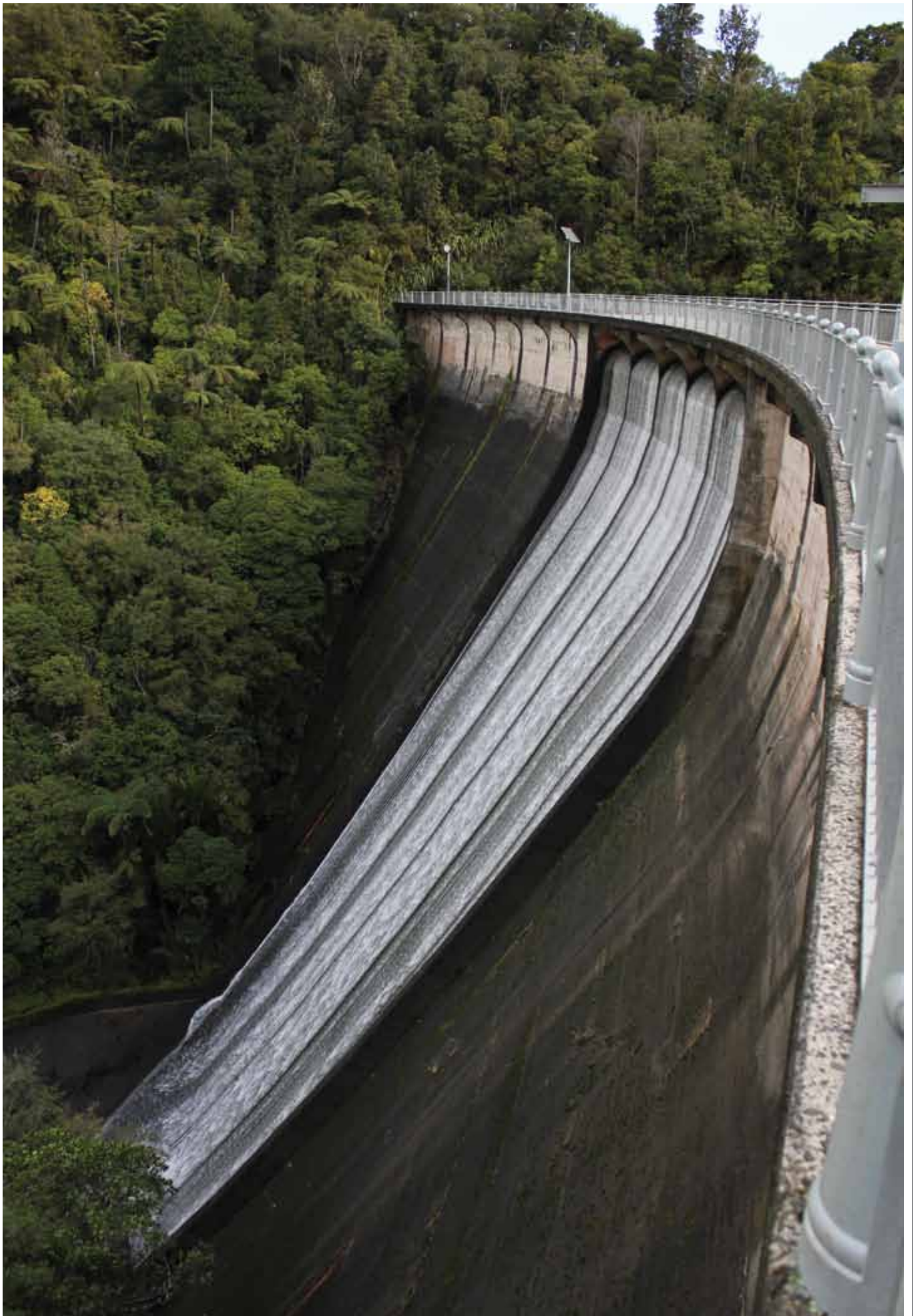




ANNUAL
WATER
QUALITY
REPORT

2012



CRF Consulting Ltd

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23 October 2012

REVIEW OF WATER QUALITY MANAGEMENT SYSTEM

CRF Consulting has been retained by Watercare to undertake an independent review of its water quality management system. The review covered Watercare's:

- Annual sampling programme to ensure it meets the requirements of its contractual obligations with its customers and the requirements of the Drinking Water Standards.
- Sampling locations to ensure that they are representative of the water throughout the distribution network.
- Sampling methodologies to ensure that samples collected are representative of the water supplied at that point.
- Watercare Services Laboratory's analytical methods and procedures to ensure accuracy and reliability of results can be maintained.
- Water quality data management systems to ensure that records of analytical results are stored adequately.

The findings of this review were that Watercare makes use of appropriate controls to ensure accurate and reliable water quality sampling and analysis which provide results that are representative of the water being supplied to customers. I am also satisfied with the recording and management of test results and water quality information. Where recommendations for improvements were made, Watercare has implemented actions to ensure these are met.

I have reviewed this Water Quality Annual Report and consider that it represents an accurate reflection of the water quality testing carried out this year.



Prof. Colin Fricker Ph.D
CRF Consulting Ltd.

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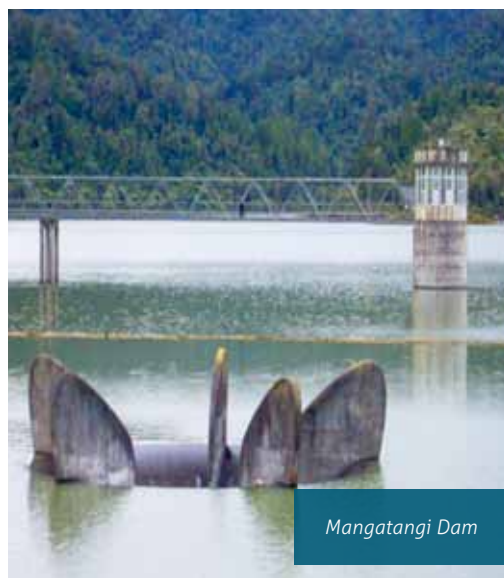
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Ardmore WTP



Mangatangi Dam

INTRODUCTION

Watercare's commitment to water quality

Watercare aims to provide a safe and reliable supply of drinking water.

Watercare achieves this by:

- Supplying water at the minimum price consistent with maintaining the long-term integrity of its assets, as required by its founding legislation
- Supplying drinking water in accordance with all national and local legislative requirements
- Meeting Drinking Water Standards for New Zealand
- Developing and maintaining its facilities in accordance with the principles of sustainability to ensure the optimum balance of environmental, social and economic factors over the life of its assets
- Undertaking such external and peer reviews as deemed appropriate to assess and benchmark performance against industry best practice.

Watercare today

Watercare is committed to developing water and wastewater infrastructure to support the region's growth and prosperity in ways that maximise environmental, social and economic benefits.

Watercare has been the provider of bulk water and wastewater services to the Auckland region since 1991. Watercare supplies bulk water to the Papakura district, where retail services are managed by a franchise agreement with Veolia Water.

On 1 November 2010, as a result of Auckland regional governance reforms, the company took over ownership and management of all the water and wastewater assets within the Auckland Council region and began retailing services directly to the people of Auckland. Unfortunately a number of these non-metropolitan (rural) plants have been taken over with significant problems that compromise regulatory compliance with the quality of water. Watercare has highlighted the quality of rural drinking water as a significant issue and is assessing a programme of work to prioritise and increase security of supply and water quality to non-metropolitan areas.

INTRODUCTION (continued)

Watercare's main services include:

- The collection, treatment and distribution of drinking water from 11 dams, 26 bores and springs, and four rivers. A total of 140 billion litres of water is treated annually at 20 plants and distributed over 9,000 kilometres of water pipes through 149 reservoirs and 108 pump stations to 450,000 households.
- The collection, treatment and disposal of wastewater at 19 treatment plants. The two main wastewater plants servicing the majority of the region are located at Mangere on the Manukau Harbour, and Rosedale on the North Shore.
- The transfer, treatment and disposal of trade waste. Watercare works with approximately 1,700 customers administering the trade waste bylaw to protect the wastewater network and assist in ensuring the wastewater treatment plant discharges meet consent requirements.
- The provision of commercial laboratory services in support of the business. The independently accredited laboratory provides a full range of testing and sampling services for water, wastewater, biota and air quality, and also works with a wide customer base across a variety of industries to provide first-class laboratory analysis and sampling services.

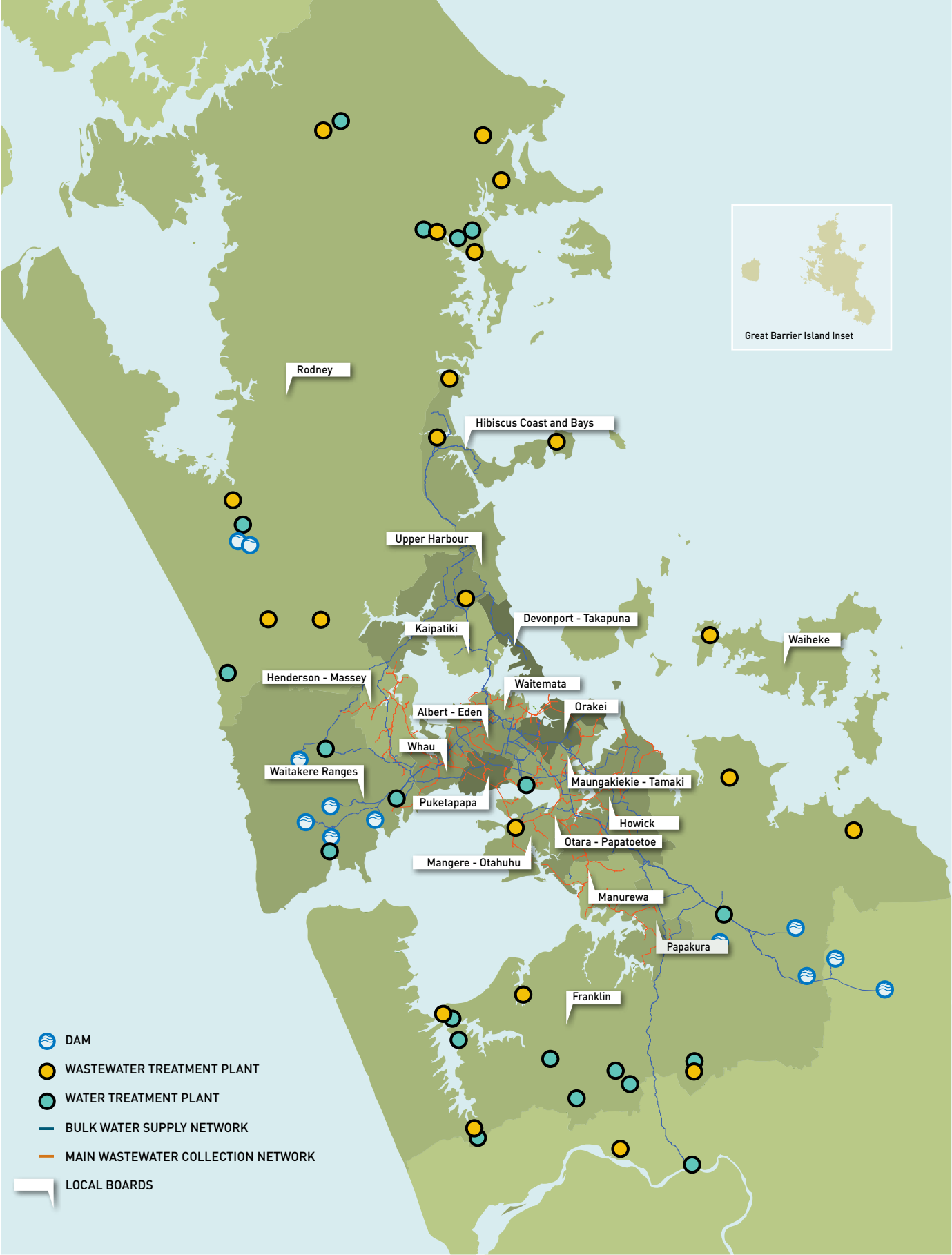
This report covers water quality from 1 July 2011 to 30 June 2012.



Watercare volunteers distributing water at the Round the Bays fun run.

WATERCARE'S NETWORKS

And the Local Board areas that we serve



REGULATORY AND CONTRACTUAL REQUIREMENTS

Local Government (Auckland Council) Act 2010

Watercare is a council controlled organisation (CCO) and wholly owned subsidiary of Auckland Council. The company's obligations to deliver water and wastewater services for Auckland are established under Part 5 section 57(1) of this Act.

Health (Drinking Water) Amendment Act 2007

The Health (Drinking Water) Amendment Act 2007 came into effect on 1 July 2008. The Act allows water suppliers the choice of complying with the Drinking Water Standards for New Zealand (DWSNZ) 2000 or 2005 (Revised 2008) until 1 January 2015 when the DWSNZ 2005 (Revised 2008) becomes mandatory. Watercare has opted to comply with the DWSNZ 2005 (Revised 2008) from 1 July 2009.

Drinking Water Standards for New Zealand

The DWSNZ 2005 (Revised 2008) prescribe maximum acceptable values (MAVs) for determinands of public health significance and provide a yardstick against which drinking water quality is measured. They also specify monitoring requirements, laboratory competence and remedial measures to be taken in the event of the standards being breached.

Agreement relating to the supply of bulk water

Veolia Water manages, maintains and operates the Papakura water network. Watercare has a signed contract with Veolia Water setting out the terms under which Watercare supplies bulk water to the district. This recognises the separate obligations under the Local Government Acts 1974 and 2002.

Terms include using reasonable endeavours to:

- Minimise risks to persons, property and the environment
- Plan for contingencies
- Plan co-operatively
- For Watercare, maintain 'A' grading for the Ardmore and Waikato water treatment plants
- For Veolia Water, to achieve and maintain 'a' grading for their reticulation networks.

Compliance with the specific requirements is outlined in Appendix 2.

REGULATORY AND CONTRACTUAL REQUIREMENTS (continued)

Public health grading of community supplies

As the Ministry of Health's explanatory notes say: "The grading provides an assessment of the Ministry of Health's confidence in the public health safety of each community drinking-water supply. The grading is a measure of confidence that a drinking-water supply system will not become contaminated, rather than an absolute indication of quality at a specific time."

The grading has two letters. The first letter (upper case) represents the source and treatment grading, while the second letter (lower case) grades the water in the distribution zone.

Watercare's Statement of Corporate Intent specifies the following key performance indicators with respect to grading:

Indicator	Measure	2012/13 Target	2013/14 Target	2014/15 Target
Potable Water Quality	Percentage of graded metropolitan water treatment plants achieving Grade 'A'	100%	100%	100%
	Percentage of graded metropolitan supply reticulation achieving Grade 'a'	100%	100%	100%
	Percentage of graded non-metropolitan water treatment plants achieving Grade 'A'	35%	45%	50%
	Percentage of graded non-metropolitan water supply reticulation achieving Grade 'a'	15%	25%	50%

PROTECTING OUR SOURCES

The quality of water at the source is a major consideration in determining the level of treatment supplied.

Auckland's water supply is obtained from three different types of sources: dams, rivers and from under the ground. The exact proportion of each source varies daily depending on the storage levels in the dams and the time of the year.

Watercare now operates 11 dams, five in the Waitakere Ranges, four in the Hunua Ranges, Hays Creek Dam near Papakura and the Mangakura Dam in Helensville. The sources in the Hunua and Waitakere ranges supply around 80 percent of Auckland's drinking water. The Hunua and Waitakere dams are surrounded by bush or forest. These areas have been protected from development and preserved for many years to minimise any risk of contamination. Auckland Council controls activities within the water supply catchments and allows passive recreational use of the land. Watercare's lakes are not available for boating or other water sports, to protect water quality. Nevertheless, treatment is still required to make the water safe to drink.

Auckland's river water is sourced from three rivers: the Waikato River, Mahurangi River (Warkworth) and Hotoe River (Wellsford). The Waikato River provides up to 15 percent of the region's water. While the Waikato River carries mineral compounds sourced from geothermal activity and its catchment is predominantly farmland, the advanced water treatment technologies implemented at the Waikato Water Treatment Plant ensures the treated water complies with the DWSNZ.

Watercare recognises that Tainui Maori have a special relationship with the river and acknowledges Tainui's guardianship role over the Waikato River. The company actively supports Tainui in its endeavours to protect and enhance river quality. Watercare makes submissions on resource consent applications that will affect the river and also sponsors Waikato RiverCare, an incorporated society working to improve river quality through shoreline planting programmes.

Watercare also sources water from 26 bores and springs, servicing local Auckland communities. The Onehunga Water Treatment Plant (WTP) sources water from bores. In Rodney, the Hamiltons Road WTP (Snells/Algies) sources water from a bore and the Muriwai WTP from a spring. In Franklin, bore water is sourced for the Buckland Beach, Clarks Beach, Glenbrook Beach, Patuhamoe, Waiau and three Waiuku WTPs. The Bombay WTP sources water from a spring. The Pukekohe WTP sources water from both bore and spring water.



Cosseys Dam is one of five dams in the Hunua Ranges, originally built in 1955.

PRODUCING HIGH-QUALITY DRINKING WATER

Watercare operates 20 water treatment plants which take untreated water and removes unsafe contaminants such as suspended solids, bacteria, algae, minerals and man-made chemical pollutants.

Watercare uses tried and trusted processes to produce safe drinking water. Commonly referred to as barriers, they are designed to meet the drinking water standards, which are in turn based on World Health Organisation drinking water guidelines, Australian drinking water guidelines and the United States' national primary drinking water standards.

The following tables summarise the barriers used at the different treatment plants, which are appropriate to the different sources.

This table shows that the metropolitan treatment plants have at least two barriers to contamination.

Station Process	Ardmore	Huia	Huia Village	Onehunga	Waikato	Waitakere
Coagulation	✓	✓	✓	✓	✓	✓
Clarification	✓	✓			✓	✓
Sand filtration	✓	✓		✓		✓
Membrane filtration			✓		✓	
Disinfection	✓	✓	✓	✓	✓	✓
Activated carbon			✓		✓	
pH adjustment	✓	✓	✓	✓	✓	✓
Alkalinity adjustment					✓	✓
Fluoridation	✓	✓		See note*	✓	✓

* Water supplied from Onehunga WTP into the main network is fluoridated.

This table summarises the Rodney non-metropolitan treatment plants processes. Fluoride is not dosed at the Rodney water treatment plants.

Station Process	Muriwai	Hamiltons Rd (Snells/Algies)	Helensville	Warkworth	Wellsford
Coagulation			✓	✓	✓
Sedimentation			✓	✓	✓
Clarification			✓	✓	✓
Sand filtration			✓	✓	✓
Cartridge filtration	✓				
Chlorine disinfection	✓	✓	✓	✓	✓
UV disinfection	✓			✓	✓
Activated carbon			✓	✓	
pH adjustment	✓	✓	✓	✓	✓

PRODUCING HIGH-QUALITY DRINKING WATER (continued)

The following tables summarise the Franklin non-metropolitan treatment plants processes. Fluoride is only dosed at the Pukekohe Water Treatment Plant.

Station Process	Bombay	Buckland	Clarks Beach	Glenbrook Beach	Patumahoe
Cartridge filtration	✓				
Chlorine disinfection	✓	✓	✓	✓	✓
UV disinfection	✓	✓		✓	
pH adjustment	✓		✓		

Station Process	Pukekohe	Waiiau Beach	Waiuku Rd	Victoria Rd	Cornwall Rd (Waiuku)
Pressure filtration			✓	✓	✓
Membrane filtration	✓				
Chlorine disinfection	✓	✓	✓	✓	✓
UV disinfection	✓				
Fluoridation	✓				

Coagulation /Clarification

Coagulation/clarification is the primary metropolitan treatment process. Positively charged alum is added to the water as it enters clarifiers. It attracts negatively charged particles in the water, allowing them to bind together.

A polyelectrolyte can be added to aid this process, forming a floc blanket which continually grows and settles. This allows clear water at the surface to flow on to the next stage of treatment.

Coagulation and clarification can remove up to 95 per cent of the dirt in the water – most of the organic and inorganic compounds (including the coagulants), bacteria and other organisms.

Filtration

All of the metropolitan and some of the non-metropolitan water treatment plants employ filters as barriers. Most have traditional sand filter beds. They are fully monitored and washed automatically to ensure they operate optimally.

The Waikato and Huia Village WTPs feature membrane filters. These filters comprise cassettes of thousands of narrow tubes covered with a semi-permeable membrane. The water is drawn through the membranes and out of the tubes. The holes in the membranes are just 0.035 microns in diameter, providing higher removal rates of bacteria, protozoa and some viruses.

Membrane filters are utilised at the Pukekohe WTP to remove iron and manganese which cause discoloured water.

PRODUCING HIGH-QUALITY DRINKING WATER (continued)

Activated carbon

Activated carbon reduces organics and taste and odour compounds. Compounds, produced by algae, can have a disproportionate impact on taste and odour, even in minute quantities, and at high levels have an impact on public health. At the Waikato and Huia Village water treatment plants, activated carbon is a standard part of the process. It can be added at the Huia, Waitakere, Ardmore, Warkworth and Helensville water treatment plants as required.

Disinfection

Chlorination is the most common form of disinfection used by water utilities throughout the world.

The concentration of chlorine is maintained within a tight range to ensure adequate disinfection while having minimum aesthetic effect. Chlorine is added as a final stage of the treatment process for two reasons. Firstly, it kills any remaining bacterial contaminants and it maintains that protection as the water travels through the distribution system. Secondly, it can take several days for water to travel through the hundreds of kilometres of pipe to the furthest extent of the network.

Ultraviolet disinfection is also used in some of the non-metropolitan water treatment plants as an additional barrier. This disinfection method uses UV light at short wavelengths to kill micro-organisms that may be resistant to chemical disinfection.

Final treatment

At the request of its customers, Watercare adds fluoride at a concentration of less than one part per million at the metropolitan water treatment plants (excluding at the Onehunga and Huia Village plants) and at the Pukekohe Water Treatment Plant. Fluoride is dosed in accordance with the drinking water standards.

While not required to ensure the safety of the water, Watercare also adds small quantities of lime or caustic soda to adjust the water's pH as required.

PROTECTION AND MAINTENANCE OF DISTRIBUTION SYSTEMS

Water supply distribution systems can also affect water quality. Any breaks in the watermains are isolated and repaired, then the pipes are chlorinated, flushed and reconnected to the water supply system. This minimises the risk of any potential contamination entering the distribution system. New mains and reservoirs are also disinfected before use also.

All service reservoirs are covered with roofs to avoid contamination from birds, animals, leaves or other airborne sources. Service reservoirs are tanks, usually on higher ground. They help to maintain pressure in the supply lines by smoothing out the peaks and troughs in demand. While these reservoirs may be supplied at a constant rate, typically they are drawn down during the day and refilled at night.



Redoubt Road Reservoir Complex.

MONITORING AND PROCESS CONTROL

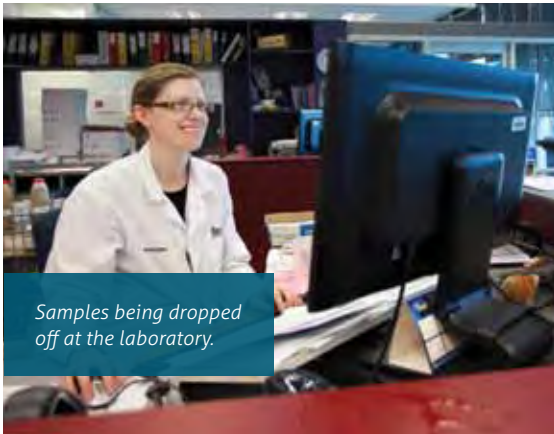
In accordance with the drinking water standards and other legislation, Watercare has an extensive water quality monitoring programme to monitor chemical, physical, radiological and aesthetic parameters as well as bacteriological parameters.

Watercare Laboratory Services is IANZ accredited and experienced in sampling and analysis for a range of chemical and biological tests for water, wastewater, landfill, marine and environmental samples including soils and sludges. Air-quality expertise includes point emission, biogas, odour and ambient sampling and testing. The laboratory works with a wide range of external organisations including councils, environmental consultants and industries, nationwide.

The laboratory recognises that customer needs go beyond analysis to providing advice on test programmes and results, electronic methods of data transfer, provision of innovative sampling services, continual improvement of test methods, quality assurance and a high level of customer service.

All our water quality monitoring and reporting is co-ordinated through our Water Quality Database. This software is used to review performance against drinking water standards, contractual requirements and operational parameters. The system also enables trends to be observed and provides exception reports on test results exceeding drinking water standard guidelines.

Data from monitoring equipment is collected also through online monitoring systems at the company's treatment plants and within the reticulation system, allowing staff to control and respond to changing conditions remotely. The results are faster response times, more consistent water quality and more effective management and control.



Samples being dropped off at the laboratory.



Water treatment plant operators analysing online monitoring data.

MONITORING AND PROCESS CONTROL (continued)

Watercare complied with all of the DWSNZ 2005 (Revised 2008) microbiological, protozoa and chemical criteria between 1 July 2011 to 30 June 2012 at the metropolitan water treatment plants. Results for each treatment plant are summarised in **Appendix 1**.

Watercare also complied with all contractual microbiological water quality standards at all of its bulk supply points for 2011/12, and almost all of the aesthetic standards met the required compliance. These figures are reported in **Appendix 2**. Compliance is based on results for the financial year 1 July 2011 to 30 June 2012.

Appendix 3 shows water quality information for each grading zone. Monitoring includes turbidity, pH and chlorine residual.

Microbiological monitoring

Microbiological tests are carried out to ascertain the presence or absence of potential disease-causing organisms. It is impracticable to monitor water supplies for all potential human pathogens, so surrogates are used to indicate possible contamination. As required by the drinking water standards, Watercare uses E.coli (*Escherichia coli*) as the primary compliance indicator for microbiological contamination.

Heterotrophic plate counts are also used as a general indication of all organisms that may be present in a water supply, and are a useful indicator of operational performance. The count shows mainly environmental organisms, as well as some faecal organisms. It is a useful measure of general water quality in addition to the indicator organism (*E.coli*).

Protozoan monitoring

Protozoa such as *Cryptosporidium* and *Giardia* occur in many New Zealand water sources. They are found in the faeces of humans and wild, farm and domestic animals.

A key objective of the drinking water standards is to protect the population against such protozoa, which can have an immediate and serious impact on public health.

Watercare has significantly increased the monitoring and control capability at its plants. The aim is to ensure that control systems react appropriately when any individual process or filters approaches the borders of the target zone.



Microbiological samples are prepared for analysis at Watercare's Laboratory Services.

MONITORING AND PROCESS CONTROL (continued)

Chemical and physical monitoring

Watercare also monitors a range of physical and chemical parameters as required by the drinking water standards to ensure that drinking water is safe over a person's lifetime.

Watercare aims for a pH of 7.9 which is the midpoint of the customer-specified target of 7.6 to 8.2. pH control is important to ensure adequate disinfection of the water supply.

Fluoride is one of the most abundant elements in the earth's crust, and is typically found as the fluoride ion or as organic or inorganic fluorides. It is found naturally in groundwater supplies, and is present in most food and beverage products and in toothpaste. At the request of our customers, Watercare adds fluoride to its metropolitan treated water (except at the Onehunga and Huia Village treatment plants), and at Pukekohe Water Treatment Plant. Watercare is required to monitor fluoride on a weekly basis. The drinking water standards state a maximum acceptable value (MAV) of 1.5 mg/L. Watercare did not exceed this value in 2011/12.

Chlorine is the primary defence against disease-causing microbiological contaminants in public water supply systems. Chlorine is used in sufficient amounts to kill microbes at the treatment plants and provide a residual in the distribution system.

Aesthetic parameters

As mentioned above, aesthetic parameters pose no threat to human health but can affect drinking water appearance, taste and odour.

Groundwater is often high in dissolved solids (salts) and hardness (calcium), which can cause calcification on hot-water systems and fixtures in the Rodney and Franklin districts. However, Watercare's metropolitan plants can all be considered surface water sources, as the Onehunga aquifer is not deep enough to acquire typical groundwater attributes. As such it is comparatively low in salts and calcium and is considered 'soft' water.

It is worth noting that as water in New Zealand is generally low in minerals and metal salts it will attempt to acquire them. The Ministry of Health has warned that water sitting overnight in contact with some low-quality fittings such as taps and mixers can absorb some oxides of these metals. For that reason, they advise flushing away the first cupful of water from taps each day. Twice a year Watercare places flushing notices in local newspapers. This notice is also on the community section of the Watercare website, www.watercare.co.nz



The Ardmore Water Treatment Plant is the largest of 20 plants.

FLUSHING YOUR DRINKING WATER

Some plumbing fittings have the potential to allow minute traces of metals to accumulate in water settling within the fittings for several hours.

Although the health risk is small, the Ministry of Health recommends that you flush a large glass of water from your drinking water tap each morning before use to remove any metals that may have dissolved from the plumbing fittings.

We recommend this simple precaution for all households, including those on public and private water supplies.

Alum (aluminium sulphate) is a coagulant that is added to aid the removal of colour and turbidity.

Aluminium can accumulate in pipe sediments, and be re-suspended during periods of rapid changes to flow patterns. The drinking water standards guideline value is 0.15 mg/L. Aluminium detected in treated water at the plants is typically less than this value.

Iron and manganese are naturally occurring minerals. They have no health implications and can be found in food supplements in much higher concentrations than are likely to occur in a glass of water. Unusual changes to the flow within the system can stir up deposits that have settled out of the water within the mains.

Taste and odour are sometimes related to fluctuating chlorine levels due to changing water demand.

The chlorine residual throughout the reticulation network is regularly monitored. Chlorine is added in areas remote from the treatment plants to ensure the required levels are maintained through to the consumers' taps.

Algal blooms, particularly in the Lower Nihotupu Dam, can prompt taste and odour complaints also. The dam is usually taken out of supply in early summer before this becomes a problem. Watercare has commissioned Niwa to advise on monitoring and management strategies to minimise cause for further complaints. Typical algal levels at each of Watercare's raw water sources are shown in **Appendix 4**.

Colour in water originates mainly from soil and vegetable matter such as leaves in the catchment. Corroding metal pipes can colour the water too, with iron producing a brownish colour and copper a faint blue colour.



VERIFICATION OF DRINKING WATER QUALITY

Compliance with the DWSNZ 2005 (Revised 2008) microbiological, protozoa and chemical criteria between 1 July 2011 to 30 June 2012 at Watercare's water treatment plants is summarised in **Appendix 1**.

Compliance with the bulk water agreement with Veolia Water is reported in **Appendix 2**.

Appendix 3 shows water quality information for each grading zone. Monitoring includes turbidity, pH and chlorine residual.

Note: In the results ND refers to non-detectable.

