking water regulator) for comment. This proposal suggests inclusion on the register of contact details of the CEO; contact details and qualifications of operators, managers and contractors; population information; deprivation index; details of accredited quality control or risk management

¹²⁸ See the Inquiry's website under Stage 2 Fact Papers No 4.

standards applied; a broad description of the water catchment and water source; treatment processes; volume of water produced by each treatment facility; design capacity of each treatment facility; and chemicals used as treatment.

[756] The Ministry proposes to seek approval for the proposal from the Director of Public Health, the Director-General and the Minister. If their approval is obtained, the Ministry has advised that it will consult with PHUs and suppliers about the proposed changes and whether there will be unacceptable compliance costs. Work is also underway to ensure that the Drinking Water Online system can accommodate the additional information.

Concluding Remarks

[757] The Inquiry recommends that a licensing system for all existing and future drinking water suppliers be established as soon as practicable. The new system should include mandatory qualifications for suppliers and their staff.

[758] The detail of a licensing and mandatory qualification system should be worked out after a more detailed review and consultation with interested parties. A licensing system should include, at a minimum, organisational capability (such as governance, finance, backup, management, insurance and the like) as well as the competence and qualifications of key staff members. The standards should be high and commensurate with the risks attending the supply of drinking water to all of New Zealand's population and all visitors to our country. A mandatory qualification system should involve a programme of qualifications that addresses the different disciplines involved in water supply and provide for qualifications, experience and continued professional development appropriate for the level of staff members involved.

[759] All aspects of licensing and qualification would be best come under the purview of a new dedicated drinking water regulator as recommended above.

PART 17 – WATER SAFETY PLANS

Introduction

[760] Section 69Z of the Health Act requires every drinking water supplier to prepare a WSP. A WSP is an important tool for actively managing public health risks. Such risks represent a significant burden, and potential cost, as identified and discussed in Part 4 at [110]–[118]. When properly prepared and implemented, a WSP should demonstrate that a water supplier understands the risks associated with its particular supply and is actively managing those risks. However, a WSP is neither an end in itself nor a panacea for a supply that is incapable of continuously providing safe water.

[761] Section 69Z(2)(a) sets out mandatory matters to be included in a WSP, thereby requiring a water supplier to:

- (a) Identify the public health risks (if any) associated with that drinking water supply;
- (b) Identify critical points in that drinking water supply;
- (c) Identify mechanisms for preventing public health risks arising in that drinking water supply; and
- (d) Identify mechanisms for reducing and eliminating public health risks, if they arise.

[762] Section 69Z(2)(a) also requires a water supplier to include:

- (a) Information about the estimated costs and benefits of the mechanisms for preventing public health risks and for reducing and eliminating them, if they arise; and
- (b) A timetable for managing the public health risks that have been identified.

[763] In short, s 69Z establishes a process whereby every water supplier is required to identify and address public health risks. The expectation appears to have been that

by requiring all water suppliers to prepare a WSP, this process would lead to water suppliers better understanding and actively managing risks to their supplies over time.

[764] While the balance struck in the legislation may have been appropriate at the commencement of the new regime, given it was a significant shift to move to a risk management approach, the evidence before the Inquiry has identified a number of deficiencies in relation to WSPs, as they are generally prepared and implemented by water suppliers at present.

Difficulties with Current Approach to WSPs

[765] It is important to be clear that the WSP model is not itself the problem, although the current statutory regime does present a number of practical problems which are identified below. WSPs which are developed and implemented appropriately should deliver a water supply to New Zealanders in accordance with international best practice. But the evidence before the Inquiry has established that WSPs are largely treated as an exercise in compliance with the current regime (in other words, box-ticking), rather than as an important tool for a water supplier's management and operational staff to actively understand and manage public health risks. There are a number of reasons for this which need to be addressed to ensure WSPs are implemented effectively so as to protect public health.

[766] First, the provisions of the Health Act have caused difficulties in practice. In particular:

- (a) Section 69Z(2)(a) merely requires the identification of various matters and a timetable for addressing them;
- (b) Section 69Z(8)(b) merely requires a water supplier to "start to implement" its WSP within one month of its approval by a DWA; and
- (c) Section 69ZB provides for WSPs to remain in force for up to five years.

[767] Together, these provisions have allowed some water suppliers to achieve "compliance" by preparing a pro forma WSP and taking limited steps to implement it over a long period of time. There is no effective legislative mechanism to require the implementation of all of the mechanisms identified to manage the public health risks, nor is there a requirement to meet the timetable set out in the WSP. Evidence to the

Inquiry suggested this has for some time been a concern of the DWAs, who consider that they have limited ability to require action by a drinking water supplier as long as some initial step(s) towards implementation have been taken.

[768] Second, the weakness of these provisions has undoubtedly contributed to the fact that WSPs have not been properly understood by many water suppliers, as evidenced by the following behavioural issues:

- (a) WSPs being prepared and then “left on the shelf”, rather than being part of everyday operations and the subject of constant feedback.
- (b) Preparation of WSPs being largely outsourced to consultants without appropriate contribution and ownership by the water supplier.
- (c) Failure to have appropriate personnel across the various levels of a water supplier involved in the development, implementation, and ongoing review of WSPs. For example, Risk and Audit Committees should have oversight of WSPs but the Inquiry did not understand this to be the norm. Certainly, it was not the case at HDC, prior to the August 2016 outbreak.
- (d) Failure to integrate WSPs into broader risk management, long term planning, and resource allocation decisions to ensure that significant costs are planned for and project work undertaken. For example, evidence to the Inquiry suggested that the expectation that WSPs would lead to prioritisation of drinking water infrastructure in local councils’ Long Term Plans had not eventuated.
- (e) Water suppliers either not allocating, or not being able to allocate, sufficient resources for the effective development, implementation, and review of WSPs.
- (f) Focus on achieving only the minima required by the Health Act, rather than improving over time in accordance with international best practice, such as meaningfully using:
 - (i) Hazard Analysis and Critical Control Point principles;

- (ii) Assessments of both maximum (uncontrolled) and residual risk; and
 - (iii) Conceptual risk mapping.
- (g) Reviews of WSPs being constrained by DWA resources. A desktop review is the norm for the initial review (Scope 3 procedure)¹²⁹ and there are variable practices around the country as to the frequency and extent of onsite reviews and the appropriate response to developments while a WSP is in place. The shortage of DWAs also means that the statutory timeframe of 20 working days for a DWA to review a WSP is not always met (see ss 69Z(5) and (6)). This pressure leads to a risk that the review is not as thorough as it should be.

[769] These behaviours contrast poorly with how the WSP model should operate. In summary:

- (a) An effective WSP will be modular with a central overarching document supported by various other documents such as risk registers, a detailed ERP, critical control points, and process flow diagrams. Each of these components of the WSP is important and a WSP should not be considered complete until all aspects are in place. Any audit of a WSP needs to encompass all components.
- (b) A WSP needs to be a “living document”. This requires the water supplier to have the technical expertise and organisational capacity to develop it, use it, keep it under review, and amend it. Any audit or oversight processes need to facilitate a water supplier to do this and also be able to require changes in response to developments.
- (c) While a water supplier needs to fully own its WSP, this does not mean all personnel need to be as familiar with all aspects as others. A water supplier needs to ensure that:
 - (i) Its leadership and management understand the risks arising and that they have appropriately addressed the management of

¹²⁹ **CB158.**

those risks in their strategic decision making, long term planning, audit and resource allocation processes, and delegations;

- (ii) Its water management personnel have the appropriate technical knowledge and skills to manage the particular supply; and
- (iii) Its operational staff understand the processes they are required to follow and the matters they are required to monitor and escalate as appropriate.

Given the complexity of many water supplies, to effectively ensure a WSP is a “living document”, a water supplier is likely to need to ensure that a person with appropriate expertise is routinely overseeing and coordinating these various aspects as a core component of his/her role.

- (d) While consultants have an important role to play in assisting water suppliers, they should be providing advisory and audit functions, rather than being delegated responsibility for the preparation and, in some cases, implementation of WSPs.

[770] Third, the mechanisms in the current statutory regime that would have allowed some of these matters to be addressed have not been used by the Ministry of Health. Section 69Z(2)(a)(vi) requires a drinking water supplier to comply with any additional requirements for the content and format of WSPs imposed by the Director-General of Health. The Director-General of Health has never made use of this power. Consequently, while New Zealand once led the world in its approach to managing the safe provision of water using WSPs, that is no longer the case.

[771] The Inquiry has been particularly assisted by the evidence of Dr Fricker and Dr Deere about the evolution of water safety planning and regulation and, in particular, the need to address critical control point processes as part of a WSP. As explained by Dr Deere and Dr Fricker, and supported by the other experts who participated in the WSP panel at the August hearing, identifying and implementing operational responses to critical control points is in fact the “core” of a WSP.

[772] A critical control point is simply a specific point, procedure, or step in a process at which control can be exercised to reduce, eliminate, or prevent the possibility of a

hazard or risk. A critical control point analysis will identify where operational protocols are appropriate to manage the risk or may identify that some new infrastructure is required to do so. For example, in a supply that lacks sufficient contact time for chlorine to be effective, solutions may include some form of reservoir or an additional form of disinfection.

[773] Operational protocols should address a critical control point by providing for monitoring of defined acceptable performance limits and the response when those limits are exceeded. For instance, as the example of a process control summary provided by Dr Deere to the Inquiry (and subsequently circulated by the Ministry of Health to DWAs) shows, the level of free available chlorine is a useful performance measure in a chlorinated supply and is usefully identified as a critical control point.¹³⁰

[774] Undoubtedly, resourcing issues have contributed to the WSP issues identified by the Inquiry to various degrees but it is important to note the compelling evidence before the Inquiry that resourcing decisions by water suppliers are inevitably driven by both the regulatory framework and the effectiveness of its enforcement. As discussed in Part 12, DWAs have to date lacked expertise in relation to water engineering or plant operation and this has impacted on their ability to critically assess a water supplier's operations including the efficacy of its WSP. Given the limitations with the current regulatory framework and the lack of any meaningful enforcement with respect to WSPs (at all stages, including proper preparation and addressing updates and lapses), it is unfortunate, but not surprising, that WSPs are largely treated an exercise in compliance and insufficient resource is applied to ensure they are an effective tool for addressing public health risks.

[775] The Inquiry was pleased to see that the Ministry of Health has sought to address some of these subsequent to the August 2017 hearing. On 18 August 2017, it wrote to all DWAs, and also to Water New Zealand, to advise that all WSPs need to identify and adequately address critical control points. The Ministry has advised the Inquiry that, if necessary, the Director-General of Health will issue notices to individual water suppliers who do not update their existing WSP to include critical control point processes in a reasonable time. It has also provided additional guidance to DWAs on

¹³⁰ See **CB229** at Table 3.2 and Attachment 7.

applying the Scope 3 procedure with respect to the inclusion of critical control points and process control summaries.¹³¹

[776] Whilst the Inquiry was pleased to learn of these developments it was, however, concerned to see that only one example of a critical control point process control summary template had been provided by the Ministry of Health as at 22 September 2017 and that as 15 September 2017 there was still confusion amongst Public Health Managers as to what was required.¹³² As indicated at above, the Inquiry's expectation was that the Director-General would exercise his power under s69Z(2)(b)(v) to issue a mandatory directive requiring critical control points to be inserted in WSPs by a specified (proximate) date.

[777] The Inquiry heard evidence from both Dr Deere and Dr Fricker that a suite of process control summary templates could be prepared in short order (within a few days) to assist water suppliers with the necessary changes to their WSPs. Dr Deere and Dr Fricker both advised that they were available to assist the Ministry of Health, if requested, to ensure this was the case. The Inquiry also took steps to confirm that neither had any conflict of interest in assisting the Ministry of Health in this way.

[778] Consequently, the Inquiry encourages the Ministry of Health to continue to work on these matters with urgency, and to make use of the expert assistance available to do so, to ensure that all water supplies have a WSP in place that is fit for purpose. Only then can the WSP be a truly useful tool for managing the public health risks associated with that particular supply.

[779] The Inquiry has observed that the drinking water industry is not the only industry where practices need to be regularly critically assessed and improved to ensure the safety of the community. Models are available from other industries. By way of example, the New Zealand aviation industry is now subject to rules that require it to move from quality assurance to a safety management system focussed on a risk-based approach. The Inquiry has noted the useful and clear materials that have been provided by the Civil Aviation Authority to assist with this process.¹³³

¹³¹ See Attachments 7, 8 and 9 in #3 of the "Ministry of Health Responses to requests" tab on the Inquiry website.

¹³² See Attachments 8 and 18A in #3 of the "Ministry of Health Responses to requests" tab on the Inquiry website.

¹³³ See www.caa.govt/sms.

Recommendations

[780] The Inquiry recommends that:

- (a) The Director-General of Health issue a notice under s 69Z(2)(a)(vi) to any water supplier who has not by 23 February 2018 amended, if necessary to do so, its WSP to ensure it complies with the Scope 3 procedure with respect to the inclusion of critical control points and process control summaries.¹³⁴ Ministry of Health officials should take appropriate steps in respect of any water supplier who does not comply with such a notice.
- (b) Water suppliers be required by the Director-General to review their WSPs to ensure that:
 - (i) Leadership and management understand the relevant drinking water risks and have appropriately addressed the management of those risks in their strategic decision making, long term planning, audit and resource allocation processes, and delegations;
 - (ii) Operational staff understand the critical control points and other processes they are required to follow, the matters they are required to monitor and escalate as appropriate, and the critical control points and other processes are in place and are being implemented; and
 - (iii) The WSP is being used as a living document and updated as necessary.
- (c) The Ministry of Health assist water suppliers to undertake the review set out in the above recommendation by updating their guidance notes and templates to provide clear and concise direction.
- (d) DWAs be resourced (including with any necessary technical assistance) to meaningfully review all components of a WSP at appropriate intervals for each water supply.

¹³⁴ See Attachment 9 in #3 of the “Ministry of Health Responses to requests” tab on the Inquiry website.

- (e) Any failures to implement a WSP be subject to review and, where appropriate, compliance and/or enforcement action.
- (f) The Health Act be amended to:
 - (i) Require mandatory substantive compliance with a WSP;
 - (ii) Address what voluntary changes to a WSP will trigger a further review by a DWA;
 - (iii) Address what changes to a water supplier's infrastructure or processes should trigger a mandatory requirement to amend a WSP; and
 - (iv) Clarify when a water supplier will be liable for any default in implementation, including where a WSP has lapsed.

PART 18 – EMERGENCY RESPONSE PLANS AND OUTBREAK MANAGEMENT

[781] The August 2016 outbreak highlighted the importance of all water suppliers and public health agencies being prepared in advance for a waterborne outbreak because networked water supplies spread pathogens widely and very quickly. By the time a pathogen in a networked water supply is detected, it will in virtually all cases already have been supplied to a significant proportion of the consumers drawing from that supply. There exists a real risk that consumers (including key personnel of the water supplier and medical services) will have been affected and available resources will quickly be overwhelmed.

[782] As discussed in Parts 13–15 of the Stage 1 Report, the Havelock North outbreak highlighted the importance of:

- (a) A water supplier having appropriate ERPs and pre-prepared communications in place, including the text of a boil water notice; and
- (b) Co-operation between agencies, both during an outbreak and in preparation for such emergency events.

[783] The Inquiry received helpful submissions on these matters from parties, including DHBs, the Auckland Regional Public Health Service, regional and district councils, the CDWRG, Water New Zealand, ESR, as well as individual submitters. The submissions highlighted existing legislative and institutional arrangements, various current approaches to preparation in particular communities, and suggestions for requirements for water suppliers, including with respect to pre-prepared communications plans. The submissions emphasised that there is clearly much that can be learned by industry participants from each other. For example, Waimakariri District Council and Selwyn District Council each provided examples of the systems they have in place to provide text and email notifications, including for a boil water notice.

[784] The Inquiry is conscious that this is an area where the appropriate responses will change with technological developments and in light of the particular circumstances. For example, the Inquiry is aware that the Ministry of Civil Defence and Emergency Management is launching its Emergency Mobile Alerts service which the New Zealand Police, Fire and Emergency New Zealand, the Ministry for Primary Industries, the Ministry of Health and Civil Defence Emergency Management will use to

alert people if their lives, property or health are at serious risk. It does not, therefore, consider it appropriate to make any specific recommendations as to how to manage a waterborne outbreak. This is because best practice will continue to evolve over time and emergency responses may need to be context specific. For example, ERPs for a city or town will involve different considerations from those for rural areas.

[785] The Inquiry, however, does consider that there is a need to ensure the lessons learned from the August 2016 outbreak, particularly the need for preparedness and interagency co-operation, are not lost. Consequently, it recommends that the current legislative framework should be improved in two ways as described below.

[786] First, an amendment should be made to the Health Act to require every water supplier to have an effective ERP including a communications plan and a pre-prepared boil water notice.¹³⁵ The Inquiry acknowledges that s 69Z(2)(a)(iii)(B) of the Health Act (which requires a WSP to identify mechanisms for reducing and eliminating public health risks) may have been expected to achieve this. Unfortunately, this is not the case. In order to be effective, a water supplier's ERP needs to:

- (a) Be specific to that supplier;
- (b) Be reviewed after every major incident, and at least annually;
- (c) Include a communications plan, which is regularly updated; and
- (d) Address the issuing of a boil water notice, and include a template notice.

[787] Second, every water supplier should be required to consult with its local PHUs in the development of its ERP. There is no such requirement at the moment but, as the outbreak showed, significant co-operation is needed in the event of a waterborne outbreak. As the Stage 1 Report highlighted, it is not appropriate for key steps and key communications to be dependent on the particular personnel available at any time. This will inevitably mean that important matters will be overlooked or delayed.

[788] The response to the outbreak, and the submissions received in Stage 2, also highlighted a high degree of uncertainty as to when a water supplier should consider

¹³⁵ While the Inquiry has focussed on boil water notices given the circumstances of the outbreak, it is also important to note that a water contamination event may require a "Do not drink" or "Do not use" notice if the contaminant cannot be addressed by boiling, for example, a chemical.

issuing a boil water notice and the appropriate content of such a notice. A boil water notice is an important protective step, but one that cannot be taken lightly, given the costs and difficulties to the community associated with it. In order to properly assess when to issue a notice, a water supplier must be able to assess the competing risks. To do this, a water supplier must have a detailed understanding of its network and its raw water. This emphasises the resourcing and capacity issues addressed in Part 11.

[789] While not detracting from the individual responsibility of every water supplier to be properly prepared for an emergency, the Inquiry has found that the current drafting of the DWSNZ and the Drinking-water Guidelines is inadequate in this respect. Neither document effectively assists water suppliers to understand how they should use boil water notices to manage risks to public health. Consequently, the Inquiry recommends that the Ministry of Health review, update and amend the DWSNZ and the Drinking-water Guidelines in respect of ERPs and boil water notices in light of international best practice. As a result, there should be:

- (a) Clear guidance as to the various circumstances in which issuing a boil water notice should be considered; and
- (b) A template notice based on best practice for water suppliers to use in the preparation of their ERPs.

PART 19 – MONITORING AND TESTING

Introduction

[790] In the Stage 1 Report, the Inquiry set out the details of an error made by a drinking water testing laboratory used by HDC. The laboratory failed to use sodium thiosulphate to dechlorinate samples taken from chlorinated water. This was a basic requirement. Some 1,318 samples taken over a period immediately after the August outbreak had to be discarded. HDC was accordingly non-compliant with the DWSNZ for that period.¹³⁶

[791] The Inquiry also set out its concerns in the Stage 1 Report about certain results from the post-outbreak investigative monitoring programme, namely, that cross-contamination was being raised as a means to explain presence readings in samples from the Eastbourne 2 bore. That testing was carried out by another laboratory used by HDC.¹³⁷

[792] The above occurrences raised broader concerns about the procedures in place for the monitoring and testing of drinking water, including sampling and laboratories. The Inquiry indicated that in Stage 2 it would consider necessary improvements to the monitoring and testing regime to ensure that the issues revealed in Stage 1 were not occurring elsewhere, and that they would not occur again in future.

[793] The Inquiry's list of issues for Stage 2 included the following:

- (a) The requirements in the DWSNZ for monitoring and testing of drinking water;
- (b) Drinking water sampling; and
- (c) Accreditation, recognition and oversight of drinking water testing laboratories.

[794] The Inquiry was helpfully assisted in its consideration of these matters by a range of submissions and an expert panel at the August 2017 hearing comprising

¹³⁶ See Stage 1 Report at [96]–[102].

¹³⁷ See Stage 1 Report at [103]–[105].

Dr Fricker, Dr Deere, Dr Nokes, Ms Gilbert and Ms Hofstra (Programme Manager for Drinking Water Testing at IANZ).

[795] At the August hearing, the Inquiry requested the establishment of a Sampling and Monitoring Caucus, which met during the hearing week to discuss and make recommendations on issues raised during the hearing. The Caucus produced a report to the Inquiry on 11 August 2017. The report is annexed as **Appendix 7**.

[796] This part of the report sets out the problems identified with the regime for monitoring and testing, sampling and laboratories and the Inquiry's recommendations. It also discusses the work of the Sampling and Monitoring Caucus and the progress made by IANZ and the Ministry of Health in response to the recommendations of the Caucus.

[797] Effective monitoring and testing is a critical part of the drinking water regime. It underpins several of the principles identified in Part 2 of this report, and is relevant to many of the risks outlined in Part 3. The Inquiry has identified clear deficiencies in the existing monitoring and testing regime. Some of these should be addressed with urgency through interim measures. The Inquiry urges those responsible, primarily the Ministry of Health, to consider and take action on the Inquiry's recommendations, along with the recommendations of the Sampling and Monitoring Caucus.

Problems with Monitoring and Testing

[798] Section 69Y of the Health Act requires drinking water suppliers to monitor their drinking water to determine compliance with the DWSNZ and to detect and assess public health risks generally. The DWSNZ specify acceptable levels of determinands in drinking water and performance standards for monitoring and testing.

[799] The Inquiry has identified, through submissions, evidence at the August hearing, and the work of the Sampling and Monitoring Caucus, that certain monitoring and testing aspects of the DWSNZ are deficient. The key deficiencies, some of which are also recorded as recommendations in the report of the Sampling and Monitoring Caucus, are outlined under the subheadings below. Sampling and laboratories are discussed separately.

Presence/Absence Testing

[800] The DWSNZ allow a water supplier to test for E.coli in the first instance using a presence/absence test. If the test returns a presence result, the sample or a subsequent sample must be enumerated, that is, a quantitative test must be carried out.

[801] The Inquiry heard evidence from Dr Fricker at the August hearing that too often a subsequent clear enumerated result leads to the misconception that the initial presence result was a “false positive”.¹³⁸ This is a fallacy. A subsequent clear enumerated result does not negate an initial presence result. A history of initial presence results may illustrate a pattern of transgressions or a deterioration in the quality of a supply. Quantitative data can provide a better indication of the severity of contamination than simply a presence result.

[802] Notwithstanding the above, the Inquiry accepted the views of Dr Fricker and a number of other submitters that the use of presence/absence testing for E.coli (and total coliforms once included, as below) can be confusing and misleading. The Inquiry considers it should be removed from the DWSNZ. All testing should be quantitative.

Routine Testing for Total Coliforms

[803] The DWSNZ currently do not require routine testing for total coliforms as an indicator microorganism. The Inquiry heard evidence that these microorganisms can be useful indicators of problems with water supplies, such as inadequate disinfection, ingress of water into the reticulation, backflow, and insufficient residual disinfectant within the reticulation. Testing for total coliforms is simple, inexpensive (in fact it can be undertaken simultaneously with monitoring for E.coli at no additional cost) and effective, and is mandated in many overseas jurisdictions.

[804] The Inquiry agrees with the evidence and submissions that the DWSNZ should mandate routine monitoring of total coliforms. This is best practice worldwide and it has formed a useful part of the HDC’s post-outbreak voluntary investigative monitoring programme, as recommended by Dr Fricker and accepted by the Hawke’s Bay JWG and HDC. Once included in the DWSNZ, consideration will need to be given to the significance and interpretation of positive total coliform readings.

¹³⁸ See also Stage 1 Report at [176].

Protozoa Monitoring

[805] The DWSNZ have contained protozoa monitoring requirements since 2008, however, the Inquiry understands that many water suppliers have not complied with these requirements. Evidence provided to the Inquiry suggests that the relevant sections, which base treatment requirements on the mean concentration of cryptosporidium oocysts, may not in fact be the best approach. The Inquiry therefore recommends that the current protozoa monitoring requirements in the DWSNZ be thoroughly reviewed and that any revised requirements be strictly enforced.

Frequency of Monitoring

[806] The frequency of monitoring prescribed by the DWSNZ is determined by matters such as population size, bore security and treatment system, if any. The frequency of monitoring is generally spread evenly throughout the year.

[807] ESR submitted to the Inquiry that the DWSNZ should provide an approach which addresses the fluctuating risk of contamination at different times of the year. This would not mean any relaxation of the DWSNZ or stray into monitoring requirements in the case of emergency events, but would rather recognise that risks to a water supply may naturally be heightened at certain times of the year. For example, in winter the risks to a water supply might relate to rain events and flooding, whereas in summer risks might relate to capacity issues or the impact of reduced flow. The DWSNZ should reflect this reality. Such an approach would, however, require appropriate and competent implementation by the relevant water supplier and the proposed monitoring for such events should be included in the WSP and approved by the DWA.

[808] The DWSNZ currently allow for a reduced frequency of monitoring for faecal contamination in groundwater sources deemed to be secure. The Inquiry has found this to be counterintuitive. Where a source has secure classification and is not treated, frequency of monitoring should in fact be increased. Notwithstanding the Inquiry's recommendations that the secure classification be urgently removed and all drinking water be treated, the Inquiry considers that, pending those steps, the monitoring frequency requirements for secure sources should be increased.

Approval of Test Methods

[809] The Inquiry heard evidence at the August 2017 hearing that both the criteria for approving testing methods, and the ongoing recognition of test methods, are out of line with international best practice. Dr Fricker's advice was that the process for obtaining approval in New Zealand is significantly faster and simpler than anywhere else in the world. He said the criteria for approval need to be more rigorous to ensure that methods meet international best practice while being fit for purpose for application in New Zealand. Dr Fricker also advised that there are significant numbers of approved test methods in New Zealand which are out of date and ineffective.

[810] The Inquiry accepts the concerns raised and, as recommended by the Sampling and Monitoring Caucus, has concluded that the Ministry of Health should review and consolidate the currently approved drinking water testing methods and strengthen the methodology and processes for assessing equivalence of new methods against reference testing methods.

Need for Interim Response to Problems with Monitoring and Testing

[811] As explained below, the Ministry of Health and IANZ have accepted that the above matters need to form part of the review of the DWSNZ. While the Inquiry appreciates this progress, it is concerned that this review will take some time, even if certain aspects can be undertaken with urgency and without full consultation.

[812] Consequently, the Inquiry urges the Director-General and the Ministry of Health to consider interim measures to address these pressing issues in the short term. These could include issuing guidance, or corresponding with the relevant parties about changes that could be made to current practices. These matters are vital to public health and too important to be left until the end of the DWSNZ review process.

Problems with Sampling

[813] The DWSNZ currently only specify, in a technical sense, how drinking water sampling should be undertaken. In submissions, and at the August hearing, the Inquiry heard that there is no mechanism in the DWSNZ, or elsewhere, for ensuring that the persons undertaking sampling are appropriately trained, assessed, certified and overseen. The Inquiry thus identified a gaping hole in the system, which poses

significant risks to the effectiveness of the whole monitoring and testing regime. A defect at the sampling stage will invalidate all downstream processes.

[814] To illustrate the seriousness of this gap, at the August hearing Dr Fricker said that 25 per cent of people in the room at that time could have E.coli on their hands. If any of them were to incorrectly take a drinking water sample, it could result in contamination and a false positive. Dr Deere advised that sampling can be the “weakest link” in the system, depending on who carries it out. Laboratories can only test samples in the state they are received. Dr Fricker estimated generally that of all positive results produced by a laboratory, half will indicate actual contamination, while the other half are invalid results. Of that latter half, 80 per cent are likely to have been caused by sampling errors.

[815] The expert panel at the August hearing unanimously agreed that sampling is one of the most important steps in the testing process. Correct sampling improves the overall quality of analytical data generated for water suppliers in order to comply with the DWSNZ. Yet the current regime provides no mechanism to ensure the competency of drinking water samplers and to monitor their performance. Dr Fricker thought it indefensible that New Zealand had no requirements for the training, certification and oversight of samplers. He described some form of certification for samplers as “every bit as important” as the accreditation of laboratories.

[816] The Inquiry understands that the majority of drinking water sampling is carried out by drinking water supplier personnel, generally council staff. In limited cases sampling is undertaken by laboratory staff, however, drinking water testing laboratories do not hold accreditation for sampling activities.

[817] Dr Deere explained that, although it must be done properly, sampling is not a “high-end skill” and that it would not be difficult to obtain the requisite expertise. Dr Fricker advised that the international norm is that water suppliers hold accreditation for drinking water sampling and that, where sampling is undertaken by laboratory staff, responsibility can be provided for in the contract between the water supplier and the laboratory. The same rules and standards need to apply regardless of who carries out the sampling.

[818] Based on the evidence provided to it, the Inquiry has concluded that drinking water samplers need:

- (a) Adequate training on how to take samples properly, including selection of sample sites, use of containers, collection of samples, and transport of samples;
- (b) Simple guidelines to follow, instead of the technical direction currently provided in the DWSNZ, and information-sharing about best practice, and common mistakes to avoid;
- (c) An understanding of the testing and supply process and the importance of sampling within this process, as well as the consequences of transgressions, to instil a sense of ownership and responsibility for their task;
- (d) Criteria against which their competency can be assessed once they have completed the requisite training and some form of certification; and
- (e) Ongoing guidance and monitoring of their performance, including an ability to take enforcement measures where required.

[819] Dr Fricker advised the Inquiry that best practice material on all of the above is readily available and could be easily implemented in the New Zealand context.

[820] The establishment of a sampling regime was a key focus for the Sampling and Monitoring Caucus. As explained below, the Inquiry acknowledges the work of IANZ and the Ministry of Health in this respect. However, that work addressed a long term solution. As for the deficiencies identified in the DWSNZ, the Inquiry urges the Ministry to consider immediate measures to fix the critical sampling gap and therefore address the risks it poses to the safety of water supplies.

Monitoring and Oversight of Water Carriers

[821] Related to sampling, a number of submitters also raised issues relating to drinking water carriers. The Inquiry accepts that these are important considerations and recommends that the Ministry of Health establish an effective regime for drinking water carriers to include at least training, oversight, enforcement of requirements, and reporting to the relevant drinking water suppliers and DWAs.

Problems with Laboratories

[822] In the Stage 1 Report the Inquiry outlined the regime for drinking water testing laboratories.¹³⁹

[823] The expert panellists at the August hearing, along with a number of submitters, were unanimous that drinking water suppliers should be able to rely implicitly on laboratories that have been accredited by IANZ and recognised by the Ministry of Health to provide completely reliable testing of drinking water.

[824] Dr Deere explained at the August hearing that the increasingly specialised expertise required for modern testing is not available within most councils and other water suppliers. He said that reliance on laboratories for accurate testing is two-fold. First, testing must of course pick up any contamination. Second, testing must instil confidence so that there are neither suggestions of laboratories producing false positives that lead to complacency about results, nor “crying wolf” about whether laboratories are actually identifying real contamination.

[825] Through submissions and evidence in Stage 2, the Inquiry has concerns that the regime for laboratories is not fit for purpose in certain respects. The issues that drew the regime to the Inquiry’s attention (namely, the sodium thiosulphate error and cross-contamination defences, both explained above) may well be occurring more widely throughout New Zealand and could happen again in future. Moreover, there is currently no ownership of the regime or leadership by its governing body, the Ministry of Health (see [297]–[301] above). The Inquiry sets out below the key areas which, in its view, need to be addressed.

[826] The Inquiry acknowledges that some key matters relating to laboratories are more fully addressed in the recommendations of the Sampling and Monitoring Caucus in **Appendix 7**.

Accreditation - Level 2 Recognition and Senior Personnel

[827] Stage 2 of the Inquiry has highlighted two key issues with the initial accreditation of laboratories. First, the current regime allows two levels of accreditation:

¹³⁹ See Stage 1 Report at Appendix 4.

- (a) Full accreditation if a laboratory is assessed to demonstrate compliance with the International Organisation for Standardisation ISO/IEC 17025:2005 General requirements for the competence of testing and calibration laboratories; or
- (b) Level 2 recognition if a laboratory assessed to demonstrate compliance with the Ministry of Health's Level 2 criteria.

[828] Ms Hofstra explained that when IANZ took over the assessment and oversight of the drinking water programme from the Ministry of Health, laboratories that were already accredited to Ministry of Health criteria for their chemical and biological programmes were able to extend their accreditation into the drinking water programme with Level 2 recognition.

[829] The difference in practice between the levels is that Level 2 laboratories are not required to undertake management review, carry out internal audits, or have a formal process for controlling documentation. Ms Hofstra advised that there are six remaining Level 2 laboratories, five in the regions and one in Auckland.

[830] Dr Fricker expressed concerns about Level 2 laboratories performing microbiological analyses. His view was that, given the fundamental importance of testing from a public health perspective, all laboratories should be required to meet the same standard. The Inquiry accepts the views of Dr Fricker and recommends the removal of Level 2 recognition.

[831] Second, the current requirement for accreditation in terms of laboratory personnel is that a suitably qualified and experienced individual is the signatory of testing results. In practice, that individual might be a professionally qualified microbiologist or, particularly in smaller laboratories, might be "suitably qualified" only by virtue of a lengthy period of experience in the industry.

[832] Dr Fricker, Dr Deere, Dr Nokes and Ms Gilbert agreed that senior microbiological expertise is a necessity in a laboratory carrying out drinking water testing. This is a regulatory requirement in most other jurisdictions. While larger water suppliers are generally able to contract for this in their supply agreements with laboratories, this is not always the case with smaller suppliers and smaller laboratories. The Inquiry accepts the views of these experts and recommends that the Ministry of

Health and IANZ include in the criteria for laboratory accreditation the employment of at least one senior microbiological expert.

Forwarding and Reporting of Test Results

[833] The Inquiry heard in submissions and evidence that it is currently unclear in the DWSNZ whether laboratories are required to forward individual non-complying test results, or just overall non-compliance with the Standards, to the Director-General. The Inquiry heard that laboratories in fact generally fail to comply with this requirement and results are often discovered only through the annual drinking water survey. Section 69ZZ(2) of the Health Act expressly requires the results of “any analysis or test” to be forwarded to the Director-General (or IANZ in practice).

[834] The Inquiry also heard from the expert panel at the August hearing that there can be problems where laboratories, as a matter of course, undertake analyses that are not covered by their specific contract with the drinking water supplier or are not required to be tested under the DWSNZ. In such cases, full testing results are often not reported to the drinking water supplier. The Sampling and Monitoring Caucus recommended that laboratories be required to report all analyses that are undertaken in full to the drinking water supplier. Regardless of the contract or regulatory requirements, if a result may indicate a risk to public safety, it should be reported.

[835] The Inquiry accordingly recommends that the Director-General issue advice to relevant parties, including laboratories and drinking water suppliers, drawing attention to the obligation under s 69ZZ(2) of the Health Act to forward the results of any drinking water analysis or test that indicates non-compliance to the Director-General. IANZ should also require laboratories to supply external quality assurance data to it immediately when received.

Structure of Laboratories in New Zealand

[836] A number of submitters, including ESR, raised concerns about a lack of support for laboratories, regardless of their size, and the size of the water supply being tested. ESR suggested that this support could be provided by public health reference laboratories. This is a laboratory that sets standards for the industry.

[837] At the August hearing Dr Deere explained that public health reference laboratories are desirable because they are not forced by competitive pressures to cut

corners. This allows them to set a high bar for quality assurance and to provide a reference service, proficiency testing and cross-checking of testing. Dr Deere advised that in the Australian context, the necessary high benchmark is set by public health reference laboratories. Dr Fricker added that the sodium thiosulphate error after the August 2016 outbreak might have been prevented if a reference facility existed to provide oversight of the performance of smaller laboratories.

[838] The Inquiry agrees that public health reference laboratories would be of much benefit in the New Zealand regime and acknowledges the Ministry of Health's advice following the August hearing that it will develop draft functions for a public health reference laboratory. The Inquiry urges the Ministry to progress this matter, and to develop a programme for its implementation in a timely manner.

[839] There was also discussion at the August 2017 hearing about the structure of laboratories in New Zealand. There are currently 49 laboratories accredited for drinking water testing. These are of varying sizes, serving varying sizes of supply, and are in both central and regional locations. Several submissions suggested that there was a need to ensure adequate capacity and capability of laboratories across the country and that this required a "national stocktake", including of the proximity and availability of laboratories to water suppliers. The Inquiry agrees that these are important considerations.

[840] Counsel assisting asked the expert panel members whether there was a case for a more centralised laboratory system. Dr Fricker explained that there is a perception that microbiology testing needs to be undertaken locally, which is not in fact the case. He gave the example of the Scottish system, which is of a similar size to New Zealand and is serviced by two large, centralised laboratories. His view was that regions and smaller centres are generally likely to be serviced by smaller laboratories, which may not hold the competency (in terms of resources and expertise) of larger laboratories in larger centres. He supported a more centralised system, as in Scotland.

[841] Dr Nokes expressed concerns about the ability of remote suppliers to get samples to centralised laboratories in a suitable timeframe. Ms Hofstra said the reason most smaller laboratories exist is because of a lack of infrastructure to meet these timeframes. However, it was accepted that the Scottish example indicates this is achievable, and that suppliers can do much to work with available flights and courier logistics.

[842] The Inquiry acknowledges the concerns raised and the potential benefits of a more, even if not entirely, centralised system. Dr Deere's advice, with which the other experts agreed, was that what is ultimately required is criteria for the necessary training, expertise, quality and quality assurance. Regardless of the size or location of the laboratory, those criteria simply need to be met. The Inquiry accepted this evidence.

Monitoring and Information Sharing

[843] At the August hearing Ms Hofstra explained the regime for ongoing monitoring and assessment of accredited laboratories. Dr Fricker and Dr Deere confirmed that the current regime generally accords with international best practice.

[844] However, Dr Fricker advised that ongoing accreditation could be strengthened by more frequent examinations of external quality assurance data for laboratories. This presently happens only during an annual assessment. Dr Fricker suggested that laboratories should be obliged to supply that information to IANZ when it is received. He also said that a different policy is needed for laboratories that only perform presence/absence testing because they do not use the same external proficiency scheme. The Inquiry agrees with the matters raised by Dr Fricker and recommends that they be addressed in IANZ's monitoring regime.

[845] Dr Deere at the August hearing outlined best practice international expectations in the event of laboratory errors, such as the sodium thiosulphate error discussed above: a root cause analysis to understand the cause and any breakdowns in processes; corrective actions to fix the cause; and information sharing of the error across the country to all analysts, laboratories, PHUs, councils and water suppliers to ensure that the issue will not occur again.

[846] Ms Hofstra confirmed that laboratories do advise IANZ of errors and that IANZ assists with root cause analyses and the implementation of corrective actions. However, there is no mechanism in the current regime for information sharing.

[847] Ms Hofstra explained that it was not standard for laboratories to share information in New Zealand where they work in a competitive environment, and that IANZ's contracts with laboratories currently contain a confidentiality clause. Dr Deere expressed his opinion that registration as a water supply analytical facility is a privilege

that carries with it obligations, one being to share information where mistakes are made. He appreciated the commercial sensitivities but considered the sharing of information much more important in this public health context.

[848] Ms Hofstra agreed that it would be a good quality assurance mechanism to share information. There are possible solutions to this issue:

- (a) There could be an exclusion of confidentiality in IANZ's agreements with laboratories where there is a breach of accreditation criteria;
- (b) It could be a condition of accreditation that information about mistakes be shared (as is the case with other of IANZ's programmes);
- (c) Sharing of breaches could occur on an anonymous basis, at IANZ's discretion; and
- (d) There could be a system for sharing issues with the Ministry of Health (as occurs with the Ministry for Primary Industries in another programme) and follow up action taken by the Ministry.

[849] The Inquiry appreciates the openness of IANZ to such ideas and the willingness to promptly implement them, as shown in its responses to the recommendations of the Sampling and Monitoring Caucus. The Inquiry recommends that IANZ, with support and follow up action where necessary by the Ministry of Health, continue to implement and update a mechanism for laboratories to share information.

Contracts Between Water Suppliers and Laboratories

[850] Dr Fricker and Dr Deere both emphasised the importance of water suppliers being "smart clients". While they do not need to have all possible technical expertise, they need the ability to understand the testing process sufficiently to have confidence in the validity of the monitoring undertaken. They need to know how to engage a laboratory, what services the laboratory is allowed to offer them in accordance with the DWSNZ, and what to include in their contracts with laboratories.

[851] As summarised in the joint statement in the Report of the Sampling and Monitoring Caucus, the water supplier must be able to ensure it arranges for

appropriate sample collection, handling, transport, analysis and reporting to ensure it has confidence in the safety of its drinking water.

[852] HDC's submission indicated that this was an area of difficulty for water suppliers. It submitted that national direction and specialist advice should be provided. The Inquiry agrees that some form of national direction is appropriate. The Inquiry's view is that the development of template tenders and contracts, which allow for personalisation, would be beneficial to water suppliers.

[853] The Inquiry also notes the advice of Dr Fricker that, of a water supplier's total operating costs, the percentage spent on the testing regime is generally less than 1 per cent. Dr Deere agreed that this was not a significant part of the operating costs. Dr Fricker advised that the percentage could be more than trebled without any corresponding impact on the price of water for consumers. He also said that investment in testing has a significant influence on a supplier's capital programme and that correct test results can in fact save a lot of money. The Inquiry accepts this evidence and considers it part and parcel of the need for water suppliers to better understand and embrace the importance of the testing process.

Role of Ministry of Health

[854] It is important in this part to mention Ministry of Health's approach to the recognition and ongoing performance management of drinking water laboratories.

[855] As explained in Part 7, the Ministry has up to this point failed to acknowledge any responsibility for the recognition and oversight of laboratories, stating that this is solely within the purview of IANZ. This position simply cannot be supported by a proper interpretation of the statutory regime. The Director-General has express powers and responsibilities in relation to laboratories under s 69ZY of the Health Act. The Inquiry's view is that the Ministry has hitherto taken an incorrect approach to its governance role.

[856] The Inquiry acknowledges and is encouraged by the Memorandum of Understanding signed between IANZ and the Ministry on 28 September 2017, which better attributes roles and responsibilities between the two parties. The Memorandum is discussed further below.

Drinking Water Online

[857] Many submissions raised concerns with the new Drinking Water Online system. The Inquiry acknowledges these concerns but did not consider the matter further because the new system is in its infancy. The Inquiry urges the Ministry of Health to review the relevant submissions and to take into account the useful points made. In particular, submitters said that:

- (a) The previous Water Information New Zealand was difficult to use and, at this stage, it was unclear whether the Drinking Water Online system would be any improvement;
- (b) Its design and functionality were not optimal and showed a need for a greater level of investment;
- (c) The system contained inaccurate information;
- (d) There were limitations on the ability to report test results in the system and this should be able to happen instantaneously;
- (e) There had been limited training on the new system; and
- (f) There would be benefit in combining drinking water testing results and communicable disease notification, as these areas are often interrelated.

Sampling and Monitoring Caucus

[858] The Sampling and Monitoring Caucus was formed to respond to the various issues raised with monitoring and testing, sampling and laboratories at the August hearing. The Caucus members included Dr Fricker, Dr Deere and representatives from IANZ and the Ministry of Health.

[859] The Report of the Caucus made a joint statement about the consequences and importance of accurate sampling and analysis of drinking water; outlined the issues identified at the August hearing; and set out agreed recommendations. Recommendations 1 to 7 involve areas relating to IANZ and were, accordingly, agreed by IANZ, the Ministry, Dr Fricker and Dr Deere. Recommendations 9 to 24 relate to broader matters and were agreed by the Ministry, Dr Fricker and Dr Deere. Recommendations 8 and 25 of the Caucus Report provided that IANZ and the Ministry,

respectively, would report back to the Inquiry by 22 September 2017 on matters already implemented, and matters yet to be implemented, in response to the recommendations.

[860] An assessment of the responses is provided in **Appendix 8** to this report. The Inquiry greatly appreciates the prompt action taken by IANZ on various matters. The Inquiry also acknowledges the Ministry of Health's input. Many of the responses to the broader matters in Recommendations 9 to 24, however, indicate that it will be quite some time before various measures are implemented. Where pressing concerns have been raised in an area that is fundamental to the safe supply of drinking water and public health, the Inquiry's view is that it is neither satisfactory nor responsible that the public be required to wait for the necessary assurances and action.