APPENDIX 1 Water quality at treatment plants

ARDMORE WTP

Component Name	Component Units	Number of Samples	Max	Minimum	Average	Standard Deviation	MAV DWSNZ 2008	GV DWSNZ 2008	Compliant with DWSNZ 2005 (amended 2008)
ACID HERBICIDES									
2-4-5-Trichlorophenoxyacetic	mg/L	10	0.00	0.00	0.00				
2-4-Dichlorophenoxyacetic acid	mg/L	10	0.00	0.00	0.00				
4-(2-4-Dichlorophenoxy) butano	mg/L	20	0.00	0.00	0.00				
Bentazone	mg/L	16	0.00	0.00	0.00				
Dichlorprop	mg/L	26	0.00	0.00	0.00		0.1		✓
MCPA	mg/L	16	0.00	0.00	0.00		0.002		✓
Mecoprop (MCP)	mg/L	16	0.00	0.00	0.00		0.01		✓
Picloram	mg/L	26	0.00	0.00	0.00		0.2		✓
Triclopyr	mg/L	16	0.00	0.00	0.00		0.1		✓
CHEMICAL AND PHYSICAL									
abs254	abs units	104	0.02	0.01	0.01	0.00			
Alkalinity Total	mg/L	104	22.58	15.00	18.04	1.70			
Aluminium	mg/L	104	0.04	0.02	0.03	0.00		0.1	✓
Bromate	mg/L	26	0.00	0.00	0.00		0.01		✓
Bromide	mg/L	26	0.04	0.00	0.02	0.01			
Calcium	mg/L	104	8.00	6.00	6.97	0.59			
Calcium Hardness	mg/L	104	20.00	15.00	17.10	1.27			
Chlorate	mg/L	26	0.05	0.01	0.03	0.01	0.8		✓
Chloride	mg/L	26	14.00	12.00	12.68	0.74		250	✓
Chlorine Residual	mg/L	732	1.59	0.90	1.27	0.17	5		✓
Chlorite	mg/L	26	0.00	0.00	0.00		0.8		✓
Colour	Hazen Units	104	0.00	0.00	0.00			10	✓
Conductivity	mS/m	104	13.50	9.84	10.43	0.67			
Fluoride	mg/L	104	1.03	0.09	0.85	0.19	1.5		✓
Iodide	mg/L	26	0.00	0.00	0.00	0.00			
Iron	mg/L	102	0.03	0.00	0.01	0.01		0.2	✓
Magnesium	mg/L	104	1.60	1.10	1.35	0.19			
Magnesium Hardness	mg/L	104	6.70	4.60	5.77	0.59			
Manganese	mg/L	104	0.01	0.00	0.00	0.00	0.4	0.04	✓
pH	pH unit	732	8.79	7.49	7.95	0.23		7.0-8.5	
Potassium	mg/L	26	1.10	0.95	1.00	0.05			
Silicon	mg/L	26	17.00	12.00	14.50	1.87			
Sodium	mg/L	26	9.60	7.70	8.66	0.63		200	✓
Sulphate	mg/L	26	8.76	0.10	7.46	2.35		250	✓
Suspended Solids	mg/L	104	0.40	0.00	0.23	0.15			
Total Hardness	mg/L	104	26.00	20.00	22.56	1.39		200	✓
Total Organic Carbon (TOC)	mg/L	104	3.00	0.70	1.51	0.81			
Turbidity	NTU	732	0.45	0.00	0.18	0.08		2.5	✓

APPENDIX 1 Water quality at treatment plants

ARDMORE WTP (continued)

Component Name	Component Units	Number of Samples	Maximum	Minimum	Average	Standard Deviation	MAV DWSNZ 2008	GV DWSNZ 2008	Compliant with DWSNZ 2005 (amended 2008)
MICROBIOLOGY									
Confirmed Cryptosporidium per 100L	/100 L	20	0.00	0.00	0.00		1		✓
Confirmed Giardia per 100L	/100 L	20	0.00	0.00	0.00		1		✓
Escherichia coli	MPN/100 mL	732	0.00	0.00	0.00		1		✓
NUTRIENTS									
Dissolved Reactive Phosphorus	mg/L	26	0.01	0.00	0.00	0.00			
Ammonia	mg/L	26	0.04	0.00	0.01	0.01		1.5	✓
Nitrate	mg/L	26	0.07	0.01	0.04	0.02	50		✓
Nitrite	mg/L	26	0.00	0.00	0.00	0.00	0.2		✓
TKN	mg/L	16	0.49	0.00	0.18	0.18			
Total Phosphorus	mg/L	26	0.01	0.00	0.01	0.01			
PLASTICISERS									
Di(2-ethylhexyl) adipate	µg/L	26	0.00	0.00	0.00				
Di(2-ethylhexyl) phthalate	µg/L	26	0.00	0.00	0.00		9		✓
POLYCYCLIC AROMATIC HYDROCARBONS									
Benzo[a]pyrene	µg/L	26	0.00	0.00	0.00		0.7		✓
SEMI-VOLATILE ORGANIC COMPOUNDS – ORGANOCHLORINE PESTICIDES									
Aldrin	µg/L	26	0.00	0.00	0.00		0.00004		✓
alpha-Chlordan	µg/L	26	0.00	0.00	0.00		0.0002		✓
gamma-BHC (lindane)	µg/L	26	0.00	0.00	0.00		2		✓
Heptachlor	µg/L	26	0.00	0.00	0.00				
Heptachlor epoxide	µg/L	26	0.00	0.00	0.00				
Hexachlorobenzene	µg/L	26	0.00	0.00	0.00				
Methoxychlor	µg/L	26	0.00	0.00	0.00		0.02		✓
Permethrin (cis + trans)	µg/L	26	0.00	0.00	0.00				
pp-DDT	µg/L	26	0.00	0.00	0.00		0.001		✓
Procyimdone	µg/L	26	0.00	0.00	0.00		700		✓
SEMI-VOLATILE ORGANIC COMPOUNDS – ORGANONITROGEN HERBICIDES									
Atrazine	µg/L	26	0.00	0.00	0.00		2		✓
Metolachlor	µg/L	26	0.00	0.00	0.00		10		✓
Molinate	µg/L	26	0.00	0.00	0.00		7		✓
Pendimethalin	µg/L	26	0.00	0.00	0.00		20		✓
Propanil	µg/L	26	0.00	0.00	0.00				
Simazine	µg/L	26	0.00	0.00	0.00		2		✓
Terbutylazine	µg/L	26	0.00	0.00	0.00		8		✓
Trifluralin	µg/L	26	0.00	0.00	0.00		30		✓

APPENDIX 1 Water quality at treatment plants

ARDMORE WTP (continued)

Component Name	Component Units	Number of Samples	Maximum	Minimum	Average	Standard Deviation	MAV DWSNZ 2008	GV DWSNZ 2008	Compliant with DWSNZ 2005 (amended 2008)
SEMI-VOLATILE ORGANIC COMPOUNDS – ORGANONITROGEN HERBICIDES									
Alachlor	µg/L	26	0.00	0.00	0.00		20		✓
SEMI-VOLATILE ORGANIC COMPOUNDS – ORGANOPHOSPHORUS PESTICIDES									
Chlorpyrifos	µg/L	26	0.00	0.00	0.00		40		✓
Diazinon	µg/L	26	0.00	0.00	0.00				
Pirimiphos-meth	µg/L	26	0.00	0.00	0.00		100		✓
TRACE ELEMENTS									
Antimony	mg/L	26	0.00	0.00	0.00	0.00	0.02		✓
Arsenic	mg/L	26	0.00	0.00	0.00	0.00	0.01		✓
Barium	mg/L	26	0.01	0.01	0.01	0.00	0.7		✓
Boron	mg/L	26	0.01	0.01	0.01	0.00	1.4		✓
Cadmium	mg/L	26	0.00	0.00	0.00		0.004		✓
Chromium	mg/L	26	0.00	0.00	0.00	0.00	0.05		✓
Copper	mg/L	26	0.00	0.00	0.00	0.00	2		✓
Cyanide	mg/L	26	0.00	0.00	0.00		0.6		✓
Lead	mg/L	26	0.00	0.00	0.00	0.00	0.01		✓
Lithium	mg/L	26	0.00	0.00	0.00	0.00			
Mercury	mg/L	26	0.00	0.00	0.00		0.007		✓
Molybdenum	mg/L	26	0.00	0.00	0.00		0.07		✓
Nickel	mg/L	26	0.01	0.00	0.00	0.00	0.08		✓
Selenium	mg/L	26	0.00	0.00	0.00		0.01		✓
Zinc	mg/L	26	0.00	0.00	0.00	0.00		1.5	✓
TRIHALOMETHANES									
bromodichloromethane	mg/L	104	0.03	0.00	0.01	0.00	0.06		✓
bromoform	mg/L	104	0.00	0.00	0.00	0.00	0.1		✓
chloroform	mg/L	104	0.03	0.00	0.01	0.00	0.4		✓
dibromochloromethane	mg/L	104	0.01	0.00	0.00	0.00	0.15		✓
THM Ratio		104	0.49	0.09	0.14	0.06			

APPENDIX 1 Water quality at treatment plants

ARDMORE WTP (continued)

Component Name	Component Units	Number of Samples	Maximum	Minimum	Average	Standard Deviation	MAV DWSNZ 2008	GV DWSNZ 2008	Compliant with DWSNZ 2005 (amended 2008)
SEVOLATILE ORGANIC COMPOUNDS									
1-1-1-trichloroethane	mg/L	26	0.00	0.00	0.00				
1-2-3-trichlorobenzene	mg/L	26	0.00	0.00	0.00				
1-2-4-trichlorobenzene	mg/L	26	0.00	0.00	0.00				
1-2-dichlorobenzene	mg/L	26	0.00	0.00	0.00		1.5	0.001	✓
1-2-dichloroethane	mg/L	26	0.00	0.00	0.00		0.03		✓
1-4-dichlorobenzene	mg/L	26	0.00	0.00	0.00		0.4	0.0003	✓
benzene	mg/L	26	0.00	0.00	0.00		0.01		✓
carbon tetrachloride	mg/L	26	0.00	0.00	0.00				
ethylbenzene	mg/L	26	0.00	0.00	0.00		0.3	0.002	✓
m- & p-xylene	mg/L	26	0.00	0.00	0.00		0.6		✓
styrene	mg/L	26	0.00	0.00	0.00		0.004	0.004	✓
tetrachloroethylene	mg/L	26	0.00	0.00	0.00		0.05		✓
toluene	mg/L	26	0.00	0.00	0.00		0.8	0.03	✓
trans-1-2-dichloroethene	mg/L	26	0.00	0.00	0.00		0.06		✓
trichloroethylene	mg/L	26	0.00	0.00	0.00		0.02		✓

APPENDIX 1 Water quality at treatment plants

HUIA WTP TREATED

Component Name	Component Units	Number of Samples	Maximum	Minimum	Average	Standard Deviation	MAV DWSNZ 2008	GV DWSNZ 2008	Compliant with DWSNZ 2005 (amended 2008)
ACID HERBICIDES									
2-4-5-Trichlorophenoxyacetic	mg/L	5	0.00	0.00	0.00				
2-4-Dichlorophenoxyacetic acid	mg/L	5	0.00	0.00	0.00				
4-(2-4-Dichlorophenoxy) butano	mg/L	10	0.00	0.00	0.00				
Bentazone	mg/L	8	0.00	0.00	0.00				
Dichlorprop	mg/L	13	0.00	0.00	0.00		0.1		✓
MCPA	mg/L	8	0.00	0.00	0.00		0.002		✓
Mecoprop (MCP)	mg/L	8	0.00	0.00	0.00		0.01		✓
Picloram	mg/L	13	0.00	0.00	0.00		0.2		✓
Triclopyr	mg/L	8	0.00	0.00	0.00		0.1		✓
CHEMICAL AND PHYSICAL									
abs254	abs units	52	0.24	0.01	0.03	0.04			
Alkalinity Total	mg/L	52	21.00	15.00	18.76	1.70			
Aluminium	mg/L	52	0.38	0.02	0.05	0.08		0.1	✓
Bromate	mg/L	13	0.00	0.00	0.00		0.01		✓
Bromide	mg/L	13	0.05	0.00	0.02	0.01			
Calcium	mg/L	52	12.00	7.70	9.49	0.96			
Calcium Hardness	mg/L	52	29.96	19.00	24.10	2.59			
Chlorate	mg/L	13	0.00	0.00	0.00		0.8		✓
Chloride	mg/L	13	21.90	18.00	20.29	1.28		250	✓
Chlorine Residual	mg/L	366	1.18	0.68	0.92	0.14	5		✓
Chlorite	mg/L	13	0.00	0.00	0.00		0.8		✓
Colour	Hazen Units	52	0.00	0.00	0.00			10	✓
Conductivity	mS/m	52	15.81	8.20	14.72	1.32			
Fluoride	mg/L	52	1.03	0.00	0.82	0.26	1.5		✓
Iodide	mg/L	4	0.00	0.00	0.00	0.00			
Iron	mg/L	52	0.87	0.01	0.09	0.25		0.2	✓
Magnesium	mg/L	52	3.10	2.00	2.53	0.37			
Magnesium Hardness	mg/L	52	12.77	8.24	9.91	1.14			
Manganese	mg/L	52	0.03	0.00	0.00	0.01	0.4	0.04	✓
pH	pH unit	366	8.82	7.30	7.86	0.23		7.0-8.5	✓
Potassium	mg/L	13	1.00	0.74	0.88	0.08			
Silicon	mg/L	13	18.00	13.00	15.20	1.92			
Sodium	mg/L	13	13.00	11.00	12.00	1.00		200	✓
Sulphate	mg/L	13	18.00	15.00	16.19	0.96		250	✓
Suspended Solids	mg/L	52	2.40	0.00	0.54	0.67			
Total Hardness	mg/L	52	42.73	29.00	34.29	3.02		200	✓
Total Organic Carbon (TOC)	mg/L	52	3.80	0.90	1.79	0.73			
Turbidity	NTU	366	1.74	0.10	0.22	0.16		2.5	✓

APPENDIX 1 Water quality at treatment plants

HUIA WTP TREATED (continued)

Component Name	Component Units	Number of Samples	Maximum	Minimum	Average	Standard Deviation	MAV DWSNZ 2008	GV DWSNZ 2008	Compliant with DWSNZ 2005 (amended 2008)
MICROBIOLOGY									
Confirmed Cryptosporidium per 100L	/100 L	5	0.00	0.00	0.00		1		
Confirmed Giardia per 100L	/100 L	5	0.00	0.00	0.00		1		
Escherichia coli	MPN/100 mL	366	0.00	0.00	0.00		1		
NUTRIENTS									
Dissolved Reactive Phosphorus	mg/L	13	0.01	0.00	0.01	0.00			
Ammonia	mg/L	13	0.01	0.00	0.01	0.00		1.5	✓
Nitrate	mg/L	13	0.05	0.02	0.04	0.01	50		✓
Nitrite	mg/L	13	0.00	0.00	0.00	0.00	0.2		✓
TKN	mg/L	8	0.42	0.00	0.21	0.18			
Total Phosphorus	mg/L	13	0.02	0.00	0.01	0.01			
PLASTICISERS									
Di(2-ethylhexyl) adipate	µg/L	1	0.00	0.00	0.00				
Di(2-ethylhexyl) phthalate	µg/L	1	0.00	0.00	0.00		9		✓
POLYCYCLIC AROMATIC HYDROCARBONS									
Benzo[a]pyrene	µg/L	1	0.00	0.00	0.00		0.7		✓
SEMI-VOLATILE ORGANIC COMPOUNDS – ORGANOCHLORINE PESTICIDES									
Aldrin	µg/L	1	0.00	0.00	0.00		0.00004		✓
alpha-Chlordan	µg/L	1	0.00	0.00	0.00		0.0002		✓
gamma-BHC (lindane)	µg/L	1	0.00	0.00	0.00		2		✓
Heptachlor	µg/L	1	0.00	0.00	0.00				
Heptachlor epoxide	µg/L	1	0.00	0.00	0.00				
Hexachlorobenzene	µg/L	1	0.00	0.00	0.00				
Methoxychlor	µg/L	1	0.00	0.00	0.00		0.02		✓
Permethrin (cis + trans)	µg/L	1	0.00	0.00	0.00				
pp-DDT	µg/L	1	0.00	0.00	0.00		0.001		✓
Procymidone	µg/L	1	0.00	0.00	0.00		700		✓
SEMI-VOLATILE ORGANIC COMPOUNDS – ORGANONITROGEN HERBICIDES									
Atrazine	µg/L	1	0.00	0.00	0.00		2		✓
Metolachlor	µg/L	1	0.00	0.00	0.00		10		✓
Molinate	µg/L	1	0.00	0.00	0.00		7		✓
Pendimethalin	µg/L	1	0.00	0.00	0.00		20		✓
Propanil	µg/L	1	0.00	0.00	0.00				
Simazine	µg/L	1	0.00	0.00	0.00		2		✓
Terbutylazine	µg/L	1	0.00	0.00	0.00		8		✓
Trifluralin	µg/L	1	0.00	0.00	0.00		30		✓

APPENDIX 1 Water quality at treatment plants

HUIA WTP TREATED (continued)

Component Name	Component Units	Number of Samples	Maximum	Minimum	Average	Standard Deviation	MAV DWSNZ 2008	GV DWSNZ 2008	Compliant with DWSNZ 2005 (amended 2008)
SEMI-VOLATILE ORGANIC COMPOUNDS – ORGANONITROGEN HERBICIDES									
Alachlor	µg/L	1	0.00	0.00	0.00		20		✓
SEMI-VOLATILE ORGANIC COMPOUNDS – ORGANOPHOSPHORUS PESTICIDES									
Chlorpyrifos	µg/L	1	0.00	0.00	0.00		40		✓
Diazinon	µg/L	1	0.00	0.00	0.00				
Pirimiphos-meth	µg/L	1	0.00	0.00	0.00		100		✓
TRACE ELEMENTS									
Antimony	mg/L	13	0.00	0.00	0.00	0.00	0.02		✓
Arsenic	mg/L	13	0.00	0.00	0.00	0.00	0.01		✓
Barium	mg/L	13	0.01	0.00	0.00	0.00	0.7		✓
Boron	mg/L	13	0.02	0.01	0.01	0.00	1.4		✓
Cadmium	mg/L	13	0.00	0.00	0.00		0.004		✓
Chromium	mg/L	13	0.00	0.00	0.00	0.00	0.05		✓
Copper	mg/L	13	0.00	0.00	0.00	0.00	2.0		✓
Cyanide	mg/L	13	0.00	0.00	0.00		0.6		✓
Lead	mg/L	13	0.00	0.00	0.00	0.00	0.01		✓
Lithium	mg/L	13	0.00	0.00	0.00	0.00			
Mercury	mg/L	13	0.00	0.00	0.00		0.007		✓
Molybdenum	mg/L	13	0.00	0.00	0.00		0.07		✓
Nickel	mg/L	13	0.00	0.00	0.00	0.00	0.08		✓
Selenium	mg/L	13	0.00	0.00	0.00		0.01		✓
Zinc	mg/L	13	0.00	0.00	0.00	0.00		1.5	✓
TRIHALOMETHANES									
bromodichloromethane	mg/L	52	0.03	0.00	0.01	0.00	0.06		✓
bromoform	mg/L	52	0.00	0.00	0.00	0.00	0.1		✓
chloroform	mg/L	52	0.03	0.00	0.01	0.01	0.4		✓
dibromochloromethane	mg/L	52	0.02	0.00	0.01	0.00	0.15		✓
THM Ratio		52	0.53	0.13	0.20	0.07			

APPENDIX 1 Water quality at treatment plants

HUIA WTP TREATED (continued)

Component Name	Component Units	Number of Samples	Maximum	Minimum	Average	Standard Deviation	MAV DWSNZ 2008	GV DWSNZ 2008	Compliant with DWSNZ 2005 (amended 2008)
VOLATILE ORGANIC COMPOUNDS									
1-1-1-trichloroethane	mg/L	1	0.00	0.00	0.00				
1-2-3-trichlorobenzene	mg/L	1	0.00	0.00	0.00				
1-2-4-trichlorobenzene	mg/L	1	0.00	0.00	0.00				
1-2-dichlorobenzene	mg/L	1	0.00	0.00	0.00		1.5	0.001	✓
1-2-dichloroethane	mg/L	1	0.00	0.00	0.00		0.03		✓
1-4-dichlorobenzene	mg/L	1	0.00	0.00	0.00		0.4	0.0003	✓
benzene	mg/L	1	0.00	0.00	0.00		0.01		✓
carbon tetrachloride	mg/L	1	0.00	0.00	0.00				
ethylbenzene	mg/L	1	0.00	0.00	0.00		0.3	0.002	✓
m- & p-xylene	mg/L	1	0.00	0.00	0.00		0.6		✓
styrene	mg/L	1	0.00	0.00	0.00		0.004	0.004	✓
tetrachloroethylene	mg/L	1	0.00	0.00	0.00		0.05		✓
toluene	mg/L	1	0.00	0.00	0.00		0.8	0.03	✓
trans-1-2-dichloroethene	mg/L	1	0.00	0.00	0.00		0.06		✓
trichloroethylene	mg/L	1	0.00	0.00	0.00		0.02		✓

APPENDIX 1 Water quality at treatment plants

HUIA VILLAGE TREATED

Component Name	Component Units	Number of Samples	Maximum	Minimum	Average	Standard Deviation	MAV DWSNZ 2008	GV DWSNZ 2008	Compliant with DWSNZ 2005 (amended 2008)
CHEMICAL AND PHYSICAL									
abs254	abs units	122	0.08	0.00	0.02	0.01			
Alkalinity Total	mg/L	1	21.64	21.64	21.64				
Aluminium	mg/L	1	0.01	0.01	0.01			0.1	✓
Bromate	mg/L	1	0.00	0.00	0.00		0.01		✓
Bromide	mg/L	1	0.03	0.03	0.03				
Calcium	mg/L	1	4.40	4.40	4.40				
Calcium Hardness	mg/L	1	10.99	10.99	10.99				
Chlorate	mg/L	1	0.26	0.26	0.26		0.8		✓
Chloride	mg/L	1	28.40	28.40	28.40			250	✓
Chlorine Residual	mg/L	122	1.40	0.37	0.89	0.23	5.0		✓
Chlorite	mg/L	1	0.00	0.00	0.00		0.8		✓
Colour	Hazen Units	1	0.00	0.00	0.00			10	✓
Conductivity	mS/m	1	14.50	14.50	14.50				
Fluoride	mg/L	1	0.00	0.00	0.00		1.5		✓
Iodide	mg/L	1	0.00	0.00	0.00				
Iron	mg/L	1	0.00	0.00	0.00			0.2	✓
Magnesium	mg/L	1	2.80	2.80	2.80				
Magnesium Hardness	mg/L	1	11.53	11.53	11.53				
Manganese	mg/L	1	0.00	0.00	0.00		0.4	0.04	✓
pH	pH unit	122	8.94	7.40	7.87	0.30		7.0-8.5	
Potassium	mg/L	1	1.00	1.00	1.00				
Silicon	mg/L	1	16.00	16.00	16.00				
Sodium	mg/L	1	18.00	18.00	18.00			200	✓
Sulphate	mg/L	1	4.89	4.89	4.89			250	✓
Suspended Solids	mg/L	1	0.00	0.00	0.00				
Total Dissolved Solids	mg/L	1	78.00	78.00	78.00			1000	✓
Total Hardness	mg/L	1	22.52	22.52	22.52			200	✓
Total Organic Carbon (TOC)	mg/L	13	2.90	1.30	1.94	0.58			
Turbidity	NTU	122	0.47	0.00	0.13	0.08		2.5	✓

MICROBIOLOGY

Escherichia coli	MPN/100 mL	122	0.00	0.00	0.00		1.0		✓
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NUTRIENTS

Dissolved Reactive Phosphorus	mg/L	1	0.00	0.00	0.00				
Ammonia	mg/L	1	0.00	0.00	0.00			1.5	✓
Nitrate	mg/L	1	0.05	0.05	0.05		50.0		✓
Nitrite	mg/L	1	0.00	0.00	0.00		0.2		✓
Total Phosphorus	mg/L	1	0.00	0.00	0.00				

APPENDIX 1 Water quality at treatment plants

HUIA VILLAGE TREATED (continued)

Component Name	Component Units	Number of Samples	Maximum	Minimum	Average	Standard Deviation	MAV DWSNZ 2008	GV DWSNZ 2008	Compliant with DWSNZ 2005 (amended 2008)
PLASTICISERS									
Di(2-ethylhexyl) adipate	µg/L	1	0.00	0.00	0.00				
Di(2-ethylhexyl) phthalate	µg/L	1	0.00	0.00	0.00		9		✓
POLYCYCLIC AROMATIC HYDROCARBONS									
Benzo[a]pyrene	µg/L	1	0.00	0.00	0.00		0.7		✓
SEMI-VOLATILE ORGANIC COMPOUNDS – ORGANOCHLORINE PESTICIDES									
Aldrin	µg/L	1	0.00	0.00	0.00		0.00004		✓
alpha-Chlordan	µg/L	1	0.00	0.00	0.00		0.0002		✓
gamma-BHC (lindane)	µg/L	1	0.00	0.00	0.00		2		✓
Heptachlor	µg/L	1	0.00	0.00	0.00				
Heptachlor epoxide	µg/L	1	0.00	0.00	0.00				
Hexachlorobenzene	µg/L	1	0.00	0.00	0.00				
Methoxychlor	µg/L	1	0.00	0.00	0.00		0.02		✓
Permethrin (cis + trans)	µg/L	1	0.00	0.00	0.00				
pp-DDT	µg/L	1	0.00	0.00	0.00		0.001		✓
Procyimdone	µg/L	1	0.00	0.00	0.00		700		✓
SEMI-VOLATILE ORGANIC COMPOUNDS – ORGANONITROGEN HERBICIDES									
Atrazine	µg/L	1	0.00	0.00	0.00		2		✓
Metolachlor	µg/L	1	0.00	0.00	0.00		10		✓
Molinate	µg/L	1	0.00	0.00	0.00		7		✓
Pendimethalin	µg/L	1	0.00	0.00	0.00		20		✓
Propanil	µg/L	1	0.00	0.00	0.00				
Simazine	µg/L	1	0.00	0.00	0.00		2		✓
Terbutylazine	µg/L	1	0.00	0.00	0.00		8		✓
Trifluralin	µg/L	1	0.00	0.00	0.00		30		✓
SEMI-VOLATILE ORGANIC COMPOUNDS – ORGANONITROGEN HERBICIDES									
Alachlor	µg/L	1	0.00	0.00	0.00		20		✓
SEMI-VOLATILE ORGANIC COMPOUNDS – ORGANOPHOSPHORUS PESTICIDES									
Chlorpyrifos	µg/L	1	0.00	0.00	0.00		40		✓
Diazinon	µg/L	1	0.00	0.00	0.00				
Pirimiphos-meth	µg/L	1	0.00	0.00	0.00		100		✓

APPENDIX 1 Water quality at treatment plants

HUIA VILLAGE TREATED (continued)

Component Name	Component Units	Number of Samples	Maximum	Minimum	Average	Standard Deviation	MAV DWSNZ 2008	GV DWSNZ 2008	Compliant with DWSNZ 2005 (amended 2008)
TRACE ELEMENTS									
Antimony	mg/L	1	0.00	0.00	0.00		0.02		✓
Arsenic	mg/L	1	0.00	0.00	0.00		0.01		✓
Barium	mg/L	1	0.00	0.00	0.00		0.7		✓
Boron	mg/L	1	0.02	0.02	0.02		1.4		✓
Cadmium	mg/L	1	0.00	0.00	0.00		0.004		✓
Chromium	mg/L	1	0.00	0.00	0.00		0.05		✓
Copper	mg/L	1	0.00	0.00	0.00		2		✓
Cyanide	mg/L	1	0.00	0.00	0.00		0.6		✓
Lead	mg/L	1	0.00	0.00	0.00		0.01		✓
Lithium	mg/L	1	0.00	0.00	0.00				
Mercury	mg/L	1	0.00	0.00	0.00		0.007		✓
Molybdenum	mg/L	1	0.00	0.00	0.00		0.07		✓
Nickel	mg/L	1	0.00	0.00	0.00		0.08		✓
Selenium	mg/L	1	0.00	0.00	0.00		0.01		✓
Zinc	mg/L	1	0.00	0.00	0.00			1.5	✓
TRIHALOMETHANES									
bromodichloromethane	mg/L	1	0.01	0.01	0.01		0.06		✓
bromoform	mg/L	1	0.00	0.00	0.00		0.1		✓
chloroform	mg/L	1	0.01	0.01	0.01		0.4		✓
dibromochloromethane	mg/L	1	0.00	0.00	0.00		0.15		✓
THM Ratio		1	0.16	0.16	0.16				
VOLATILE ORGANIC COMPOUNDS									
1-1-1-trichloroethane	mg/L	1	0.00	0.00	0.00				
1-2-3-trichlorobenzene	mg/L	1	0.00	0.00	0.00				
1-2-4-trichlorobenzene	mg/L	1	0.00	0.00	0.00				
1-2-dichlorobenzene	mg/L	1	0.00	0.00	0.00		1.5	0.001	✓
1-2-dichloroethane	mg/L	1	0.00	0.00	0.00		0.03		✓
1-4-dichlorobenzene	mg/L	1	0.00	0.00	0.00		0.4	0.0003	✓
benzene	mg/L	1	0.00	0.00	0.00		0.01		✓
carbon tetrachloride	mg/L	1	0.00	0.00	0.00				
ethylbenzene	mg/L	1	0.00	0.00	0.00		0.3	0.002	✓
m- & p-xylene	mg/L	1	0.00	0.00	0.00		0.6		✓
styrene	mg/L	1	0.00	0.00	0.00		0.004	0.004	✓
tetrachloroethylene	mg/L	1	0.00	0.00	0.00		0.05		✓
toluene	mg/L	1	0.00	0.00	0.00		0.8	0.03	✓
trans-1-2-dichloroethene	mg/L	1	0.00	0.00	0.00		0.06		✓
trichloroethylene	mg/L	1	0.00	0.00	0.00		0.02		✓

APPENDIX 1 Water quality at treatment plants

ONEHUNGA WTP TREATED

Component Name	Component Units	Number of Samples	Maximum	Minimum	Average	Standard Deviation	MAV DWSNZ 2008	GV DWSNZ 2008	Compliant with DWSNZ 2005 (amended 2008)
ACID HERBICIDES									
2-4-5-Trichlorophenoxyacetic	mg/L	5	0.00	0.00	0.00				
2-4-Dichlorophenoxyacetic acid	mg/L	5	0.00	0.00	0.00				
4-(2-4-Dichlorophenoxy) butano	mg/L	10	0.00	0.00	0.00				
Bentazone	mg/L	8	0.00	0.00	0.00				
Dichlorprop	mg/L	13	0.00	0.00	0.00		0.1		✓
MCPA	mg/L	8	0.00	0.00	0.00		0.002		✓
Mecoprop (MCP)	mg/L	8	0.00	0.00	0.00		0.01		✓
Picloram	mg/L	13	0.00	0.00	0.00		0.2		✓
Triclopyr	mg/L	8	0.00	0.00	0.00		0.1		✓
CHEMICAL AND PHYSICAL									
abs254	abs units	52	0.01	0.00	0.01	0.00			
Alkalinity Total	mg/L	52	76.13	46.42	58.32	6.01			
Aluminium	mg/L	52	0.04	0.00	0.03	0.01		0.1	✓
Bromate	mg/L	13	0.00	0.00	0.00		0.01		✓
Bromide	mg/L	13	0.10	0.01	0.04	0.03			
Calcium	mg/L	52	11.00	0.89	8.26	1.80			
Calcium Hardness	mg/L	52	27.47	2.20	20.55	4.48			
Chlorate	mg/L	13	0.06	0.02	0.04	0.01	0.8		✓
Chloride	mg/L	13	22.90	17.00	20.51	1.96		250	✓
Chlorine Residual	mg/L	366	1.07	0.65	0.86	0.13	5		✓
Chlorite	mg/L	13	0.00	0.00	0.00		0.8		✓
Colour	Hazen Units	52	0.00	0.00	0.00			10	✓
Conductivity	mS/m	52	25.90	14.70	22.95	2.44			
Fluoride	mg/L	52	0.90	0.00	0.15	0.20	1.5		✓
Iodide	mg/L	4	0.02	0.00	0.01	0.01			
Iron	mg/L	52	0.01	0.00	0.00	0.00		0.2	✓
Magnesium	mg/L	52	9.30	0.90	7.82	1.68			
Magnesium Hardness	mg/L	52	38.00	3.70	32.36	6.36			
Manganese	mg/L	52	0.00	0.00	0.00		0.4	0.04	✓
pH	pH unit	366	8.20	7.59	7.92	0.16		7.0-8.5	✓
Potassium	mg/L	13	3.20	0.31	2.42	1.05			
Silicon	mg/L	13	39.00	3.20	31.13	10.94			
Sodium	mg/L	13	26.00	2.10	20.23	7.18		200	✓
Sulphate	mg/L	13	14.20	10.00	12.94	1.37		250	✓
Suspended Solids	mg/L	52	0.30	0.00	0.15	0.21			
Total Hardness	mg/L	52	65.35	5.90	53.16	9.16		200	✓
Total Organic Carbon (TOC)	mg/L	52	0.80	0.30	0.53	0.17			
Turbidity	NTU	366	6.50	0.00	0.21	0.71		2.5	✓