[861] The Inquiry appreciates that there is a need for long term and permanent solutions to many of the matters raised but, as outlined above, the Inquiry urges the Ministry to make greater efforts to take interim action, such as issuing guidance, best practice examples, and communicating with relevant parties, to begin to address the more urgent issues raised.

Memorandum of Understanding

[862] As part of the Caucus recommendations, IANZ and the Ministry, on 28 September 2017, signed a Memorandum of Understanding setting out a coordinated approach to drinking water laboratory assessments and any issues arising from assessments. The Inquiry was told at the August hearing that a Memorandum of Understanding approach is used successfully in the meat industry to provide clear direction on the respective roles and responsibilities of IANZ and the Ministry for Primary Industries.

[863] Importantly, the Memorandum of Understanding acknowledges IANZ's functions in respect of the accreditation of laboratories, but expressly recognises that the Director-General of Health remains responsible and accountable for any decision to recognise or not recognise a laboratory under s 69ZY(1) of the Health Act. It also acknowledges IANZ's practical responsibility for the register of accredited and recognised laboratories, but again expressly recognises that the Director-General of Health remains responsible and accountable for the maintenance of the register under s 69ZY(4).

[864] Furthermore, the Memorandum of Understanding provides that IANZ will inform the Ministry of major laboratory non-conformities; suspensions, withdrawals or reductions in scope of a laboratory's accreditation; and any policy matters or issues of concern relating to the provision of safe drinking water. The Ministry must then inform IANZ of follow up action taken.

[865] This express recognition of the Director-General's functions and the Ministry's apparent commitment to take action where non-conformities and other such issues arise contrasts starkly with its earlier position. That earlier approach was also expressed by the Director-General under cross-examination at the August hearing. The Inquiry considers that the Memorandum is a step in the right direction in terms of the Ministry acknowledging its statutory responsibility and governance role in the current regime.

Concluding Remarks

[866] The Inquiry reiterates the importance of accurate monitoring and testing, sampling and laboratory processes. It is fundamental that drinking water suppliers are able to rely on the testing regime and those who provide these key services to ensure the detection of contamination and the safe supply of drinking water.

[867] Many of the recommendations in this part are urgent and can be, and in fact have been, implemented without structural or legislative change. The Inquiry commends the work of IANZ in this respect and urges the Ministry to take a similar approach.

PART 20 – BORES AND CASINGS

Introduction

[868] Investigations into the August 2016 outbreak included extensive examination of the bores and casings in Brookvale Road. This included their form of construction, maintenance history and condition. These investigations highlighted a number of deficiencies in the current regime and practices that have national implications. The Inquiry considered this topic both in relation to drinking water extraction bores, and also any other bores that penetrate an aquifer or aquitard in locations which could influence drinking water.

[869] The deficiencies identified by the Inquiry include the design and supervision of the construction of new bores and associated headworks (including the unfortunate practice of below-ground level bore heads); inspection and maintenance practices; determining expected service lives; and the adequacy of controls on safely decommissioning and securing redundant bores.

[870] There is no single point of reference or code or required technical specifications for any of the activities associated with bores, casings and headworks. Requirements exist in a number of places. The DWSNZ cites the NZS 4411. There are some references to bores in the Drinking-water Guidelines. Regional plans under the RMA also contain provisions relating to bores. Bore requirements are included as conditions of resource and building consents. Bore and casing provisions in some cases are also contained within policies and standards of individual water suppliers.

[871] These multifarious sources give rise to much variation and inconsistency, and a lack of clarity and certainty for those responsible for bores and casings.

Submissions and Evidence

[872] Submissions were received from a number of organisations including the Crown, regional and district councils, DHBs and Regional Public Health Services, Water New Zealand, CDWRG, Engineering New Zealand (previously the Institution of Professional Engineers New Zealand) and individuals. All submitters concurred that the current bore and casing regime was fragmented and unsatisfactory.

[873] There was general support for a review of NZS 4411 to update it to current international best practice and to extend its scope to cover all life cycle aspects of bores and casings relevant to drinking water.

[874] There was acceptance that below-ground bore heads carried additional risk and that with changing rainfall patterns, and attendant flooding risk, this risk may be increasing. Rather than adopt arbitrary standards for flood risk (such as a 50 or 100 year Annual Return Period storm) there was a need to critically assess the flood risk for each bore and include this and mitigation measures in WSPs.

[875] A number of submissions suggested that more regular inspection and reporting was required and that the current five year period in the DWSNZ for bore head security reports was too long.

[876] Dr Deere noted that, during the recent Australian review of the concept of a secure groundwater, the engineers' biggest concern was their inability to detect the failure of bores, casings and surface structures, and he gave examples where extensive inspection had failed to detect faults. Even close scrutiny with cameras was of limited value in determining condition and likely service life. He also noted that the industry had been surprised at the failure rates they had seen, even in geo-stable landscapes, and that predicting the service life of these facilities was very difficult. Unpredicted corrosion had been observed on numerous occasions and was a complex problem.

[877] Dr Deere said that this meant that even the best codes of practice, and construction techniques, inspection and maintenance programmes cannot guarantee security under all circumstances. This is one of the matters underpinning the Inquiry's recommendation to abolish the "secure" classification in the DWSNZ, as discussed in Part 15.

Discussion

[878] As aquitards provide some defence against contamination, any works which penetrate an aquitard can, if not properly constructed and maintained, add risk. It is also important that any water drawn from beneath an aquitard is not at risk of contamination as it is drawn up through the bore and bore head works.

[879] Pumping water from an aquifer has an influence on the flow direction of water within the aquifer, resulting in localised draw down. In the vicinity of the bore itself this can result in a flow direction downwards, placing increased risk of water flowing down the outside of the casing if it is not effectively sealed.

[880] If there are any faults in the casing above the aquitard, then it is possible that water subject to the influence of surface water (and therefore at greater risk of contamination) can be drawn into the bore. Dr Deere referred to examples of pinhole corrosion, a condition that is difficult to predict and detect.

[881] It follows that bores and casings should be regulated. A single, uniform standard or code is obviously needed. There are two important aspects of bore construction, operation and maintenance: first, the protection of the source; and, second, ensuring that water is not at risk of contamination as it is drawn from the bore. Both should be addressed by a code. Insofar as consent conditions are attached to self-supplier bores, a new robust code should provide a level of protection to self-suppliers as well.

Findings

[882] The Inquiry has concluded that a comprehensive review of NZS 4411 should be carried out, covering the design, construction, as-built records, supervision, operation, inspection, maintenance, refurbishment/renewal and decommissioning of all bores that draw water from any groundwater source water intended for drinking or penetrating the aquitard of any drinking water catchment.

[883] The Inquiry also recommends that a subsequent review of the DWSNZ, Drinking-water Guidelines, all regional plans, RMA consent conditions, building consent conditions (where they apply), and water suppliers' policies and standards be undertaken to bring them into line with any new national standard.

[884] It is the view of the Inquiry that below-ground bore heads are undesirable and introduce additional and unnecessary risk, and therefore that no new below-ground bores should be permitted. It is recognised that careful design is required to avoid substantial above ground structures reducing the seismic performance of bore structures, however, recent experience in Canterbury and Kaikoura has greatly improved the sector's knowledge of how this can be managed.

[885] For all existing bores with below-ground headworks the Inquiry's view is that the DWAs should ensure that special attention is given to this risk in future WSPs and appropriate mitigation measures should be implemented, including treatment and raising them where practicable.

[886] It is recognised that there are thousands of existing bores that will not meet modern best practice. For water supply bores, all future WSPs should assess the risks associated with the existing facilities and how these are best avoided or mitigated. For other bores which penetrate an aquitard, any risks need to be managed through their resource or building consents.

PART 21 – THE HEALTH ACT 1956

Introduction

[887] Part 2A of the Health Act sets out the current statutory framework for the supply of drinking water. The Inquiry has considered both the general approach of the current framework and also specific changes that are required.

Current Approach: Change in Direction Needed

[888] As discussed in Part 8 above (Accountability of Water Suppliers), the key concept underpinning the current regime is that a water supplier has a duty which is limited to taking “all practicable steps” to comply with the DWSNZ (Health Act, s 69V(1) and s 69ZF). That is, there is no absolute duty to comply with the DWSNZ.

[889] This limited duty is further constrained by:

- (a) The wide and general definition of “all practicable steps” in s 69H which includes considering a water supplier’s financial position; and
- (b) Section 69V(2), which provides that a water supplier will comply with the obligation to take all practicable steps if that supplier implements the provisions of its approved WSP relating to the DWSNZ.

[890] The Inquiry understands that this approach was enacted in 2007 in response to concerns about the ability of particular water suppliers to meet the costs of compliance. The evidence before the Inquiry has shown that this approach has led to highly variable standards and practices across the country with respect to compliance with the DWSNZ.

[891] There was broad support in the submissions from public health agencies and others for compliance with the DWSNZ to be mandatory.

[892] The Inquiry acknowledges that resources are not infinite but it has concluded that, given the importance of safe drinking water to the health of New Zealanders, and our economic wellbeing, it is necessary to determine the appropriate standards for a drinking water supply to meet, and then to consider how these standards can be met,

rather than have the applicable standard driven by the circumstances or priorities of a water supplier.

[893] For this reason, the Inquiry recommends that the current drinking water regime should be recast with the starting point being the prescription of mandatory minimum standards for drinking water. While this will be a significant change in approach, the Inquiry understands that with modern solutions, acquiring appropriate infrastructure and technology is not in fact inordinately expensive. Bulk purchasing opportunities available to groups of water suppliers could reduce the cost further.

[894] The Inquiry has also concluded that the importance of safe drinking water would be better emphasised, and the regime more readily accessible, if a separate Drinking Water Act were enacted.

Specific Changes

[895] The Inquiry has received submissions about a number of specific Health Act issues. The changes that the Inquiry recommends are set out below:

Recommended changes to the Health Act 1956		
Section	Subject	Recommendation
69C	Application of ss 69S to 69ZC	Amend to provide that specified self suppliers are subject to ss 69S to 69ZC.
69H	Definition of all practicable steps	Repeal.
69J	Drinking Water Register	Increase information about suppliers kept on the Register.
69P	DWSNZ amendment	Repeal three year provision, limit any consultation to three months.
69R	DWSNZ commencement	Repeal.
69S	Duty to provide adequate supply of drinking water	Remove obligation to take “all practicable steps”.
69U	Protect source	Amend to clarify and strengthen obligations on water suppliers, including “reasonable steps”, and relationship with RMA regime and NES Regulations.
69V	Obligation to comply with DWSNZ	Remove obligation to take “all practicable steps”, leaving obligation to comply with the DWSNZ. Repeal subsection (2).

Recommended changes to the Health Act 1956		
Section	Subject	Recommendation
69W	Duty to supply wholesome drinking water	Repeal and simply require compliance with the DWSNZ.
69Z(1)	Duty to prepare and implement a WSP	Require compliance with the WSP requirement.
69Z(2)	WSP requirements	Require an effective ERP including a communications plan and pre-prepared boil water notice. Require backflow mitigation be addressed.
69Z(8)	Approval of WSP	Remove requirement to take “all practicable steps” to obtain approval, leaving obligation to obtain approval of a WSP. Expand to address what voluntary changes to a WSP will trigger a further review by a DWA; and what changes to a water supplier’s infrastructure or processes should trigger a mandatory requirement to amend a WSP. Clarify when a water supplier will be liable for any default in implementation, including where a WSP has lapsed.
69ZB	Duration of WSP	Review five year period.
69ZD	Duty to keep records	Amend to clarify record-keeping requirements and availability of records.
69ZF	Remedial action	Remove obligation to take “all practicable steps” leaving a requirement to take the appropriate remedial action
69ZK	Appointment of DWAs	Review need for accreditation, include wider skills, and delete agency.
69ZM	Accountability of DWAs	Review appropriateness.
69ZO and 69ZP	DWA powers	Review and combine with all powers given directly to DWAs and designated officers.
69ZY	Recognition of laboratories	Review effectiveness of section for Director-General’s oversight and leadership of laboratories.
69ZZR	Offences	Create new offence of supplying water unfit for human consumption and provide for recovery of costs if convicted of any offence.
69ZZS	Defences	Repeal subsection (2). Remove the defences of taking “all practicable steps” and that the defendant did not intend to commit the offence to make it a strict liability offence.
69ZZZ	Backflow protection	Strengthen terms of section.

Recommended changes to the Health Act 1956		
Section	Subject	Recommendation
New section	Treatment	Mandate at least one effective and appropriate form of treatment with very limited exemptions.
New section	JWGs	Provide for mandatory collaboration groups.
New section	Regulator	Establish an independent drinking water regulator.
New section	Licensing	Establish a licensing system for suppliers.
Part 2A	Drinking water	Repeal and replace with a stand alone Drinking Water Act.

[896] The discussion below addresses the changes that have been proposed which are not otherwise specifically addressed elsewhere in this report.

Timing of Changes to the DWSNZ

[897] Under the current statutory framework, ss 69P (obligation to consult) and 69R (commencement of DWSNZ) effectively mean that no change can be made to the DWSNZ in less than five years. This is because a minimum three year consultation period is required and changes to the DWSNZ can only take effect two years after they have been gazetted. While there is a limited exemption for urgent matters, the Inquiry has found that the effect of these provisions has been to frustrate or delay necessary changes to the DWSNZ. The Inquiry understands that, while this time period was intended to give some comfort to suppliers in relation to long term capital investments, it has in fact generally been to their detriment. This arises, for example, because advances in science and technology that would lead to cost savings have not been reflected in changes to the DWSNZ. Consequently, the Inquiry recommends that ss 69P and 69R be the subject of urgent amendment.

[898] The Inquiry notes that the Ministry of Health in a 2009 proposal to amend the drinking water provisions of the Health Act 1956¹⁴⁰ recommended that s 69P should be amended to provide for consultation of “at least 3 months”. It may be that a setting a (short) time period for consultation is considered desirable, but the Inquiry does not endorse the accompanying comment that:

¹⁴⁰ Attachment 13 in #3 of the “Ministry of Health Responses to Requests” on the Inquiry website, which describes the 2009 proposed changes in a table appended to a Ministry of Health memorandum, dated 14 September 2017.

If the intent of the reference to three years is to ensure the Standards aren't reviewed too often it is recommended that the new wording says something like "standards must not be issued more often than five yearly and adequate consultation must be carried out, with each round of consultation being over at least three months.

[899] The Inquiry considers that a time limit on the frequency of updates to the DWSNZ is both artificial and unnecessarily restrictive, to the detriment of water suppliers and consumers.

Backflow

[900] The topic of backflow has been discussed in the Stage 1 Report (at [223]–[230]) and in this report at [358]–[361]. Section 69ZZZ makes provision for backflow prevention where a networked supplier considers it "desirable or necessary".

[901] Given the evidence before the Inquiry as to the significant risks associated with backflow, the Inquiry accepted the submission of the Auckland Regional Public Health Service that provision for backflow prevention should be mandatory. While the Inquiry appreciates that it will not be possible to always prevent backflow, it considers it imperative that all water suppliers have in place auditable demonstrated backflow minimisation practices.

Self-suppliers

[902] The Register of Drinking Water Suppliers for New Zealand (as at 4 April 2017) records that there are 693 specified self-suppliers (as defined in ss 69G and 69J) servicing a population of 106,973 people. While specified self-suppliers are required to be registered under the Health Act (s 69J), they are not currently subject to its regulatory or audit provisions. The Inquiry recommends that this be changed because specified self-suppliers, such as prisons, hospitals, schools and maraes, in fact tend to service relatively large numbers of people.¹⁴¹ While a more comprehensive review of all levels of self-supply (other than private households) appears desirable, the most pressing need is to provide protection for well over 100,000 people who are served by specified self-suppliers.

¹⁴¹ Refer to paragraph [24]–[25] above.

Enforcement Provisions

[903] The enforcement regime set out in Part 2A has never been invoked but widespread concern has been raised about the efficacy of the current offence provisions. As discussed in Parts 7 and 8, effective enforcement is essential to ensuring accountability. The Inquiry also notes that there are examples of effective enforcement regimes in other jurisdictions which will have useful learnings for New Zealand.

[904] The Inquiry has observed that many of the changes recommended in this report will have flow-on consequences for the offence provisions, but it records that it considers it inappropriate for any defence provision to allow (as s 69ZZS(2)(b) currently does) for a defendant to prove that he or she did not intend to commit the offence. Public welfare offences are normally strict liability and offences relating to drinking water supply are no different.¹⁴² The Inquiry recommends that the defences in s 69ZZS, and all other references to all practicable steps, be removed so as to make compliance mandatory and the offences ones of strict liability.

¹⁴² In England, Wales and Scotland, the legislation contains a specific criminal offence (supply of water unfit for human consumption). Those reviewing the Act should consider whether a comparable offence should be added in New Zealand.

PART 22 – THE DWSNZ

Introduction

[905] In the Stage 1 Report the Inquiry summarised the DWSNZ and the processes for their amendment.¹⁴³ The DWSNZ, first gazetted in 2005, were revised in 2008 largely to take into account comments made by key stakeholders and users.

[906] The foreword to the DWSNZ states that “[t]he availability of safe drinking-water for all New Zealanders, irrespective of where they live, is a fundamental requirement for public health.” The Inquiry agrees, but has found that some sections of the DWSNZ, far from ensuring the availability of safe drinking water, actually increase many of the risks to consumers set out in Part 3 of this report.

[907] In Parts 8 and 21, the Inquiry has recommended that compliance with the DWSNZ should be mandatory and in Part 21, the Inquiry has concluded that the defence of taking “all reasonable steps” to comply with the DWSNZ should be removed. These changes, while not addressing the substance of the current DWSNZ, are fundamental to ensuring that the DWSNZ facilitate the availability of safe drinking water.

[908] In terms of the substantive sections of the current DWSNZ, it is inappropriate for the Inquiry to consider all aspects or to attempt to rewrite them. This section sets out the key sections of the DWSNZ that have been identified by experts and submitters as lacking in efficacy and rigour, therefore requiring early review and change. As noted below, some of these changes have been discussed in earlier parts of this report.

Sections of the DWSNZ Requiring Early Review and Change

Changes Discussed in Earlier Parts of the Report

[909] Part 15 above discusses in detail the issue of secure bore water classification. Evidence provided to the Inquiry from water quality experts and drinking water engineers indicated that the science behind this classification is unsound. As concluded in Part 15, the Inquiry recommends that the concept of secure groundwater be removed entirely from the DWSNZ.

¹⁴³ See Stage 1 Report at Appendix 4.

[910] Part 19 above discusses specific sections of the DWSNZ relating to the monitoring and testing of drinking water which require amendment. The relevant changes include:

- (a) Removal of presence/absence testing and a requirement for all testing to be quantitative;
- (b) Mandatory routine testing for total coliforms;
- (c) Review and enforcement of protozoa monitoring requirements; and
- (d) Requirements for frequency of monitoring.

Other Changes Required

[911] Based on the expert evidence and submissions received, the following two further parts of the DWSNZ relating to boil water notices and treatment of plumbosolvent water require early review and change.

[912] Several sections of the DWSNZ suggest a level of 10 E.coli per 100 millilitres as the concentration at which a boil water notice should be considered. The Inquiry received advice that there is no scientific basis for this number, and therefore recommends that it be removed. Clearer advice on when to issue a boil water notice is needed in the DWSNZ, supplemented with associated information in the Drinking-water Guidelines and a template notice based on best practice for water suppliers to use in the preparation of their ERPs.

[913] The DWSNZ do not currently require treatment of plumbosolvent water or address the quality of plumbing fittings. The Inquiry is aware that significant water quality issues have arisen in Flint, Michigan in relation to elevated levels of lead leaching from plumbing fittings. Much of the potable water in New Zealand is regarded as plumbosolvent and yet no treatment is required. The Inquiry has been advised that it is relatively simple and inexpensive to treat water to prevent lead leaching and that this is a requirement in many countries around the world. The Inquiry therefore recommends that the treatment of plumbosolvent water and the quality of plumbing fittings be addressed in the DWSNZ.

Urgency of Review and Changes

[914] Given the public health exposure, and the risks outlined in Part 3 above, it is important that the recommended review and changes to the DWSNZ take place without delay. The Ministry of Health has indicated that any substantive amendment to the DWSNZ would result in amended standards coming into effect in 2024. This length of time is simply unacceptable. The recommended changes to the DWSNZ should be made with urgency, as is enabled by s 69P(2) of the Health Act. As discussed in Part 21 above, the consultation period for changes to the DWSNZ can, and should, be reduced to no more than three months and should be restricted to technical issues.

[915] The Inquiry's view is that any review of the DWSNZ must be carried out by an expert or panel of experts with appropriate experience and expertise both in New Zealand and in overseas jurisdictions. Many of the recommended changes to the DWSNZ are based on international best practice which does not currently occur in New Zealand.

PART 23 – URGENT AND EARLY RECOMMENDATIONS

Introduction

[916] As contemplated by its terms of reference, some of the Inquiry's recommendations would, if accepted, involve changes to the existing law, and others are likely to require detailed reviews or consultation with interested parties. The Inquiry appreciates that these processes will take time.

[917] Other recommendations will not need a change to the law and can be implemented early, and without undue difficulty. In light of the public health and safety risks involved, and given the disastrous consequences which can occur following contamination of drinking water, the Inquiry's view is that implementation of such recommended changes should take place as a matter of urgency. The risks of not doing so are simply too great. Some of these measures have already been accepted as appropriate by interested parties, and are being pursued.

[918] The recommendations identified in this part would substantially improve the safety of drinking water in Havelock North and elsewhere in New Zealand, and could prevent a recurrence of an outbreak of waterborne illness.

Recommendations

[919] In the light of the above, and for the reasons set out in the earlier parts of this report, the Inquiry recommends the following for urgent and early implementation:

Promulgate Principles of Drinking Water Safety

- (1) The six fundamental principles of drinking water safety should be recorded and promulgated to the industry and used to inform all recommended reforms as well as the operation of the entire drinking water system.

[See Part 2 of this report]

Abolish the Secure Classification System

- (2) The secure classification system in section 4.5 of the DWSNZ should be abolished forthwith. The concept of a secure classification is fundamentally

flawed as it does not provide a sound or safe basis for dispensing with treatment or reducing monitoring requirements and provides an erroneous and misleading message that the bore water is safe.

- (3) The Director-General of Health should urgently encourage and persuade suppliers and DWAs not to rely on any current “secure” bore water classifications. To this end, the Director-General should give consideration, inter alia, to publishing a statement relating to the performance of the duty imposed on suppliers under the Health Act in ss 69U and/or 69W.
- (4) Section 4.5 of the DWSNZ should be deleted forthwith, with such other consequential changes as may be needed (for example, amendments to sections 3.1 (Compliance and Transgressions), 3.3.1 (Determinands), 4.3.8.2 (Free Available Chlorine Disinfection), 4.3.9 (Response to Transgressions), 5 (Protozoal Compliance), 10.3.2 and Table 10.1 (Microbial Treatment Requirements)).
- (5) In respect of the changes to the DWSNZ identified in recommendation (4) above, the Minister of Health should utilise the powers in s 69P(2) to dispense with consultation before amending the DWSNZ, on the basis the Minister can be satisfied from the contents of this report, and the Stage 1 Report that the amendment is needed urgently.

[See Part 15 of this report]

Encourage Universal Treatment

- (6) Because the risks to the public of untreated drinking water are simply too high to continue with such supplies until legislation mandating universal treatment has been considered and passed, the Director-General of Health can and should, in the interests of public safety and welfare, exercise effective and practical leadership to encourage water suppliers to use appropriate and effective treatment without delay.
- (7) The Director-General of Health should promptly provide firm and clear advice to drinking water suppliers that all supplies should be appropriately and effectively treated pending any change to the law and/or the DWSNZ.

- (8)** The CEOs of DHBs (with PHU responsibilities) should advise drinking water suppliers that all supplies should be effectively treated pending any change to the law and/or the DWSNZ.

[See Part 5 of this report]

Establish a Drinking Water Regulator

- (9)** A dedicated drinking water regulator which can oversee all other reforms should be established early and promptly.
- (10)** The important fundamental characteristics of a dedicated drinking water regulator should include:
- (a) Independence and freedom from conflicts of interest;
 - (b) A sufficient level of resourcing; and
 - (c) Proper expertise in relation to all relevant disciplines necessary for the delivery of safe drinking water.
- (11)** Without defining or limiting the matters for which a regulator might be responsible, a regulator should have responsibility for licensing and qualification of supplies, the standards and practices of water suppliers, DWAs, laboratories and samplers, compliance and enforcement, and the approval and monitoring of WSPs.
- (12)** Pending any legislative change in relation to the creation of a drinking water regulator, a Drinking Water Regulation Establishment Unit should be set up to address the matters set out below:
- (a) Maintaining momentum;
 - (b) Facilitating the establishment of a drinking water regulator; and
 - (c) Facilitating the hand-over to a drinking water regulator.

The Ministry of Health's current disaggregated drinking water resources do not possess the necessary skills and attributes and should not be used for this purpose.

[See Parts 7 and 10 of this report]

Interim Improvements at and by the Ministry of Health

- (13)** The Ministry of Health, via the DWAs and Medical Officers of Health, should take urgent steps to administer and enforce the existing regulatory regime, having regard to the findings and recommendations in this Stage 2 Report.
- (14)** Further:
- (a) The Director-General should promptly put in place a clear and effective enforcement policy which emphasises, but is not limited to, the issuing of compliance orders by Medical Officers of Health under s 69ZZH, with a view to urgently improving compliance levels by suppliers.
 - (b) The Director-General should reformat the annual report and make effective use of ss 69ZZZB and 69ZZZC to hold suppliers accountable in a meaningful and direct way.
 - (c) The Ministry of Health should establish a panel of drinking water experts (with expertise across the range of different disciplines relevant to the delivery of safe drinking water).
 - (d) The panel of drinking water experts should provide advice to the Ministry in relation to implementation of all required interim improvements.
 - (e) The Ministry of Health should take all necessary steps to boost DWA numbers and resources.
 - (f) The HPO qualification should be removed as a requirement for DWAs.
 - (g) The Ministry of Health should urgently apply a substantial increase in resources and skills to drinking water so as to give effect to these recommendations.

- (h) Dr Snee's recommendations to simplify and clarify accountability for DWAs should be refined, as appropriate, and adopted.
- (i) After 23 February 2018, the Director-General should issue a notice without delay under s 69Z(2)(vi) requiring any supplier who has not incorporated critical control points and process control summaries in its WSP to do so within two weeks.
- (j) The Ministry of Health should recommend to the Minister that he invoke s 69P(2) to dispense with consultation and urgently amend the DWSNZ to require routine monitoring of total coliforms and to remove the use of presence/absence testing for E.coli and total coliforms.
- (k) The Ministry of Health should establish an effective regime for drinking water samplers, including (at least) training, certification, and oversight.
- (l) The Director-General should promptly remove Level 2 laboratory recognition.

[See Parts 7 and 19 of this report]

Amend RMA to Expressly Recognise Drinking Water Source Protection

- (15)** Sections 6 and 30 of the RMA should be amended to expressly recognise protection and management of drinking water sources as a matter of national importance and as a function of regional councils, respectively.
- (16)** The above amendments should be considered for processing, if appropriate, through the statute amendments bill process on the basis that they are matters of clarification and do not alter any substantive law.

[See Part 13 of this report]

Accelerate NES Regulations Review

- (17)** The review of the NES Regulations should be accelerated and consideration should be given to rewriting them as a matter of high priority to address the specific problems identified in this Stage 2 Report.

[See Part 14 of this report]

Encourage Joint Working Groups

- (18)** DHBs (with PHUs) should establish as soon as practicable (with the assistance of the Ministry of Health), a JWG (or groups) responsible for oversight of drinking water safety in their respective regions. Such JWGs should operate along the lines of the Hawke's Bay JWG and the CDWRG described in this Stage 2 Report.

[See Part 9 of this report]

Urgently Amend the Health Act

- (19)** Sections 69P and 69R should be the subject of urgent amendment. Sections 69P (obligation to consult) and 69R (commencement of DWSNZ) effectively mean that no change can be made to the DWSNZ in less than five years, which is a wholly unacceptable timeframe.

[See Part 21 of this report]

PART 24 – FURTHER RECOMMENDATIONS TO PREVENT RECURRENCES

[920] Having identified the early and urgent recommendations required, the Inquiry sets out below the further changes needed to prevent recurrences of an outbreak of waterborne disease in water supplies throughout New Zealand. The Inquiry further recommends the following:

Mandate Universal Treatment

- (20)** Appropriate and effective treatment of drinking water should be mandated by law or through the DWSNZ for all supplies (networked and specified self-suppliers). This should include a residual disinfectant in the reticulation.
- (21)** Provision should be made for exemptions to mandatory treatment only in very limited circumstances. Any supplier seeking an exemption should have to discharge a heavy onus of satisfying an appropriately qualified and experienced body of the present, and ongoing, safety of the particular supply.

[See Part 5 of this report]

Establish a Licensing and Qualifications System for Drinking Water Suppliers and Operators

- (22)** A licensing system for all existing and future networked drinking water suppliers should be established as soon as practicable and consideration should be given to a mandatory qualification system for suppliers and their staff.
- (23)** The detail of a licensing and mandatory qualification system should be worked out after a more detailed review and consultation with interested parties. A licensing system should include, at a minimum, organisational capability (such as governance, finance, backup, management, insurance and the like) as well as the competence and qualifications of key staff members. The standards should be high and commensurate with the risks attending the supply of drinking water to all of New Zealand's population and all visitors to our country. A mandatory qualification system should involve a programme of qualifications that addresses the different disciplines involved in water supply and provide for qualifications, experience and continued professional development.

- (24) All aspects of licensing and qualifications would best come under the purview of a new dedicated drinking water regulator, as recommended above.

[See Part 16 of this report]

Other Changes to the Health Act

- (25) A separate Drinking Water Act should be enacted to better emphasise the importance of safe drinking water and to make the statutory regime more readily accessible.
- (26) The Health Act should be amended to remove the “all practicable steps” test in, at least, ss 69H, 69S, 69V, 69Z and 69ZF, thereby making all duties on water suppliers mandatory.
- (27) The defences in s 69ZZS, and all other references to all practicable steps, should be removed so as to make compliance mandatory and to create strict liability offences.
- (28) The legislative changes to the Health Act set out in Part 21 should be adopted.
- (29) The position regarding self-suppliers should be comprehensively reviewed first, to determine an appropriate definition of self-suppliers which should be regulated and overseen, and, second, to determine what regulation, oversight, and other measures are needed to achieve safe supply to members of the public being served by self-suppliers.

[See Part 21 of this report]

Review DWSNZ

- (30) In addition to the urgent DWSNZ changes at recommendation (4) above, a comprehensive review should be carried out by an expert or experts and the DWSNZ should be amended after such review to incorporate, at least, the remaining recommended changes set out in Part 22.

[See Part 22 of this report]

Mandate Collaboration

- (31)** Collaboration groups (JWGs) should be mandated by law. How such JWGs are configured should depend on relevant local and regional circumstances.

[See Part 9 of this report]

Create Dedicated and Aggregated Drinking Water Suppliers

- (32)** Given the existence of a compelling case for dedicated and aggregated suppliers being established as an effective and affordable means to improve compliance, competence and accountability, the Government should make a decisive and definitive assessment of whether to mandate, or persuade, suppliers to establish aggregated dedicated water suppliers.
- (33)** Given the long history of equivocation on this issue (see **Appendix 3**), a review and decision by the Government should be actioned as soon as practicable.

[See Part 11 of this report]

Improve Resourcing and Capability of DWAs

- (34)** The training, qualifications and selection criteria for DWAs should be reviewed in order to, in particular, increase levels of water treatment and network operation expertise.
- (35)** The need for accreditation of DWAs should be reviewed once the questions of their structure, employment, accountability and qualifications are resolved. At that point, a more informed assessment of the accreditation system and its continued necessity under an improved system can be made.

[See Part 12 of this report]

Implement Amended NES Regulations

- (36)** The Ministry for the Environment should ensure the outcome of the review of the NES Regulations is accompanied by a comprehensive and ongoing programme of implementation and guidance. This should include providing

councils with the information they require to implement the NES Regulations properly. It should also include better mechanisms for information input and information-sharing between councils. When JWG's are established, the information-sharing aspect of the NES Regulations should form a core part of their activities.

[See Part 14 of this report]

Review WSPs

- (37)** Water suppliers should be required by the Director-General to review their WSPs to ensure that:
- (a) leadership, governance and management understand the relevant drinking water risks and have appropriately addressed the management of those risks in their strategic decision making, long term planning, audit and resource allocation processes, and delegations;
 - (b) operational staff understand the critical control points and other processes they are required to follow, the matters they are required to monitor and escalate as appropriate, and that the critical control points and other processes are in place and are being implemented; and
 - (c) the WSP is being used as a living document and is updated as frequently as necessary.

[See Part 17 of this report]

Strengthen Enforcement of WSPs

- (38)** All DWAs and Medical Officers of Health should adopt a rigorous approach to the requirements for approving and reporting on implementation of WSPs as set out in ss 69Z(4)–(5), 69ZL(1)(a) and 69ZP(1)(c)(iii) of the Health Act.
- (39)** DWAs should action any failures to implement a WSP promptly and effectively with, where appropriate, compliance orders and/or other enforcement action.

[See Parts 12 and 17 of this report]

Require an ERP and Boil Water Notice documentation

- (40) An amendment should be made to the Health Act to require every water supplier to have an effective ERP, including a communications plan and pre-prepared boil water notice. The supplier should be required to consult with its local public health agencies in the development of its ERP.
- (41) The Ministry of Health should review, update and amend the DWSNZ and Drinking-water Guidelines in respect of ERPs and boil water notices in light of international best practice.

[See Part 18 of this report]

Improve the Testing and Laboratories Regime

- (42) The Ministry of Health should review and consolidate the currently approved drinking water testing methods and strengthen the methodology and process for assessing equivalence of new methods against reference testing methods.
- (43) The Ministry of Health should establish an effective regime for drinking water carriers to include at least training, oversight, enforcement of requirements, and reporting to the relevant drinking water suppliers and DWAs.
- (44) The Ministry of Health and IANZ should include in the criteria for laboratory accreditation the employment of at least one senior microbiological expert.
- (45) The Director-General should issue advice to relevant parties, including laboratories and drinking water suppliers, drawing attention to the obligation under s 69ZZ(2) of the Health Act to forward the results of any drinking water analysis or test that indicates non-compliance to both the Director-General and IANZ. IANZ should also require laboratories to supply external quality assurance data to it immediately when received.
- (46) IANZ, with support and follow up action where necessary by the Ministry of Health, should continue to implement and update a mechanism enabling and requiring laboratories to share information.

[See Part 19 of this report]

Review NZS 4411

- (47)** A comprehensive review of NZS 4411 should be carried out, covering the design, construction, as-built records, supervision, operation, inspection, maintenance, refurbishment/renewal and decommissioning of all bores that draw water from any groundwater source water intended for drinking or that penetrate the aquitard of any drinking water catchment.
- (48)** A subsequent review of the DWSNZ, Drinking-water Guidelines, all regional plans, RMA consent conditions, building consent conditions (where they apply), and water suppliers' policies and standards should be undertaken to bring them into line with any new national standard.

[See Part 20 of this report]

Prohibit New Below-ground Bore Heads

- (49)** No new below-ground bore heads should be permitted. Below-ground bore heads are undesirable and introduce additional (and unnecessary) risk.
- (50)** DWAs should ensure special attention is given to the risk of existing bores with below-ground headworks in future WSPs. Appropriate mitigation measures should be implemented, including treatment and raising them where practicable.

[See Part 20 of this report]

[921] So far as implementation of the above recommendations is concerned, the Inquiry makes the following additional recommendation:

- (51)** The Government should invite the Controller and Auditor-General to monitor, for the next five years, the implementation of all the recommendations and initiatives set out in this Stage 2 Report. The Controller and Auditor-General should report to Parliament, as appropriate, on the question of implementation during the five year period.

PART 25 – CONCLUDING OBSERVATIONS

[922] The Inquiry is satisfied that New Zealand's drinking water strategy must be informed, at all times, by an appreciation of the ubiquitous nature of the risks to drinking water and the seriousness of the consequences of failing to supply safe drinking water. The existence of these risks and the severity of their consequences provide a significant part of the social policy justification for the necessary regulatory regime.

[923] The Inquiry's investigations during the Stage 2 phase have demonstrated that the problems revealed in the Stage 1 Report in relation to HDC's supply of drinking water to the residents of Havelock North are not confined to that region. Water suppliers in other parts of New Zealand exhibit the same or similar problems. The Ministry of Health's annual reports on Drinking Water over the past five years have shown that many suppliers are not compliant with the DWSNZ.

[924] These findings point to a widespread systemic failure among water suppliers to meet the high standards required for the supply of safe drinking water to the public. The industry has demonstrated that it is not capable of itself improving when the standards are not met.

[925] Neither has the Ministry of Health, the government body charged with administering the provisions of the Health Act governing drinking water, shown an ability to call the industry to account.

[926] There is currently no adequate or effective enforcement of the statutory obligations on water suppliers. The DWAs are under-resourced and have not been able to discharge their statutory responsibilities. The important tool of a WSP, as used by water suppliers and monitored and enforced by DWAs, has proven ineffective to ensure ownership by water suppliers of the risks around the delivery of safe drinking water to the public.

[927] In short, the administration of the present system of regulation does not ensure that water suppliers comply with the law and the DWSNZ. The Ministry of Health is incapable of doing so, for the reasons explained in this report. Accordingly, far-reaching recommendations have been made by the Inquiry in Parts 23 and 24. The

key recommendations are for the treatment of all supplies and the setting up of a dedicated drinking water regulator.

[928] Many of the recommendations require urgent or early implementation. In the meantime, the current drinking water team within the Ministry of Health should be dismantled and replaced by a Drinking Water Regulation Establishment Unit. Pending such changes, the Ministry of Health should, through the DWAs and Medical Officers of Health, take immediate steps to enforce the current law in the hope the recalcitrant water suppliers will be called to account before it is too late to prevent another outbreak of waterborne disease.

[929] The Inquiry has found that the drinking water industry has over at least a five year period experienced problems on multiple levels. These include source protection, drinking water suppliers, difficulties attracting qualified and experienced staff, the Ministry of Health drinking water team, lack of leadership, and the regulatory environment. All of these problems have combined to produce a lack of public awareness of the changes over recent years to the risks resulting from unsafe water.

[930] The Inquiry believes its recommendations should enable these problems to be addressed in a manner that best secures the safety of drinking water for all New Zealanders.

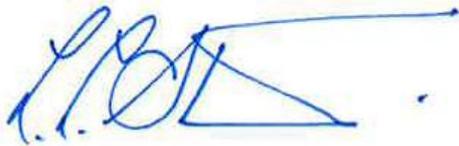
[931] For a final word in this Stage 2 Report, the Inquiry has chosen to refer to the importance of the multi-barrier protection of drinking water (Principle 3 in Part 2). A reference to multiple barriers appropriately includes the requirement to treat all drinking water in the interests of protecting the health of all New Zealanders. Hence the inclusion of recommendation (20) in Part 24. In support, the Inquiry cites the recent observations of Dr Hrudehy. Speaking of his own country of Canada, he said:

British Columbia, the western most province is more like [New Zealand], there are a lot of untreated water supplies and it is basically rolling the dice. It is not a question of if somebody will get sick; it is just a question of when and how many.

Acknowledgements

[932] As was the case during Stage 1, the Inquiry has received outstanding advice and legal guidance from counsel assisting, Mr Nathan Gedye QC. Mr Gedye was very ably assisted by Ms Fionnghuala Cuncannon, Ms Annabel Linterman and Ms Carissa Cross, all of Meredith Connell. Professor Colin Fricker, an adjunct professor at Queen's University, continued to provide outstanding scientific advice to the Inquiry. The breadth and depth of this knowledge has been invaluable. The Inquiry expresses its deep gratitude to Dr Fricker and all counsel assisting for their work throughout both stages.

[933] The Inquiry also records its appreciation for the dedication and extremely hard work provided by Head of Secretariat, Mr Blair Cairncross. His commitment to the many tasks required by his role has been first class. Mr Cairncross was very ably assisted by the Inquiry's Secretary, Ms Denise Mitchell whose typing and presentation of the Stage 2 Report was exemplary. Finally, the Inquiry thanks Dr Karena Kelly, Lecturer in the School of Māori Studies at Victoria University of Wellington, and the Honourable Justice Joe Williams, who translated the whakataki to this report.



Hon Lynton Stevens QC



Dr Karen Poutasi CNZM



Anthony Wilson ED*

APPENDIX 1



Government Inquiry into Havelock North Drinking Water

UNDER THE INQUIRIES ACT 2013

**IN THE MATTER OF GOVERNMENT INQUIRY INTO HAVELOCK
NORTH DRINKING WATER**

**INTERIM REPORT AND RECOMMENDATIONS OF THE PANEL
FOLLOWING HEARING IN JUNE 2017**

14 JULY 2017

**INTERIM REPORT AND RECOMMENDATIONS OF THE PANEL
FOLLOWING HEARING IN JUNE 2017**

Introduction

- [1] A key requirement of the Terms of Reference for the Inquiry is to address the prevention of future contamination events and ways to minimise the risk of such events. In particular the Terms of Reference require the Inquiry to make recommendations on inter alia: “6. Any other matter which the Inquiry believes may promote the safety of drinking water and/or prevent the recurrence of similar instances”.
- [2] In its Interim Report dated 15 December 2016, the Inquiry made a number of recommendations relating to the safety of Havelock North drinking water for the next 12 months with the consent of all affected parties.
- [3] Between 27 and 29 June 2017, the Inquiry held a further hearing in the Hastings District Court. The purpose of the hearing was to consider two of the issues identified as part of the Stage Two investigation namely:
- (1) The current safety of Havelock North drinking water; and
 - (2) Drinking water partnerships and collaboration.
- [4] The scope and elements of these issues were identified in a paper “Stage Two Issues and Questions” issued with Minute No 8 dated 23 May 2017. The matters to be considered in relation to the first issue, current safety of Havelock North drinking water, included the following:
- (a) As concerns Brookvale bore 3 and its associated treatment plant: since re-opening on 7 March 2017, review its effectiveness, operational history, test results, maintenance and inspection schedule, any problems or concerns with it;
 - (b) Status of, and any plans for, Brookvale bore 2;
 - (c) HDC’s current WSP;
 - (d) HDC’s current Emergency Response Plan (ERP) for Drinking Water;

- (e) The status of, and plans for, the Hastings bores supplying Havelock North;
- (f) The investigative monitoring regime recommended by the Inquiry on 15 December 2016: results, proposals for continued investigative monitoring, issues arising out of investigative monitoring;
- (g) The experience of the JWG in overseeing current drinking water safety: effectiveness, progress, issues;
- (h) What aquifer investigations to date; status of, and plans for further investigating, the aquifers from which the Hastings bores and Brookvale bore 3 draw;
- (i) Status of, and plans for, treatment of all water supplied to Havelock North.

- [5] Importantly the matters to be considered included the Hastings bores. There were three reasons for this. First, Mr Thew of the HDC had advised the Panel that at various times throughout the year drinking water sourced from the Hastings bores was used to supplement the supply of drinking water to the residents of Havelock North. Second, the Inquiry was concerned at the number of transgressions in recent times involving E.coli readings in the Hastings bores. These have resulted in a number of the bores being classified as non-secure under the Drinking-water Standards for New Zealand 2005 (Revised 2008) (Drinking-water Standards), while others have now been rated as provisionally secure. Third, the recommendations made by the panel in December 2016 applied to the bores in both Brookvale Road and Hastings.
- [6] The Inquiry records that inclusion of consideration of the issue of monitoring and testing of Hastings bores as a central question at the June hearing, as well as its consideration at the hearing, occurred without demur from any of the Core Participants.
- [7] The Inquiry invited and received further evidence and submissions from the parties affected. The Panel heard oral evidence from a number of witnesses, including representatives of the Joint Working Group (Water Safety JWG) and executives of the Hastings District Council (HDC).

Issues concerning monitoring and testing

- [8] One of the questions canvassed with the parties at the June hearing involved whether the recommendations made following the December 2016 hearing

concerning monitoring and testing of Havelock North/Hastings drinking water should be amended or varied in any respects.