APPENDIX 1 Water quality at treatment plants

ONEHUNGA WTP TREATED (continued)

Component Name	Component Units	Number of Samples	Maximum	Minimum	Average	Standard Deviation	MAV DWSNZ 2008	GV DWSNZ 2008	Compliant with DWSNZ 2005 (amended 2008)
MICROBIOLOGY									
Confirmed Cryptosporidium per 100L	/100 L	4	0.00	0.00	0.00		1		✓
Confirmed Giardia per 100L	/100 L	4	0.00	0.00	0.00		1		✓
Escherichia coli	MPN/100 mL	366	0.00	0.00	0.00		1		✓
NUTRIENTS									
Dissolved Reactive Phosphorus	mg/L	13	0.06	0.03	0.04	0.01			
Ammonia	mg/L	13	0.02	0.00	0.01	0.01		1.5	✓
Nitrate	mg/L	13	3.10	1.80	2.80	0.43	50		✓
Nitrite	mg/L	13	0.00	0.00	0.00	0.00	0.2		✓
TKN	mg/L	8	0.20	0.00	0.12	0.11			
Total Phosphorus	mg/L	13	0.06	0.02	0.04	0.01			
PLASTICISERS									
Di(2-ethylhexyl) adipate	µg/L	1	0.00	0.00	0.00				
Di(2-ethylhexyl) phthalate	µg/L	1	0.00	0.00	0.00		9		✓
POLYCYCLIC AROMATIC HYDROCARBONS									
Benzo[a]pyrene	µg/L	1	0.00	0.00	0.00		0.7		✓
SEMI-VOLATILE ORGANIC COMPOUNDS – ORGANOCHLORINE PESTICIDES									
Aldrin	µg/L	1	0.00	0.00	0.00		0.00004		✓
alpha-Chlordan	µg/L	1	0.00	0.00	0.00		0.0002		✓
gamma-BHC (lindane)	µg/L	1	0.00	0.00	0.00		2		✓
Heptachlor	µg/L	1	0.00	0.00	0.00				
Heptachlor epoxide	µg/L	1	0.00	0.00	0.00				
Hexachlorobenzene	µg/L	1	0.00	0.00	0.00				
Methoxychlor	µg/L	1	0.00	0.00	0.00		0.02		✓
Permethrin (cis + trans)	µg/L	1	0.00	0.00	0.00				
pp-DDT	µg/L	1	0.00	0.00	0.00		0.001		✓
Procymidone	µg/L	1	0.00	0.00	0.00		700		✓
SEMI-VOLATILE ORGANIC COMPOUNDS – ORGANONITROGEN HERBICIDES									
Atrazine	µg/L	1	0.00	0.00	0.00		2		✓
Metolachlor	µg/L	1	0.00	0.00	0.00		10		✓
Molinate	µg/L	1	0.00	0.00	0.00		7		✓
Pendimethalin	µg/L	1	0.00	0.00	0.00		20		✓
Propanil	µg/L	1	0.00	0.00	0.00				
Simazine	µg/L	1	0.00	0.00	0.00		2		✓
Terbutylazine	µg/L	1	0.00	0.00	0.00		8		✓
Trifluralin	µg/L	1	0.00	0.00	0.00		30		✓

APPENDIX 1 Water quality at treatment plants

ONEHUNGA WTP TREATED (continued)

Component Name	Component Units	Number of Samples	Maximum	Minimum	Average	Standard Deviation	MAV DWSNZ 2008	GV DWSNZ 2008	Compliant with DWSNZ 2005 (amended 2008)
SEMI-VOLATILE ORGANIC COMPOUNDS – ORGANONITROGEN HERBICIDES									
Alachlor	µg/L	1	0.00	0.00	0.00		20		✓
SEMI-VOLATILE ORGANIC COMPOUNDS – ORGANOPHOSPHORUS PESTICIDES									
Chlorpyrifos	µg/L	1	0.00	0.00	0.00		40		✓
Diazinon	µg/L	1	0.00	0.00	0.00				
Pirimiphos-meth	µg/L	1	0.00	0.00	0.00		100		✓
TRACE ELEMENTS									
Antimony	mg/L	13	0.00	0.00	0.00	0.00	0.02		✓
Arsenic	mg/L	13	0.00	0.00	0.00	0.00	0.01		✓
Barium	mg/L	13	0.00	0.00	0.00	0.00	0.7		✓
Boron	mg/L	13	0.07	0.04	0.06	0.01	1.4		✓
Cadmium	mg/L	13	0.00	0.00	0.00		0.004		✓
Chromium	mg/L	13	0.00	0.00	0.00	0.00	0.05		✓
Copper	mg/L	13	0.00	0.00	0.00	0.00	2		✓
Cyanide	mg/L	13	0.00	0.00	0.00		0.6		✓
Lead	mg/L	13	0.00	0.00	0.00	0.00	0.01		✓
Lithium	mg/L	13	0.00	0.00	0.00	0.00			
Mercury	mg/L	13	0.00	0.00	0.00		0.007		✓
Molybdenum	mg/L	13	0.00	0.00	0.00	0.00	0.07		✓
Nickel	mg/L	13	0.00	0.00	0.00	0.00	0.08		✓
Selenium	mg/L	13	0.00	0.00	0.00	0.00	0.01		✓
Zinc	mg/L	13	0.00	0.00	0.00	0.00		1.5	✓
TRIHALOMETHANES									
bromodichloromethane	mg/L	52	0.00	0.00	0.00	0.00	0.06		✓
bromoform	mg/L	52	0.00	0.00	0.00	0.00	0.1		✓
chloroform	mg/L	52	0.00	0.00	0.00	0.00	0.4		✓
dibromochloromethane	mg/L	52	0.00	0.00	0.00	0.00	0.15		✓
THM Ratio		52	0.08	0.01	0.04	0.01			

APPENDIX 1 Water quality at treatment plants

ONEHUNGA WTP TREATED (continued)

Component Name	Component Units	Number of Samples	Maximum	Minimum	Average	Standard Deviation	MAV DWSNZ 2008	GV DWSNZ 2008	Compliant with DWSNZ 2005 (amended 2008)
VOLATILE ORGANIC COMPOUNDS									
1-1-1-trichloroethane	mg/L	1	0.00	0.00	0.00				
1-2-3-trichlorobenzene	mg/L	1	0.00	0.00	0.00				
1-2-4-trichlorobenzene	mg/L	1	0.00	0.00	0.00				
1-2-dichlorobenzene	mg/L	1	0.00	0.00	0.00		1.5	0.001	✓
1-2-dichloroethane	mg/L	1	0.00	0.00	0.00		0.03		✓
1-4-dichlorobenzene	mg/L	1	0.00	0.00	0.00		0.4	0.0003	✓
benzene	mg/L	1	0.00	0.00	0.00		0.01		✓
carbon tetrachloride	mg/L	1	0.00	0.00	0.00				
ethylbenzene	mg/L	1	0.00	0.00	0.00		0.3	0.002	✓
m- & p-xylene	mg/L	1	0.00	0.00	0.00		0.6		✓
styrene	mg/L	1	0.00	0.00	0.00		0.004	0.004	✓
tetrachloroethylene	mg/L	1	0.00	0.00	0.00		0.05		✓
toluene	mg/L	1	0.00	0.00	0.00		0.8	0.03	✓
trans-1-2-dichloroethene	mg/L	1	0.00	0.00	0.00		0.06		✓
trichloroethylene	mg/L	1	0.00	0.00	0.00		0.02		✓

APPENDIX 1 Water quality at treatment plants

WAIKATO WTP TREATED

Component Name	Component Units	Number of Samples	Maximum	Minimum	Average	Standard Deviation	MAV DWSNZ 2008	GV DWSNZ 2008	Compliant with DWSNZ 2005 (amended 2008)
ACID HERBICIDES									
2-4-5-Trichlorophenoxyacetic	mg/L	1	0.00	0.00	0.00				
2-4-Dichlorophenoxyacetic acid	mg/L	1	0.00	0.00	0.00				
4-(2-4-Dichlorophenoxy) butano	mg/L	3	0.00	0.00	0.00				
Bentazone	mg/L	2	0.00	0.00	0.00				
Dichlorprop	mg/L	4	0.00	0.00	0.00		0.1		✓
MCPA	mg/L	2	0.00	0.00	0.00		0.002		✓
Mecoprop (MCP)	mg/L	2	0.00	0.00	0.00		0.01		✓
Picloram	mg/L	4	0.00	0.00	0.00		0.2		✓
Triclopyr	mg/L	2	0.00	0.00	0.00		0.1		✓
CHEMICAL AND PHYSICAL									
abs254	abs units	53	0.17	0.00	0.02	0.03			
Alkalinity Total	mg/L	26	58.84	34.00	47.01	5.93			
Aluminium	mg/L	369	0.51	0.00	0.11	0.14		0.1	✓
Bromate	mg/L	13	0.00	0.00	0.00		0.01		✓
Bromide	mg/L	13	0.05	0.00	0.02	0.01			
Calcium	mg/L	54	22.00	14.00	18.00	2.74			
Calcium Hardness	mg/L	54	56.00	35.00	44.56	6.08			
Chlorate	mg/L	58	0.44	0.00	0.14	0.09	0.8		✓
Chloride	mg/L	13	21.50	15.00	19.08	2.09		250	✓
Chlorine Residual	mg/L	369	1.28	0.67	0.94	0.13	5		✓
Chlorite	mg/L	58	0.02	0.00	0.01	0.01	0.8		✓
Colour	Hazen Units	52	0.00	0.00	0.00			10	✓
Conductivity	mS/m	13	23.50	20.00	22.30	1.07			
Fluoride	mg/L	58	0.99	0.16	0.80	0.20	1.5		✓
Iodide	mg/L	13	0.02	0.00	0.01	0.01			
Iron	mg/L	53	0.08	0.01	0.03	0.02		0.2	✓
Magnesium	mg/L	54	3.20	2.00	2.68	0.37			
Magnesium Hardness	mg/L	53	13.18	9.47	11.05	1.19			
Manganese	mg/L	54	0.00	0.00	0.00	0.00	0.4	0.04	✓
pH	pH unit	369	8.60	6.60	7.97	0.31		7.0-8.5	✓
Potassium	mg/L	13	3.40	2.70	3.08	0.28			
Silicon	mg/L	13	38.00	26.00	32.10	4.25			
Sodium	mg/L	13	20.00	13.00	16.80	2.59		200	✓
Sulphate	mg/L	13	26.40	19.70	23.64	2.40		250	✓
Total Hardness	mg/L	54	67.00	45.00	55.57	5.81		200	✓
Total Organic Carbon (TOC)	mg/L	52	4.90	0.60	1.90	1.12			
Turbidity	NTU	369	20.40	0.05	0.57	1.86		2.5	✓

APPENDIX 1 Water quality at treatment plants

WAIKATO WTP TREATED (continued)

Component Name	Component Units	Number of Samples	Maximum	Minimum	Average	Standard Deviation	MAV DWSNZ 2008	GV DWSNZ 2008	Compliant with DWSNZ 2005 (amended 2008)
MICROBIOLOGY									
Confirmed Cryptosporidium per 100L	/100 L	56	0.00	0.00	0.00		1		
Confirmed Giardia per 100L	/100 L	56	0.00	0.00	0.00		1		
Escherichia coli	MPN/100 mL	369	0.00	0.00	0.00		1		
NUTRIENTS									
Dissolved Reactive Phosphorus	mg/L	13	0.01	0.00	0.01	0.00			
Ammonia	mg/L	13	0.02	0.00	0.01	0.01		1.5	✓
Nitrate	mg/L	13	1.29	0.29	0.50	0.28	50		✓
Nitrite	mg/L	13	0.00	0.00	0.00	0.00	0.2		✓
TKN	mg/L	8	0.15	0.00	0.11	0.06			
Total Phosphorus	mg/L	13	0.04	0.00	0.01	0.01			
PLASTICISERS									
Di(2-ethylhexyl) adipate	µg/L	13	0.00	0.00	0.00				
Di(2-ethylhexyl) phthalate	µg/L	13	0.00	0.00	0.00		9		✓
POLYCYCLIC AROMATIC HYDROCARBONS									
Benzo[a]pyrene	µg/L	13	0.00	0.00	0.00		0.7		✓
SEMI-VOLATILE ORGANIC COMPOUNDS – ORGANOCHLORINE PESTICIDES									
Aldrin	µg/L	13	0.00	0.00	0.00		0.00004		✓
alpha-Chlordan	µg/L	13	0.00	0.00	0.00		0.0002		✓
gamma-BHC (lindane)	µg/L	13	0.00	0.00	0.00		2		✓
Heptachlor	µg/L	13	0.00	0.00	0.00				
Heptachlor epoxide	µg/L	13	0.00	0.00	0.00				
Hexachlorobenzene	µg/L	13	0.00	0.00	0.00				
Methoxychlor	µg/L	13	0.00	0.00	0.00		0.02		✓
Permethrin (cis + trans)	µg/L	13	0.00	0.00	0.00				
pp-DDT	µg/L	13	0.00	0.00	0.00		0.001		✓
Procymidone	µg/L	13	0.00	0.00	0.00		700		✓
SEMI-VOLATILE ORGANIC COMPOUNDS – ORGANONITROGEN HERBICIDES									
Atrazine	µg/L	13	0.00	0.00	0.00		2		✓
Metolachlor	µg/L	13	0.00	0.00	0.00		10		✓
Molinate	µg/L	13	0.00	0.00	0.00		7		✓
Pendimethalin	µg/L	13	0.00	0.00	0.00		20		✓
Propanil	µg/L	13	0.00	0.00	0.00				
Simazine	µg/L	13	0.00	0.00	0.00		2		✓
Terbutylazine	µg/L	13	0.00	0.00	0.00		8		✓
Trifluralin	µg/L	13	0.00	0.00	0.00		30		✓

APPENDIX 1 Water quality at treatment plants

WAIKATO WTP TREATED (continued)

Component Name	Component Units	Number of Samples	Maximum	Minimum	Average	Standard Deviation	MAV DWSNZ 2008	GV DWSNZ 2008	Compliant with DWSNZ 2005 (amended 2008)
SEMI-VOLATILE ORGANIC COMPOUNDS – ORGANONITROGEN HERBICIDES									
Alachlor	µg/L	13	0.00	0.00	0.00		20		✓
SEMI-VOLATILE ORGANIC COMPOUNDS – ORGANOPHOSPHORUS PESTICIDES									
Chlorpyrifos	µg/L	13	0.00	0.00	0.00		40		✓
Diazinon	µg/L	13	0.00	0.00	0.00				
Pirimiphos-meth	µg/L	13	0.00	0.00	0.00		100		✓
TRACE ELEMENTS									
Antimony	mg/L	54	0.00	0.00	0.00	0.00	0.02		✓
Arsenic	mg/L	13	0.00	0.00	0.00	0.00	0.01		✓
Barium	mg/L	13	0.02	0.02	0.02	0.00	0.7		✓
Boron	mg/L	13	0.22	0.07	0.17	0.04	1.4		✓
Cadmium	mg/L	13	0.00	0.00	0.00		0.004		✓
Chromium	mg/L	13	0.00	0.00	0.00	0.00	0.05		✓
Copper	mg/L	13	0.00	0.00	0.00	0.00	2		✓
Cyanide	mg/L	13	0.00	0.00	0.00		0.6		✓
Lead	mg/L	55	0.00	0.00	0.00	0.00	0.01		✓
Lithium	mg/L	13	0.08	0.03	0.06	0.01			
Mercury	mg/L	53	0.00	0.00	0.00		0.007		✓
Molybdenum	mg/L	54	0.00	0.00	0.00	0.00	0.07		✓
Nickel	mg/L	54	0.00	0.00	0.00	0.00	0.08		✓
Selenium	mg/L	13	0.00	0.00	0.00		0.01		✓
Zinc	mg/L	13	0.00	0.00	0.00	0.00		1.5	✓
TRIHALOMETHANES									
bromodichloromethane	mg/L	64	0.02	0.00	0.01	0.00	0.06		✓
bromoform	mg/L	64	0.00	0.00	0.00	0.00	0.1		✓
chloroform	mg/L	64	0.03	0.00	0.01	0.00	0.4		✓
dibromochloromethane	mg/L	64	0.01	0.00	0.01	0.00	0.15		✓
THM Ratio		51	0.30	0.05	0.15	0.05			
VOLATILE ORGANIC COMPOUNDS									
1-1-1-trichloroethane	mg/L	13	0.00	0.00	0.00				
1-2-3-trichlorobenzene	mg/L	13	0.00	0.00	0.00				
1-2-4-trichlorobenzene	mg/L	13	0.00	0.00	0.00				
1-2-dichlorobenzene	mg/L	13	0.00	0.00	0.00		1.5	0.001	✓
1-2-dichloroethane	mg/L	13	0.00	0.00	0.00		0.03		✓
1-4-dichlorobenzene	mg/L	13	0.00	0.00	0.00		0.4	0.0003	✓
benzene	mg/L	13	0.00	0.00	0.00		0.01		✓
carbon tetrachloride	mg/L	13	0.00	0.00	0.00				
ethylbenzene	mg/L	13	0.00	0.00	0.00		0.3	0.002	✓
m- & p-xylene	mg/L	13	0.00	0.00	0.00		0.6		✓
styrene	mg/L	13	0.00	0.00	0.00		0.004	0.004	✓
tetrachloroethylene	mg/L	13	0.00	0.00	0.00		0.05		✓

APPENDIX 1 Water quality at treatment plants

WAITAKERE WTP TREATED

Component Name	Component Units	Number of Samples	Maximum	Minimum	Average	Standard Deviation	MAV DWSNZ 2008	GV DWSNZ 2008	Compliant with DWSNZ 2005 (amended 2008)
ACID HERBICIDES									
2-4-5-Trichlorophenoxyacetic	mg/L	3	0.00	0.00	0.00				
2,4,5-Trichlorophenoxyacetic	mg/kg	5	0.00	0.00	0.00				
2-4-Dichlorophenoxyacetic acid	mg/L	3	0.00	0.00	0.00				
2,4-Dichlorophenoxyacetic acid	mg/kg	5	0.00	0.00	0.00				
4-(2-4-Dichlorophenoxy) butano	mg/L	8	0.00	0.00	0.00				
Bentazone	mg/kg	5	0.00	0.00	0.00				
Bentazone	mg/L	3	0.00	0.00	0.00				
Dichlorprop	mg/L	8	0.00	0.00	0.00		0.1		✓
MCPA	mg/kg	5	0.00	0.00	0.00		0.002		✓
MCPA	mg/L	3	0.00	0.00	0.00		0.002		✓
Mecoprop (MCP)	mg/kg	5	0.00	0.00	0.00		0.01		✓
Mecoprop (MCP)	mg/L	3	0.00	0.00	0.00		0.01		✓
Picloram	mg/L	8	0.00	0.00	0.00		0.2		✓
Triclopyr	mg/kg	5	0.00	0.00	0.00		0.1		✓
CHEMICAL AND PHYSICAL									
abs254	abs units	36	0.03	0.00	0.02	0.01			
Alkalinity Total	mg/L	36	24.72	14.00	18.26	2.39			
Aluminium	mg/L	36	0.05	0.02	0.03	0.01		0.1	✓
Bromate	mg/L	8	0.00	0.00	0.00		0.01		✓
Bromide	mg/L	8	0.05	0.00	0.03	0.02			
Calcium	mg/L	36	12.00	9.00	9.93	0.98			
Calcium Hardness	mg/L	35	29.96	22.47	25.33	2.33			
Chlorate	mg/L	8	0.00	0.00	0.00		0.8		✓
Chloride	mg/L	8	23.60	19.00	21.58	1.63		250	✓
Chlorine Residual	mg/L	261	1.22	0.25	0.76	0.24	5		✓
Chlorite	mg/L	8	0.00	0.00	0.00		0.8		✓
Colour	Hazen Units	36	25.00	0.00	12.50	17.68		10	✓
Conductivity	mS/m	36	16.18	10.40	15.06	1.06			
Fluoride	mg/L	37	1.10	0.04	0.83	0.28	1.5		✓
Iodide	mg/L	3	0.00	0.00	0.00				
Iron	mg/L	35	0.02	0.00	0.02	0.01		0.2	✓
Magnesium	mg/L	36	2.50	1.80	2.19	0.24			
Magnesium Hardness	mg/L	36	10.30	7.40	9.04	0.72			
Manganese	mg/L	36	0.01	0.00	0.00	0.00	0.4	0.04	✓
pH	pH unit	261	9.58	7.39	7.80	0.33		7.0-8.5	✓
Potassium	mg/L	8	0.98	0.83	0.91	0.06			
Silicon	mg/L	8	16.00	10.00	13.00	2.24			
Sodium	mg/L	8	13.00	10.00	11.50	1.29		200	✓
Sulphate	mg/L	8	18.30	12.30	15.74	2.30		250	✓
Suspended Solids	mg/L	36	0.70	0.00	0.39	0.20			
Total Hardness	mg/L	36	38.61	31.00	34.25	2.08		200	✓
Total Organic Carbon (TOC)	mg/L	36	3.30	1.00	1.89	0.66			
Turbidity	NTU	261	0.55	0.10	0.24	0.08		2.5	✓

APPENDIX 1 Water quality at treatment plants

WAITAKERE WTP TREATED (continued)

Component Name	Component Units	Number of Samples	Maximum	Minimum	Average	Standard Deviation	MAV DWSNZ 2008	GV DWSNZ 2008	Compliant with DWSNZ 2005 (amended 2008)
MICROBIOLOGY									
Confirmed Cryptosporidium per 100L	/100 L	4	0.00	0.00	0.00		1		✓
Confirmed Giardia per 100L	/100 L	4	0.00	0.00	0.00		1		✓
Escherichia coli	MPN/100 mL	261	0.00	0.00	0.00		1		✓
NUTRIENTS									
Dissolved Reactive Phosphorus	mg/L	8	0.01	0.00	0.00	0.00			
Ammonia	mg/L	8	0.01	0.00	0.01	0.01		1.5	✓
Nitrate	mg/L	8	0.03	0.01	0.02	0.01	50		✓
Nitrite	mg/L	8	0.00	0.00	0.00		0.2		✓
TKN	mg/L	3	0.30	0.16	0.23	0.10			
Total Phosphorus	mg/L	8	0.00	0.00	0.00	0.00			
PLASTICISERS									
Di(2-ethylhexyl) adipate	µg/L	1	0.00	0.00	0.00				
Di(2-ethylhexyl) phthalate	µg/L	1	0.00	0.00	0.00		9		✓
POLYCYCLIC AROMATIC HYDROCARBONS									
Benzo[a]pyrene	µg/L	1	0.00	0.00	0.00		0.7		✓
SEMI-VOLATILE ORGANIC COMPOUNDS – ORGANOCHLORINE PESTICIDES									
Aldrin	µg/L	1	0.00	0.00	0.00		0.00004		✓
alpha-Chlordan	µg/L	1	0.00	0.00	0.00		0.0002		✓
gamma-BHC (lindane)	µg/L	1	0.00	0.00	0.00		2		✓
Heptachlor	µg/L	1	0.00	0.00	0.00				
Heptachlor epoxide	µg/L	1	0.00	0.00	0.00				
Hexachlorobenzene	µg/L	1	0.00	0.00	0.00				
Methoxychlor	µg/L	1	0.00	0.00	0.00		0.02		✓
Permethrin (cis + trans)	µg/L	1	0.00	0.00	0.00				
pp-DDT	µg/L	1	0.00	0.00	0.00		0.001		✓
Procymidone	µg/L	1	0.00	0.00	0.00		700		✓
SEMI-VOLATILE ORGANIC COMPOUNDS – ORGANONITROGEN HERBICIDES									
Atrazine	µg/L	1	0.00	0.00	0.00		2		✓
Metolachlor	µg/L	1	0.00	0.00	0.00		10		✓
Molinate	µg/L	1	0.00	0.00	0.00		7		✓
Pendimethalin	µg/L	1	0.00	0.00	0.00		20		✓
Propanil	µg/L	1	0.00	0.00	0.00				
Simazine	µg/L	1	0.00	0.00	0.00		2		✓
Terbutylazine	µg/L	1	0.00	0.00	0.00		8		✓
Trifluralin	µg/L	1	0.00	0.00	0.00		30		✓

APPENDIX 1 Water quality at treatment plants

WAITAKERE WTP TREATED (continued)

Component Name	Component Units	Number of Samples	Maximum	Minimum	Average	Standard Deviation	MAV DWSNZ 2008	GV DWSNZ 2008	Compliant with DWSNZ 2005 (amended 2008)
SEMI-VOLATILE ORGANIC COMPOUNDS – ORGANONITROGEN HERBICIDES									
Alachlor	µg/L	1	0.00	0.00	0.00		20		✓
SEMI-VOLATILE ORGANIC COMPOUNDS – ORGANOPHOSPHORUS PESTICIDES									
Chlorpyrifos	µg/L	1	0.00	0.00	0.00		40		✓
Diazinon	µg/L	1	0.00	0.00	0.00				
Pirimiphos-meth	µg/L	1	0.00	0.00	0.00		100		✓
TRACE ELEMENTS									
Antimony	mg/L	8	0.00	0.00	0.00	0.00	0.02		✓
Arsenic	mg/L	8	0.00	0.00	0.00	0.00	0.01		✓
Barium	mg/L	8	0.01	0.00	0.01	0.00	0.7		✓
Boron	mg/L	8	0.02	0.01	0.01	0.00	1.4		✓
Cadmium	mg/L	8	0.00	0.00	0.00		0.004		✓
Chromium	mg/L	8	0.00	0.00	0.00	0.00	0.05		✓
Copper	mg/L	8	0.01	0.00	0.00	0.00	2		✓
Cyanide	mg/L	8	0.00	0.00	0.00		0.6		✓
Lead	mg/L	8	0.00	0.00	0.00		0.01		✓
Lithium	mg/L	8	0.00	0.00	0.00	0.00			
Mercury	mg/L	8	0.00	0.00	0.00		0.007		✓
Molybdenum	mg/L	8	0.00	0.00	0.00		0.07		✓
Nickel	mg/L	8	0.00	0.00	0.00	0.00	0.08		✓
Selenium	mg/L	8	0.00	0.00	0.00		0.01		✓
Zinc	mg/L	8	0.00	0.00	0.00	0.00		1.5	✓
TRIHALOMETHANES									
bromodichloromethane	mg/L	48	0.03	0.01	0.01	0.01	0.06		✓
bromoform	mg/L	48	0.00	0.00	0.00	0.00	0.1		✓
chloroform	mg/L	48	0.03	0.01	0.02	0.01	0.4		✓
dibromochloromethane	mg/L	48	0.01	0.01	0.01	0.00	0.15		✓
THM Ratio		48	0.53	0.21	0.34	0.09			
VOLATILE ORGANIC COMPOUNDS									
1-1-1-trichloroethane	mg/L	1	0.00	0.00	0.00				
1-2-3-trichlorobenzene	mg/L	1	0.00	0.00	0.00				
1-2-4-trichlorobenzene	mg/L	1	0.00	0.00	0.00				
1-2-dichlorobenzene	mg/L	1	0.00	0.00	0.00		1.5	0.001	✓
1-2-dichloroethane	mg/L	1	0.00	0.00	0.00		0.03		✓
1-4-dichlorobenzene	mg/L	1	0.00	0.00	0.00		0.4	0.0003	✓
benzene	mg/L	1	0.00	0.00	0.00		0.01		✓
carbon tetrachloride	mg/L	1	0.00	0.00	0.00				
ethylbenzene	mg/L	1	0.00	0.00	0.00		0.3	0.002	✓
m- & p-xylene	mg/L	1	0.00	0.00	0.00		0.6		✓
styrene	mg/L	1	0.00	0.00	0.00		0.004	0.004	✓
tetrachloroethylene	mg/L	1	0.00	0.00	0.00		0.05		✓
toluene	mg/L	1	0.00	0.00	0.00		0.8	0.03	✓
trans-1-2-dichloroethene	mg/L	1	0.00	0.00	0.00		0.06		✓
trichloroethylene	mg/L	1	0.00	0.00	0.00		0.02		✓

APPENDIX 1 Water quality at treatment plants

BOMBAY WTP TREATED

Component Name	Component Units	Number of Samples	Maximum	Minimum	Average	Standard Deviation	MAV DWSNZ 2008	GV DWSNZ 2008	Compliant with DWSNZ 2005 (amended 2008)
CHEMICAL AND PHYSICAL									
Chlorine Residual	mg/L	102	1.17	0.40	0.89	0.19	5		✓
Conductivity	mS/m	52	40.00	28.60	33.42	2.46			
pH	pH unit	106	7.90	6.10	7.10	0.37		7.0-8.5	✓
Total Organic Carbon (TOC)	mg/L	6	0.80	0.00	0.28	0.36			
Turbidity	NTU	101	1.00	0.07	0.31	0.20		2.5	✓
MICROBIOLOGY									
Escherichia coli	MPN/100 mL	111	0.00	0.00	0.00		1		✓
NUTRIENTS									
Nitrate	mg/L	63	13.60	0.01	8.66	2.90	50		✓
Nitrite	mg/L	23	0.05	0.00	0.02	0.02	0.2		✓
TRIHALOMETHANES									
bromodichloromethane	mg/L	12	0.00	0.00	0.00	0.00	0.06		✓
bromoform	mg/L	12	0.00	0.00	0.00	0.00	0.1		✓
chloroform	mg/L	12	0.00	0.00	0.00	0.00	0.4		✓
dibromochloromethane	mg/L	12	0.00	0.00	0.00	0.00	0.15		✓
THM Ratio		12	0.03	0.00	0.01	0.01			

BUCKLAND WTP TREATED

Component Name	Component Units	Number of Samples	Maximum	Minimum	Average	Standard Deviation	MAV DWSNZ 2008	GV DWSNZ 2008	Compliant with DWSNZ 2005 (amended 2008)
CHEMICAL AND PHYSICAL									
Chlorine Residual	mg/L	103	1.30	0.24	0.74	0.25	5		✓
pH	pH unit	102	8.40	6.80	7.52	0.35		7.0-8.5	✓
Turbidity	NTU	103	1.25	0.09	0.38	0.20		2.5	✓
MICROBIOLOGY									
Escherichia coli	MPN/100 mL	111	0.00	0.00	0.00		1		✓

APPENDIX 1 Water quality at treatment plants

CLARKS BEACH WTP TREATED

Component Name	Component Units	Number of Samples	Maximum	Minimum	Average	Standard Deviation	MAV DWSNZ 2008	GV DWSNZ 2008	Compliant with DWSNZ 2005 (amended 2008)
CHEMICAL AND PHYSICAL									
Chlorine Residual	mg/L	105	1.51	0.30	0.74	0.23	5		✓
Fluoride	mg/L	9	0.60	0.00	0.49	0.22	1.5		✓
pH	pH unit	101	8.30	7.02	7.77	0.27		7.0-8.5	✓
Turbidity	NTU	104	1.18	0.14	0.71	0.22		2.5	✓
MICROBIOLOGY									
Escherichia coli	MPN/100 mL	112	0.00	0.00	0.00		1		✓
TRACE ELEMENTS									
Boron	mg/L	12	1.50	1.20	1.35	0.13	1.4		

CORNWALL ROAD WTP TREATED

Component Name	Component Units	Number of Samples	Maximum	Minimum	Average	Standard Deviation	MAV DWSNZ 2008	GV DWSNZ 2008	Compliant with DWSNZ 2005 (amended 2008)
CHEMICAL AND PHYSICAL									
Chlorine Residual	mg/L	103	1.68	0.37	0.78	0.21	5		✓
Iron	mg/L	10	0.01	0.00	0.00	0.00		0.2	✓
Manganese	mg/L	10	0.00	0.00	0.00	0.00	0.4	0.04	✓
pH	pH unit	103	8.40	7.30	7.88	0.24		7.0-8.5	✓
Turbidity	NTU	103	0.79	0.07	0.26	0.16		2.5	✓
MICROBIOLOGY									
Escherichia coli	MPN/100 mL	113	0.00	0.00	0.00		1		✓

GLENBROOK BEACH WTP TREATED

Component Name	Component Units	Number of Samples	Maximum	Minimum	Average	Standard Deviation	MAV DWSNZ 2008	GV DWSNZ 2008	Compliant with DWSNZ 2005 (amended 2008)
CHEMICAL AND PHYSICAL									
Chlorine Residual	mg/L	101	1.03	0.27	0.65	0.20	5		✓
Iron	mg/L	10	0.02	0.01	0.01	0.00		0.2	✓
Manganese	mg/L	10	0.01	0.00	0.00	0.00	0.4	0.04	✓
pH	pH unit	98	8.10	7.10	7.81	0.29		7.0-8.5	✓
Turbidity	NTU	100	0.53	0.09	0.25	0.11		2.5	✓
MICROBIOLOGY									
Escherichia coli	MPN/100 mL	112	0.00	0.00	0.00		1		✓

APPENDIX 1 Water quality at treatment plants

HELENSVILLE WTP TREATED

Component Name	Component Units	Number of Samples	Maximum	Minimum	Average	Standard Deviation	MAV DWSNZ 2008	GV DWSNZ 2008	Compliant with DWSNZ 2005 (amended 2008)
CHEMICAL AND PHYSICAL									
Chlorine Residual	mg/L	98	1.90	0.74	1.23	0.24	5		✓
pH	pH unit	98	7.80	6.68	7.12	0.26		7.0-8.5	✓
Total Organic Carbon (TOC)	mg/L	9	2.10	1.40	1.70	0.25			
Turbidity	NTU	3	0.06	0.05	0.05	0.01		2.5	✓
MICROBIOLOGY									
Escherichia coli	(P/A)/100 mL	95	0.00	0.00	0.00		1		✓
TRIHALOMETHANES									
bromodichloromethane	mg/L	10	0.03	0.01	0.01	0.01	0.06		✓
bromodichloromethane	mg/L	3	0.02	0.01	0.02	0.01			
bromoform	mg/L	10	0.01	0.00	0.00	0.00	0.1		✓
bromoform	mg/L	3	0.01	0.00	0.01	0.01			
chloroform	mg/L	10	0.02	0.01	0.01	0.00	0.4		✓
chloroform	mg/L	3	0.01	0.01	0.01	0.00			
dibromochloromethane	mg/L	10	0.02	0.01	0.01	0.00	0.15		✓
dibromochloromethane	mg/L	3	0.03	0.01	0.02	0.01			
THM Ratio		13	0.71	0.21	0.40	0.13			

APPENDIX 1 Water quality at treatment plants

HICKEYS WTP TREATED

Component Name	Component Units	Number of Samples	Maximum	Minimum	Average	Standard Deviation	MAV DWSNZ 2008	GV DWSNZ 2008	Compliant with DWSNZ 2005 (amended 2008)
CHEMICAL AND PHYSICAL									
Bromate	mg/L	2	0.00	0.00	0.00		0.01		✓
Bromide	mg/L	2	0.03	0.03	0.03	0.00			✓
Chlorate	mg/L	2	0.00	0.00	0.00		0.8		✓
Chloride	mg/L	2	25.00	21.00	23.00	2.83		250	✓
Chlorine Residual	mg/L	334	1.06	0.31	0.68	0.20	5		✓
Chlorite	mg/L	2	0.00	0.00	0.00		0.8		✓
Fluoride	mg/L	67	0.89	0.02	0.65	0.19	1.5		✓
Iron	mg/L	3	0.02	0.01	0.01	0.00		0.2	✓
Manganese	mg/L	3	0.02	0.00	0.01	0.01	0.4	0.04	✓
pH	pH unit	333	7.95	6.50	7.08	0.29		7.0-8.5	✓
Sulphate	mg/L	2	3.50	2.80	3.15	0.49		250	✓
Total Organic Carbon (TOC)	mg/L	8	0.20	0.00	0.12	0.09			✓
Turbidity	NTU	333	0.96	0.00	0.34	0.22		2.5	✓
MICROBIOLOGY									
Escherichia coli	MPN/100 mL	365	0.00	0.00	0.00		1		✓
NUTRIENTS									
Nitrate	mg/L	12	7.90	4.98	7.10	0.81	50		✓
Nitrite	mg/L	12	0.00	0.00	0.00	0.00	0.2		✓
TRIHALOMETHANES									
bromodichloromethane	mg/L	12	0.00	0.00	0.00	0.00	0.06		✓
bromoform	mg/L	12	0.00	0.00	0.00	0.00	0.1		✓
chloroform	mg/L	12	0.00	0.00	0.00	0.00	0.4		✓
dibromochloromethane	mg/L	12	0.00	0.00	0.00	0.00	0.15		✓
THM Ratio		12	0.04	0.00	0.02	0.01			✓

APPENDIX 1 Water quality at treatment plants

MURIWAI WTP TREATED

Component Name	Component Units	Number of Samples	Maximum	Minimum	Average	Standard Deviation	MAV DWSNZ 2008	GV DWSNZ 2008	Compliant with DWSNZ 2005 (amended 2008)
CHEMICAL AND PHYSICAL									
Chlorine Residual	mg/L	113	1.01	0.50	0.69	0.12	5		✓
pH	pH unit	113	7.63	6.91	7.31	0.20		7.0-8.5	✓
Total Organic Carbon (TOC)	mg/L	2	1.20	0.30	0.75	0.64			
MICROBIOLOGY									
Escherichia coli	(P/A)/100 mL	113	0.00	0.00	0.00		1		✓
TRIHALOMETHANES									
bromodichloromethane	mg/L	7	0.00	0.00	0.00	0.00	0.06		✓
bromodichloromethane	mg/L	2	0.00	0.00	0.00	0.00			
bromoform	mg/L	7	0.01	0.00	0.00	0.00	0.1		✓
bromoform	mg/L	2	0.00	0.00	0.00	0.00			
chloroform	mg/L	7	0.00	0.00	0.00	0.00	0.4		✓
chloroform	mg/L	2	0.00	0.00	0.00				
dibromochloromethane	mg/L	7	0.00	0.00	0.00	0.00	0.15		✓
dibromochloromethane	mg/L	2	0.00	0.00	0.00	0.00			
THM Ratio		9	0.14	0.02	0.05	0.04			

PATUMAHOE WTP TREATED

Component Name	Component Units	Number of Samples	Maximum	Minimum	Average	Standard Deviation	MAV DWSNZ 2008	GV DWSNZ 2008	Compliant with DWSNZ 2005 (amended 2008)
CHEMICAL AND PHYSICAL									
Chlorine Residual	mg/L	102	1.38	0.34	0.76	0.21	5		✓
pH	pH unit	101	8.10	6.90	7.61	0.28		7.0-8.5	✓
Turbidity	NTU	102	0.96	0.15	0.38	0.18		2.5	✓
MICROBIOLOGY									
Escherichia coli	MPN/100 mL	112	0.00	0.00	0.00		1		✓

APPENDIX 1 Water quality at treatment plants

SNELLS /ALGIES WTP TREATED

Component Name	Component Units	Number of Samples	Maximum	Minimum	Average	Standard Deviation	MAV DWSNZ 2008	GV DWSNZ 2008	Compliant with DWSNZ 2005 (amended 2008)
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CHEMICAL AND PHYSICAL

Chlorine Residual	mg/L	113	1.80	0.35	0.96	0.31	5		✓
pH	pH unit	113	8.51	7.59	8.16	0.25		7.0-8.5	✓

MICROBIOLOGY

Escherichia coli	(P/A)/100 mL	113	0.00	0.00	0.00		1		✓
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WAIKU BEACH WTP TREATED

Component Name	Component Units	Number of Samples	Maximum	Minimum	Average	Standard Deviation	MAV DWSNZ 2008	GV DWSNZ 2008	Compliant with DWSNZ 2005 (amended 2008)
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CHEMICAL AND PHYSICAL

Chlorine Residual	mg/L	106	1.20	0.29	0.77	0.21	5		✓
pH	pH unit	101	8.91	7.35	8.47	0.35		7.0-8.5	
Turbidity	NTU	105	1.57	0.23	0.95	0.22		2.5	✓

MICROBIOLOGY

Escherichia coli	MPN/100 mL	112	0.00	0.00	0.00		1		✓
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WAIUKU ROAD WTP TREATED

Component Name	Component Units	Number of Samples	Maximum	Minimum	Average	Standard Deviation	MAV DWSNZ 2008	GV DWSNZ 2008	Compliant with DWSNZ 2005 (amended 2008)
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CHEMICAL AND PHYSICAL

Chlorine Residual	mg/L	102	1.01	0.40	0.70	0.16	5		✓
Iron	mg/L	10	0.01	0.00	0.00	0.00		0.2	✓
Manganese	mg/L	10	0.00	0.00	0.00	0.00	0.4	0.04	✓
pH	pH unit	102	8.30	6.90	7.79	0.30		7.0-8.5	✓
Turbidity	NTU	102	1.14	0.07	0.27	0.21		2.5	✓

MICROBIOLOGY

Escherichia coli	MPN/100 mL	112	0.00	0.00	0.00		1		✓
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APPENDIX 1 Water quality at treatment plants

WAIUKU WTP TREATED

Component Name	Component Units	Number of Samples	Maximum	Minimum	Average	Standard Deviation	MAV DWSNZ 2008	GV DWSNZ 2008	Compliant with DWSNZ 2005 (amended 2008)
CHEMICAL AND PHYSICAL									
Chlorine Residual	mg/L	107	1.56	0.30	0.78	0.28	5		✓
Iron	mg/L	10	0.01	0.00	0.00	0.00		0.2	✓
Manganese	mg/L	10	0.03	0.00	0.00	0.01	0.4	0.04	✓
pH	pH unit	105	8.51	7.10	7.82	0.28		7.0-8.5	✓
Turbidity	NTU	106	0.59	0.10	0.28	0.13		2.5	✓

MICROBIOLOGY

Escherichia coli	MPN/100 mL	116	0.00	0.00	0.00		1		✓
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WARKWORTH WTP TREATED

Component Name	Component Units	Number of Samples	Maximum	Minimum	Average	Standard Deviation	MAV DWSNZ 2008	GV DWSNZ 2008	Compliant with DWSNZ 2005 (amended 2008)
CHEMICAL AND PHYSICAL									
Aluminium	mg/L	8	1.40	0.01	0.41	0.52		0.1	
Chlorine Residual	mg/L	116	1.90	0.51	1.09	0.26	5		✓
pH	pH unit	116	7.80	6.52	7.12	0.28		7.0-8.5	✓
Total Organic Carbon (TOC)	mg/L	12	1.60	0.70	1.26	0.30			
Turbidity	NTU	3	0.07	0.05	0.06	0.01		2.5	✓

MICROBIOLOGY

Escherichia coli	(P/A)/100 mL	113	0.00	0.00	0.00		1		✓
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TRIHALOMETHANES

bromodichloromethane	mg/L	10	0.01	0.00	0.01	0.00	0.06		✓
bromodichloromethane	mg/L	3	0.06	0.00	0.02	0.03			
bromoform	mg/L	10	0.00	0.00	0.00	0.00	0.1		✓
bromoform	mg/L	3	0.01	0.00	0.00	0.00			
chloroform	mg/L	10	0.01	0.00	0.01	0.00	0.4		✓
chloroform	mg/L	3	0.04	0.00	0.02	0.02			
dibromochloromethane	mg/L	10	0.01	0.00	0.01	0.00	0.15		✓
dibromochloromethane	mg/L	3	0.05	0.01	0.02	0.03			
THM Ratio		13	1.59	0.09	0.28	0.40			

APPENDIX 1 Water quality at treatment plants

WELLSFORD WTP TREATED

Component Name	Component Units	Number of Samples	Maximum	Minimum	Average	Standard Deviation	MAV DWSNZ 2008	GV DWSNZ 2008	Compliant with DWSNZ 2005 (amended 2008)
CHEMICAL AND PHYSICAL									
Chlorine Residual	mg/L	116	1.90	0.24	1.20	0.32	5		✓
pH	pH unit	116	7.60	6.47	7.08	0.28		7.0-8.5	✓
Total Organic Carbon (TOC)	mg/L	12	1.90	1.00	1.51	0.33			
Turbidity	NTU	3	0.07	0.05	0.06	0.01		2.5	✓
MICROBIOLOGY									
Escherichia coli	(P/A)/100 mL	113	0.00	0.00	0.00		1		✓
TRIHALOMETHANES									
bromodichloromethane	mg/L	12	0.03	0.01	0.01	0.01	0.06		✓
bromoform	mg/L	12	0.01	0.00	0.00	0.00	0.1		✓
chloroform	mg/L	12	0.02	0.00	0.01	0.00	0.4		✓
dibromochloromethane	mg/L	12	0.02	0.00	0.01	0.00	0.15		✓
THM Ratio		12	0.54	0.16	0.28	0.11			

APPENDIX 2 Compliance with bulk water agreement

PAPAKURA BWA COMPLIANCE 2011-12

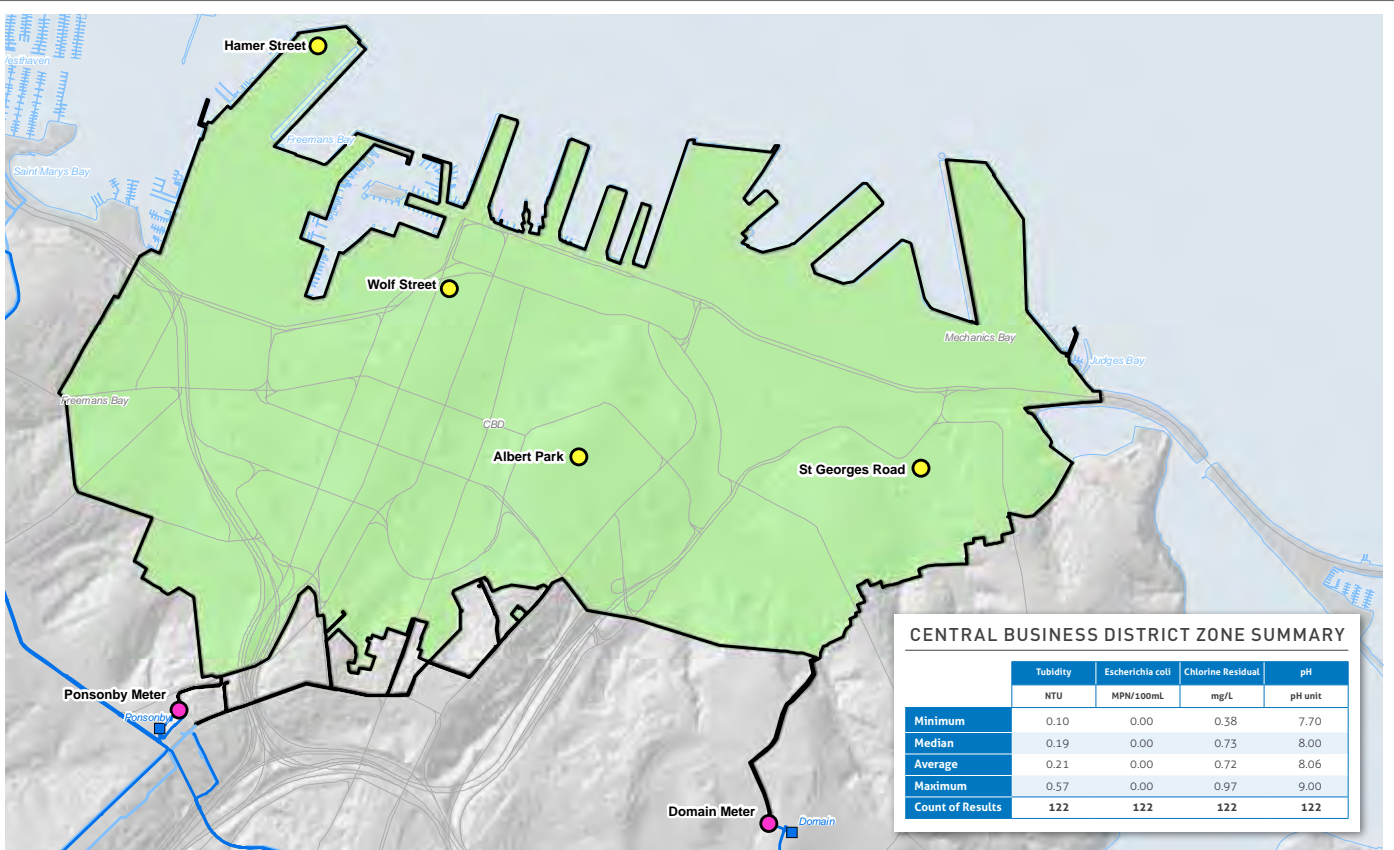
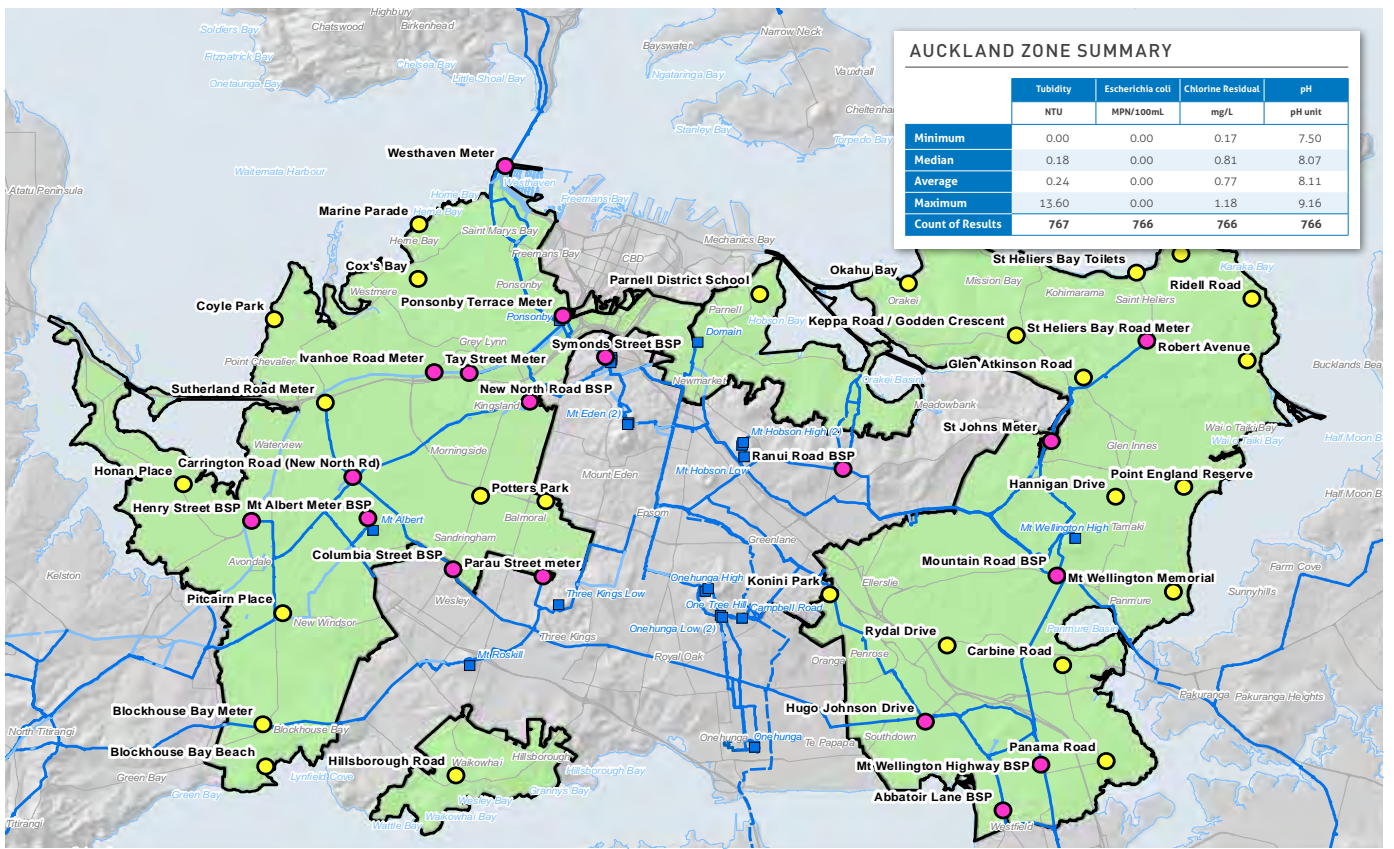
Grading Zone	FAC (0.3 to 1.5mg/l FAC)		pH (7.5 to 8.5)		Turbidity (<1.0 NTU)		HPC (<50 cfu/ml)		E.coli (<1 in 100ml)	
	Required Compliance	Year to Date	Required Compliance	Year to Date	Required Compliance	Year to Date	Required Compliance	Year to Date	Required Compliance	Year to Date
Ardmore School	95	100	95	100	98	100	98	100	100	100
Papakura	95	99	95	87	98	100	98	100	100	100
Red Hill	95	98	95	100	98	100	98	98	100	100
Takanini	95	100	95	99	98	100	98	100	100	100
Total	95	99	95	94	98	100	98	100	100	100
2010-2011 compliance	95	100	95	99	98	98	98	100	100	100
2009-2010 compliance	95	100	95	100	98	99	98	100	100	100
2008-2009 compliance	95	100	95	100	98	100	98	100	100	100
2007-2008 compliance	95	100	95	99	98	98	98	100	100	100

APPENDIX 3 Water quality in grading zones

The Drinking Water Standards of New Zealand 2000 (Revised 2008) prescribes maximum acceptable values (MAVs) and guideline values (GV) for determinands required to be measured in the network as outlined below:

Determinand	Guideline Value	Maximum Acceptance Value	Unit
Turbidity	2.5		NTU
E.coli		<1	MPN/100mL
Chlorine Residual	0.6-1.2	5	mg/L
pH	7.0-8.5		

APPENDIX 3 Water quality in grading zones Central Area

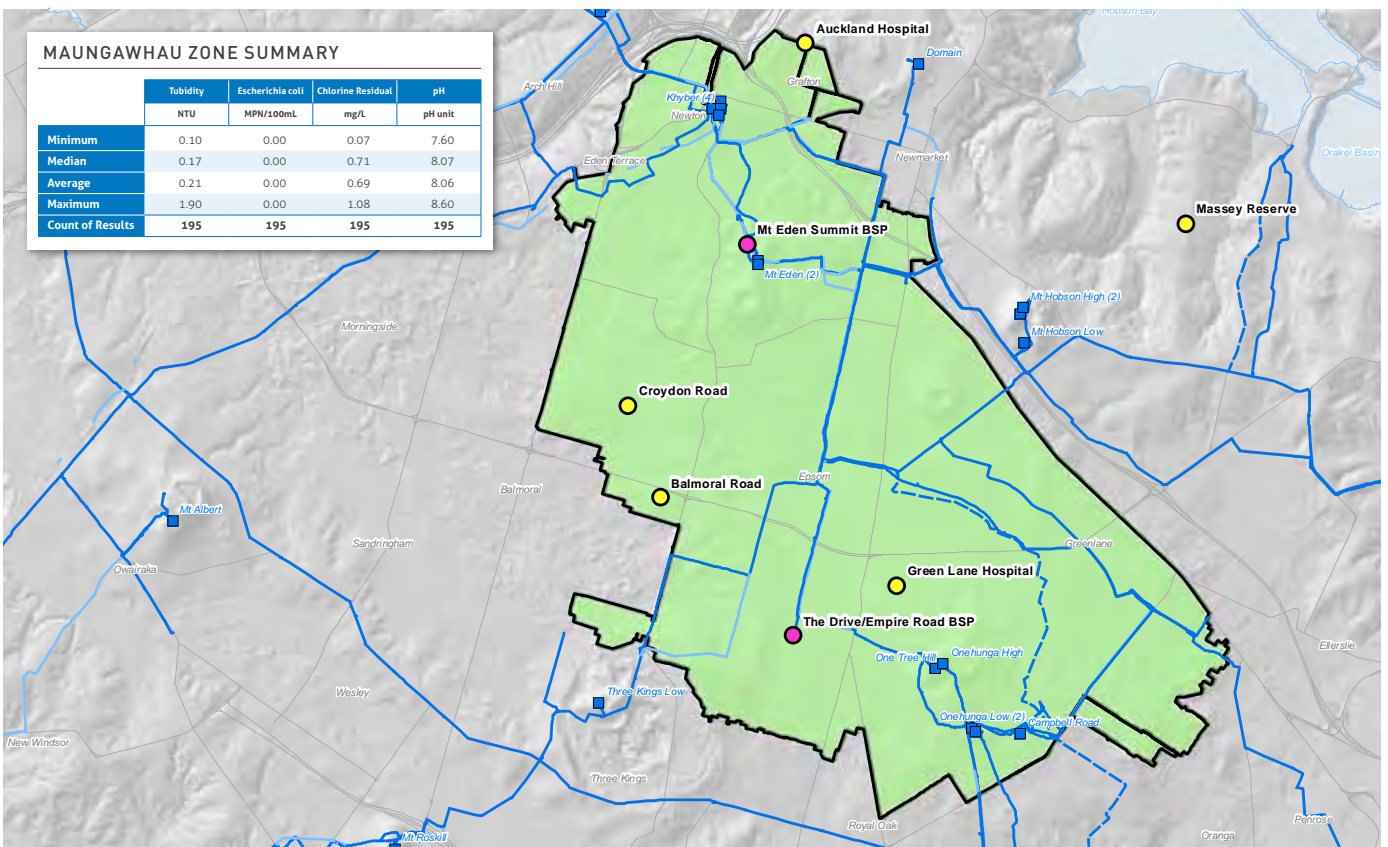
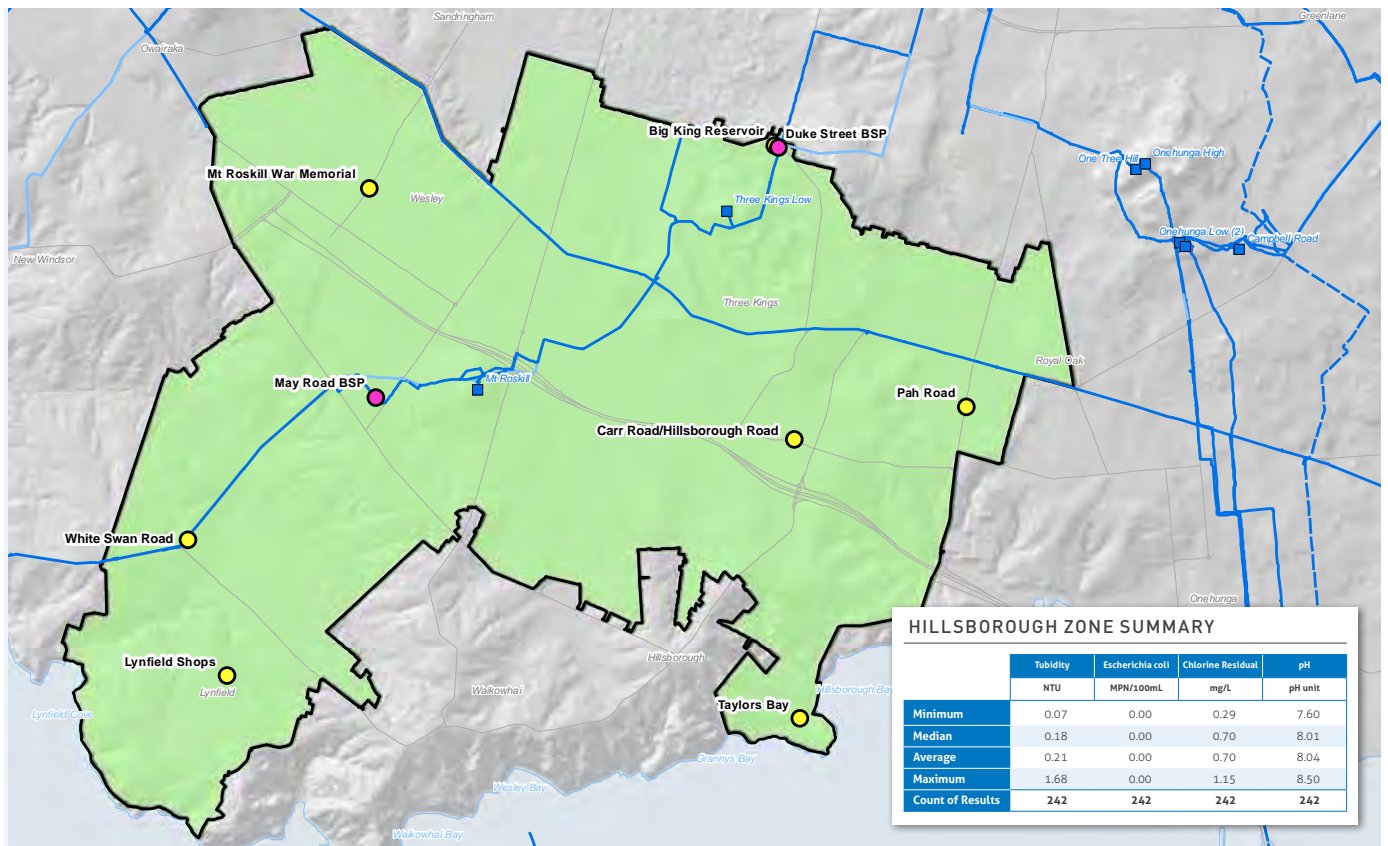


LEGEND

- Sample Taps
 - Distribution
 - Transmission
- Watermain
 - Treated Built
 - Raw Built
 - Proposed
 - Out of Service
 - Tunnel
- Reservoir
 - Reservoir
- Grading Zone
 - Grading Zone