[9] The December 2016 recommendations concerning monitoring and testing comprised the following:

- (j) For at least the 12 months commencing as soon as practicable (but before Brookvale bore 3 is reactivated), monitoring and testing of the Havelock North and Hastings drinking-water supplies take place in accordance with the recommendations of Dr Fricker dated 6 December 2016 and, in particular, that the following minimum monitoring shall be carried out:
 - (i) 2-litre raw water samples be taken daily from each bore contributing to the supply of Havelock North drinking water;
 - (ii) total coliform and E.coli testing, using either Colilert 18 or such other effective and speedy test that the DWA approves;
 - (iii) enumerated tests for all reticulation samples and presence/absence testing for the 2 litre samples from the bores;
 - (iv) testing from the reticulation sites be continued in accordance with the DWSNZ and the requirements of the DWA;
 - (v) daily testing of FAC levels take place at the ends, and in the dead ends that are most at risk, of the reticulation with a pH level of less than 8 and with a required FAC level of at least 0.2mg/L, or an adjusted level if the pH level is greater than 8;
 - (vi) testing for disinfectant by-products take place as directed by the DWA; and
 - (vii) the test set out in (i) be carried out three times a day during and immediately after an abnormal wet weather event (this event, and the details of such increased testing, to be defined and prescribed by the Water Safety JWG).
- (k) For at least the four months commencing 12 December 2016, testing and monitoring for protozoa shall be carried out at each bore weekly using 1,000 litre samples, with the regime thereafter to be subject to review by the Water Safety JWG for frequency but still using 1,000 litre samples.
- (l) For the purpose of recommendation (k) above, the Eastbourne bores 2 - 5 should be treated as one bore.

[10] In relation to issues of monitoring and testing, the Inquiry heard expert evidence from Dr Dan Deere. At the suggestion of the Inquiry Dr Deere had been retained by HDC as an expert adviser on a wide range of issues including the

ongoing safety of the Havelock North and Hastings drinking water. The Inquiry is grateful for his ongoing involvement as expert adviser to HDC.

- [11] At the hearing there appeared to be a consensus that amending or varying the recommendations concerning monitoring and testing particularly recommendations (j), (k) and (l) was desirable. Dr Deere was invited to confer with Dr Fricker to prepare suitable amended recommendations for monitoring and testing.
- [12] At the conclusion of the June 2017 hearing, it had been hoped that it might be possible for the parties including HDC, the DHB and the DWAs to reach agreement as to recommendations concerning the safety of Havelock North and Hastings drinking water that were both necessary and reasonably practicable. It is unfortunate that such agreement has not been achieved.
- [13] Draft recommendations were developed with input from both Dr Deere and Dr Fricker. The DWAs were consulted through Mr Peter Wood. However an impasse was reached and the Inquiry suggested a telephone conference involving Dr Deere, Dr Fricker, Mr Wood, and Mr Thew of HDC. Counsel for HDC then advised that HDC was either unable or unwilling to participate in such telephone conference.
- [14] Despite the failure to agree on consent recommendations, the Inquiry Panel considers that it is appropriate that recommendations should be made. In formulating such recommendations the Panel has sought and considered advice from Dr Fricker. Such recommendations are in fact less onerous than the December 2016 recommendations. The Inquiry Panel also considers they are necessary in the interests of the ongoing safety of the Havelock North drinking water, and because the issues concern public health.
- [15] The Inquiry's expectation is that all members of the Water Safety JWG will co-operate to ensure that the amended recommendations are implemented.

Factual findings

- [16] The DWSNZ provide certain criteria for classifying a groundwater source as "secure". Essentially this means that the water can be supplied untreated and that monitoring for microbiological contamination is minimal. The Inquiry

accepts that water suppliers in New Zealand should follow DWSNZ as a minimum. However Stage 1 of the Inquiry has demonstrated that there is good reason to be sceptical about the concept of secure groundwater, particularly when this classification is made based upon mean water age and minimal microbiological monitoring. Within New Zealand in recent months, several groundwater sources that were classified under the DWSNZ as “secure” have been shown to contain the faecal indicator E.coli.

[17] The Inquiry recognises that DWSNZ has criteria in place for monitoring of “secure” and non-secure groundwater. These matters will be further considered during the August hearing. Nevertheless the evidence before the Inquiry raises concerns about the safety of drinking water emanating from the Hastings bores. It is for this reason that one of the recommendations made in December 2016 provided that:

- (i) For at least the 12 months commencing 12 December 2016, the Hastings water will be treated with chlorination, and that the Water Safety JWG should keep under review the nature and extent of treatment required to ensure the safety of the Hastings water being supplied to Havelock North.

[18] The Inquiry Panel considers that, given the circumstances currently existing in relation to both Brookvale bore 3 and the Hastings bores, it is unwise to rely on the “secure” classification in the DWSNZ. The Inquiry Panel is therefore of the view that notwithstanding any current classification that may have been made by a DWA, and notwithstanding also the provisions of the DWSNZ, the Inquiry should recommend that all bores from which the HDC draws drinking water which may be supplied to Havelock North should be managed as non-secure and potentially subject to the influence of surface water and/or at the risk of contamination from defects in the sewerage systems.

[19] This finding and recommendation is made in the interests of ensuring safe drinking water for the residents of Havelock North and as an important step in preventing the occurrence of a further contamination event.

Recommendations

[20] The Inquiry Panel therefore recommends as follows:

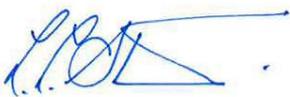
- (a) The recommendations in A(a) to (i) and (n) to (o) of the December 2016 recommendations be confirmed.
- (b) All bores from which HDC draws drinking water for supply to Havelock North or Hastings be managed as non-secure and potentially subject to the influence of surface water and/or at the risk of contamination from defects in the sewerage systems until or unless all four members of the Water Safety JWG and Dr Deere (or equivalent expert adviser) unanimously agree that any bore may be managed as secure.
- (c) The monitoring and testing of the Havelock North and Hastings drinking water supplies be subject to the following regime:
 - (i) 2-litre raw water samples be taken daily from each bore contributing to the supply of Havelock North drinking water that HDC deems to be “secure” or “provisionally secure” until a full calendar year’s worth of data has been collected. These samples are not necessary from bores that are deemed to be “non-secure”. For example, they are not necessary at Brookvale bore 3;
 - (ii) total coliform and E.coli testing is required on all samples, using either Colilert 18 or such other effective and speedy test that the DWA approves;
 - (iii) enumerated tests for all reticulation samples and presence/absence testing for the 2-litre samples from the bores;
 - (iv) testing from the reticulation sites be continued at the level currently in place;
 - (v) daily testing of FAC levels take place at the ends, and in the dead ends that are most at risk, of the reticulation with a pH level of less than 8 and with a required FAC level of at least 0.2mg/L, or an adjusted level if the pH level is greater than 8;
 - (vi) testing for disinfection by-products take place as directed by the DWA;
 - (vii) in any event the test set out in (i) should be carried out on three consecutive days after an abnormal wet weather event (this event, and the details of such increased testing, to be defined

and prescribed without delay by the Water Safety JWG following receipt of the advice being provided by Tonkin and Taylor).

- (d) Testing and monitoring for protozoa shall be carried out at each bore bi-weekly using 1,000 litre samples until the end of the year. These tests should also be carried out on three consecutive days after an abnormal wet weather event (this event, and the details of such increased testing, to be defined and prescribed by the Water Safety JWG).
- (e) The Water Safety JWG, with support from the Ministry of Health as required, satisfy itself that persons carrying out sampling and testing are properly trained and competent, that the testing methods being used are as sensitive and effective as practicable, and that the test processes are being carried out in a way that is optimal in terms of timing, efficiency, and result-reporting.

[21] Any issues concerning the implementation of the above recommendations are to be referred in the first instance for discussion and resolution by the Water Safety JWG.

[22] The above recommendations should be issued forthwith to the parties who have provided an address for service to the Inquiry and published on the Inquiry's website.



Hon Lynton Stevens QC



Dr Karen Poutasi CNZM



Anthony Wilson ED*

Contact details for Head of Secretariat:
Blair Cairncross
HavelockNorth.Water@dia.govt.nz
Telephone: (09) 363 9537
P O Box 796,
Shortland Street
Auckland 1140

APPENDIX 2

Issue 3: Drinking-water safety and compliance levels in New Zealand

Reporting and Compliance with the Drinking Water Standards for New Zealand

[1] The Health Act 1956 defines a 'drinking-water supplier' as a person who supplies drinking water to people in New Zealand or overseas from a drinking-water supply including networked suppliers (a piped supply to one or more properties), water carriers, designated ports and airports, and bulk suppliers. It does not include temporary suppliers or self-suppliers.

[2] The Act categorises supplies into Large (those serving greater than 10,001 people), Medium (serving 5,001 to 10,000), Minor (501 to 5,000), Small (101 to 500), Neighbourhood (25 to 100), and Rural Agricultural (one in which 75% or more of the water is used for agriculture and is not drunk by people or used for food preparation).

[3] All suppliers of a neighbourhood supply or larger must take all practicable steps to comply with the DWSNZ. This obligation was introduced progressively from 1 July 2012 (large supplies) to 1 July 2016 (neighbourhood and rural agricultural supplies).

[4] The Director-General of Health must publish annually a report on compliance or non-compliance with the standards for each drinking water supplier other than neighbourhood supplies.

[5] In effect, this means that although all supplies serving more than 25 people are required to meet the standards, statistics providing a national picture of compliance are only available for supplies serving 101 or more people.

Compliance by population

[6] The table below shows the population serviced by drinking water that complies with the bacteriological, protozoa and chemical requirements of the DWSNZ for the period 2009 until 2016. These figures are extracted from the annual reports on drinking water but the figures for 2009/10 and 2010/11 have been adjusted to exclude smaller supplies to enable comparison with subsequent years for which data was only reported for supplies that serve more than 101 people. Also included on the table are the preliminary results for 2016/17

National: Supplies serving more than 101 people (compliance required in all by 1 July 2015)¹⁴⁴

Period	Population	Bacteriological	Protozoa	Chemical	Fully ¹⁴⁵	Percent Fully	Change
2009/10	3,820,000	3,676,000	2,973,000	3,683,000	2,917,000	76.3	
2010/11	3,402,000	3,309,000	2,690,000	3,303,000	2,671,000	78.5	2.2
2011/12	3,807,000	3,648,000	3,039,000	3,645,000	2,920,000	76.7	-1.8
2012/13	3,810,000	3,684,000	3,017,000	3,631,000	2,930,000	76.9	0.2
2013/14	3,829,000	3,723,000	3,093,000	3,728,000	3,023,000	79.0	2.1
2014/15	3,787,000	3,666,000	3,030,000	3,737,000	3,008,000	79.4	0.4
2015/16	3,791,000	3,699,000	3,109,000	3,732,000	3,032,000	80.0	0.6
2016/17	3,815,000	3,669,000	3,170,000	3,708,000	3,094,000	81.1	1.1

[7] From the above it can be seen that although the compliance timetable was established in 2007 (and extended in 2009) there are still 759,000 people (20% of the serviced population) supplied by supplies where the water was not demonstrably safe to drink. Of these 92,000 are at risk of bacterial infection, 681,000 of protozoal infection and 59,000 at risk from the long-term effects of exposure to chemicals. Based on the preliminary figures for 2016/17 721,000 remain at risk.

[8] There has been a very gradual improvement in overall compliance of 3.7% in the last seven years, with a 2.0% improvement in both bacteriological and chemical compliance and a 4.0% improvement in protozoal compliance over the same period. Although direct comparison with earlier years is not possible, as both the standards and the questionnaire used to assess compliance have changed, in the 2005 calendar year the overall compliance rate was 80%. This suggests that in the period 2005 to 2016 no progress at all has been made in compliance with the relevant standards applicable at the time.

[9] The non-compliance is higher in the smaller supplies as set out in the tables below:

¹⁴⁴ In 2015/16 there were 496 supplies serving more than 100 people each.

¹⁴⁵ A supply is considered fully compliant if it meets the bacteriological, protozoal and chemical standards.

Large Supplies – Supplies serving greater than 10,001 each (compliance required by 1 July 2012)¹⁴⁶

Period	Population	Bacteriological	Protozoa	Chemical	Fully	Percent Fully	Change
2009/10	3,035,000	3,009,000	2,675,000	2,963,000	2,630,000	86.6	
2010/11	*2,601,000	2,601,000	2,376,000	2,558,000	2,376,000	91.4	4.8
2011/12	2,992,000	2,947,000	2,694,000	2,890,000	2,611,000	87.3	-4.1
2012/13	2,989,000	2,960,000	2,653,000	2,902,000	2,591,000	86.7	-0.6
2013/14	3,002,000	2,977,000	2,692,000	2,976,000	2,667,000	88.9	2.2
2014/15	2,940,000	2,914,000	2,599,000	2,940,000	2,599,000	88.4	-0.5
2015/16	2,947,000	2,922,000	2,650,000	2,932,000	2,610,000	88.6	0.2
2016/17	2,957,000	2,895,000	2,655,000	2,894,000	2,615,000	88.4	-0.2

*In 2010/11 data for Christchurch was not collected due to the Canterbury Earthquakes

Overall improvement in compliance 2009 to 2016: **2.0%**. (2009 to 2017 **1.8%**)

Medium Supplies – Supplies serving 5,001 to 10,000 each (compliance required by 1 July 2013)¹⁴⁷

Period	Population	Bacteriological	Protozoa	Chemical	Fully	Percent Fully	Change
2009/10	237,000	206,000	115,000	218,000	115,000	48.6	
2010/11	262,000	243,000	128,000	245,000	118,000	45.2	-3.4
2011/12	268,000	237,000	140,000	242,000	116,000	43.1	-2.1
2012/13	264,000	250,000	150,000	223,000	142,000	53.6	10.5
2013/14	270,000	264,000	155,000	237,000	143,000	52.9	-0.7
2014/15	274,000	254,000	173,000	261,000	165,000	60.2	7.3
2015/16	280,000	280,000	189,000	274,000	183,000	65.2	5.0
2016/17	295,000	264,000	226,000	282,000	214,000	72.5	7.3

Overall improvement in compliance 2009 to 2016: **16.6%** (2009 to 2017 **23.9%**)

Minor Supplies – Supplies serving 501 to 5,000 each (compliance required by 1 July 2014)¹⁴⁸

Period	Population	Bacteriological	Protozoa	Chemical	Fully	Percent Fully	Change
2009/10	465,000	405,000	169,000	420,000	158,000	34.1	
2010/11	457,000	406,000	171,000	420,000	162,000	35.5	1.4
2011/12	464,000	409,000	187,000	431,000	176,000	38.0	2.5
2012/13	474,000	415,000	194,000	427,000	179,000	37.8	-0.2
2013/14	477,000	424,000	228,000	437,000	197,000	41.2	3.4

¹⁴⁶ In 2015/16 there were 42 large supplies serving greater than 10,001 people each.

¹⁴⁷ In 2015/16 there were 24 supplies serving 5,001 to 10,000 people each.

¹⁴⁸ In 2015/16 there were 195 supplies serving 501 to 10,000 people each.

Period	Population	Bacteriological	Protozoa	Chemical	Fully	Percent Fully	Change
2014/15	494,000	440,000	238,000	457,000	228,000	46.1	4.9
2015/16	489,000	439,000	248,000	453,000	221,000	45.1	-1.0
2016/17	487,000	451,000	254,000	458,000	242,000	49.6	4.5

Overall improvement in compliance 2009 to 2016: **11.0%** (2006 to 2017 **15.5%**)

Small Supplies – Supplies serving 101 to 500 each (compliance required by 1 July 2015)¹⁴⁹

Period	Population	Bacteriological	Protozoa	Chemical*	Fully	Percent Fully	Change
2009/10	83,800	56,300	14,600	82,300	13,600	16.2	
2010/11	81,700	58,600	15,600	80,800	13,800	16.9	2.2
2011/12	82,100	56,200	18,700	81,300	16,800	20.4	3.5
2012/13	81,700	59,100	19,600	79,100	17,900	21.9	1.5
2013/14	79,700	57,200	18,800	77,500	16,500	20.7	-1.2
2014/15	78,800	58,800	19,700	78,000	16,600	21.0	0.3
2015/16	74,600	58,100	21,900	73,200	18,700	25.0	4.0
2016/17	75,600	60,000	25,800	73,900	23,800	31.5	6.5

*Small supplies are not necessarily required to be assessed for chemical constituents and so gained compliance by default unless there was a known non-compliance

Overall improvement in compliance 2009 to 2016: **8.8%** (2009 to 2017 **15.3%**)

[10] It can be seen that compliance by population reduces from 88.8% for large supplies to 25.0% for small supplies, although the greatest progress in making improvements has been in the medium supplies (16.6% compared with 2.2 % for large ones).

[11] With the exception of medium supplies, which showed a 10.5% increase in 2012/13, there is no evidence that compliance has improved significantly in the period leading up to the time by which compliance was required.

[12] Of note is that bacteriological compliance for small supplies was only 78% in 2015/16, compared with 67% in 2009/10. This only increased to 79% in 2016/17.

Compliance by treatment plant

[13] The registration of water supplies in the Drinking Water Register breaks down a supply by source, treatment plant and zone. A supply may have multiple zones, treatment plants and sources. A treatment plant is the location where disinfection

¹⁴⁹ In 2015/16 there were 235 supplies serving 101 to 500 people each.

occurs, however if the water is not disinfected or treated in another way, the supply will have a registered treatment plant, even if it is only a notional one. A treatment plant may have multiple sources including several bores in a well field.

[14] ESR provided the Inquiry with data on the compliance by treatment plant for the period 2009 to 2016.

[15] This data shows that there are currently 573 “treatment plants” serving large, medium, minor and small supplies, of which 123 have no treatment. Those without treatment serve a population of 640,625.

[16] Of the 123 without treatment, 67% complied with the bacteriological standards, 59% with the protozoal standards, and 100% with chemical standards, giving an overall compliance of 52.8% in 2015/16. This compares with an overall compliance of 29.3% in 2009/10 when there were 167 “plants”.

[17] Compliance for all 573 plants was 69% bacteriological, 41% protozoal, and 99% chemical with an overall compliance of 38.2% in 2015/16, compared with 21.7% in 2009/10 when there were 607 plants.

[18] Analysis of the supply sizes show the highest compliance for large supplies (80.8%) reducing to 57.7% for medium supplies, 43.3% for minor and 25.2% for small ones. There is also a trend towards fewer treatment plants, indicating an increasing interconnection of supplies to large plants.

Waterborne disease statistics

[19] The New Zealand notifiable disease database (EpiSurv) records the following diseases which can be transmitted by the consumption of contaminated water. Records for the period 2008 to 2016 are shown below. Not all acute cases of gastroenteritis are notifiable, only those where there is a suspected common source; the person is in a high risk category e.g. a food handler or childcare worker; or single cases of chemical, bacterial or toxic food poisoning.

Disease	Campylobacteriosis	Cryptosporidiosis	Gastroenteritis	Giardiasis	Total
2008	6,694	764	686	1,660	9,804
2009	7,177	854	712	1,639	10,382
2010	7,346	954	493	1,985	10,778
2011	6,686	610	567	1,934	9,797
2012	7,016	877	735	1,714	10,342
2013	6,837	1,348	557	1,729	10,471

Disease	Campylobacteriosis	Cryptosporidiosis	Gastroenteritis	Giardiasis	Total
2014	6,782	584	756	1,709	9,831
2015	6,218	696	503	1,510	8,927
2016	7,456	1062	512	1,616	10,646
Totals	62,212	7,749	5,521	15,496	90,978

[20] While the diseases above have been associated with outbreaks in New Zealand, the majority of cases are not likely to be due to water sources. For example in 2015 only 50 of the 1,510 cases of giardiasis (3.3%); 23 of the 6,218 of campylobacteriosis (0.4%); and 5 of the 696 of cryptosporidiosis (3.3%) were reported as part of a waterborne disease outbreak.

[21] A common cause of infection of all the above diseases is untreated water supplies serving individual dwellings. Other common causes include ingestion while swimming for giardiasis, and contact with farm animals or attending day-care centres for cryptosporidiosis. Infection rates are seasonal and, in the case of animal contact, increase at times of lambing and calving.

Boil Water Notices

[22] As part of the annual report into drinking water compliance, information on boil water notices is collected, but not published, for all networked supplies serving over 100 people. The survey does not specifically record information on the reasons for each notice being issued, nor the duration for temporary notices.

[23] The table below lists the population affected by such notices for the period 2009-2016.

Period	Population affected by Boil Water Notices			
	Survey population	Temporary	Permanent	Temporary and Permanent
2009/10	3,820,000	55,000	9,200	64,000
2010/11	3,402,000	84,000	8,100	92,000
2011/12	3,807,000	*272,000	9,300	281,000
2012/13	3,810,000	52,000	9,100	62,000
2013/14	3,829,000	37,000	6,200	43,000
2014/15	3,787,000	63,000	5,000	68,000
2015/16	3,791,000	8,100	7,200	15,000

*Includes large parts of Christchurch after the earthquakes

[24] In 2015-16, 44 supply zones had boil water notices issued, of which 26 were permanently in place, serving a population of 7,200 people. With the data available, it is not possible to derive an estimate of a combined people day measure.

International Comparison

[25] International comparisons of the safety of drinking water prove difficult given the vast array of regulatory requirements and standards. This section provides some brief notes on the safety of water in England, Wales, Scotland, Ireland and Finland.

[26] Drinking-water supplied in each of these states must, as a minimum, meet the standards laid down in the EU Drinking Water Directive. This Directive specifies that water must be free from any microorganisms, parasites (protozoa) or any other substances which constitute a potential danger to human health. The United Kingdom and Finland have incorporated these requirements into domestic legislation.

[27] As in New Zealand, maximum acceptable values are specified for a number of bacteriological and chemical parameters such as E.coli (0/100ml). No specific parameters are specified for protozoa, rather a risk based approach is used. This is accepted as being best practice.

Bacteriological compliance

England and Wales

[28] Compliance figures for E.coli are reported separately for five areas: Central and Eastern; London; Northern; Western; and Wales. The data for each region is further divided into compliance at treatment plants, service reservoirs and customers' taps. In the five years 2011-2015, all categories for all areas had >99.99% compliance. Figures are also quoted for "private supplies" for the whole of England and Wales. These are small systems that are not owned, maintained and run by water supply companies. The E.coli compliance figures for private supplies were: 2011, 89.4%; 2012, 86.1%; 2013, 89.1%; 2014, 87.2% and 2015, 91.1%.

Finland

[29] For Finland, figures are only available for systems supplying greater than 5000 people. Compliance in the years 2011–2015 was >99.99% for E.coli.

Ireland

[30] In Ireland, the water supply is managed by local councils. Information is reported for approximately 30 regions, although the actual number of regions varies by year. There are approximately 700 group water schemes and a number of private supplies. Group water schemes are small systems privately run by the local community. They account for water supply to approximately 7% of the population.

Compliance data are not readily available for the group water schemes but the proportion that is non-compliant is high.

Compliance figures for systems currently run by Irish Water

Year	Mean compliance	Percentage of regions with 100% compliance	Lowest compliance rate within a region
2011	99.8%	73.5%	94.9%
2012	98.6%	59.8%	94.5%
2013	99.2%	51.6%	95.2%
2014	99.1%	37.9%	92.3%
2015	98.9%	67.7%	49.4%

Scotland

Data is available for systems run by Scottish Water and for “private supplies”.

Compliance data for systems run by Scottish Water, water leaving treatment plant

<i>Coliform Bacteria</i>	2015	2014	2013	2012	2011
Number of tests	24,866	26,814	26,888	27,305	28,792
Number containing coliforms	16	40	17	33	49
Percentage free from coliforms	99.94%	99.85%	99.94%	99.88%	99.83%
<i>E.coli</i>					
Number of tests	24,865	26,814	26,888	27,304	28,794
Number containing faecal coliforms	0	2	1	3	5
Percentage free from faecal coliforms	100%	99.99%	99.99%	99.99%	99.99%

Compliance data for systems run by Scottish Water, service reservoirs:

<i>Coliform Bacteria</i>	2015	2014	2013	2012	2011
Number of tests	49,575	51,533	51,523	52,226	51,952
Number containing coliforms	63	104	73	109	122
Percentage free from coliforms	99.87%	99.8%	99.86%	99.79%	99.77%
<i>E.coli</i>					
Number of tests	49,573	51,533	51,591	52,226	51,952
No. containing faecal coliforms	5	2	5	7	13
Percentage free from faecal coliforms	99.99%	100%	99.99%	99.99%	99.97%

Compliance data for systems run by Scottish Water, customer taps:

<i>Coliform Bacteria</i>	2015	2014	2013	2012	2011
Number of tests	14103	14,055	14,107	14,215	14,231
Number containing coliforms	34	63	50	61	60
Percentage free from coliforms	99.76%	99.55%	99.65%	99.57%	99.58%

<i>E.coli</i>					
Number of tests	14,100	14,055	14,107	14,215	14,230
No. containing faecal coliforms	1	2	3	2	2
Percentage free from faecal coliforms	99.99%	99.99%	99.98%	99.99%	99.99%

[31] Private water supplies are classified as type A or type B. Type A supplies serve greater than 50 consumers or produce 10 cubic metres per day or supply commercial premises (e.g. bed and breakfast, cafes etc).

Type A supplies

<i>Coliform Bacteria</i>	2015	2014	2013	2012	2011
Number of tests	2114	2266	2138	2167	1946
Number containing coliforms	444	549	530	585	570
Percentage free from coliforms	79%	75.8%	75.2%	73%	70.7%
<i>E.coli</i>					
Number of tests	2116	2264	2135	2158	1944
No. containing faecal coliforms	261	303	290	333	294
Percentage free from faecal coliforms	87.7%	86.6%	86.4%	85%	84.9%

Type B supplies

<i>Coliform Bacteria</i>	2015	2014	2013	2012	2011
Number of tests	1381	1127	1167	1776	1307
Number containing coliforms	515	486	478	730	544
Percentage free from coliforms	62.7%	56.9%	59%	40.1%	58.6%
<i>E.coli</i>					
Number of tests	1382	1128	1167	1797	1302
No. containing faecal coliforms	254	244	236	429	289
Percentage free from faecal coliforms	81.6%	78.4%	79.8%	23.9%	77.8%

Protozoa Compliance

[32] In England, Wales and Scotland, there are virtually no non-compliances with the cryptosporidium regulations. Risk assessments have been completed for all potentially at risk sources and most sources deemed to be at risk have appropriate monitoring programs in place.

[33] In Ireland, there are many sources with inadequate treatment and boil water notices are relatively common to protect against infection with cryptosporidium.

APPENDIX 3

A Selected Brief History of Dedicated Supplier Consideration in New Zealand

Background

[1] In 1989, Cabinet approved a major review of the sector to be led by the Ministry of Commerce. With the change of government in 1999, LGNZ accepted the responsibility for the review but it was not progressed.

[2] In 2000 the Parliamentary Commissioner for the Environment, after studying the existing arrangements, reported:¹⁵⁰

I believe industry and community evidence indicates that the 'model' has now reached the end of its design life. Further incremental tinkering with the current systems, without going back to first principles of community water and wastewater needs relevant to the 21st century, will simply mean the necessary changes will be harder to achieve and more costly at some time in the future.

[3] The Auditor-General in 2010 undertook a performance audit of a representative sample of eight local authorities to assess how well prepared the country was to meet the likely future demand for drinking water. Among her findings were weaknesses in the adequacy of forecasting models and opportunities for how the management water supplies could be improved.¹⁵¹

[4] More recently, in 2011 the Land and Water Forum recommended:¹⁵²

The way water services infrastructure is managed and organised should be investigated to consider the potential benefit of rationalisation. This includes the possibility of a national regulator with oversight of pricing and performance issues.

[5] Also in 2011, Cabinet approved a work programme in a paper entitled '*Smarter government, stronger communities, towards better local governance and public*

¹⁵⁰ Office of the Parliamentary Commissioner for the Environment. June 2000: *Ageing Pipes and Murky Waters: Urban Water Systems for the 21st Century* <http://www.pce.parliament.nz/publications/archive/1997-2006/ageing-pipes-and-murky-waters-urban-water-system-issues-for-the-21st-century>

¹⁵¹ Controller and Auditor –General Local Authorities: Planning to meet the forecast demand for drinking water. February 2010 <https://www.oag.govt.nz/2010/water/index.htm>

¹⁵² Land and Water Forum. 2010. *Report of the Land and Water Forum: A Fresh Start for Freshwater*, p5 Recommendation 50, http://www.landandwater.org.nz/land_and_water_forum_report.pdf.

services'.¹⁵³ This included The Local Government Act 2002 Amendment Bill (No 2) currently before the House.

[6] The Government's National Infrastructure Plan 2011¹⁵⁴ gave water infrastructure the lowest ranking of all New Zealand's infrastructure sectors across measures of investment analysis, resilience, funding mechanisms, accountability, performance and regulation.

[7] In response to this assessment, in 2013 LGNZ established a major work programme (The 3 Waters Project)¹⁵⁵ to establish a clearer picture of the performance of local government three waters related assets and services, to better understand future issues, and to develop a robust framework for building on best practice.

[8] The core findings of this project are that the local government sector faces current and future challenges in terms of the provision of water assets and services. These challenges include the ability and capacity of water service providers to meet and implement regulatory standards and the variations in the quality of asset management throughout the country.

[9] The project recommended that the establishment of a single co-regulatory body similar to that which operates under Part 4A of the Gas Act 1992, to oversee the provision of water related assets and services, was an appropriate option to drive improvement.

[10] Concurrently in 2013, the Minister of Local Government appointed a Local Government Infrastructure Efficiency Expert Advisory Group whose report¹⁵⁶ included 63 recommendations covering legislation, regulation and standards; a water framework; training; improved business practices; funding and pricing; transparency; increased coordination and removal of barriers to shared services, and greater use of regional provision to deliver regional solutions.

¹⁵³ New Zealand Government Cabinet paper, 13 April 2011: Smarter government, stronger communities, towards better local governance and public services. <http://www.dia.govt.nz/Resource-material-Our-Policy-Advice-Areas-Smarter-Government-Stronger-Communities>

¹⁵⁴ <http://www.infrastructure.govt.nz/plan/2011>.

¹⁵⁵ Local Government New Zealand Stage 2 Submission 3 July 2017.

¹⁵⁶ Report of the Government Infrastructure Efficiency Expert Advisory Group Department of Internal Affairs 22 March 2013 <https://www.dia.govt.nz/.../Infrastructure-Efficiency-Expert-Advisory-Group.../LG-Inf>

[11] In 2014 the Auditor-General undertook an overview of the approach that local authorities were taking to manage in managing their infrastructure assets.¹⁵⁷ The overall finding was that local government infrastructure and capital management practices needed to improve to meet the challenges ahead.

[12] Special purpose entities for water services are not new to New Zealand. The Christchurch Drainage Board was established in 1875 and existed for 114 years, until the local government reforms of 1989. The Wellington Regional Water Board Act 1972 is still extant and superseded legislation going back to the 1870s. The Board's functions are now undertaken by the Greater Wellington Regional Council and Wellington Water Ltd.

[13] Other examples include the Hobson Bay Watershed Sewage Board (c1900), and Arch Hill Gully Drainage Board (1903), both of which became part of the Auckland Drainage Board in 1908 and are now part of Watercare; and the Hutt Valley, Dunedin and North Shore Drainage Boards.

[14] The Local Government (Auckland Council) Act 2009 created a special purpose entity for water and wastewater (Watercare Services Ltd), a CCO 100% owned by the Auckland Council.

[15] In Wellington the four city councils (Wellington, Porirua, Hutt and Upper Hutt) together with the Greater Wellington Regional Council, have created a jointly owned CCO (Wellington Water Ltd) to manage water supply, wastewater and stormwater. These local government entities concluded that the range of technical skills necessary to ensure the appropriate level of capability and capacity were better resourced collectively than in isolation.

[16] The Local Government Commission has recently commissioned an external review of Wellington Water Ltd¹⁵⁸ which found:

The Wellington Water model is in its infancy but is showing good signs of providing a more efficient and effective service than those of the previous individual arrangements... The model of a 'trusted advisory service' built on key personnel has started the journey to provide the five councils with critical asset information on which they can plan key investment on a more informed regional wide basis. The establishment of a 'centre of excellence' model needs the right level of resource funding to build on the expertise, which initially attracts

¹⁵⁷ Controller and Auditor-General. Water and Roads: Funding and management challenges November 2014 <https://www.oag.govt.nz/2014/assets>

¹⁵⁸ <http://www.lgc.govt.nz/assets/Wellington-Reorganisation/Mott-MacDonald-3-Waters-Review-June-2016-PDF.pdf>

additional company costs. .. The (shareholding councils) felt that they were getting better value than previously in terms of the service provided.

[17] Three local authorities in the Waikato, (Hamilton City, Waikato and Waipa District Councils) have been consulting with their communities for a number of years about a joint CCO. Originally proposed in 2012 by the Waikato Mayoral Forum, an entity to cover all 10¹⁵⁹ local authorities in the region was investigated.

[18] The initial November 2012 report¹⁶⁰ found:

Two challenges stood out for the water and wastewater activity - growth pressures in parts of the Hamilton, Waikato and Waipa councils, and resilience for most (if not all) the councils, but especially the smaller ones. By resilience we mean the financial, technical and organisational capacity to maintain a high quality service on an ongoing basis. This includes the ability to attract and retain highly specialist and skilled staff, address technical issues, meet demanding environmental outcomes, cope in the event of an emergency etc. Shared services are of value in addressing both these challenges.

[19] Despite the smaller councils having the potential to accrue the greatest benefit from a shared services option, only the three largest elected to proceed to further investigation. Reasons for not proceeding by the others included statutory limitations, implications for the critical mass and sovereignty of some councils, employment concerns, and that savings for some of the smaller ones might not be easily realised *“as they appear to be run on the smell of an oily rag”*.

[20] Since 2012, despite numerous costly reports, one of which estimated financial benefits in the range of \$107M to \$141M in the first 10 years, (a savings of up to 10 per cent water and wastewater rates)¹⁶¹, the Waikato proposal has yet to progress. The public consultation has resulted in the proposal being a local election issue in both the 2013 and 2016 elections, and remains contentious. The problems (and opportunities) have been overwhelmed by the politics.

[21] There are also examples of joint arrangements in Tasman, Nelson, Taranaki and Manawatu/Rangitikei.

¹⁵⁹ The report studied 11 councils as Rotorua District Council was included.

¹⁶⁰ A Strategic Review of the Opportunities Arising From ‘Shared Services’ Relating to the Water and Wastewater Activities of Territorial Authorities in the Waikato Region: [http://www.waterstudywaikato.org.nz/uploads/files/Final%20Stage%201%20Report%20to%20the%20Waikato%20Mayoral%20Forum%20DRH-sml%20\(1\).pdf](http://www.waterstudywaikato.org.nz/uploads/files/Final%20Stage%201%20Report%20to%20the%20Waikato%20Mayoral%20Forum%20DRH-sml%20(1).pdf).

¹⁶¹ Cranleigh et al. Business Case for Water Services – Delivery Options 6 May 2015: <http://www.waterstudywaikato.org.nz/uploads/files/Part%20B%20-%20Final.pdf>

APPENDIX 4

TABLE OF MEDIA REPORTED DRINKING WATER SUPPLY QUALITY ISSUES DURING THE INQUIRY				
	Date issue identified	Location	Notes	Source
1	23 August 2016	Haumoana School (Hawke's Bay)	Positive E.coli test. Source disconnected from supply.	http://www.radionz.co.nz/news/national/311663/haumoana-school-closed-due-to-e-coli
2	27 August 2016	Kaimanawa (Hauraki District)	E.coli detected in Kaimanawa. Boil water notice issued. Chlorine dosing fault discovered and repaired. Network flushed.	http://www.stuff.co.nz/waikato-times/news/hauraki-herald/92844005/water-all-clear-for-mackaytown-and-karangahake-residents http://www.hauraki-dc.govt.nz/services/water/water-quality-monitoring/
3	1, 2 September 2016	Pahiatua (Taranua District council)	Two positive tests from bore in town. Consequently Pahiatua bore lost its secure status Supply chlorinated and boil water notice issued. Boil water notice lifted 7 September 2016	http://www.stuff.co.nz/manawatu-standard/news/85080167/pahiatua-water-safe-to-drink-but-may-never-be-secure-again http://www.stuff.co.nz/national/health/83845337/possible-water-contamination-in-pahiatua-leads-to-boil-water-notice
4	7 September 2016	Foxton (Horowhenua District Council)	Ongoing discolouration of water caused by old pipes. Water considered safe to drink and no boil water notice put in place. Some residents resorted to privately treating their water to remove discolouration.	http://www.nzherald.co.nz/index.cfm?objectid=11705494&ref=twitter
5	7 October 2016	Northwest Christchurch	Water pump station shut down after receiving calls about discolouration of water. Residents advised to run outside tap for 10-15 minutes to remove remaining cloudy water from household pipes.	http://www.stuff.co.nz/the-press/news/85070845/cloudy-water-concerns-local-residents-after-bad-risk-rating

TABLE OF MEDIA REPORTED DRINKING WATER SUPPLY QUALITY ISSUES DURING THE INQUIRY				
	Date issue identified	Location	Notes	Source
6	21 October 2016	Geraldine	Treated with chlorine following “discovery of a single E.coli bacterium at two locations”. Supply usually only treated with UV.	http://www.stuff.co.nz/timaru-herald/news/85610854/geraldine-drinking-water-treated-with-chlorine-after-discovery-of-ecoli-during-water-testing
7	11 November 2016	Tokomaru water supply (Horowhenua District Council)	Boil water notice issued following heavy rainfall. Lifted on 15 November 2016.	http://www.horowhenua.govt.nz/Public-Notices/Boil-Water-Notice-lifted-Tokomaru-Water-Supply?OC_EA_PublicEmergencyAnnouncementList_Dismiss=18678cc4-63d3-4963-a37f-822a658f5f9c
8	11 November 2016	Hurunui, Ward and Seddon North Canterbury/Hurunui District. Also Raglan in North Island.	Boil water notices issued following earthquake.	https://www.tvnz.co.nz/one-news/new-zealand/600-evacuated-kaikoura-third-day-after-quake-closes
9	11 November 2016	Richmond	Temporary chlorination of water between 11-14 November 2016 while work was undertaken on major pipes.	http://www.tasman.govt.nz/council/media-centre/public-notices-archive/public-notices-archive-2016/temporary-chlorination-of-richmonds-water/
10	14 November 2016	Kaikoura District Council – multiple areas	Boil water notices issued for Kaikōura town, Ocean Ridge, and Oaro, Fernleigh, east coast rural and Peketa supplies following earthquake. Kaikōura town and Ocean Ridge notices lifted on 23 December.	http://www.radionz.co.nz/news/kaikoura-earthquake/321139/kaikoura-boil-water-notice-lifted
11	14 November 2016	Peketa (Kaikoura District Council)	Continuing low level bacterial contamination at source following earthquake. Boil water notice issued “..please boil all drinking/cooking water for at least 1 minute before you use it”	http://www.stuff.co.nz/national/nz-earthquake/87908488/kaikoura-boilwater-notice-lifted-ahead-of-christmas https://www.kaikoura.govt.nz/latest-news/boilwater/

TABLE OF MEDIA REPORTED DRINKING WATER SUPPLY QUALITY ISSUES DURING THE INQUIRY				
	Date issue identified	Location	Notes	Source
12	2 December 2016 (Colin Street bore)	Lower Hutt	Three positive tests for E.coli, in different locations, all sourced from same aquifer over course of five months.	http://www.nzherald.co.nz/nz/news/article.cfm?c_id=1&objectid=11795064
	4 February 2017 (Naenae Reservoir)	Water sourced from Waiwhetu Aquifer at Colin Street bore, Naenae Reservoir, Mahoe Street bore.	Water chlorinated immediately and this was published on the Hutt City Council facebook page. No boil water notices issued.	http://www.gw.govt.nz/chlorination-of-lower-hutts-water-supply-to-continue/
	12 April 2017 (Mahoe Street bore)		The second two transgressions were reported in the news and information put in the 'news' section on the Wellington Water, Hutt City and Greater Wellington websites.	http://www.huttcity.govt.nz/Services/Water-services/chlorination-of-lower-hutts-water-supply/ https://wellingtonwater.co.nz/your-water/drinking-water/waiwhetu-aquifer/
			There is now information about the transgressions, chlorination and investigations on the Wellington Water, Hutt City, and Greater Wellington's websites. The test results themselves are not published.	http://www.stuff.co.nz/national/health/92182391/expert-wants-details-of-ecoli-in-lower-hutts-aquifer-made-public
			Massey University School of Public Health, Senior Lecturer Stanley Abbott is recorded as saying he is concerned that Wellington Water is withholding the level of E.coli found in a positive test result from the Waterloo well on 12 April 2017 and wants it made public	http://wellington.scoop.co.nz/?p=101791
			10 August 2017 - Waiwhetu Acquifer – Greater Wellington Regional Council voted to permanently chlorinate the water.	

TABLE OF MEDIA REPORTED DRINKING WATER SUPPLY QUALITY ISSUES DURING THE INQUIRY				
	Date issue identified	Location	Notes	Source
13	5 December 2016	Queenstown (Arrowtown, Hawea and Glendhu Bay) – Queenstown Lakes District Council	Council decided to proactively chlorinate water in these areas as a precaution during busy tourist season. Usually these areas are not chlorinated.	http://www.radionz.co.nz/news/national/319663/queenstown-communities-to-get-chlorinated-water
14	12 December 2016	Amberley/Amberley Beach (Hurunui District Council)	Detection of low level E.coli. “Precautionary temporary boil water notice” issued stating “all drinking water ...should be boiled for at least 1 minute before consumption”. Supply chlorinated through to 19 January 2017. No cause for contamination identified.	http://www.hurunui.govt.nz/assets/Boil-Water-Notice-Temporary.pdf
15	20 December 2016	Punakaiki (Buller District Council)	Boil water notice issued from 20 December 2016 to 31 May 2017 due to the poor quality of the raw water supplying the treatment plant. Excessive bacterial and protozoal counts and plant had inadequate filtration. “Consumers will be required to boil all drinking water and water used for food preparation until further notice”. Boil water notice lifted after new filter at treatment plant installed and test results clear – 31 May 2017.	http://www.stuff.co.nz/the-press/news/west-coast/93202314/boil-water-notice-lifted-at-west-coast-tourist-hot-spot-punakaiki http://bullerdc.govt.nz/punakaik-boil-water-notice-20122016/ http://www.stuff.co.nz/the-press/news/west-coast/93202314/boil-water-notice-lifted-at-west-coast-tourist-hot-spot-punakaiki
16	January - April 2017	Taylorville (Grey District Council) Runanga (Grey District Council)	Positive E.coli results. Boil water notice issued.	http://www.stuff.co.nz/national/91505741/boil-water-notices-plague-the-west-coast
17	18 January 2017	Arthur’s Pass water supply (Selwyn District Council)	Boil water notice issued following flooding and slips. No E.coli detected.	https://www.tvnz.co.nz/one-news/new-zealand/boil-water-notice-flooding-and-slips-force-closure-arthurs-pass-lewis
18	26 January 2017	Otama Rural Water Scheme, Pyramid Bridge Pump station (Gore District)	Presence of E.coli detected, boil water notice issued. Scheme is meant to be for stock water only.	http://www.stuff.co.nz/southland-times/news/88786038/Boil-water-notice-issued-for-Otama-water-scheme

TABLE OF MEDIA REPORTED DRINKING WATER SUPPLY QUALITY ISSUES DURING THE INQUIRY				
	Date issue identified	Location	Notes	Source
19	January/February 2017	Westland District –Arahura, Kumara	E.coli detected in Arahura and Kumara supplies. Boil water notices issued. In February, the Kumara supply was chlorinated due to ongoing detection of E coli.	http://www.stuff.co.nz/national/91505741/boil-water-notices-plague-the-west-coast http://www.kumarawestcoast.org/latest-news/2017/2/8/kumara-water-situation-update-8217 http://www.kumarawestcoast.org/latest-news/2017/2/6/westland-water-situation-update-3217
20	2 February 2017	Napier (Enfield Reservoir)	<p>Positive E.coli results on 2, 4 and 7 February 2017.</p> <p>Supply chlorinated 2 February 2017. It was only one of the two reservoir tanks which was returning the E.coli results. Tank isolated and cleaned. Final dose of chlorine on 14 February 2017.</p> <p>Council released enumerated results showing a reading of 1.1. Council concluded since the reading was so low it was consistent with the presence of dust in the tank caused by “strong winds”. Metservice said no “strong winds” at the relevant time, only “fresh winds”. E.coli also detected on four subsequent occasions in March and May 2017.</p>	http://www.scoop.co.nz/stories/AK1702/S00072/napier-water-to-be-chlorinated-as-precaution.htm http://www.nzherald.co.nz/hawkes-bay-today/news/article.cfm?c_id=1503462&objectid=11801349 http://wellington.scoop.co.nz/?p=96622
21	3 February 2017	Levin (Horowhenua District Council)	<p>Boil water notice issued after heavy rain. Plant forced to shut down.</p> <p>Notice lifted two days later on 5 February 2017.</p>	http://www.stuff.co.nz/manawatu-standard/news/89091778/Don-t-drink-Levins-water-Heavy-rain-contaminates-Horowhenua-districts-drinking-water