APPENDIX 3 Water quality in grading zones Central Area

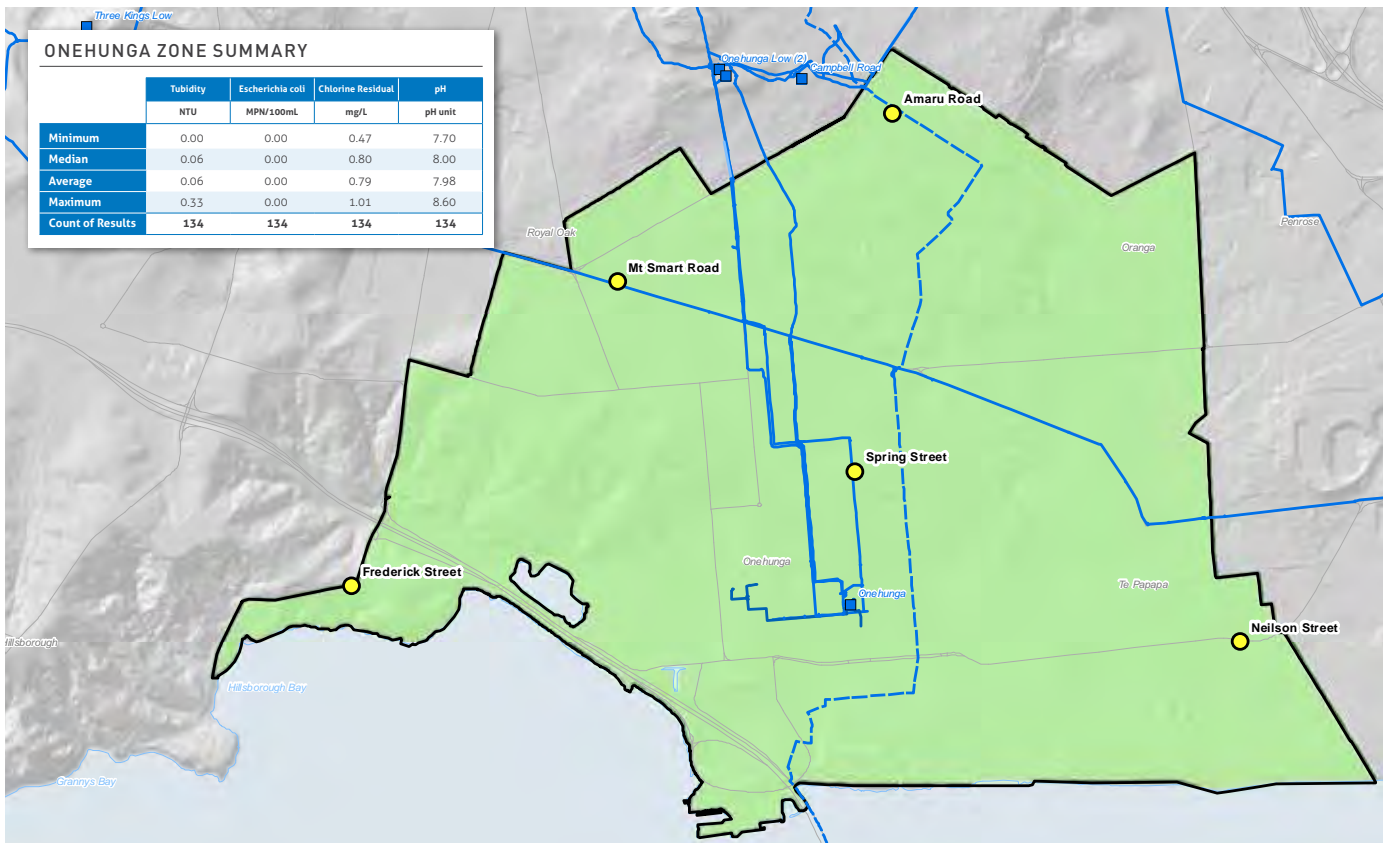
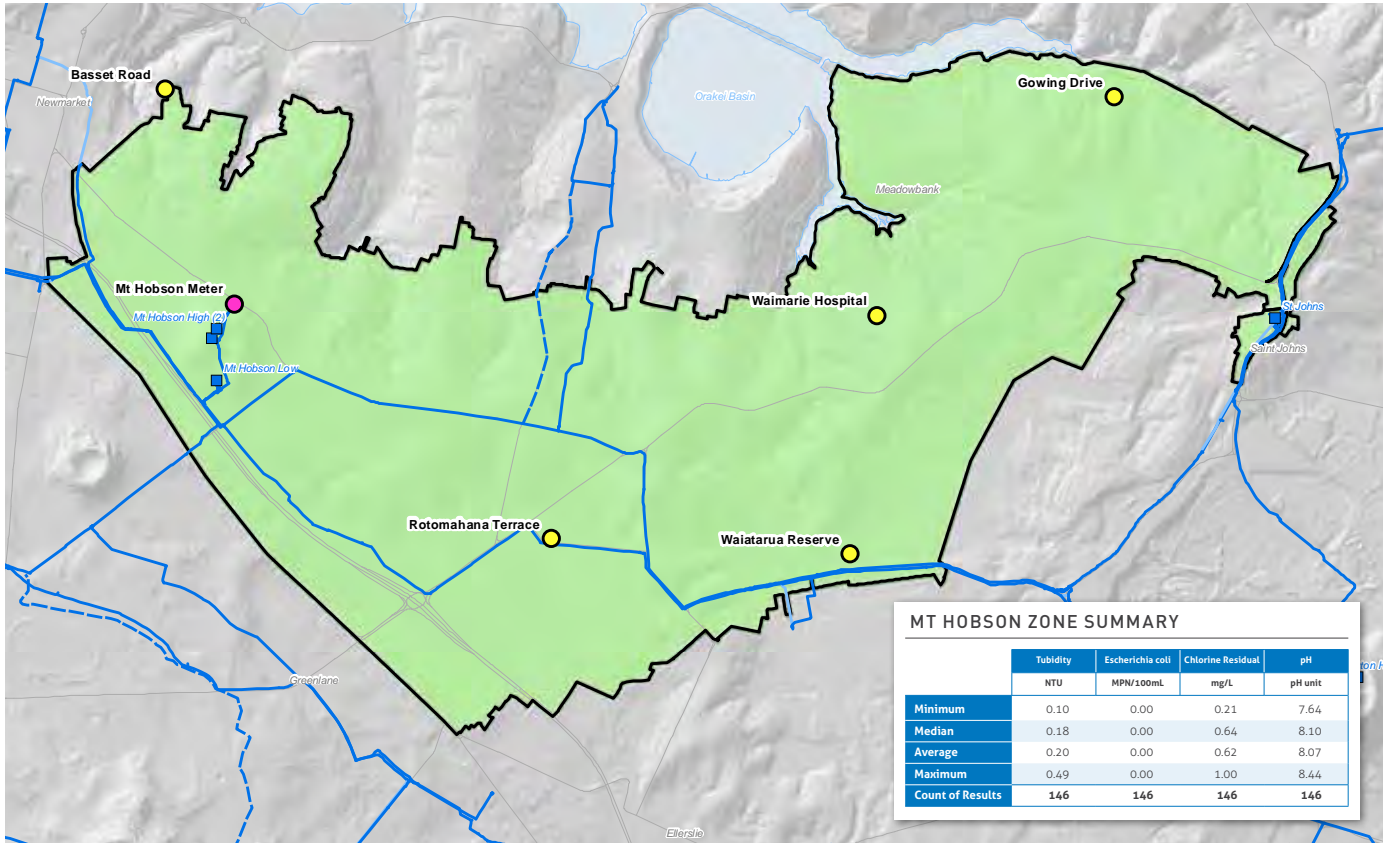


LEGEND

- Sample Taps ● Distribution
- Transmission
- Watermain — Treated Built
- Raw Built
- Proposed
- Out of Service
- Reservoir
- Grading Zone
- Tunnel



APPENDIX 3 Water quality in grading zones Central Area

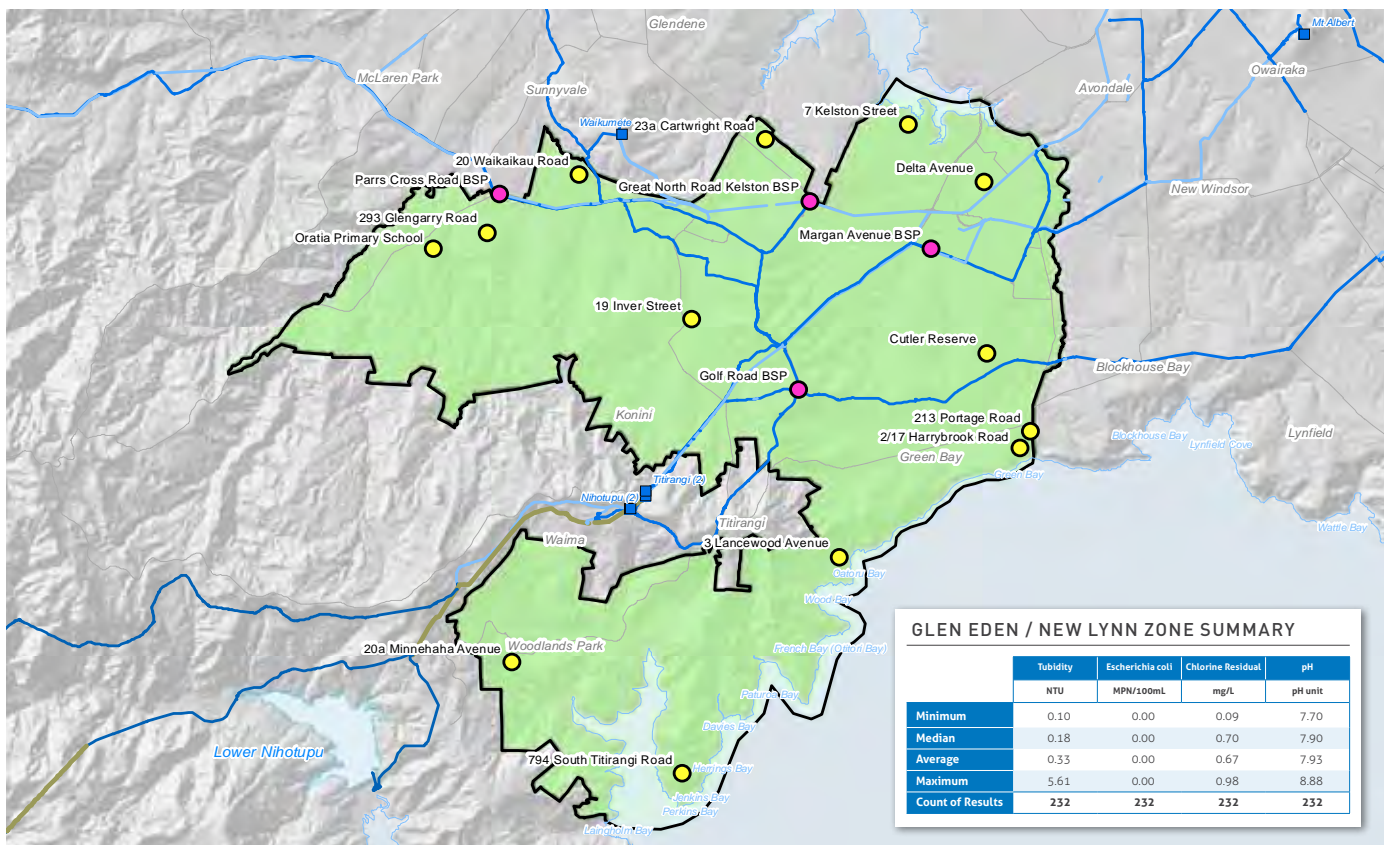
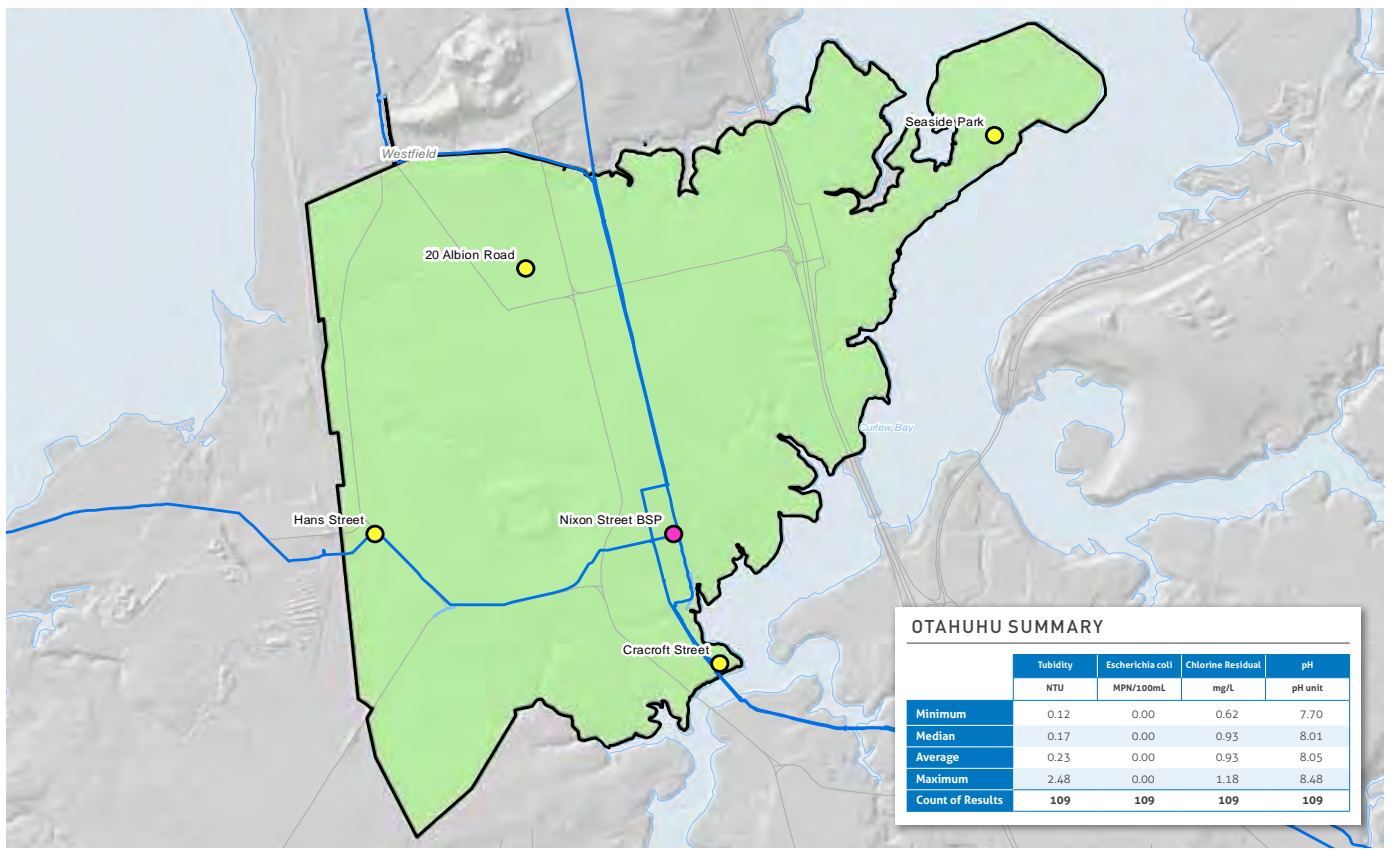


LEGEND

- Sample Taps
 - Distribution
 - Transmission
- Watermain
 - Treated Built
 - Raw Built
 - Proposed
 - Out of Service
 - Tunnel
- Reservoir
 - Reservoir
- Grading Zone
 - Grading Zone



APPENDIX 3 Water quality in grading zones Central/North Western Area

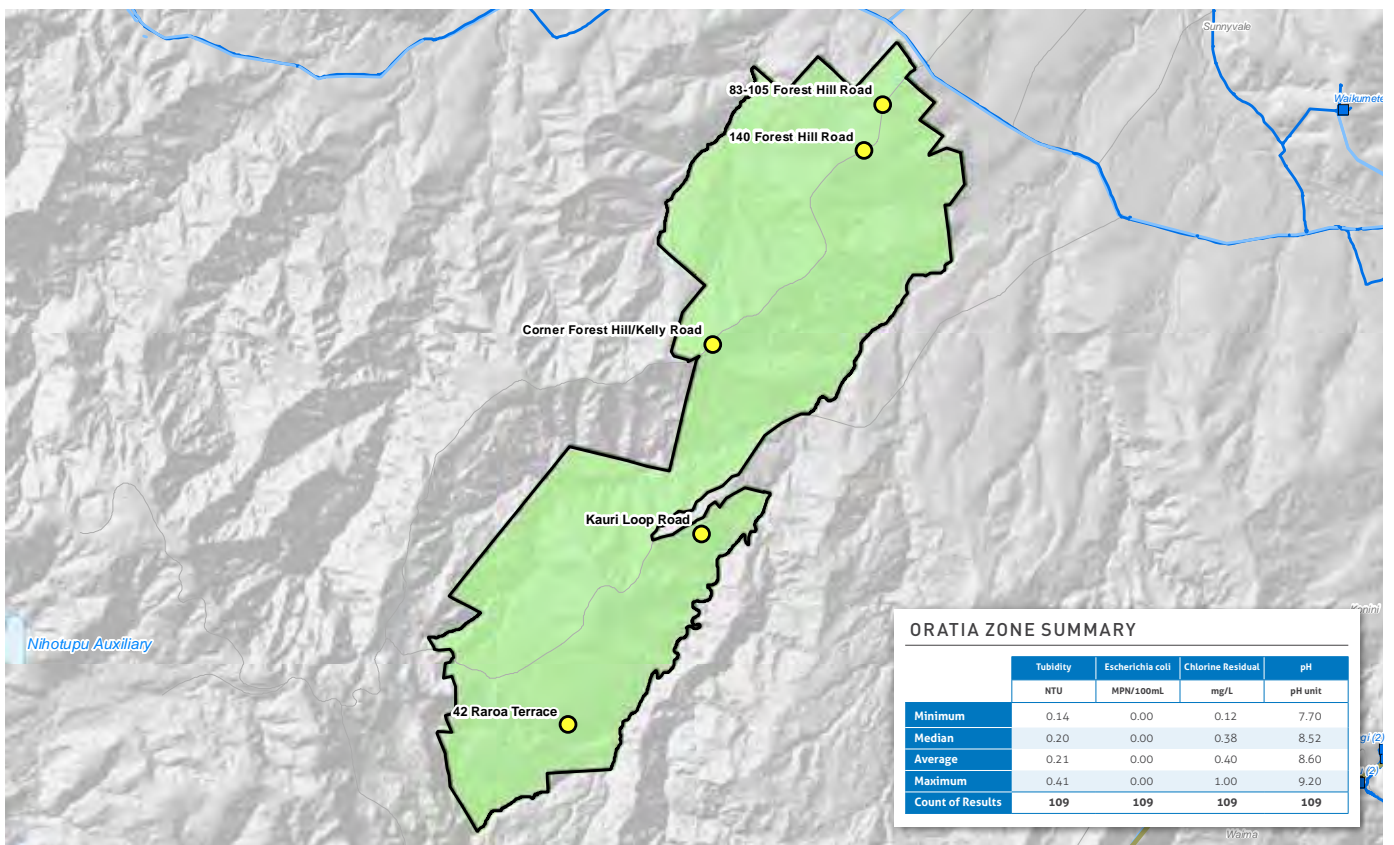
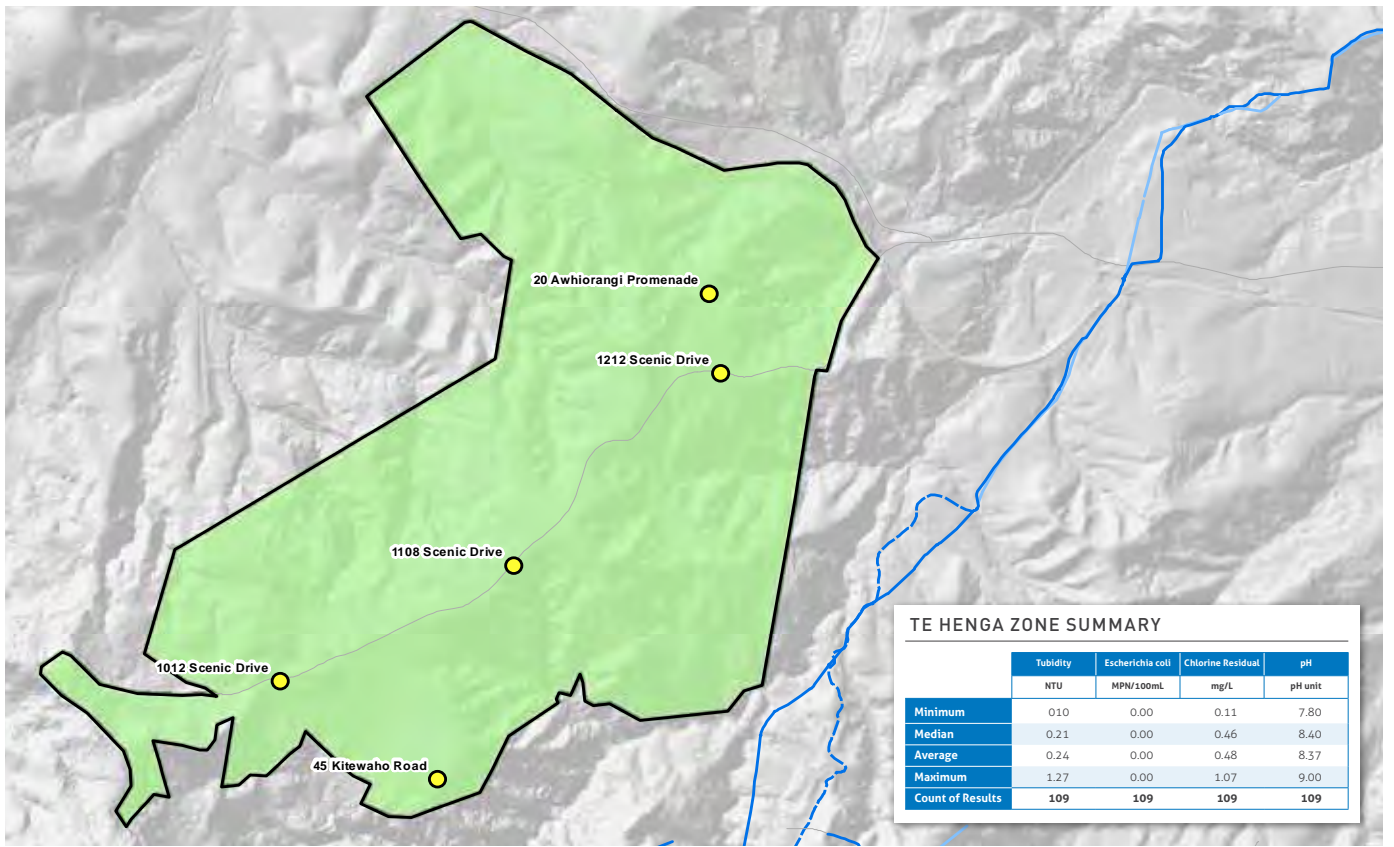


LEGEND

- Sample Taps ● Distribution
- Watermain — Treated Built
- Reservoir ■ Reservoir
- Grading Zone ■ Grading Zone
- Transmission
- Raw Built
- Proposed
- Out of Service
- Tunnel



APPENDIX 3 Water quality in grading zones North Western Area

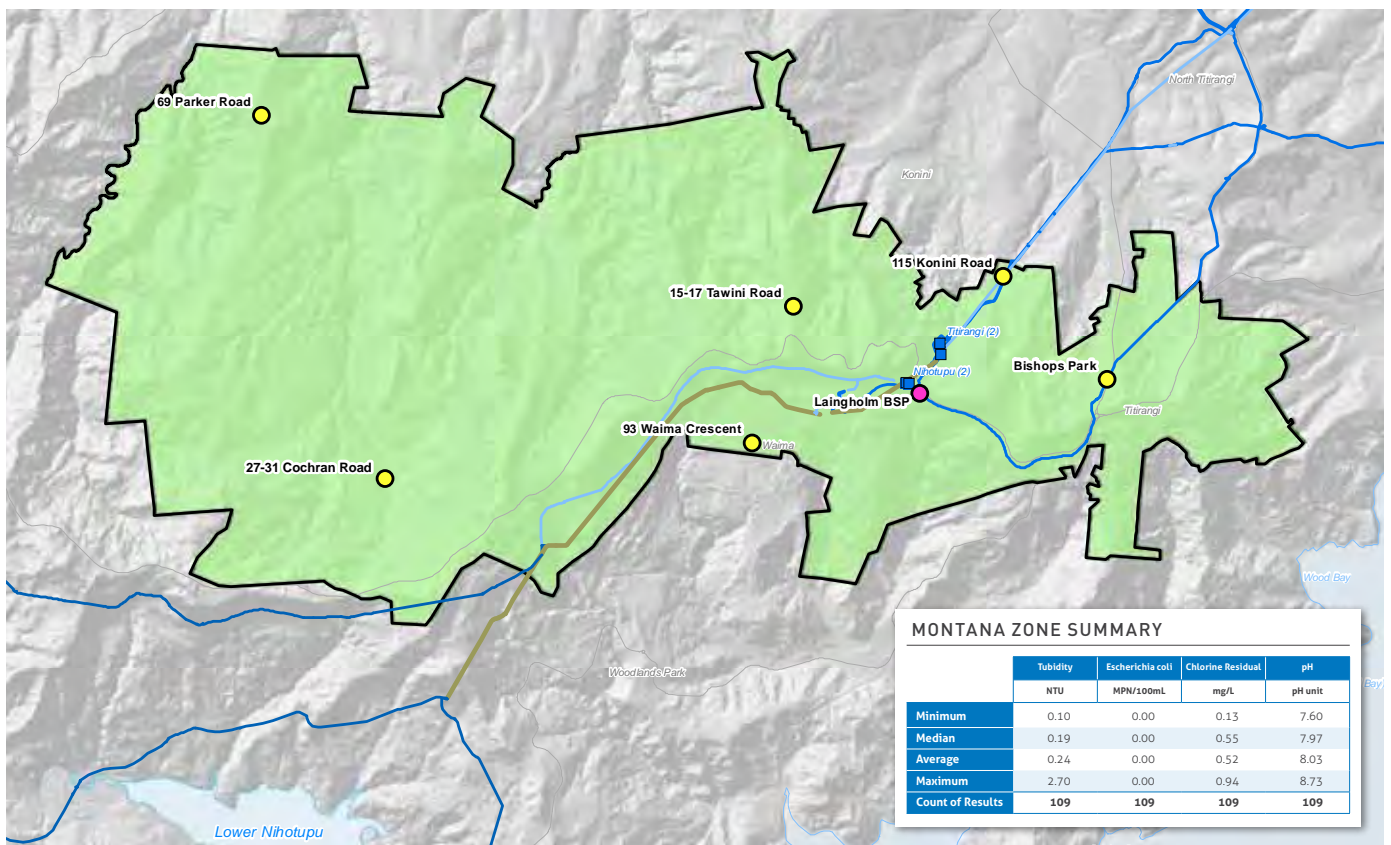
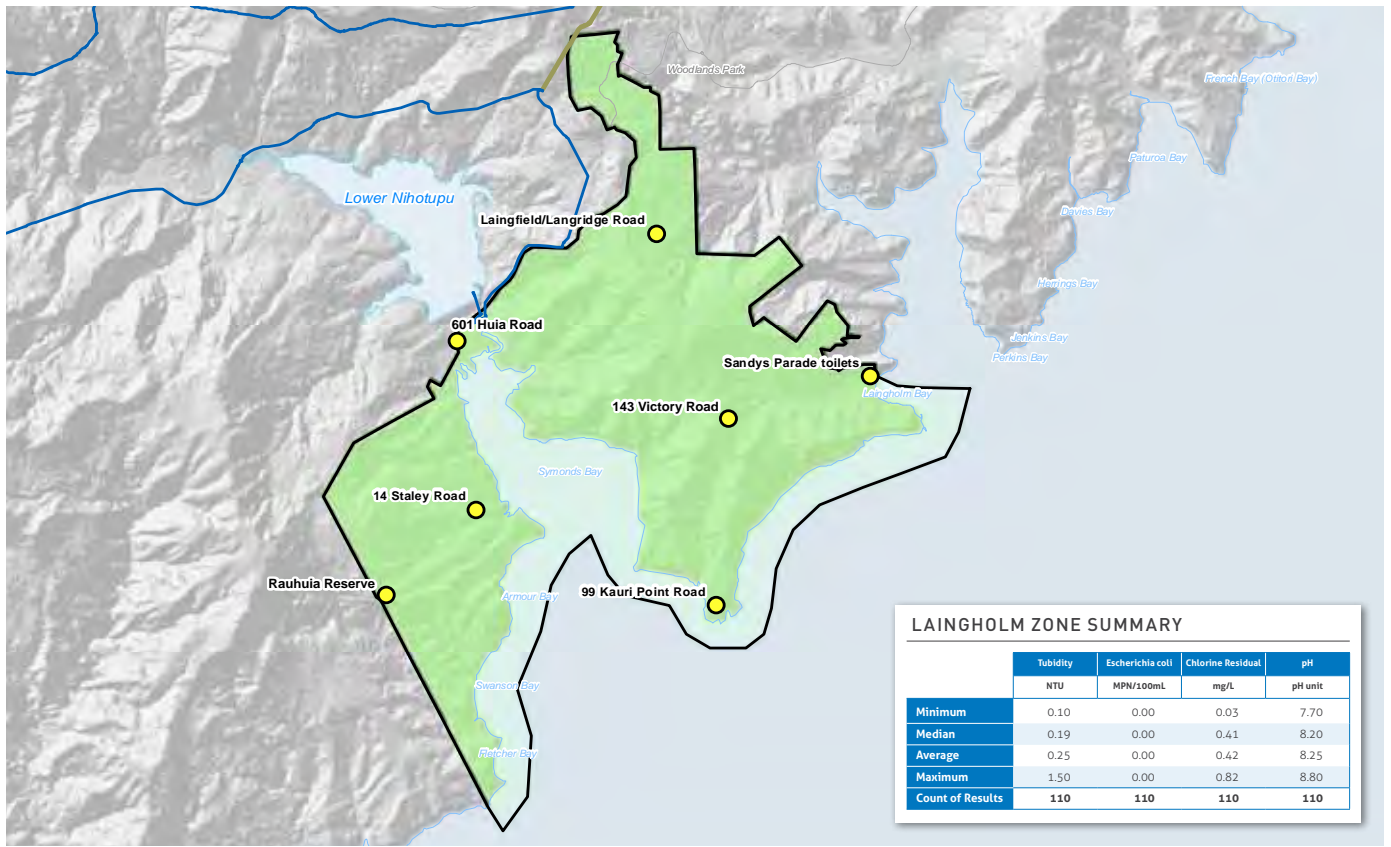


LEGEND

- Sample Taps
 - Distribution
 - Transmission
- Watermain
 - Treated Built
 - Raw Built
 - - - Proposed
 - - - Out of Service
 - Tunnel
- Reservoir
- Grading Zone