TABLE OF MEDIA REPORTED DRINKING WATER SUPPLY QUALITY ISSUES DURING THE INQUIRY				
	Date issue identified	Location	Notes	Source
22	18 February 2017	Waimarama (Hastings District Council)	Routine monitoring found low levels of E.coli. System flushed, chlorinated, boil water notice issued – “must boil their water until further notice ...Place the water in a clean metal plan and bring to a rolling boil for one minute” 24 February notice lifted.	http://www.scoop.co.nz/stories/AK1702/S00576/boil-water-notice-for-waimarama.htm http://www.nzherald.co.nz/hawkes-bay-today/news/article.cfm?c_id=1503462&objectid=11807074 http://www.hastingsdc.govt.nz/boil-water-notice-waimarama
23	9 March 2017	Omahu Water Supply, Auckland	Silt contamination shut down and impaired treatment station from the largest of Auckland’s five major water sources – Omahu Water Supply.	http://www.radionz.co.nz/news/on-the-inside/326828/was-watercare%27s-info-as-murky-as-its-water
24	16 March 2017	Amberley/Amberley Beach (Hurunui District Council)	Detection of E.coli. “Precautionary temporary boil water notice” provides “All drinking water should be boiled for at least 1 minute before consumption” Supply chlorinated. 20 March 2017 boil water notice lifted after supply chlorinated. No comment on whether the cause had been identified. 16 March 2017 boil water notice observed “We have only just fully turned off the chlorine from the last transgression and at this stage we're unsure if it's the same unknown cause as before or a new source”.	http://www.hurunui.govt.nz/news-and-views/from-talk-to-action/boilwater-notice/
25	23 March 2017	Western Bay of Plenty – Pukehina Breach, Paengaroa, Makeru, Little Waihi and Pongakawa	High pH detected. The plant should have been automatically shut down but was not.	http://www.nzherald.co.nz/nz/news/article.cfm?c_id=1&objectid=11824779
26	5 April 2017	Richmond Water Supply (Tasman District Council)	E.coli detected in the upper reservoir. Chlorination	http://www.stuff.co.nz/national/health/91221168/richmond-water-supply-chlorinated-after-e-coli-detected-in-one-reservoir

TABLE OF MEDIA REPORTED DRINKING WATER SUPPLY QUALITY ISSUES DURING THE INQUIRY				
	Date issue identified	Location	Notes	Source
27	6 April 2017	Selwyn District Council – Acheron Water Supply	After wild weather boil water notice issued. No E.coli detected.	http://www.newshub.co.nz/home/new-zealand/2017/04/cyclone-debbie-brings-wild-weather-to-canterbury.html
28	7 April 2017	Fairlie (Mackenzie District Council)	E.coli detected. Possibly linked to power cuts affecting chlorine plant which were not notified to Council. Boil water notice issued. Alert system implemented to notify power cuts. Boil water notice on Facebook.	http://www.stuff.co.nz/timaru-herald/news/91296548/claims-power-cuts-likely-cause-of-e-coli-contamination-in-fairlies-water http://www.stuff.co.nz/timaru-herald/news/91339112/New-alert-will-allow-council-to-react-if-power-cut
29	11 April 2017	Esk Ridge and East Ridge (Kanuka Cliffs) attached to Esk water supply (Hastings District Council)	E.coli detected. System flushed, chlorinated, boil water notice. Boil water notice lifted 21 April 2017. Chlorination to continue while investigations occur.	http://www.scoop.co.nz/stories/AK1704/S00713/esk-boil-water-notice-lifted.htm http://www.scoop.co.nz/stories/AK1704/S00421/boil-water-notice-for-esk-ridge-and-kanuka-cliffs.htm
30	13 April 2017	Brightwater (Tasman District Council)	Boil water notices issued following heavy rainfall	http://www.stuff.co.nz/nelson-mail/news/91548235/Brightwater-residents-advised-to-boil-drinking-water-after-flood-contaminates-supply
31	13 April 2017	Rangitaiki, Ruatoki, Te Mahoe, Taneatua (including Te Teko/Mapou, Edgecumbe, Awakeri, Braemar, Onepu, Otakiri and Thornton)	Boil water notices issued following Cyclone Cook	https://www.tvnz.co.nz/one-news/new-zealand/happened-ex-tropical-cyclone-cook-hits-bop-hardest-but-leaves-east-both-islands-battered-saturated

TABLE OF MEDIA REPORTED DRINKING WATER SUPPLY QUALITY ISSUES DURING THE INQUIRY				
	Date issue identified	Location	Notes	Source
32	20 April 2017	Governor's Bay (Christchurch City Council)	E.coli found. Possibly caused by heavy rain. Water chlorinated, boil water notice issued.	http://www.radionz.co.nz/news/national/329170/e-coli-found-in-governors-bay-water-supply
33	19 May 2017	Hawea and Arrowtown (Queenstown Lakes District Council)	Chlorination. Elevated coliform counts. Temporary, proactive chlorination had been in place over the summer until 31 March 2017.	http://www.scoop.co.nz/stories/AK1705/S00459/emergency-chlorination-in-arrowtown-and-hawea.htm http://www.scoop.co.nz/stories/AK1703/S00745/chlorination-proposed-for-five-communities.htm
34	19 May 2017	Waiheke High School and Te Huruhi Primary School (Waiheke Island)	Both schools use same bore. Te Hurihuri Primary School tested positive for E.coli a fortnight before Waiheke High School. At that time, Waiheke High School clear. Filter replaced. High School shipped in water until three clear tests.	http://www.radionz.co.nz/news/national/331117/waiheke-high-school-avoids-illness-from-e-coli http://www.nzherald.co.nz/nz/news/article.cfm?c_id=1&objectid=11858575
35	24 May 2017	Napier	Positive test for E.coli. Council required to chlorinate. The result was at the lowest level determinable. Decision on 8 July 2017 to continue chlorinating even though no further positive tests	http://www.stuff.co.nz/national/health/92910296/napiers-drinking-water-being-chlorinated-following-positive-test http://www.nzherald.co.nz/hawkes-bay-today/news/article.cfm?c_id=1503462&objectid=11887511
36	27 May 2017	Waverley (South Taranaki)	Boil water notice following positive E.coli test. Provides water to around 300 households. Subsequent tests came back clear. Council staff door knocked and handed out boil water notices on 27 May 2017.	http://www.stuff.co.nz/taranaki-daily-news/news/93067103/ecoli-found-in-south-taranaki-towns-water-supply http://www.stuff.co.nz/taranaki-daily-news/news/93067103/ecoli-found-in-south-taranaki-towns-water-supply

TABLE OF MEDIA REPORTED DRINKING WATER SUPPLY QUALITY ISSUES DURING THE INQUIRY				
	Date issue identified	Location	Notes	Source
37	4 July 2017	Whirinaki (Hastings)	Boil water notice issued and supply flushed and chlorinated after routine tests showed E.coli (2 cfu). Investigation into cause ongoing. Boil water notice lifted 10 July 2017.	http://www.scoop.co.nz/stories/AK1707/S00217/whirinaki-boil-water-notice-lifted.htm http://www.hastingsdc.govt.nz/whirinakiwater http://www.nzherald.co.nz/hawkes-bay-today/news/article.cfm?c_id=1503462&objectid=11885873
38	4 July 2017	Methven (Ashburton District Council)	Inadequate chlorine residual detected. No E.coli. DWA/DHB directed a boil water notice to be issued at 11.40 am. Council instead issued notice at 6.30 pm, only after further tests. Dispute between council and DWAs/DHB – over whose responsibility to issue the boil water notice, Council's delay in issuing, and how the notice was communicated. Notified public via Facebook, media, and community board members notifying people personally (late Friday night) but not told complexities e.g don't wash salads, and not all restaurants notified even the next day.	http://www.newsie.co.nz/news/42584-council-action-delayed-on-boil-water-advisory.html
39	20-22 July 2017	Omakau, Patearoa or Ophira Precautionary: Acheron, Hororata, Malvern Hills and Springfield. In Timaru, boil water notices have been issued for the Te Moana, Seadown, Rangitata Huts and Downlands Water Schemes - including Pareora and St Andrews. Ashburton	Following floods Civil Defence issued boil water notices for many places.	http://www.nzherald.co.nz/nz/news/article.cfm?c_id=1&objectid=11893808 http://www.newshub.co.nz/home/new-zealand/2017/07/dunedin-locals-rescued-as-torrential-rain-flooding-slips-continue.html http://www.nzherald.co.nz/nz/news/article.cfm?c_id=1&objectid=11893665

TABLE OF MEDIA REPORTED DRINKING WATER SUPPLY QUALITY ISSUES DURING THE INQUIRY				
	Date issue identified	Location	Notes	Source
40	26 July 2017	Richardson North Rural Water Scheme and in the Whitelea Rd area (Clutha District Council)	Boil water notice issued following floods. Water treatment plants struggling in the wake of flooding.	http://www2.nzherald.co.nz/the-country/news/article.cfm?c_id=16&objectid=11895342
41	4 August 2017	Hurunui	Hurunui District Council voted to chlorinate the water supply permanently.	https://www.stuff.co.nz/the-press/news/95439131/hurunuis-water-to-be-chlorinated-blindsiding-residents
42	15 August 2017	Dunedin	Boil water notice issued on 15 August 2017 after untreated water entering water supply. Boil water notice lifted but taps required to be flushed – 17 August 2017.	https://www.tvnz.co.nz/one-news/new-zealand/dunedins-boil-water-notice-lifted-but-taps-must-flushed-before-drinking
43	16 September 2017	Peaks Rural Water Supply (Hurunui)	Boil water notice issued after E.coli detected in water supply.	http://www.hurunui.govt.nz/news-and-views/from-talk-to-action/boilwater-notice/
44	19 September 2017	Kaero (Far North District Council)	Boil water notice still in place after two years. Issued in July 2015 and is ongoing.	https://www.stuff.co.nz/auckland/local-news/northland/96791690/kaero-water-supply-unsafe-to-drink-for-two-years
45	19 September 2017	Monalto and Mt Somers Water Supplies (Ashburton)	Precautionary boil water notices issued after high turbidity detected in water supplies, likely due to current rainfall. Boil water notice for Mt Somers lifted on 22 September 2017.	http://www.ashburtondc.govt.nz/our-council/news/articles/Pages/Precautionary-boil-water-notice-issued.aspx
46	20 September 2017	Marton (Rangitikei District Council)	Dirty water coming out of pipes. Ongoing for last 14 or 15 months. The dirty water was due to asbestos concrete pipes and frequent pipe breakage.	https://www.tvnz.co.nz/one-news/new-zealand/its-absolutely-revolting-marton-residents-fed-up-decades-brown-tap-water
47	5 October 2017	Hauraki (Hauraki District Council)	Problem at treatment plant that may result in reduced water pressure and discolouration. Water still considered safe to drink.	http://www.radionz.co.nz/news/national/340915/conservate-water-warning-for-hauraki-plains

TABLE OF MEDIA REPORTED DRINKING WATER SUPPLY QUALITY ISSUES DURING THE INQUIRY				
	Date issue identified	Location	Notes	Source
48	17 October 2017	Canterbury	Reports of high levels of nitrate contamination in private water supplies. Also nitrate levels have been increasing in Council-monitored wells but are still below the limit.	http://www.radionz.co.nz/news/national/341701/concerns-raised-over-nitrates-effects-on-babies
49	20 October 2017	Waipatiki Beach campground	Boil water notice issued after E.coli detected in water supply for Council-owned campground.	https://www.stuff.co.nz/environment/98187187/e-coli-found-in-campground-drinking-water
50	17 November 2017	Huntly	Residents complained about “brown” water, which is caused by iron and manganese deposits in pipes. No water quality issues. Council taking various measures including flushing water supply at main, making adjustments at treatment plant, and starting a research project for a long term solution.	https://www.stuff.co.nz/national/99125016/residents-turn-noses-up-at-dirty-water-in-Huntly

APPENDIX 5

TREATMENT FORMS

[1] As noted in Part 5 of this report, the Inquiry has concluded that all networked supplies and specified self-supplies should receive appropriate and effective treatment prior to distribution to consumers.

[2] Following international best practice, a multi-barrier approach to treatment of water supplies should be utilised at all times. A “source to tap” regime should be implemented which begins with the protection of source water quality and ends with the supply of wholesome water to the consumer’s tap with adequate residual disinfectant in the reticulation, such that consumers are protected from infectious agents.

[3] There is a plethora of methodologies used to treat water prior to its distribution to consumers and it is not within the scope of this report to describe all forms of treatment in detail.

[4] In New Zealand, all surface waters are required by the DWSNZ to receive adequate treatment to remove pathogenic microorganisms including bacteria, viruses and protozoa

[5] For groundwater supplies, the DWSNZ allow for no treatment if the source is deemed to be “secure”. For reasons described in Part 15 of this report, the Inquiry has concluded that the secure status shall be abolished.

[6] During the August hearings, the Inquiry heard evidence from a panel of experts comprising Drs Fricker, Deere and Nokes and Messrs Rabbits and Graham who agreed that treatment of groundwater sources was desirable.

[7] Water treatment essentially has three fundamental purposes: to make it aesthetically acceptable, to remove harmful chemicals (where present) and to inactivate or remove pathogens.

[8] For groundwater sources, inactivation or removal of pathogens is the most important aspect of water treatment, although for some sources additional specialised treatment may be required, for example, for the removal of arsenic, iron or nitrates. The

requirement for these forms of treatment appears to be uncommon and will not be discussed further.

[9] Traditionally, groundwater sources have been treated with chlorine to inactivate pathogenic microbes such as bacteria and viruses. The conditions required for effective disinfection (pH, turbidity, chlorine contact time, temperature and concentration) are described in the DWSNZ and the Inquiry finds these requirements to be satisfactory.

[10] Both the installation of equipment for disinfection by chlorination and ongoing running costs are relatively inexpensive and the Inquiry can see no credible reason to avoid chemical disinfection given its important dual benefits. Not only is the raw water treated to inactive pathogens but a residual disinfectant is provided to protect against deterioration of water quality in the distribution system.

[11] During the course of the Inquiry there have been statements made in the press that disinfection using chlorine results in the formation of toxic compounds such as trihalomethanes and haloacetic acids which have been linked to some forms of cancer. The Inquiry has sought advice on this matter and is satisfied that with groundwater sources the formation of these compounds is likely to be at an extremely low level and well below the World Health Organisation guideline level for lifetime exposure. Acceptable levels for the compounds are included in the DWSNZ.

[12] Within the past 30 years, cryptosporidium has become recognised as a waterborne pathogen that has been responsible for a number of outbreaks of disease across the globe.

[13] While originally it was thought that cryptosporidium was a problem associated with surface water, it has become clear that disease associated with this organism has also been linked to groundwater. Dr Fricker has provided evidence to the Inquiry that groundwater-associated outbreaks of cryptosporidiosis are not uncommon. Consequently, the Inquiry has formed the opinion that groundwater sources under the influence of surface water should also be treated to remove or inactivate cryptosporidium.

[14] Cryptosporidium is unusual in respect of waterborne pathogens in that it is almost completely resistant to chlorine disinfection.

[15] Cryptosporidium can be removed from water supplies by filtration (either conventional or by the use of membranes). Chemical disinfection for cryptosporidium can be achieved using chlorine dioxide or ozone but these forms of treatment can be difficult to apply and costly to install and run.

[16] The application of ultraviolet light to drinking water supplies is in common use to inactivate cryptosporidium across the globe. Furthermore, by applying the correct intensity of UV, bacteria and viruses can also be inactivated, providing a further barrier to these organisms.

[17] Inactivation of microorganisms using UV can be applied to any size of water treatment facility.

[18] New Zealand has a large number of small water supply systems (both groundwater and surface water). Notwithstanding the size of the community being supplied, the Inquiry has formed the opinion that all systems should receive treatment in order to make drinking water safe. For groundwater sources this can be achieved by a combination of UV and chlorination. For surface water systems, some other form of treatment (for example, coagulation and filtration in various forms) may be required.

[19] Upon installation of treatment facilities, it is incumbent upon the engineers performing the installation that they demonstrate adequate performance of the equipment (particularly with respect to UV and filtration systems) and adequate contact time for chlorine disinfection where this is the primary process used to disinfect.

[20] The DWSNZ provide requirements for water treatment plant performance and it is the responsibility of the water supplier to maintain records of parameters that can impact the effectiveness of treatment such as turbidity, UV intensity, pH, chlorine concentration and chlorine contact time.

[21] Failure to maintain adequate records or to ensure satisfactory performance of treatment facilities is a breach of the DWSNZ and should invoke action by the DWA and where appropriate the Ministry of Health.

[22] The Inquiry finds that the evidence in favour of treatment of all water supplies is compelling and recommends that adequate treatment be mandatory for all water supplies.

APPENDIX 6

DISCUSSION PAPER BY COUNSEL ASSISTING DEALING WITH RMA ISSUES

1 Introduction

- 1.1 This is a preliminary discussion paper provided by counsel assisting the Inquiry on Issues 8, 9 and 10 of the Stage Two Issues and Questions in advance of the filing of submissions by parties on 21 July 2017 and the August 2017 hearing.
- 1.2 This paper has been prompted by material received by the Inquiry just prior to the June 2017 and the August 2017 hearings, including from the Hawke's Bay Regional Council¹⁶² and the Canterbury District Health Board.¹⁶³ This material provided helpful views on aspects of Issues 8, 9 and 10.
- 1.3 In summary:
- (a) Issue 8 addresses the **adequacy of the existing NES Regulations**;¹⁶⁴
 - (b) Issue 9 addresses the **adequacy of the current approach taken by regional councils to assessing and granting water permit applications by water suppliers**;
 - (c) Issue 10 addresses the **adequacy of the current approach taken by regional councils to first barrier protection (other than under the NES Regulations)**.
- 1.4 Issues 8, 9 and 10 as formulated in the Stage Two Issues and Questions arose as a result of issues identified by the Inquiry in Stage One.
- 1.5 The following sections set out points for discussion on the matters identified by Issues 8, 9 and 10. The Inquiry's consideration is, of course, not limited to the material set out in this document. The intention is to provide some focus and points of discussion for submissions and the August 2017 hearing.

2 Scene setting

- 2.1 This paper takes Issue 8 as a starting point but there is merit in addressing Issues 8, 9 and 10 together. Sub issues arising include:
- (a) Whether there is a critical "gap" in the current Resource Management Act 1991 (**RMA**) regime for managing and/or protecting drinking water sources?
 - (b) Whether that gap has been, or could be, adequately plugged by the NES Regulations?

¹⁶² Refer Report from Hawke's Bay Regional Council, dated 20 June 2017.

¹⁶³ Refer Canterbury District Health Board Stage Two Submission, dated 6 July 2017.

¹⁶⁴ Resource Management (National Environmental Standard for Sources of Human Drinking Water) Regulations 2007.

- (c) If the NES cannot “plug the gap”, whether a more comprehensive regulatory framework is needed for the management and/or protection of present and future drinking water sources? Consideration of such a framework might allow the Inquiry to look forward (i.e. to plugging the gap) instead of looking backwards (i.e. by fixing the NES Regulations), and to focus on how regional councils can in future address the matters identified by Issues 9 and 10.
- (d) How any options proposed for a more comprehensive regulatory framework should be tested, for example, by way of an examination of the appropriateness of the proposal in achieving the purpose of the RMA and, in particular, the benefits and costs of the environmental, economic, social and cultural outcomes?¹⁶⁵
- (e) What sort of timeframes would be desirable and achievable for any proposed solutions? Accepting that some changes may take longer, are there any changes that can and should put in place as soon as possible, and if so how could that be achieved?

2.2 It is important to recognise that recommendations in this sphere, particularly any clarification to the role of regional councils, must be expressly limited to the management and/or protection of drinking water *sources* through the control of discharges to land, take and use of water, or use of land that might impact on water quality. Unless this distinction is made very clear, there would be potential for regional council obligations to overlap with the regime under the Health Act 1956 (**Health Act**). For example, any suggestion that regional councils are to be responsible for managing drinking water to certain specified standards, would duplicate and inappropriately undermine other specific statutory responsibilities, for which other bodies have prime responsibility.

3 Points for consideration and discussion

3.1 In light of the questions posed above, there is a range of potential initiatives to address Issues 8, 9 and 10, all of which have benefits and possible limitations. Various points for discussion are set out below. These should be considered together and, as noted above, are not indicative of the only options available for consideration by the Inquiry. Additional suggestions and perspectives are welcome. Parties filing submissions or comments on Issues 8, 9 and 10 may wish to follow the same order of topics as set out below.

	Question/potential concern	Options/discussion points
1	Regulatory recognition of the management and/or protection of drinking water sources	Bespoke legislative provision? Expanding the Health Act regime? For either of the above, would there then be a need to expressly exclude this matter from the RMA regime? Expanding the RMA regime? Under any new scenario, which entity would be responsible for source protection?

¹⁶⁵ Refer to the requirements for an evaluation report under s 32 of the Resource Management Act 1991.

	Question/potential concern	Options/discussion points
2	Higher order direction in the RMA	<p>New matter of national importance in s 6 of the RMA? For example (and these could be combined):</p> <p><i>(x) The protection of potable freshwater sources from inappropriate use and development; or</i></p> <p><i>(y) The management of significant risks to potable freshwater sources;</i></p> <p>What is inappropriate use and development? What would constitute a “significant physical risk”?</p> <p>Issues with definition of potable freshwater sources?</p> <ul style="list-style-type: none"> • Physical extent of “source”? • Whether to incorporate underutilised or potential future sources? • Individual regional council definition vs standardised approach? • Any reference to size of supply?
3	Express recognition as regional council function	<p>New function of regional councils in s 30 of the RMA? For example (and these could be combined):</p> <p><i>(x) The protection of potable freshwater sources from inappropriate use and development; or</i></p> <p><i>(y) The management of significant risks to potable freshwater sources;</i></p> <p>Extent of overlap with existing functions? Is this needed given current functions?</p>
4	Express requirement for monitoring by regional councils	<p>Expressly and specifically require monitoring of consents/permits related to (or with a potential effect on) drinking water sources in s 35?</p> <p>Monitoring could practically be carried out by consent holder or consent authority?</p> <p>Include an accompanying reporting requirement? (Beyond that required by state of the environment monitoring)</p>
5	Requirements for consultation	<p>If so, with which parties?</p> <p>Expressly list Minister of Health and other relevant parties in Schedule 1, clause 3 for matters relating to drinking water sources, prior to notification by any council of any policy statement or plan?</p>

	Question/potential concern	Options/discussion points
6	Requirement for consideration of drinking water sources for all consents/permits	Expressly incorporate consideration of drinking water sources in s 104 of the RMA, and/or in either ss 105 or 107 as a matter to which specific regard must be had (s 105), or which must not result in certain adverse outcomes (s 107)? Expressly require consideration of water safety management plan type documents?
7	Inclusion of specific objectives and policies in regional plans to ensure recognition of management and/or protection of drinking water sources	<i>Short term:</i> through the s 55 process by way of a new national policy statement? Another mechanism? <i>Longer term:</i> through a new national policy statement? Through the current NPSFM? Through new or amended NES Regulations? Another mechanism? Provides desirable consistency across regional councils and regional plans? Could/should provisions take into account a wide range of management and/or protection matters, such as provision for existing/future drinking water sources, and the appropriateness of location of drinking water supplies near to risky infrastructure assets (like sewerage pipelines), and vice versa? Should rules be developed through the normal schedule 1 process, or should they be nationally applied through an amended or new NES? Refer to Appendix 1 for some existing examples of such provisions in regional plans.
8	Immediate inclusion of specific conditions on all existing and future water permits for drinking water supplies	New or amended NES Regulations that specify deemed conditions to be attached to such permits, or deemed permitted activity standards where no consent is required, until a regional plan becomes operative that specifies different/more stringent alternative rules?
9	Classification of water take permits for drinking water supply	Is permitted or controlled activity status appropriate? Should all such activities be restricted discretionary or more onerous, to enable a consent authority to decline resource consent in appropriate circumstances? Mechanism to implement this?

	Question/potential concern	Options/discussion points
10	Adequacy of existing NES Regulations	<p>Need to extend their “trigger” (i.e. current already non-compliance, at which point health is already at risk)?</p> <p>Better to apply by spatial criterion?</p> <p>Need to expand their scope (i.e. size of supply and type of consent/permit)?</p> <p>Need to provide for retrospective effect?</p> <p>Need to expressly require consideration of cumulative effects?</p> <p>Need to amend or clarify various definitions, including abstraction point and upstream?</p> <p>How to manage and ensure there are no increased compliance costs for water suppliers (i.e. monitoring, fixing bores, extra treatment)?</p>
11	Implementation of existing NES Regulations	Roll out new programme of implementation of NES Regulations, on basis that they are adequate in their current form?
12	Drinking water supplies as a “compulsory” national value in the NPSFM	<p>Drinking water already in NPSFM as an “additional” national value - Wai Māori / municipal and domestic water supply. Are other changes needed to better reflect the importance of drinking water?</p> <p>Reclassifying drinking water supply as a “compulsory” national value would likely require the development of specified numeric attribute states. Would this result in an undesirable overlap with/duplication of drinking water standards?</p>

APPENDIX 7

Report of the Sampling and Monitoring Caucus 11 August 2017

Introduction

The Inquiry has requested International Accreditation New Zealand (**IANZ**), the Ministry of Health (**MoH**), and Drs Fricker and Deere to provide a joint statement and proposed recommendations relating to sampling and monitoring issues that have arisen during the hearing 7-11 August 2017.

Members of the Sampling and Monitoring Caucus variously met on the evening of 8 August 2017 (Phil Barnes, Sally Gilbert, Geoff Hallam, Anne Hofstra, and Scott Rostron) and the morning of 9 August 2017 (Dan Deere, Colin Fricker, Sally Gilbert, and Scott Rostron) to consider sampling and monitoring issues that were identified during the Inquiry Hearing held on 7-11 August 2017.

The following statements and recommendations are made, as identified below, either:

- (a) jointly by IANZ, MoH and Drs Fricker and Deere; or
- (b) jointly by MoH and Drs Fricker and Deere.

Joint statement by IANZ, MoH and Drs Fricker and Deere

The consequences arising from the faulty collection, handling, transportation, analysis and reporting of drinking-water samples are serious as this will provide inaccurate information about the quality of the drinking-water (including suggesting contamination when none may exist) but more importantly contamination of the drinking-water may not be detected.¹⁶⁶ The drinking-water supplier needs to understand the importance of appropriate sampling and analysis to have confidence in the validity of water supply monitoring it undertakes. The drinking-water supplier must ensure it arranges for appropriate sample collection, handling, transport, analysis, and reporting to ensure it has confidence in the safety of its drinking-water.

Issues identified in the course of the panel discussion before the Inquiry and considered by the Sampling and Monitoring Caucus

- There is no requirement for training and competencies for the person collecting drinking-water samples.
- The DWSNZ do not specify that sampling must be undertaken by a trained and competent sampler.

¹⁶⁶ Adapted from the Guidelines for drinking water quality management for New Zealand (2017), Chapter 6.

- While the reference method for equivalence is appropriate, assessing methods against this referee method is not robust and the process needs improving.
- The criteria for reviewing new methods for analysing drinking-water samples does not meet international best practice and needs to be reviewed and strengthened.
- Reliance on a single microbiological sample result to respond with a Boil Water Notice is not always appropriate; the trigger of ten E.coli is not international best practice.
- The DWSNZ currently only include E.coli and do not include other indicator organisms such as total coliforms.
- There are overseas examples of drinking-water suppliers who ask laboratories not to report some results that may require the water supplier to take action. There is no evidence of this practice in New Zealand but it would be important to ensure it does not occur.
- Some laboratories analysing drinking-water samples may not report a positive E.coli result to the DWA if the drinking-water supplier has over-sampled against the monitoring criteria in the DWSNZ as it will not exceed the allowable number of transgressions.
- Some laboratories may not inform the DWA and water supplier of a positive E.coli result from a water tanker.
- The separation of non-potable water and potable water samples to avoid cross-contamination should be considered industry best practice but is not always adequate.
- Examples of best practices and significant non-conformances are not always shared with all relevant parties so lessons can be learned.
- When other agencies, industry or individuals are sampling in a drinking-water catchment for their own purpose, the significance of the sample results and the importance of sharing this sampling information with the drinking-water supplier and other relevant parties may not be fully appreciated.

Consumers do not appear to understand the significance of the annual report on drinking-water quality, which includes the results of water supply monitoring, and the information it provides about the quality and safety of their drinking-water supply.

Proposed Recommendations agreed by IANZ, MoH and Drs Fricker and Deere

1. IANZ and MoH will develop systems for assuring competence of drinking water samplers. In particular, MoH will consider options for developing and implementing specifications for people taking samples.
2. IANZ will add supplementary criteria into its contracts with laboratories with the effect that:¹⁶⁷

¹⁶⁷ IANZ accredits organisations in accordance with ISO 17025 and is empowered to set additional mandatory supplementary criteria.

- a. Laboratories are required to tell IANZ about all major “non-conformities” i.e. non-conformances which are shown to either directly affect or are likely to have an effect on the validity of drinking-water sample results produced by the laboratory;
 - b. IANZ will notify MoH of major non-conformities which are likely to affect the validity of drinking-water sample results;
 - c. IANZ will look to improve systems for monitoring ongoing performance issues of laboratories recognised under the Drinking Water Programme.
3. IANZ and MoH will implement information sharing arrangements relating to monitoring of sampling and testing activities undertaken pertaining to drinking-water samples.
 4. IANZ will introduce a system for publishing anonymised information on best practice and major non-conformities related to the Drinking Water Programme.
 5. IANZ and MoH will develop guidance on what a drinking-water supplier should take into account when selecting and contracting laboratory services for testing drinking-water samples.
 6. IANZ will collaborate with MoH in the development of supplementary criteria for accreditation, based on the proposed changes to the DWSNZ, while the DWSNZ are under review.
 7. Current IANZ criteria for the separation of potable and non-potable water samples will be made more explicit and given additional emphasis during the assessment process. The MoH will consider the importance of avoiding cross-contamination in the competencies for sampling officers.
 8. IANZ and MoH will provide a report to the Inquiry by 5pm on Friday 22 September 2017 setting out the options, criteria, arrangements and guidance detailed in recommendations [1] to [7] above, including the matters that have already been implemented and the work programme for matters yet to be implemented. Drs Fricker and Deere will be available for technical guidance prior to the submission of this report if required and will review a full draft of the report on or before 20 September 2017.

Proposed Recommendations agreed by the MoH and Drs Fricker and Deere

9. In the review of the DWSNZ, the MoH will recommend strengthening the requirements for the collection, handling and transport of drinking-water samples and provide options for including a person specification or competency requirements that may be given effect through mechanisms such as industry certification, accreditation or other mechanism that will include academic and practical training and ongoing competencies.
10. In the review of the DWSNZ, the MoH will recommend adding total coliforms to the indicator microorganisms to be routinely monitored.
11. In the review of the DWSNZ, the MOH will consider and make recommendations in respect of other indicator microorganisms to be monitored.

12. In the review of the DWSNZ the MoH will recommend removing the use of presence/absence testing for *E.coli* and total coliforms (when included).
13. In the review of the DWSNZ, the MoH will recommend improvements to the criteria for assessing new methods for analysing drinking-water samples to ensure they meet international best practice while being fit for purpose for application in New Zealand.
14. In the review of the DWSNZ, the MoH will recommend improvements to the methodology and process for assessing equivalence against the reference methods.
15. In the review of the DWSNZ, the MoH will recommend that laboratories must report all microbiological analyses that are undertaken in full to the drinking-water supplier.
16. In the review of the DWSNZ, the MoH will recommend that all positive *E.coli* and total coliform results in potable water must be reported by the laboratory to the DWA, even in cases of oversampling against the DWSNZ requirements.
17. In the review of the DWSNZ, the MoH will recommend that all positive *E.coli* and total coliform results in potable water must be reported by the laboratory to the drinking-water carrier and the drinking-water supplier, even in cases of oversampling against the DWSNZ requirements.
18. In the review of the DWSNZ, the MoH will recommend no longer recognising level 2 laboratories.
19. In the review of the DWSNZ, the MoH will recommend the inclusion of mechanisms for sharing confidential third party microbiological results from samples taken within drinking-water catchments.
20. Following the review of the DWSNZ, the MoH will review the approved methods for analysing drinking-water samples against the requirements of the revised DWSNZ.
21. The MoH will investigate the establishment of drinking-water reference laboratories, including their role in the assessment of new methods for analysing drinking-water samples.
22. The MoH currently promulgates international developments and best practice through updating the Guidelines for Drinking-Water Management. The MoH will make the Guidelines more accessible (for example, linked to the DWSNZ, other guidance and templates).
23. The MoH will issue guidance to public health units that the terms of reference for joint working groups or other collaborative arrangements must include sharing information such as the results of water samples collected in drinking-water catchments to assist the drinking-water supplier understand any risks in the source waters.
24. The MoH will improve the format and content of the annual report on Drinking-Water Quality to make the information more accessible by consumers so they can understand the quality of their drinking-water.

25. The MoH will provide a report to the Inquiry by 5pm on Friday 22 September 2017 setting out the options, criteria, arrangements and guidance detailed in recommendations [9] to [24] above, including the matters that have already been implemented and the work programme for matters yet to be implemented. Drs Fricker and Deere will be available for technical guidance prior to the submission of this report if required and will review a full draft of the report on or before 20 September 2017.

Signatures

“P BARNES”

.....

Phil Barnes

“D DEERE”

.....

Dan Deere

“C FRICKER”

.....

Colin Fricker

“S GILBERT”

.....

Sally Gilbert

“A HOFSTRA”

.....

Anne Hofstra

“S ROSTRON”

.....

Scott Rostron

APPENDIX 8

Assessment of Responses to Recommendations of Sampling and Monitoring Caucus

This appendix should be read in conjunction with Part 19 and Appendix 7, the Report of the Sampling and Monitoring Caucus. This appendix sets out the responses to the recommendations of the Caucus by IANZ and the Ministry of Health, which were provided on 22 September 2017.

Assessment of Responses by IANZ

As indicated in Part 19, the Inquiry greatly appreciates the progress made on various matters by IANZ, as discussed in turn.

	Caucus Recommendation (Summarised)	Response
1	IANZ and MoH will develop systems for assuring competence of drinking water samplers.	<p>IANZ's indication is that all drinking water sampling will be required to be performed in accordance with an IANZ/Ministry of Health approved competency framework within two years from 1 October 2017. It also advises that where laboratories are responsible for sampling, implementation of the sampling framework will be prioritised based on a review of each laboratory's sampling protocols and an assessment of any associated public health risks. Reviews are to be completed by IANZ and the Ministry before the end of 2017. Laboratories identified as high risk will be required to ensure that sampling is performed in accordance with the approved competency framework within 12 months from 1 October 2017.</p> <p>With proper implementation by IANZ and the Ministry, with expert guidance from Drs Fricker and Deere, the Inquiry's view is that this much needed regime to ensure the competency of drinking water samplers can be achieved in the longer term. However, as indicated above, the Inquiry is concerned that more could be done to ensure correct sampling processes in the interim before the sampling regime is established. This is discussed below in relation to the Ministry's responses.</p>
2	IANZ will add supplementary criteria into its contracts with laboratories.	<p>IANZ has revised its "Supplementary Criteria for Accreditation" document, which applies to all drinking water testing laboratories. The revised accreditation criteria document will be applied to laboratories within 12 months as reassessment occurs on an annual basis. The document now contains stricter requirements in respect of test methodologies, laboratory proficiency testing, reporting of results, reporting of laboratory non-conformities, and separation of potable and non-potable samples. IANZ has also advised that as of August 2017, at all on-site laboratory assessments it has been placing additional emphasis on the separation of samples. The Inquiry is guided by the expertise of Dr Fricker, who considers that the revisions to the accreditation criteria are appropriate.</p> <p>The revisions to the accreditation criteria were intended to immediately address some of the urgent issues raised with laboratory practices, in particular reporting and separation of potable and non-potable samples. The revisions will assist in addressing these critical areas while the relevant DWSNZ are under review. The Inquiry also understands that IANZ will make further revisions where necessary, up to the release of the</p>

	Caucus Recommendation (Summarised)	Response
		revised DWSNZ. The Inquiry acknowledges and appreciates the willing and prompt action by IANZ to put these measures in place.
3	IANZ and MoH will implement information sharing arrangements.	IANZ has advised it will develop a newsletter for sharing anonymous information about drinking water laboratory performance issues, such as critical or major non-conformities, frequently encountered non-conformities, and best practice developments and ideas. This will be produced in the first quarter of 2018. In the interim, IANZ will circulate any such issues or developments that arise individually to the authorised representatives of registered laboratories. The Inquiry endorses this approach. The Inquiry agrees with the expert panel members at the August hearing, particularly Dr Fricker, who stated that there is much benefit in sharing information about good and poor practices in order to improve the performance of all laboratories.
4	IANZ will introduce a system for publishing anonymised information.	
5	IANZ and MoH will develop guidance on what a drinking-water supplier should take into account when selecting and contracting laboratory services.	IANZ has indicated that it will complete an options analysis for a means of ensuring that drinking water suppliers are competent and confident when selecting and contracting drinking water sampling and laboratory services. The chosen option will be implemented in the first quarter of 2018. The Inquiry acknowledges that implementation of this measure may be challenging and suggests that the matter might best practically be approached through the development of model tender and contract documents, rather than through softer guidance. Notwithstanding, the Inquiry endorses the aims to give drinking water suppliers a better, and necessary, understanding of the importance of correct monitoring and testing and sampling and laboratory practices. As identified by the Caucus in the joint statement in its report, there is a lack of understanding in the current regime. This proposed measure will improve the interactions between the parties involved in drinking water monitoring and testing, where previously their respective roles were independent, and promote better confidence in the safety of a supplier's drinking water.
6	IANZ will collaborate with MoH in the development of supplementary criteria for accreditation.	See response to [2] above.
7	Current IANZ criteria for the separation of potable and non-potable water samples will be made more explicit and given additional emphasis.	See response to [2] above.

Assessment of Responses by the Ministry of Health

The Inquiry acknowledges the Ministry's involvement in the measures already implemented or soon to be implemented by IANZ discussed above. The remaining recommendations of the Sampling and Monitoring Caucus related more broadly to the Ministry. The Ministry's responses to these recommendations are discussed below. The establishment of a sampling regime is discussed briefly first.

	Caucus Recommendation (Summarised)	Response
8	IANZ and MoH will develop systems for assuring competence of drinking water samplers.	<p>As indicated above, the Inquiry acknowledges the progress made towards the establishment of a system for ensuring the competency of drinking water samplers. However, this is a long term solution.</p> <p>The Inquiry understands that on 8 September 2017 the Ministry, through Ms Gilbert, emailed public health managers to raise awareness about the importance of correct sampling procedures and provide information about guidance on sampling and potential training opportunities. The Ministry asked that the information provided be passed on to DWAs, other staff associated with drinking water, and councils and other water suppliers in their region. The Inquiry was not provided with details of any responses to the Ministry's email or general acceptance and awareness raised.</p> <p>While the email will assist, the Inquiry, guided by the expertise of Dr Fricker, considers that the Ministry could do more to address incorrect sampling practices in the short term. For example, as indicated above, there are several documents available internationally that provide criteria for sample collection for the purpose of specific tests. Such criteria could form a basis for the interim assessment of competency of water samplers, whether by DWAs, laboratories, or water suppliers themselves, before a sampling regime is established and implemented. Water suppliers could equally be asked to develop a sampling manual that sets out requirements for sampling for different tests.</p> <p>The Inquiry's concern is to address more urgently the clear risk of errors made in the monitoring and testing process, such as the failure to use sodium thiosulphate when sampling chlorinated water. These sorts of errors continue to jeopardise the safe supply of drinking water.</p>
9	In the review of the DWSNZ, the MoH will: Recommend strengthening the requirements for the collection, handling and transport of drinking-water samples.	<p>The Ministry has indicated that its proposed Drinking Water Advisory Committee will be responsible for reviewing the DWSNZ. The Inquiry cautions this approach and reiterates its view in Part 22 that the review of the DWSNZ must be undertaken by an expert or experts. The review will cover several aspects of the DWSNZ relevant to monitoring and testing, as outlined in recommendations 9 to 19 of the Sampling and Monitoring Caucus and discussed above. The Ministry's indicative timeline for this review culminates in the revised DWSNZ taking effect from 1 May 2024. This is simply unacceptable given the public health importance of these, and in fact all, aspects of the DWSNZ. The risks to public health</p>
10	Recommend adding total coliforms to the indicator microorganisms to be routinely monitored.	

	Caucus Recommendation (Summarised)	Response
11	Consider and make recommendations in respect of other indicator microorganisms to be monitored.	<p>cannot wait such a lengthy period.</p> <p>The Ministry has indicated that some matters may be able to reviewed with urgency, which would remove the lengthy requirement for consultation and notice. The Inquiry urges the Ministry to carefully consider which of the relevant DWSNZ relating to monitoring and sampling require urgent review. The Inquiry suggests that this would encompass almost all of the matters identified in recommendations 9 to 19, as well as the review of the approved test methods, and that these matters simply cannot wait until 1 May 2024 to take effect.</p> <p>Note - this assessment applies to [9] through [20].</p>
12	Recommend removing the use of presence/absence testing for E.coli and total coliforms (when included).	
13	Recommend improvements to the criteria for assessing new methods for analysing drinking-water samples.	
14	Recommend improvements to the methodology and process for assessing equivalence against the reference methods.	
15	Recommend that laboratories must report all microbiological analyses that are undertaken in full to the drinking-water supplier.	
16	Recommend that all positive E.coli and total coliform results in potable water must be reported by the laboratory to the DWA.	
17	Recommend that all positive E.coli and total coliform results in potable water must be reported by the laboratory to the drinking-water carrier and the drinking-water supplier.	
18	Recommend no longer recognising level 2 laboratories.	
19	Recommend the inclusion of mechanisms for sharing confidential third party microbiological results.	

	Caucus Recommendation (Summarised)	Response
20	Following the review of the DWSNZ, the MoH will review the approved methods for analysing drinking-water samples against the requirements of the revised DWSNZ.	
21	The MoH will investigate the establishment of drinking-water reference laboratories.	The Ministry has developed draft functions for drinking water reference laboratories and is currently consulting on these with ESR, which already operates communicable disease reference laboratories. The Inquiry has not been given any indication when such laboratories might be put in place within the current regime. The Inquiry suggests that further consideration and a programme for implementation be developed with a degree of urgency.
22	The MoH will make the Guidelines more accessible.	The Ministry has advised that it is now updating its Drinking-water Guidelines on an ongoing basis, rather than annually, and that its website recommends readers to use the online, up-to-date content. It also advised that in October 2017 a larger suite of work would commence of reviewing all of its guidance, standards, templates and drinking water website. This will include making the information provided in the annual report more accessible to consumers so they can understand the quality of their drinking water.
23	The MoH will issue guidance to public health units that the terms of reference for joint working groups or other collaborative arrangements must include sharing information.	The Ministry has indicated that on 28 August 2017, it emailed all public health managers emphasising the importance of collaborative arrangements between public health staff within District Health Boards and water suppliers. Working collaboratively and sharing information is also now encouraged by the Ministry's 2017-18 Strategic Priorities and Guidance for Public Health Units and in the Environmental Health Exemplar used as the basis for the contracts between public health units and the Ministry.
24	The MoH will improve the format and content of the annual report on Drinking-Water Quality to make the information more accessible by consumers.	The Inquiry appreciates these responses. The Inquiry suggests that the Ministry should actively promote changes to the Guidelines, rather than simply hoping that water suppliers will regularly read them, and urges that the much needed programme of review to commence in October 2017 proceeds with the appropriate degree of urgency.

APPENDIX 9**List of Legal Representatives**

	Organisation	Lawyers
1	Hastings District Council	Matt Casey QC Victoria Casey QC
2	Hawke's Bay Regional Council	Bal Matheson
3	Hawke's Bay District Health Board	Peter Chemis, Buddle Findlay Nicola Ridder, Buddle Findlay
4	Local Government New Zealand	Matt Conway, Simpson Grierson Katharine Hockly, Simpson Grierson
5	Ministry of Health Ministry for the Environment Department of Internal Affairs Ministry of Education	Bernadette Arapere, Crown Law Nicolette Butler, Crown Law
6	Water New Zealand	Helen Atkins, Atkins Holm Majurey Rowan Ashton, Atkins Holm Majurey
7	Counsel Assisting the Inquiry	Nathan Gedye QC
8	Counsel Assisting the Inquiry	Fionnghuala Cuncannon, Annabel Linterman and Carissa Cross, Meredith Connell

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