APPENDIX 3 Water quality in grading zones North Western Area

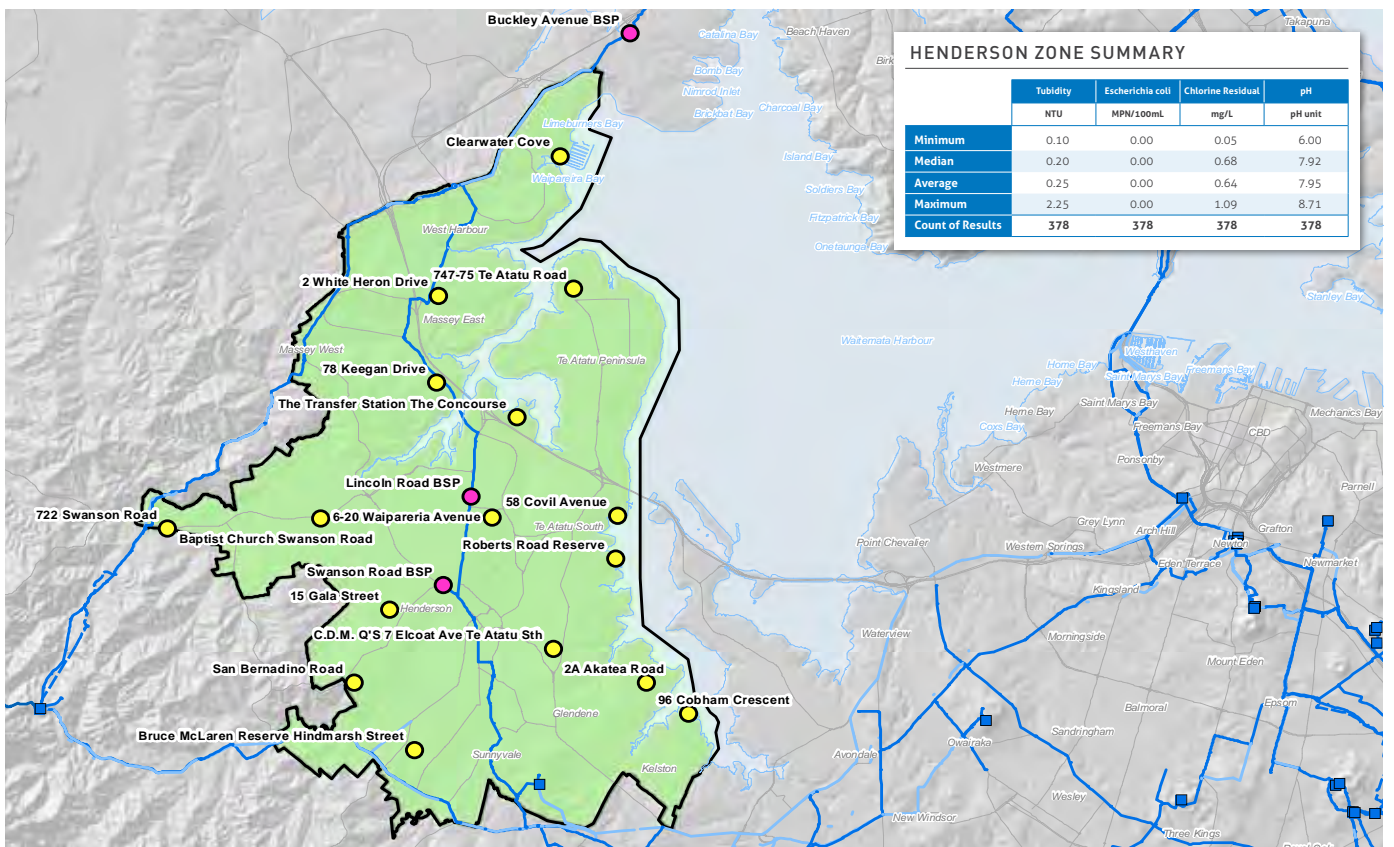
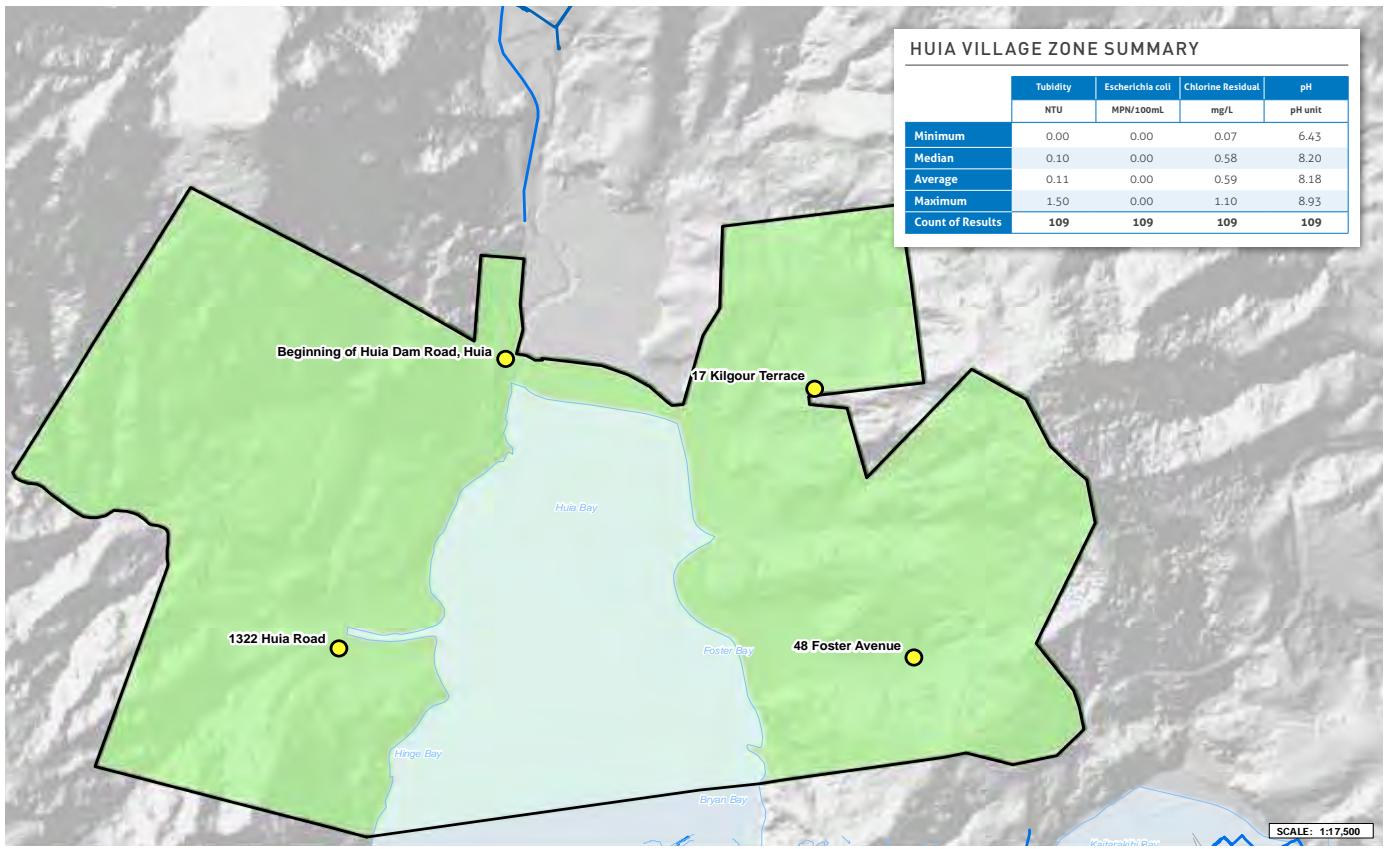


LEGEND

- Sample Taps
- Distribution
- Watermain
- Treated Built
- Proposed
- Reservoir
- Transmission
- Raw Built
- Out of Service
- Grading Zone
- Tunnel



APPENDIX 3 Water quality in grading zones North Western Area

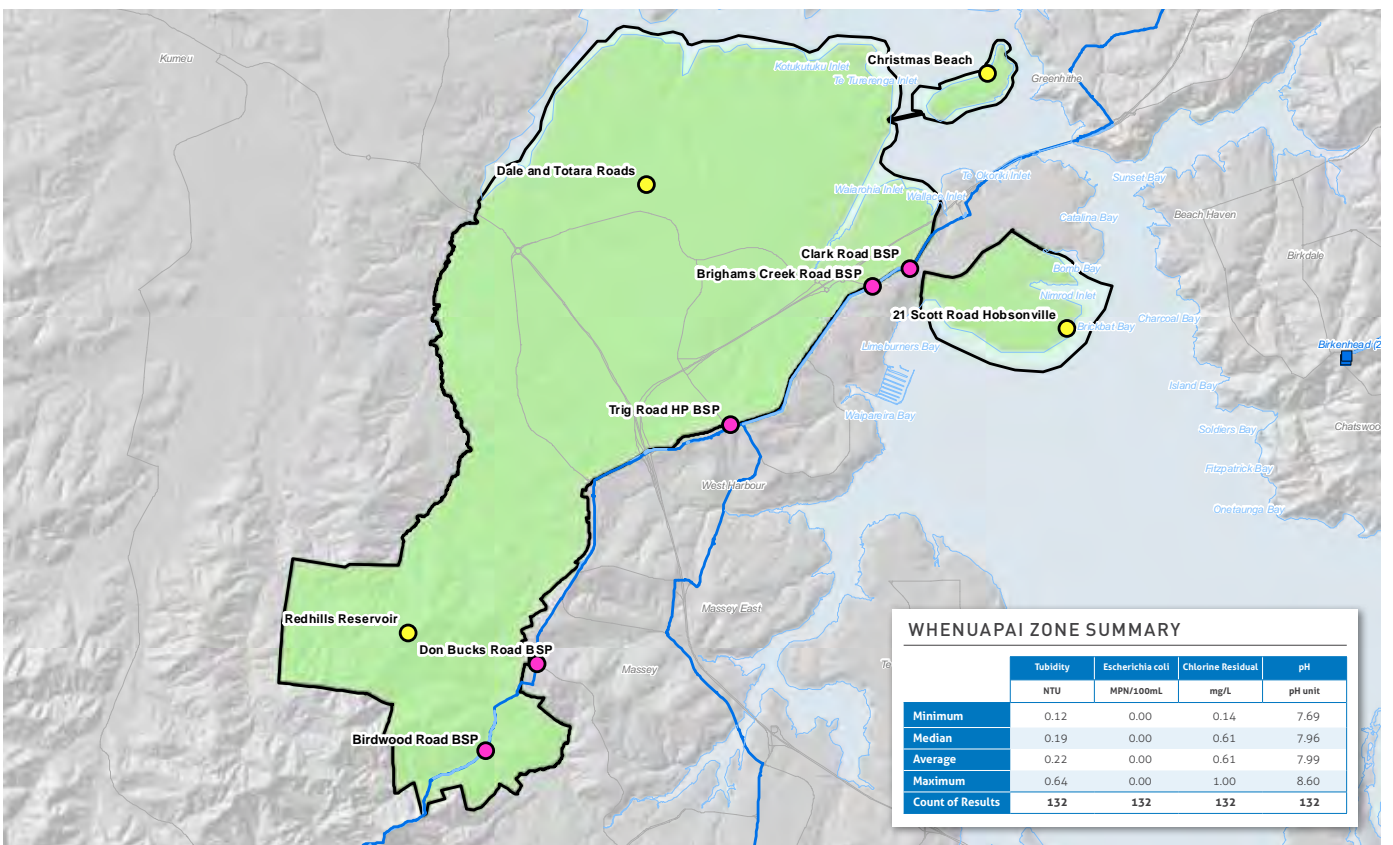
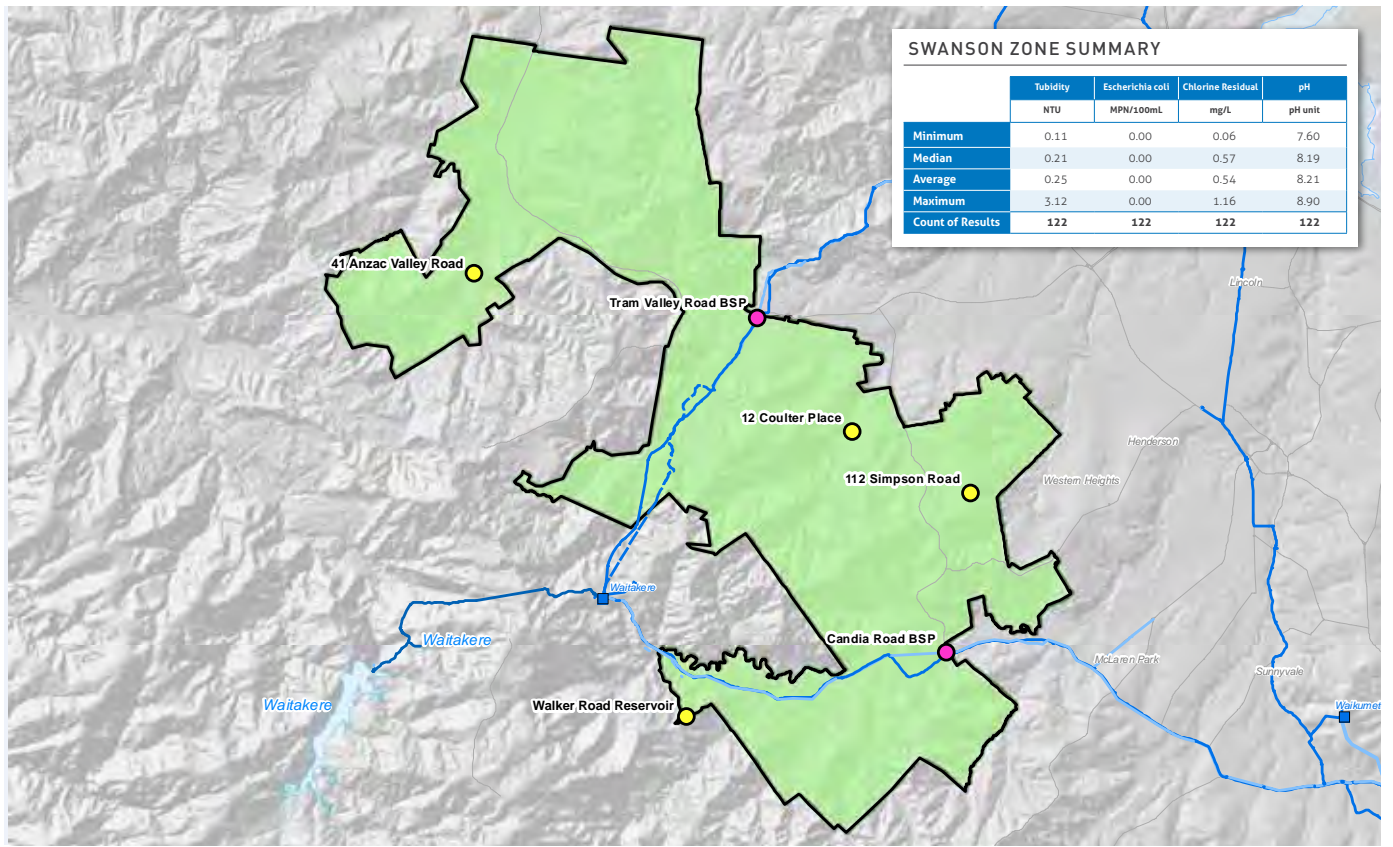


LEGEND

- Sample Taps ● Distribution
- Watermain — Treated Built
- Proposed
- Reservoir
- Transmission
- Raw Built
- Out of Service
- Grading Zone
- Tunnel



APPENDIX 3 Water quality in grading zones North Western Area

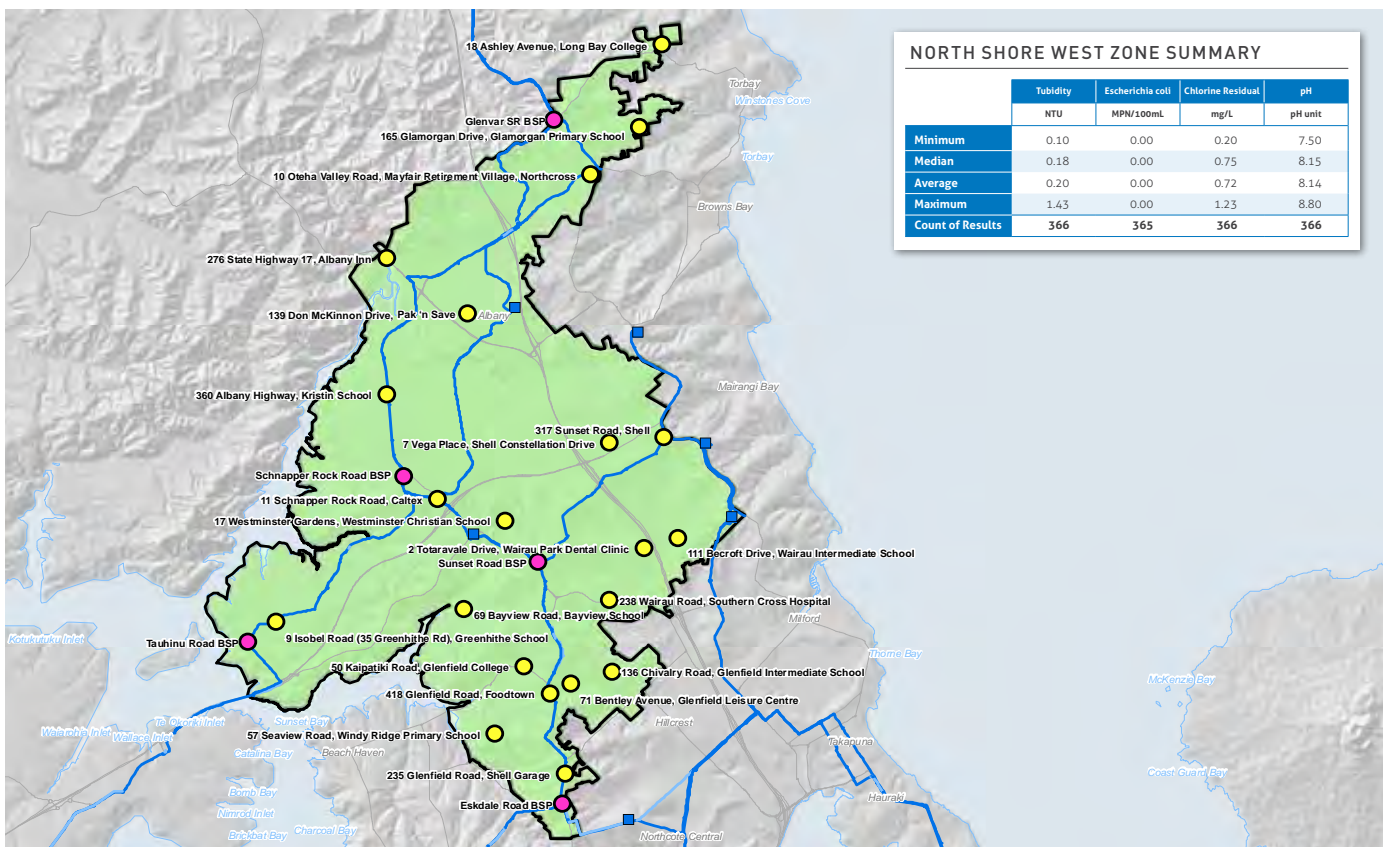
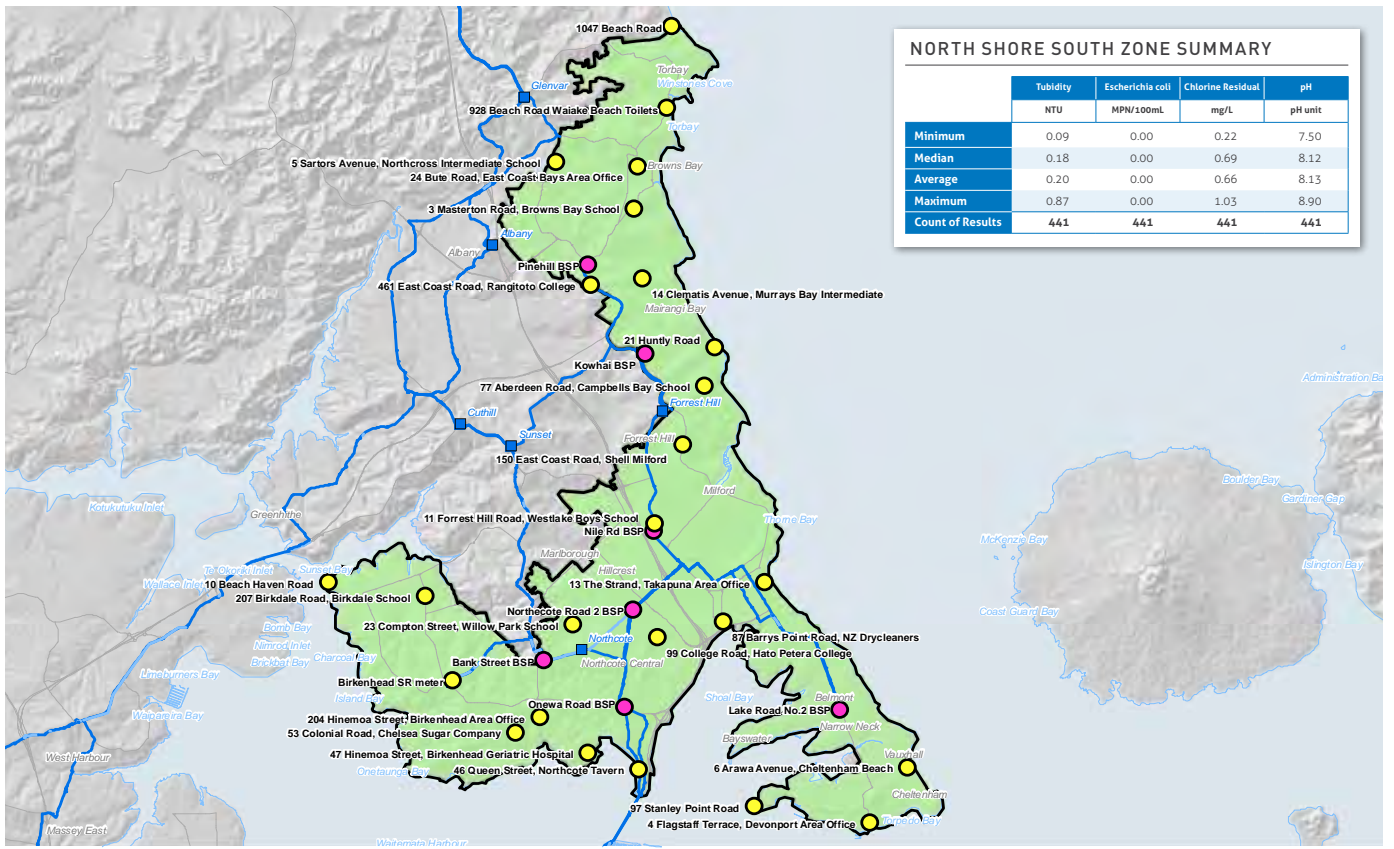


LEGEND

- Sample Taps ● Distribution
- Watermain — Treated Built
- Proposed
- Reservoir
- Transmission
- Raw Built
- Out of Service
- Grading Zone
- Tunnel



APPENDIX 3 Water quality in grading zones North Western Area

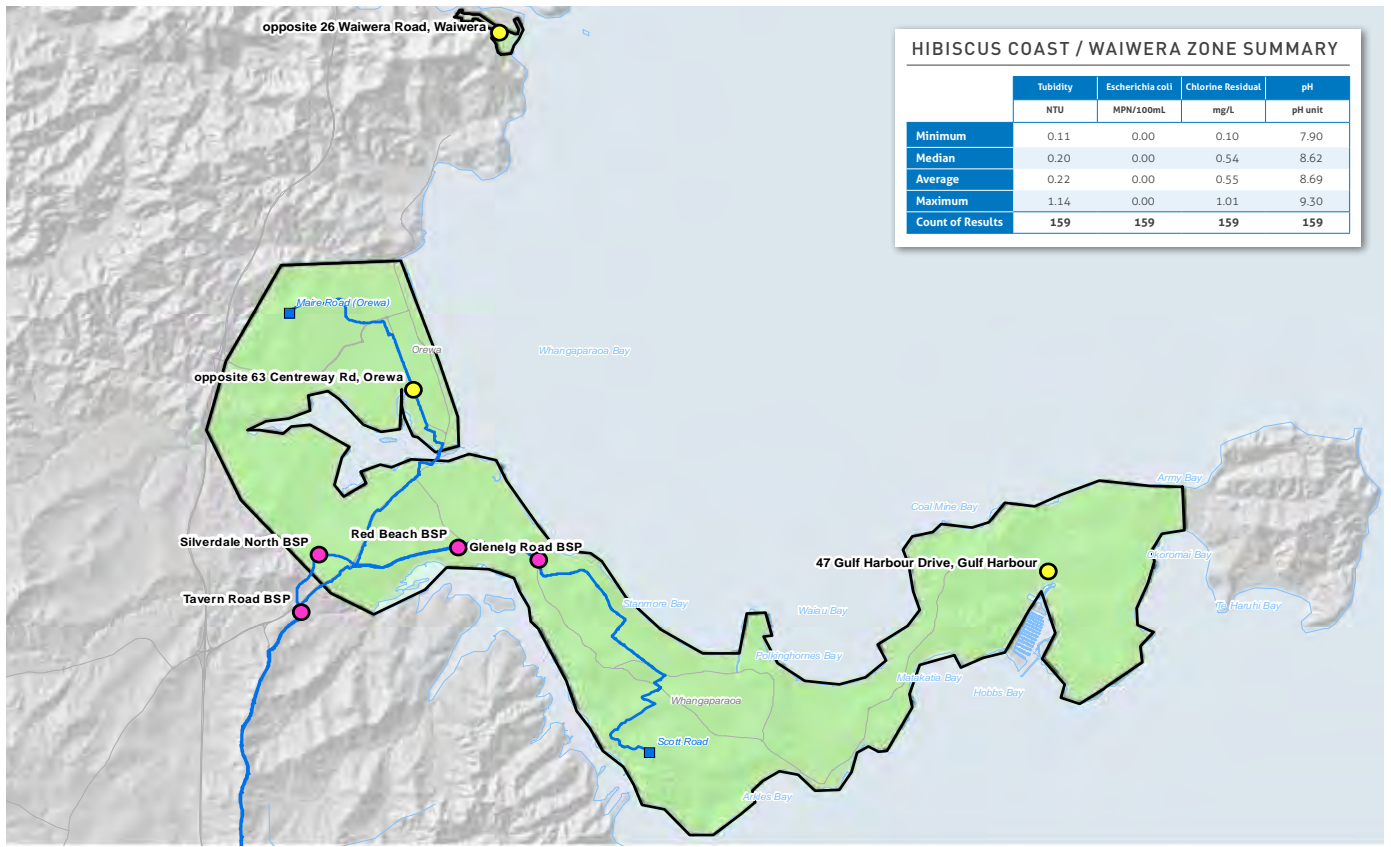


LEGEND

- Sample Taps ● Distribution
- Watermain — Treated Built
- Proposed —
- Reservoir ■
- Transmission ●
- Raw Built —
- Out of Service —
- Grading Zone
- Tunnel —

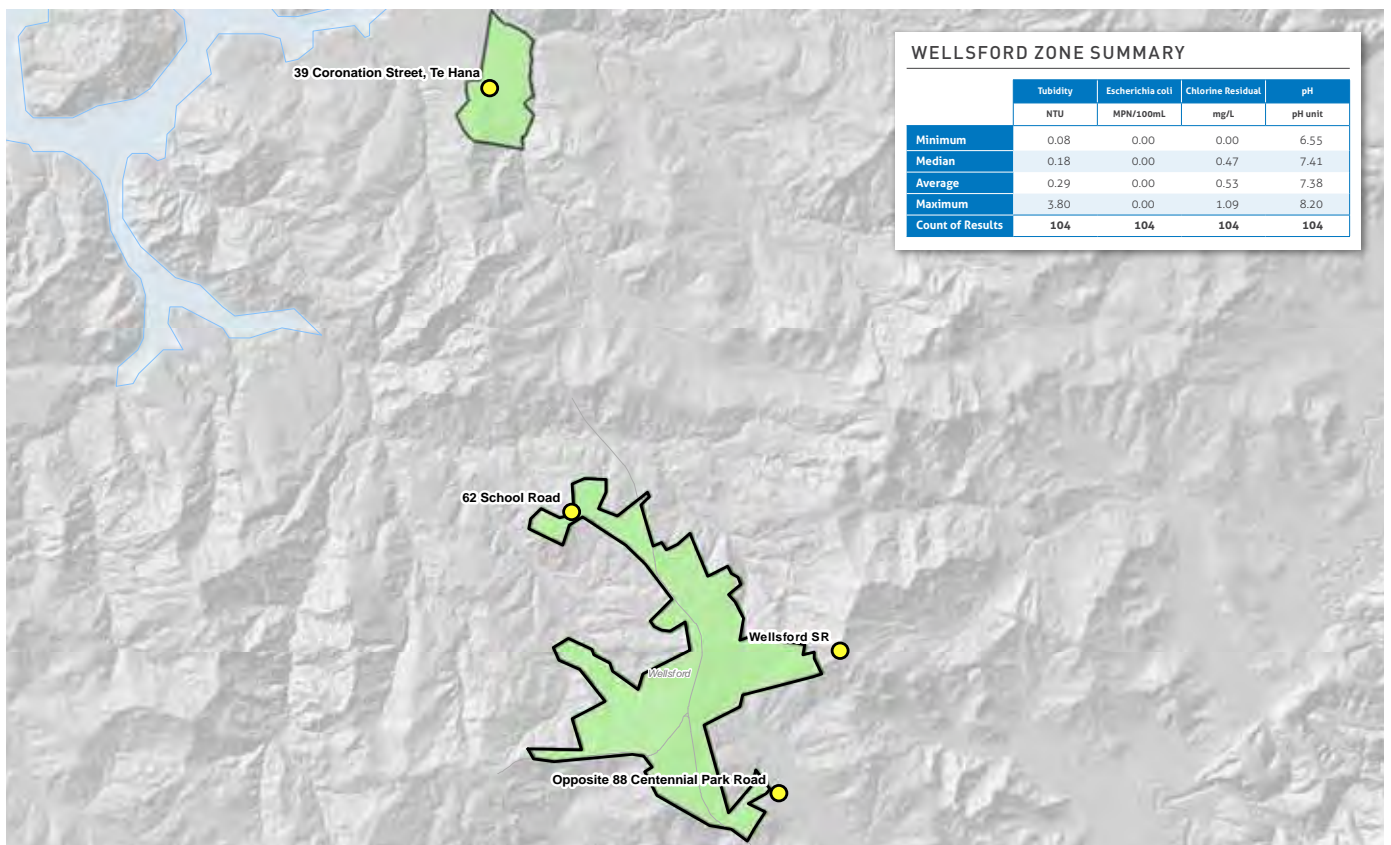


APPENDIX 3 Water quality in grading zones North Western Area



HIBISCUS COAST / WAIWERA ZONE SUMMARY

	Turbidity	Escherichia coli	Chlorine Residual	pH
	NTU	MPN/100mL	mg/L	pH unit
Minimum	0.11	0.00	0.10	7.90
Median	0.20	0.00	0.54	8.62
Average	0.22	0.00	0.55	8.69
Maximum	1.14	0.00	1.01	9.30
Count of Results	159	159	159	159



WELLSFORD ZONE SUMMARY

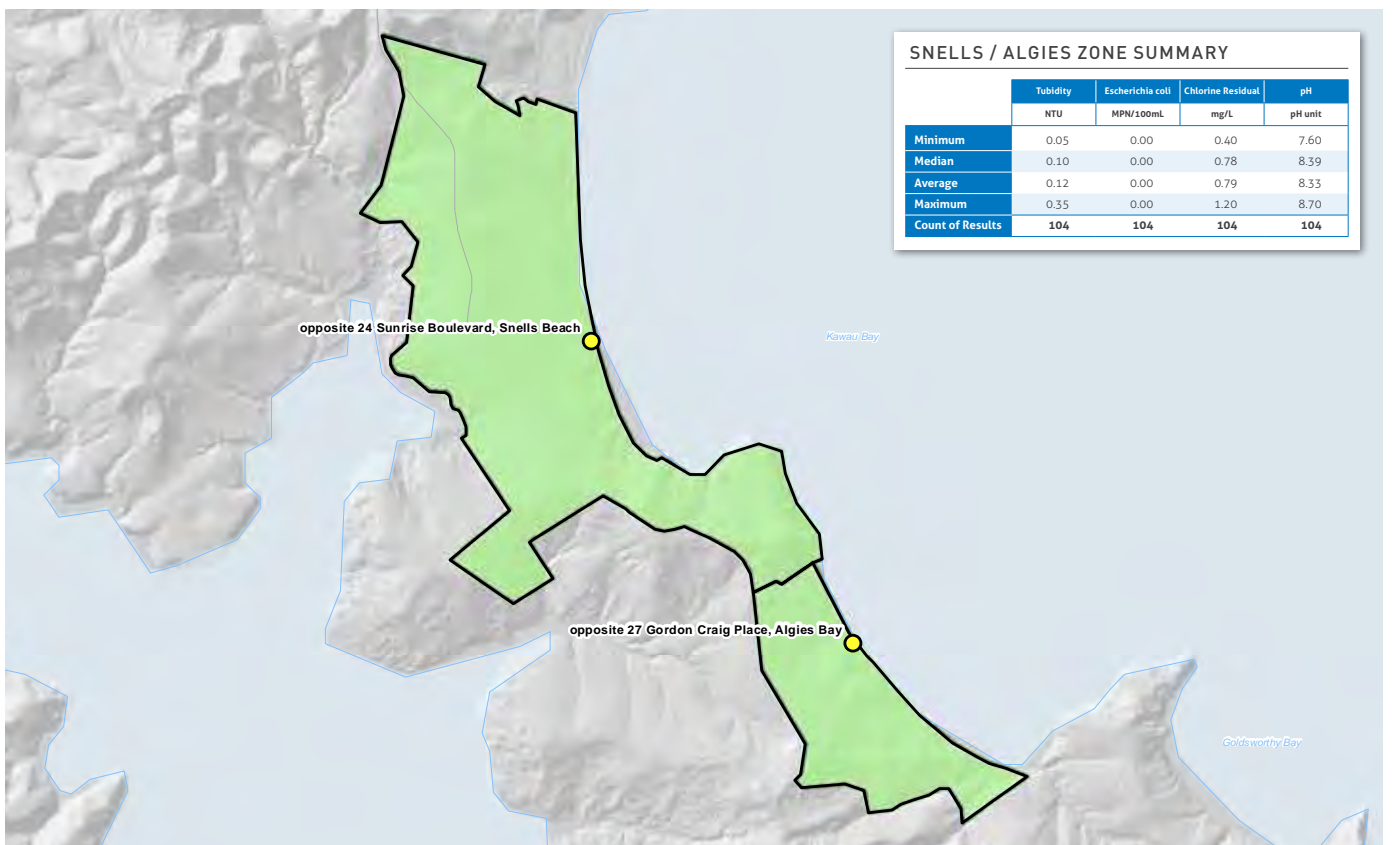
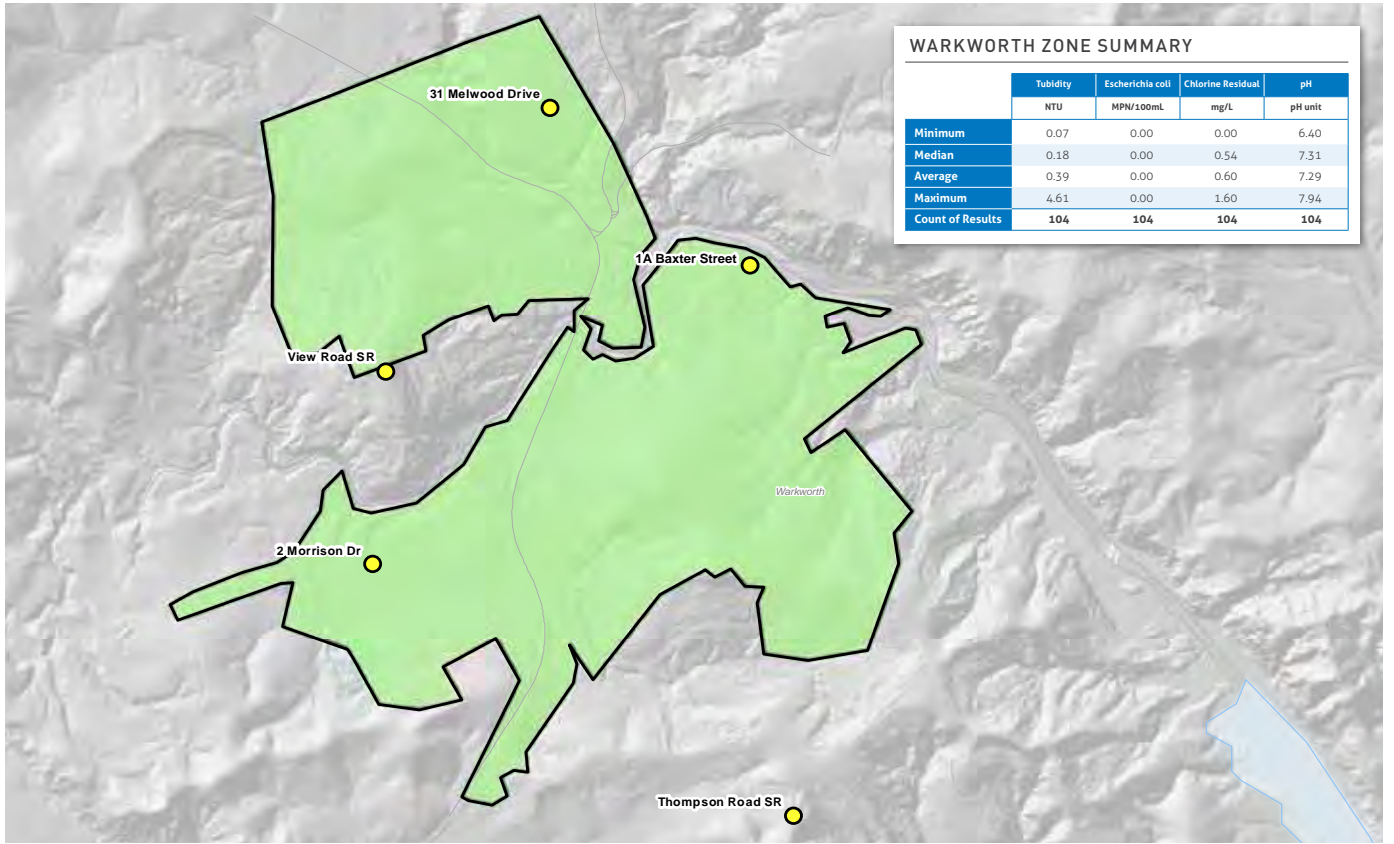
	Turbidity	Escherichia coli	Chlorine Residual	pH
	NTU	MPN/100mL	mg/L	pH unit
Minimum	0.08	0.00	0.00	6.55
Median	0.18	0.00	0.47	7.41
Average	0.29	0.00	0.53	7.38
Maximum	3.80	0.00	1.09	8.20
Count of Results	104	104	104	104

LEGEND

- Sample Taps
- Watermain
- Reservoir
- Grading Zone
- Distribution
- Treated Built
- Proposed
- Out of Service
- Transmission
- Raw Built
- Tunnel



APPENDIX 3 Water quality in grading zones North Western Area

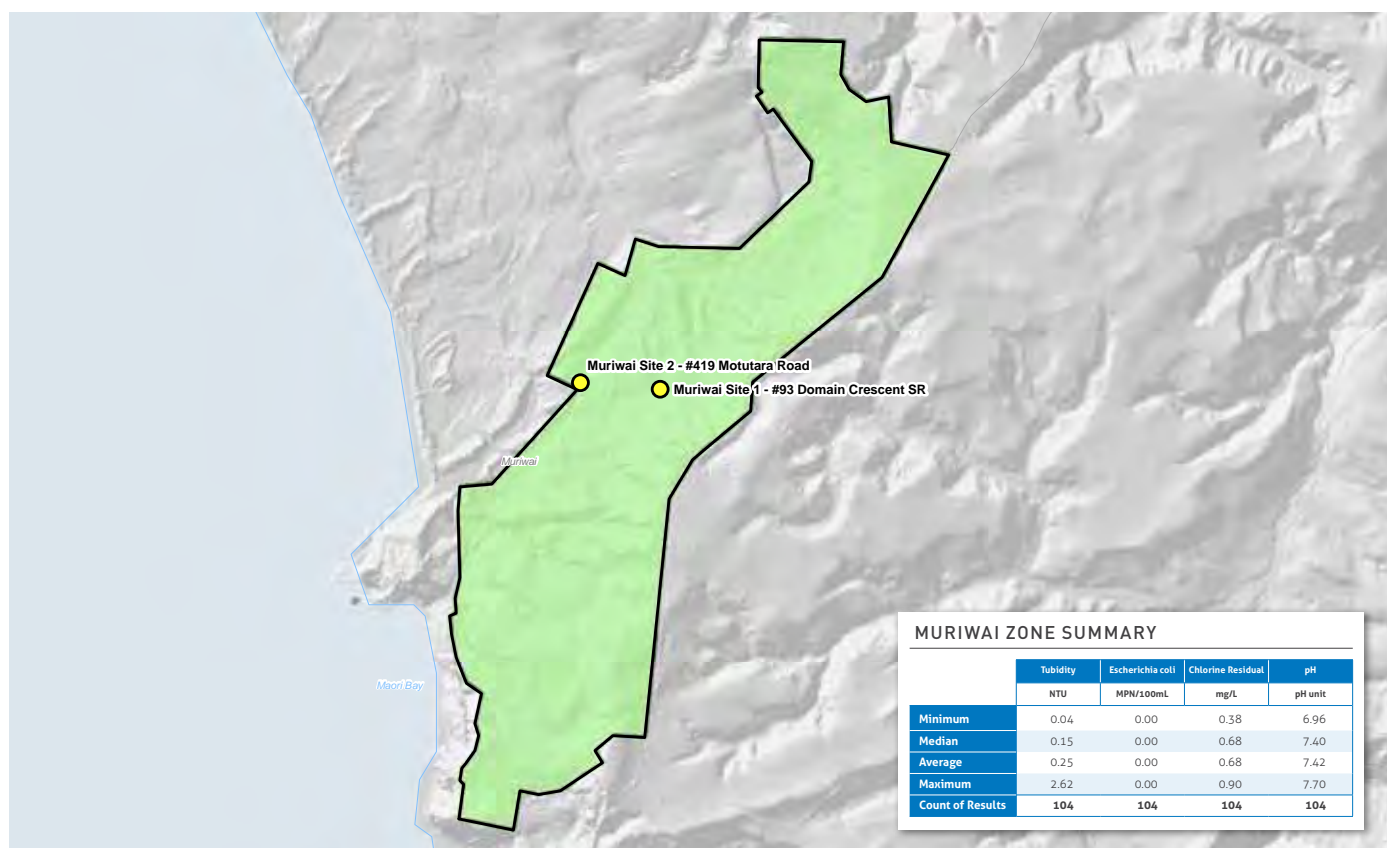
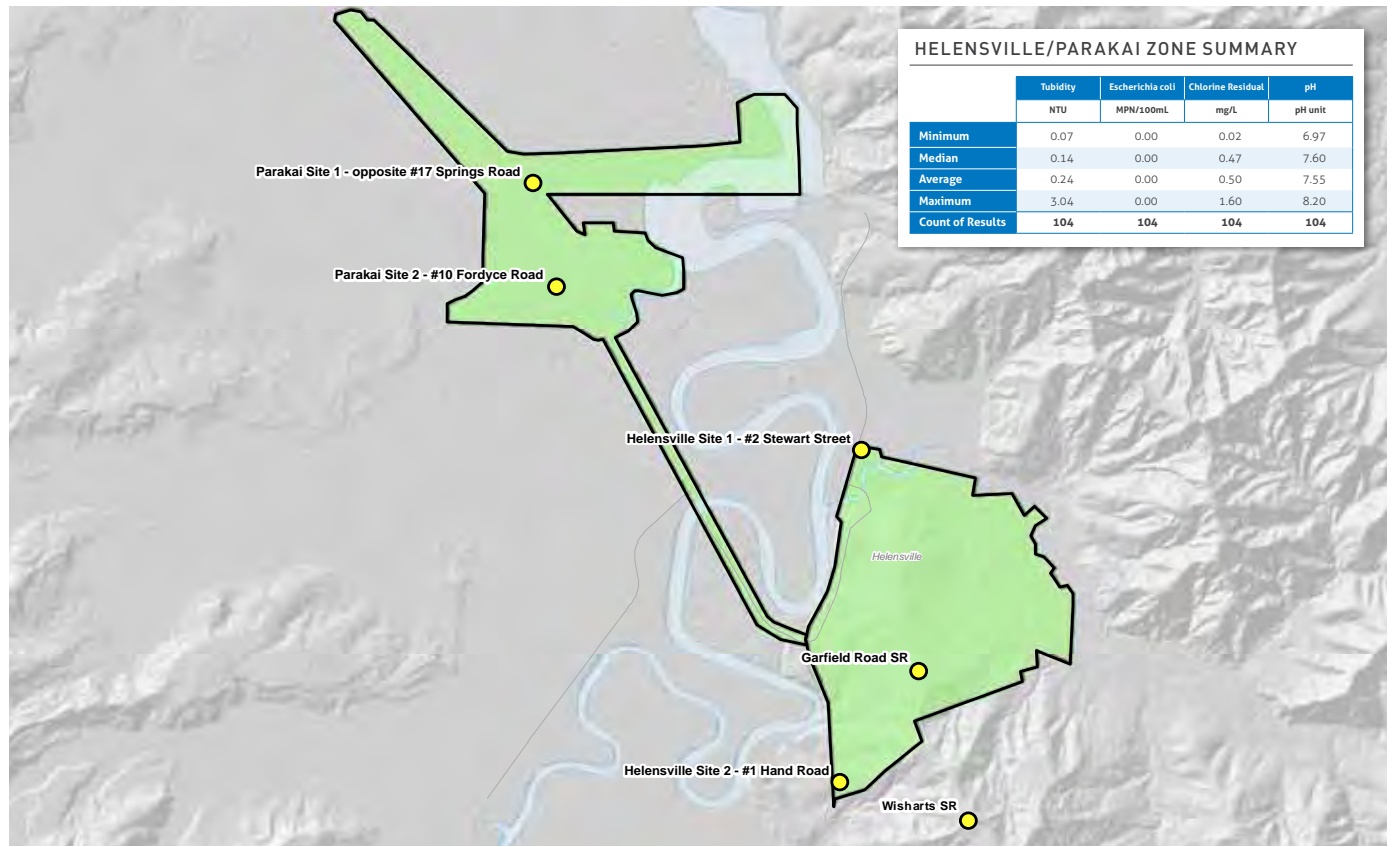


LEGEND

- Sample Taps ● Distribution
- Transmission
- Watermain — Treated Built
- Raw Built
- - - Proposed
- - - Out of Service
- Reservoir
- Grading Zone
- Tunnel



APPENDIX 3 Water quality in grading zones North Western Area

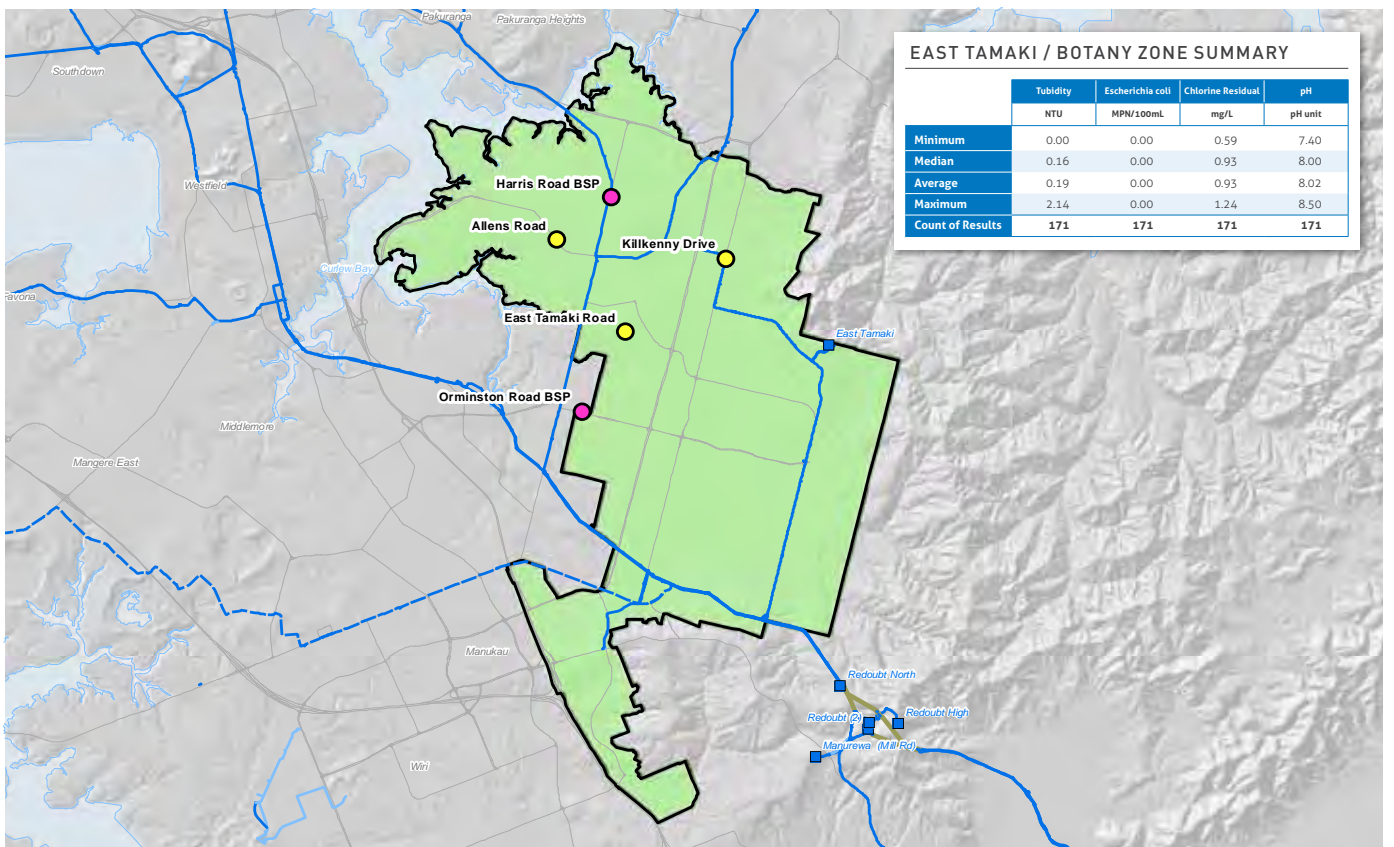
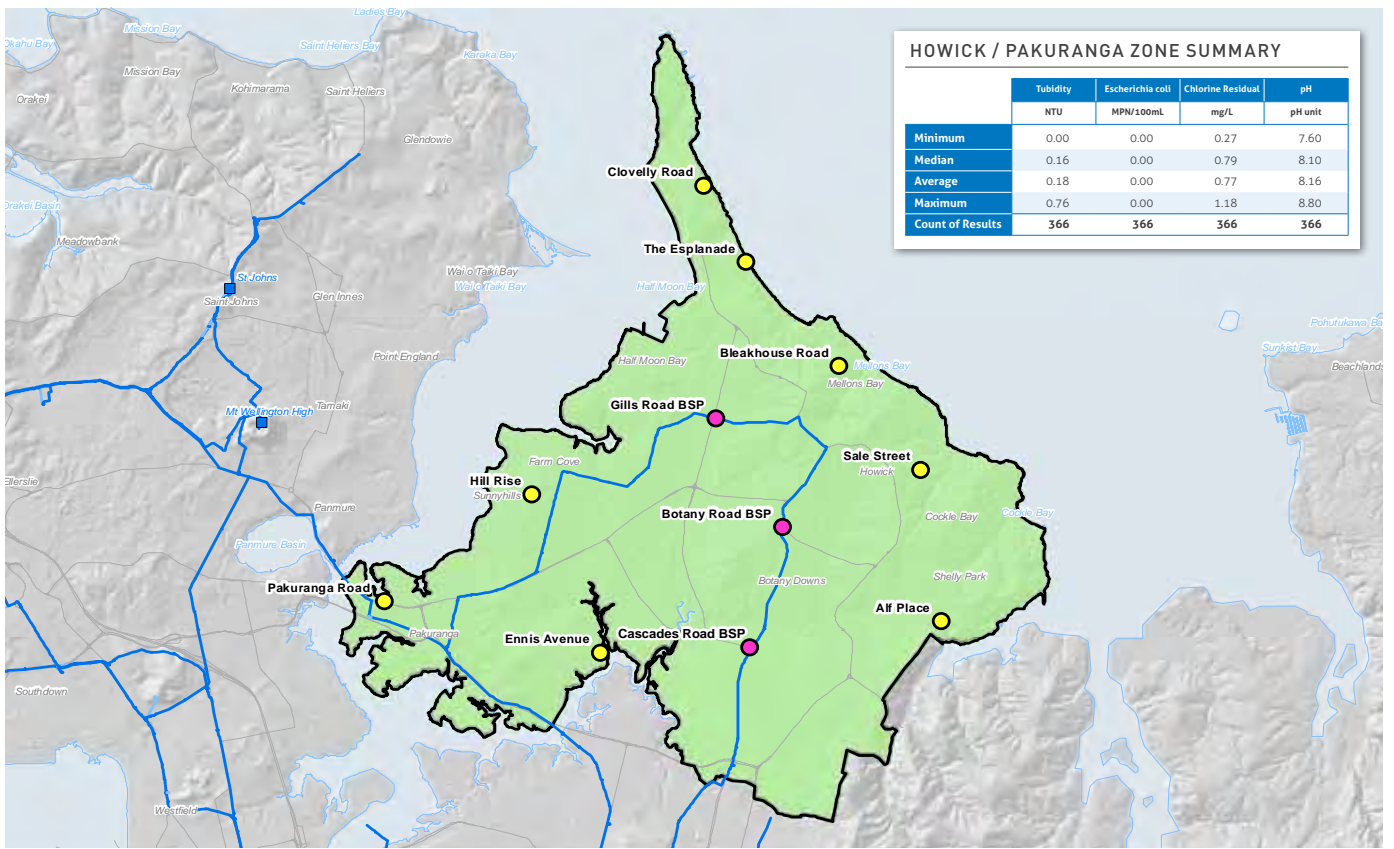


LEGEND

- Sample Taps ● Distribution
- Transmission
- Watermain — Treated Built
- Raw Built
- - - Proposed
- Out of Service
- Tunnel
- Reservoir
- Grading Zone



APPENDIX 3 Water quality in grading zones Southern Area

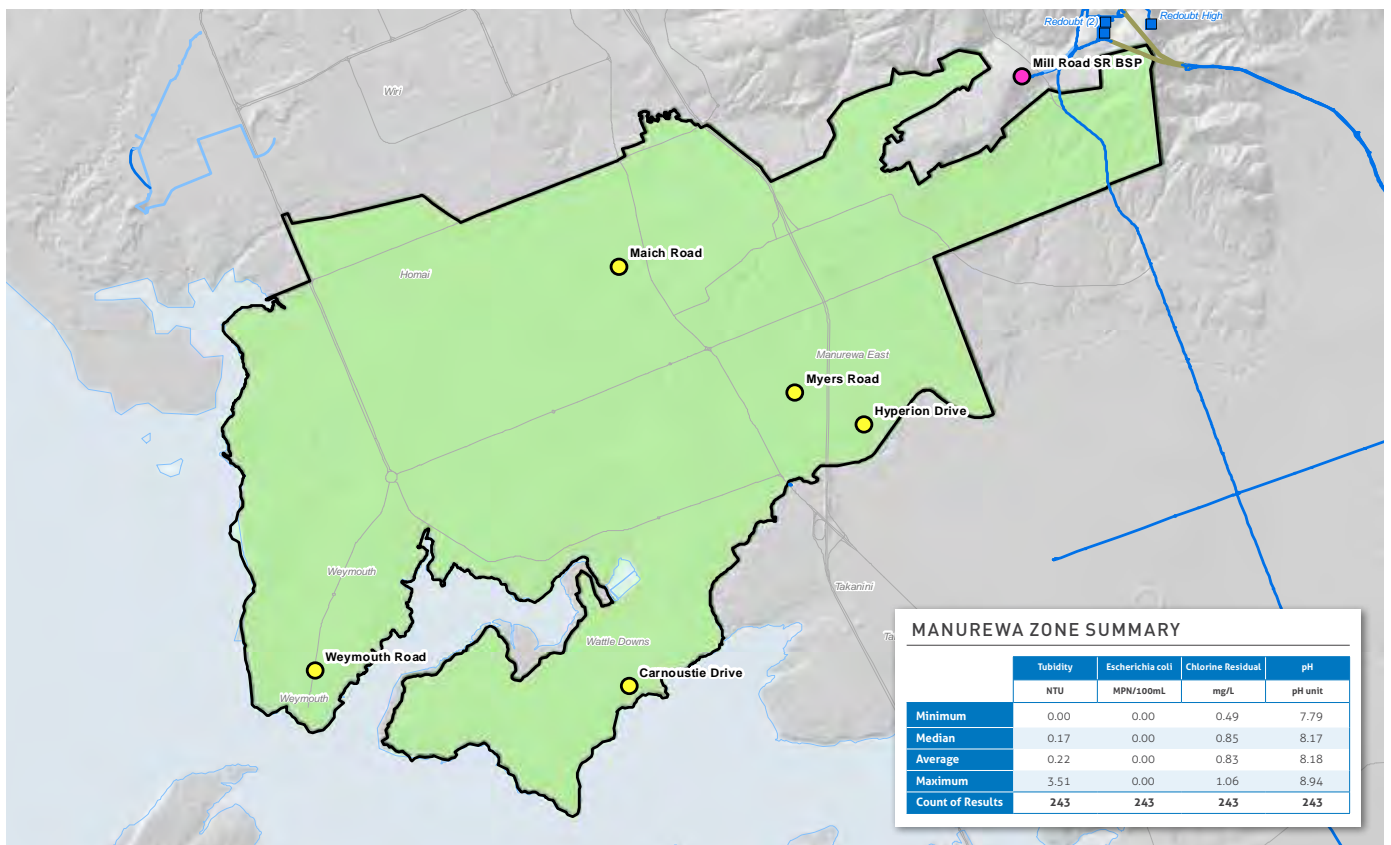
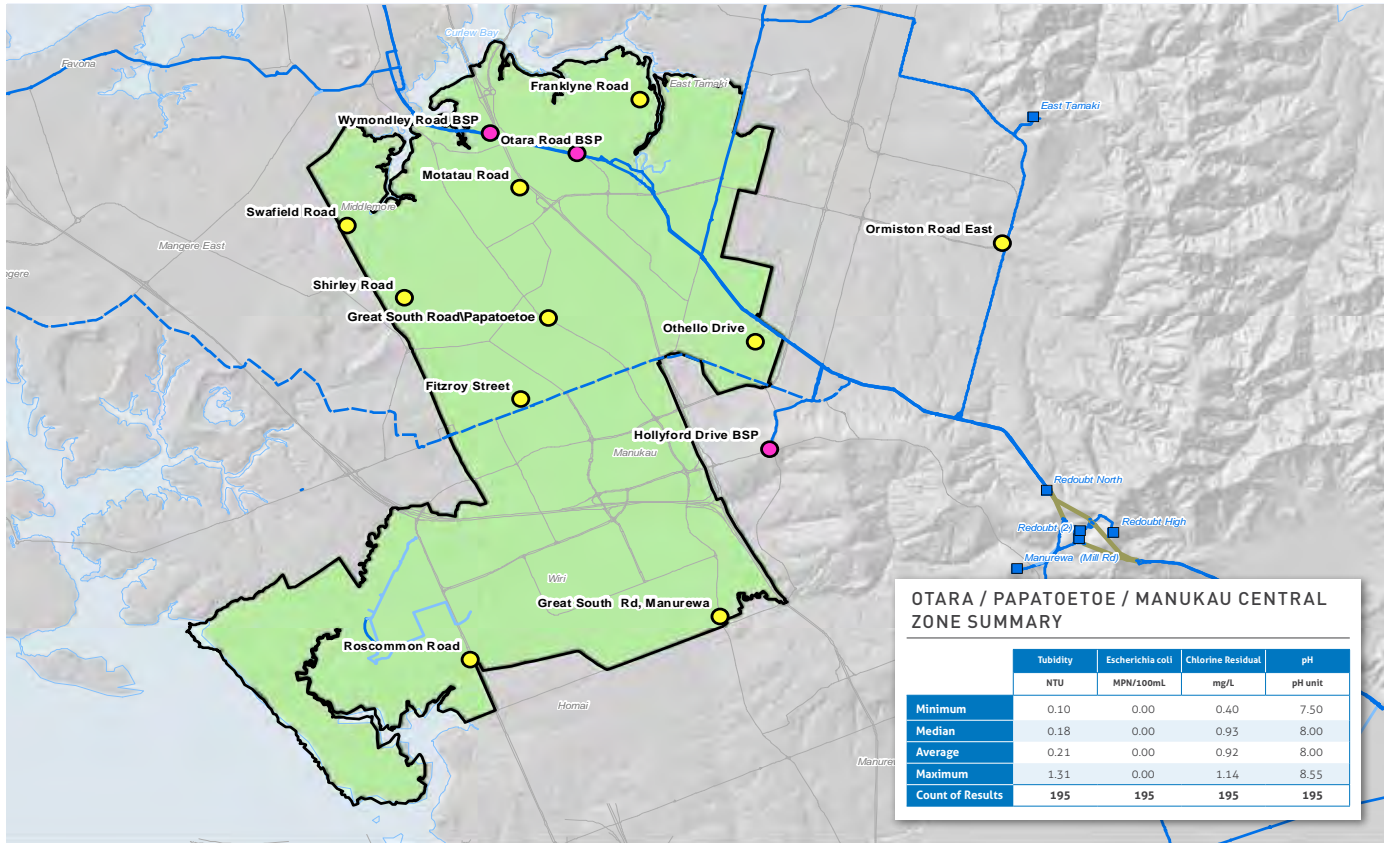


LEGEND

- Sample Taps ● Distribution
- Watermain — Treated Built
- Proposed - - -
- Reservoir ■
- Transmission ●
- Raw Built —
- Out of Service - - -
- Grading Zone ■
- Tunnel —



APPENDIX 3 Water quality in grading zones Southern Area

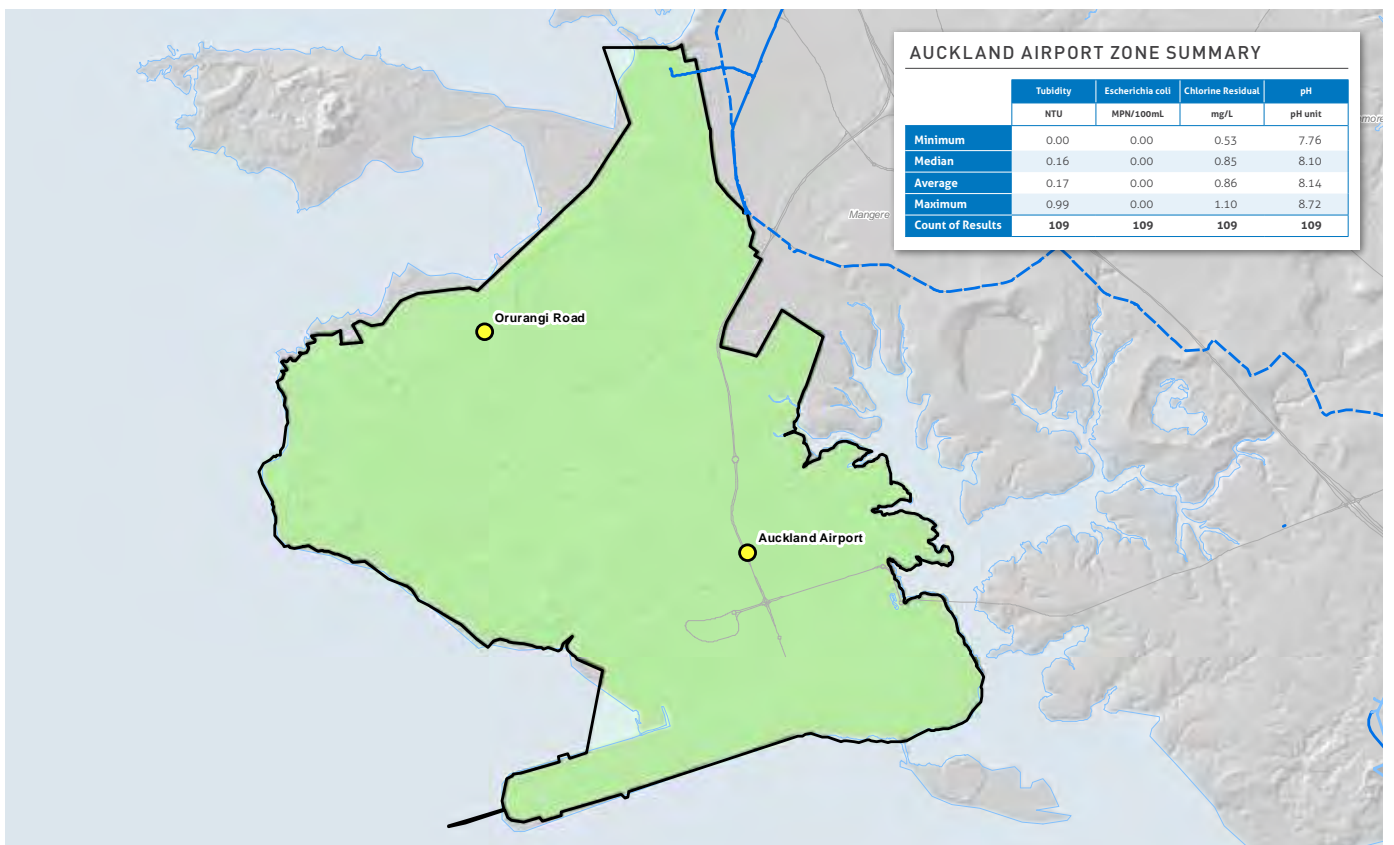
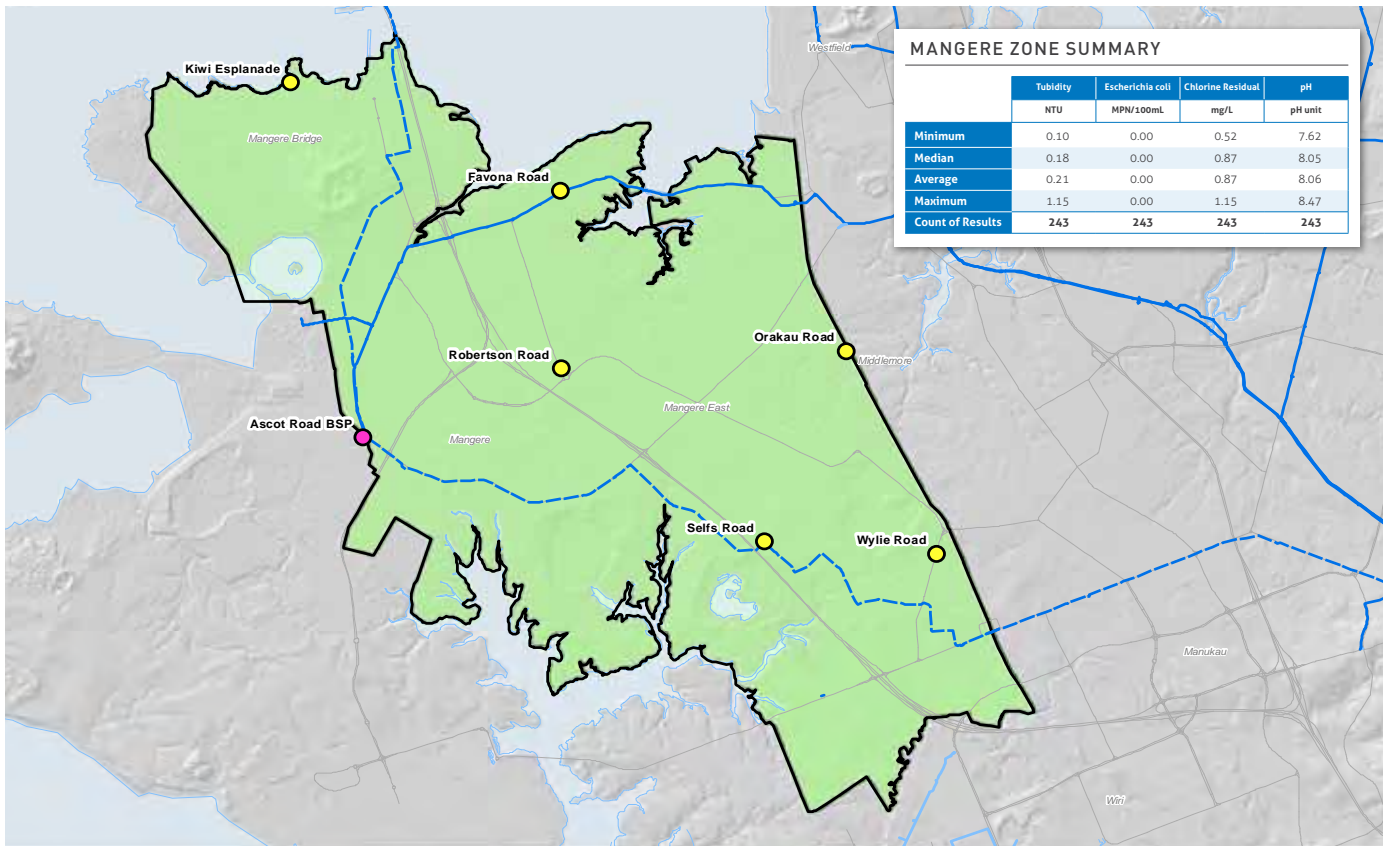


LEGEND

- Sample Taps ● Distribution
- Transmission
- Watermain — Treated Built
- Raw Built
- Proposed
- Out of Service
- Reservoir
- Grading Zone
- Tunnel



APPENDIX 3 Water quality in grading zones Southern Area



LEGEND

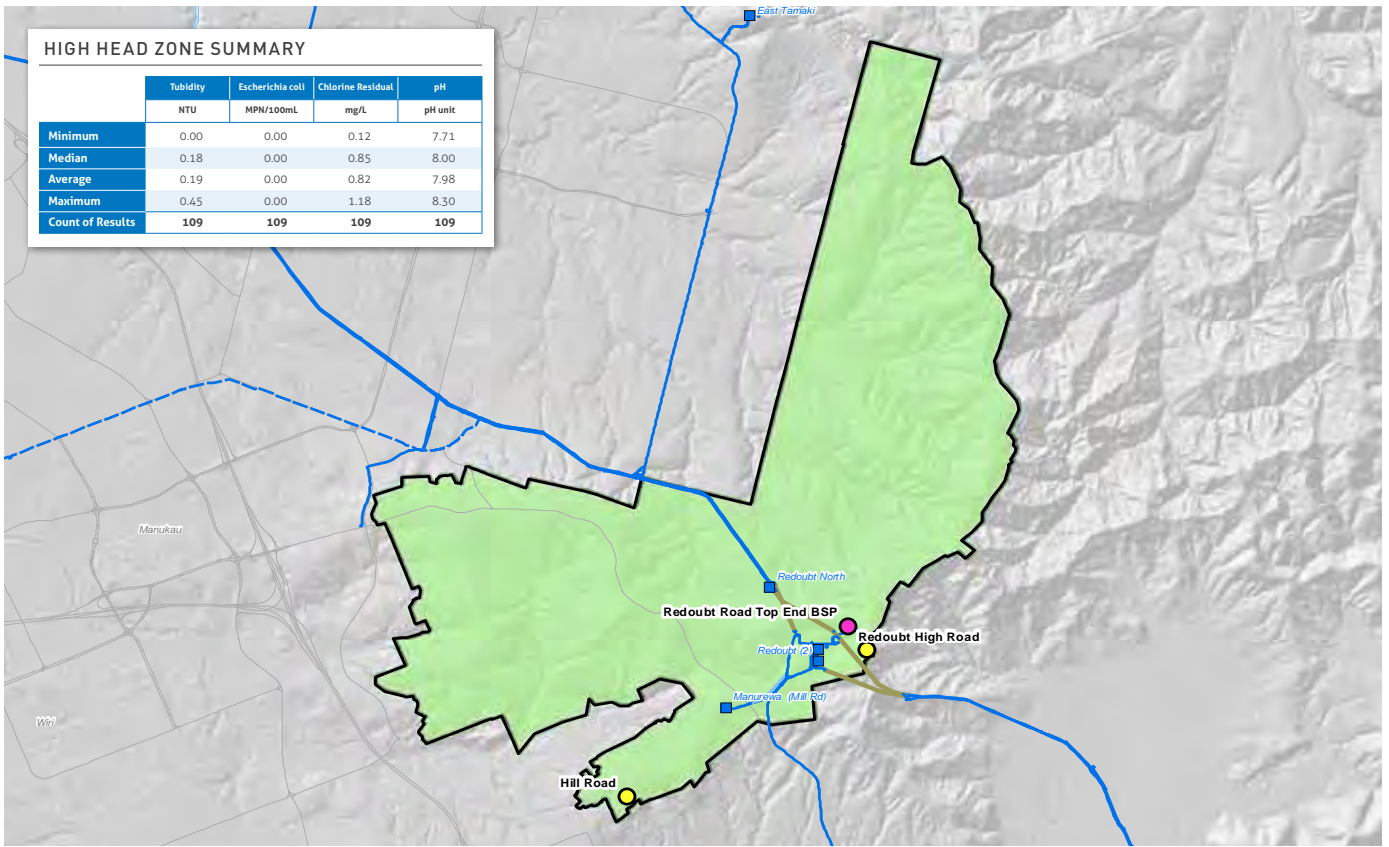
- Sample Taps
 - Distribution
 - Transmission
- Watermain
 - Treated Built
 - Raw Built
 - Proposed
 - Out of Service
 - Tunnel
- Reservoir
 - Grading Zone



APPENDIX 3 Water quality in grading zones Southern Area

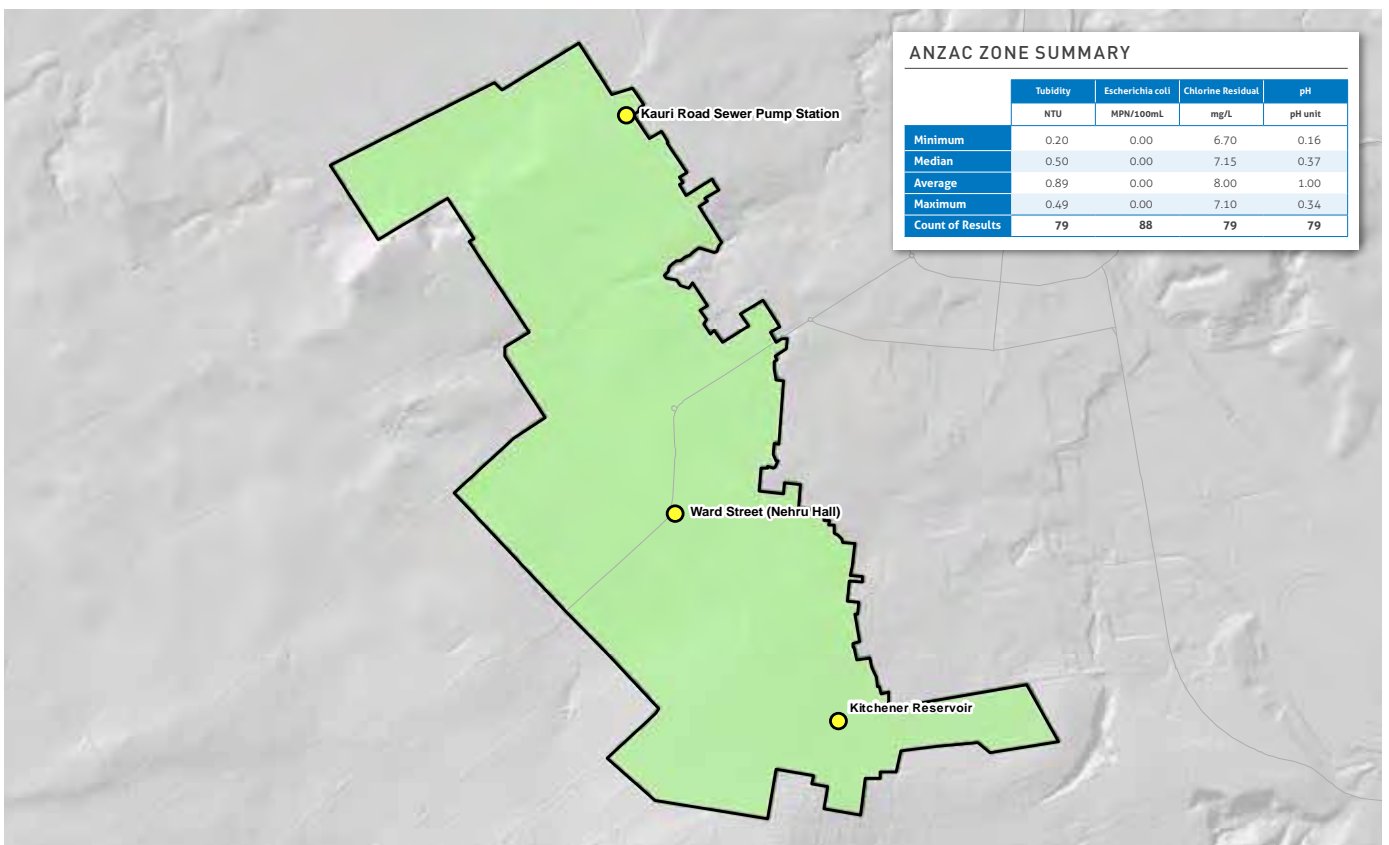
HIGH HEAD ZONE SUMMARY

	Turbidity	Escherichia coli	Chlorine Residual	pH
	NTU	MPN/100mL	mg/L	pH unit
Minimum	0.00	0.00	0.12	7.71
Median	0.18	0.00	0.85	8.00
Average	0.19	0.00	0.82	7.98
Maximum	0.45	0.00	1.18	8.30
Count of Results	109	109	109	109



ANZAC ZONE SUMMARY

	Turbidity	Escherichia coli	Chlorine Residual	pH
	NTU	MPN/100mL	mg/L	pH unit
Minimum	0.20	0.00	6.70	0.16
Median	0.50	0.00	7.15	0.37
Average	0.89	0.00	8.00	1.00
Maximum	0.49	0.00	7.10	0.34
Count of Results	79	88	79	79

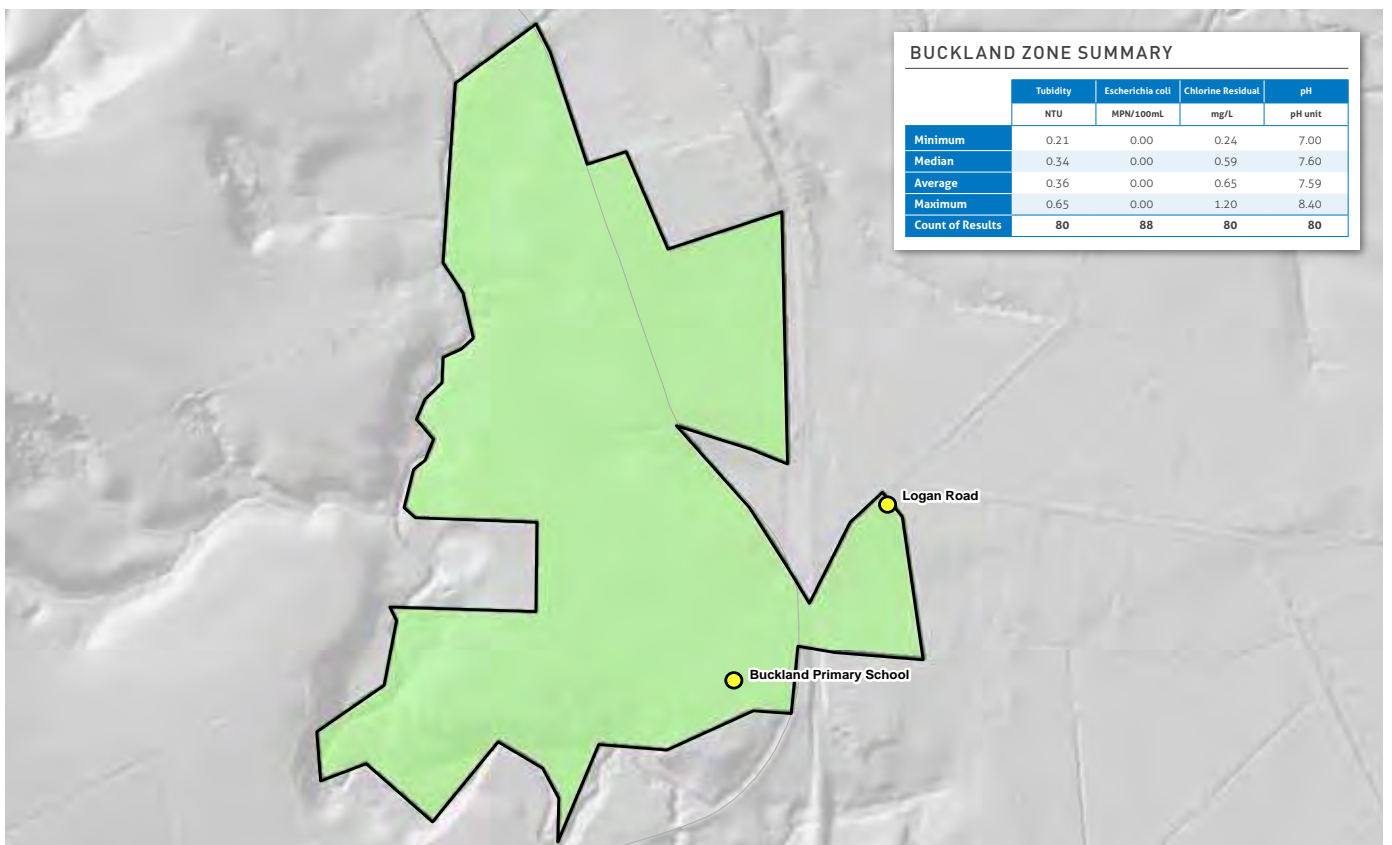
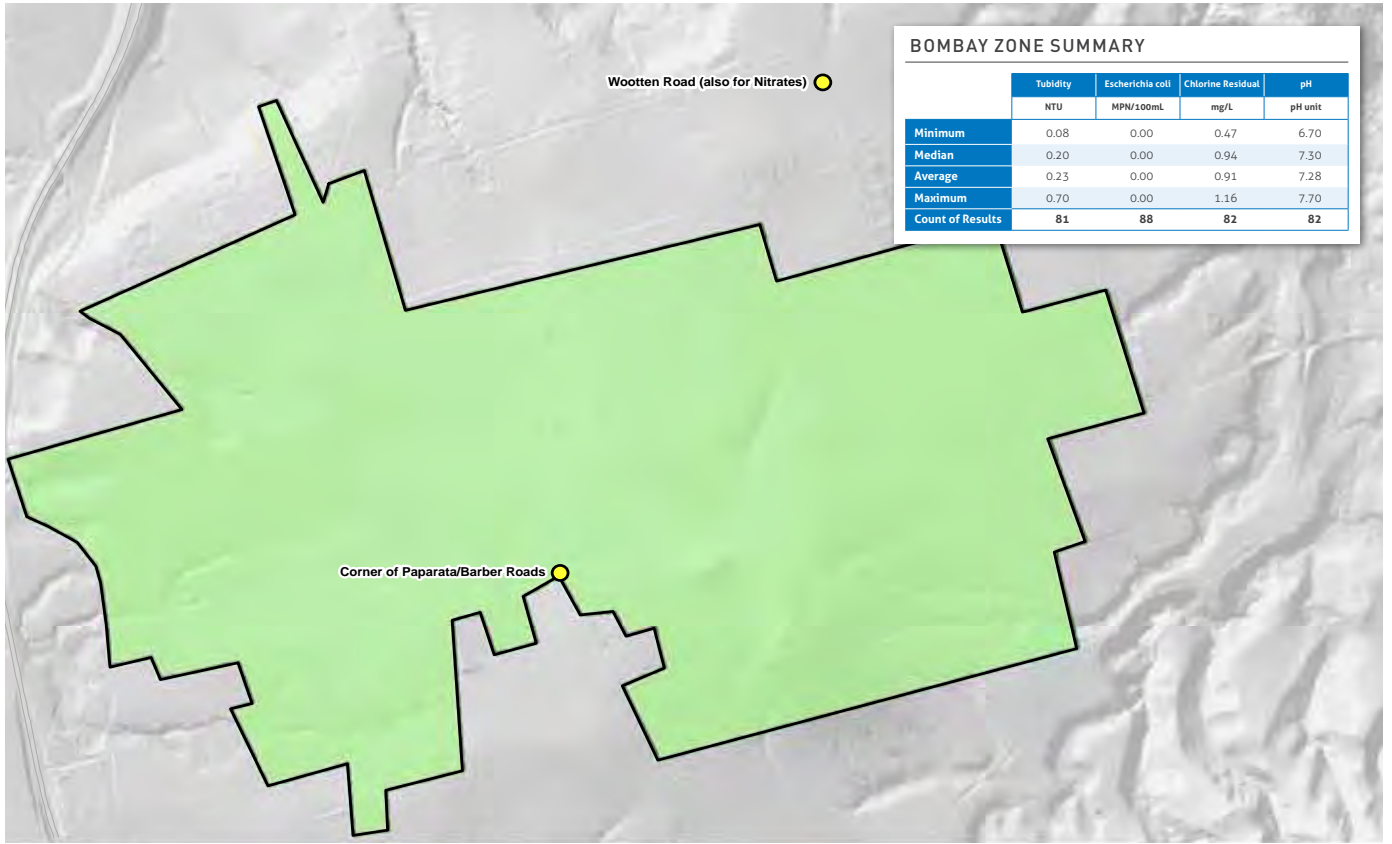


LEGEND

- Sample Taps
 - Distribution
 - Transmission
- Watermain
 - Treated Built
 - Raw Built
 - Proposed
 - Out of Service
 - Tunnel
- Reservoir
 - Reservoir
- Grading Zone
 - Grading Zone



APPENDIX 3 Water quality in grading zones Southern Area

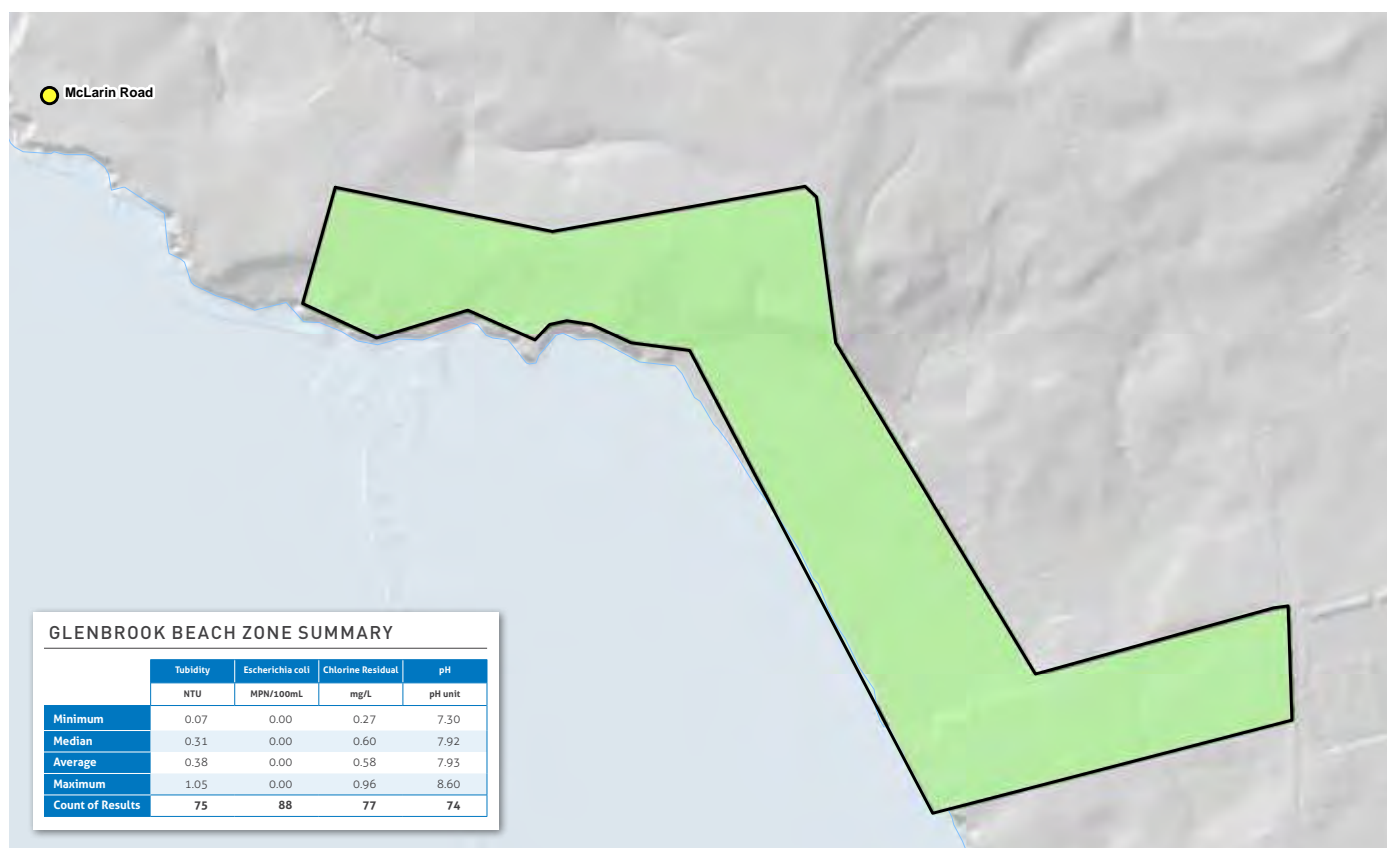
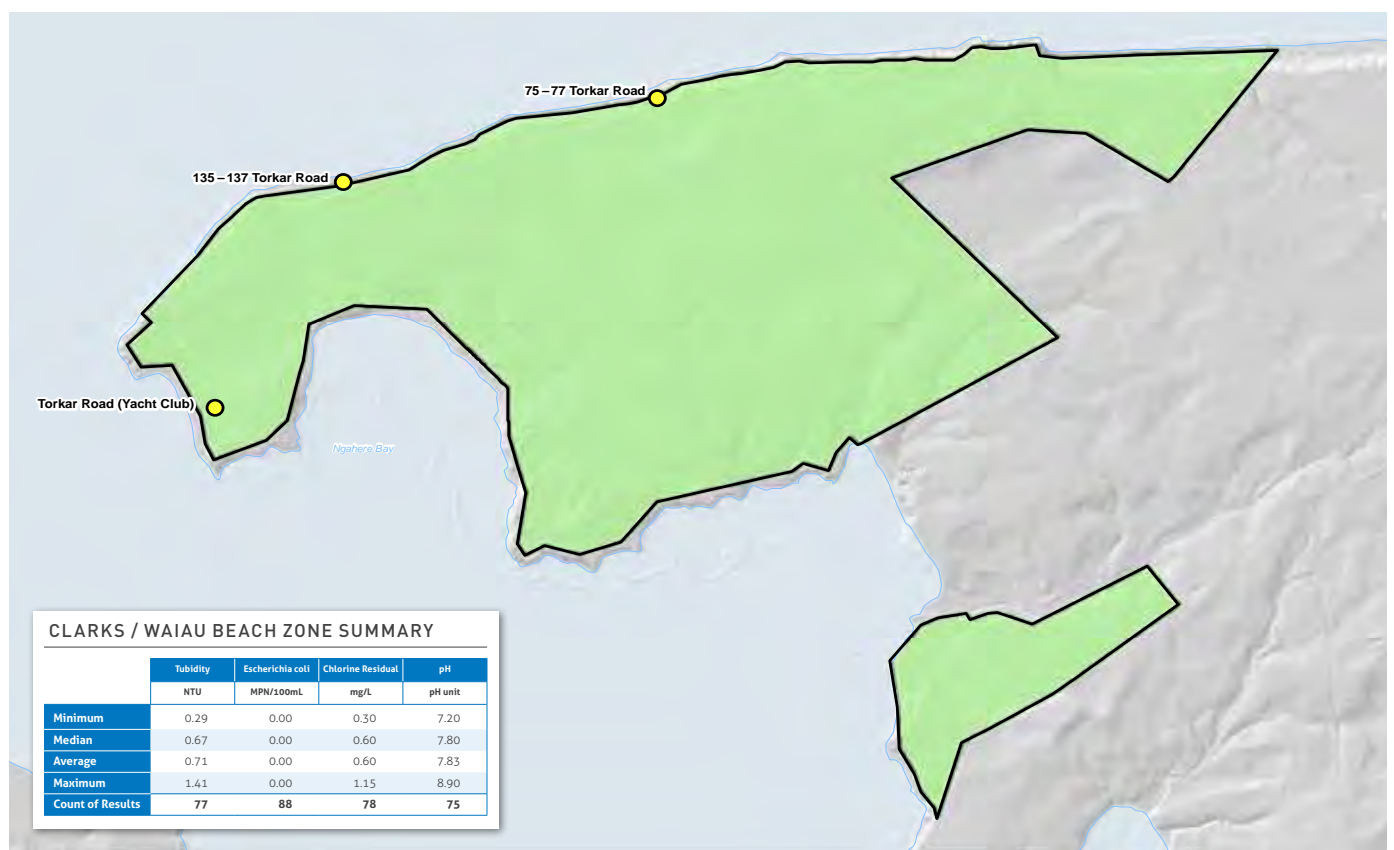


LEGEND

- Sample Taps
 - Distribution
 - Transmission
- Watermain
 - Treated Built
 - Raw Built
 - Proposed
 - Out of Service
 - Tunnel
- Reservoir
 - Grading Zone



APPENDIX 3 Water quality in grading zones Southern Area

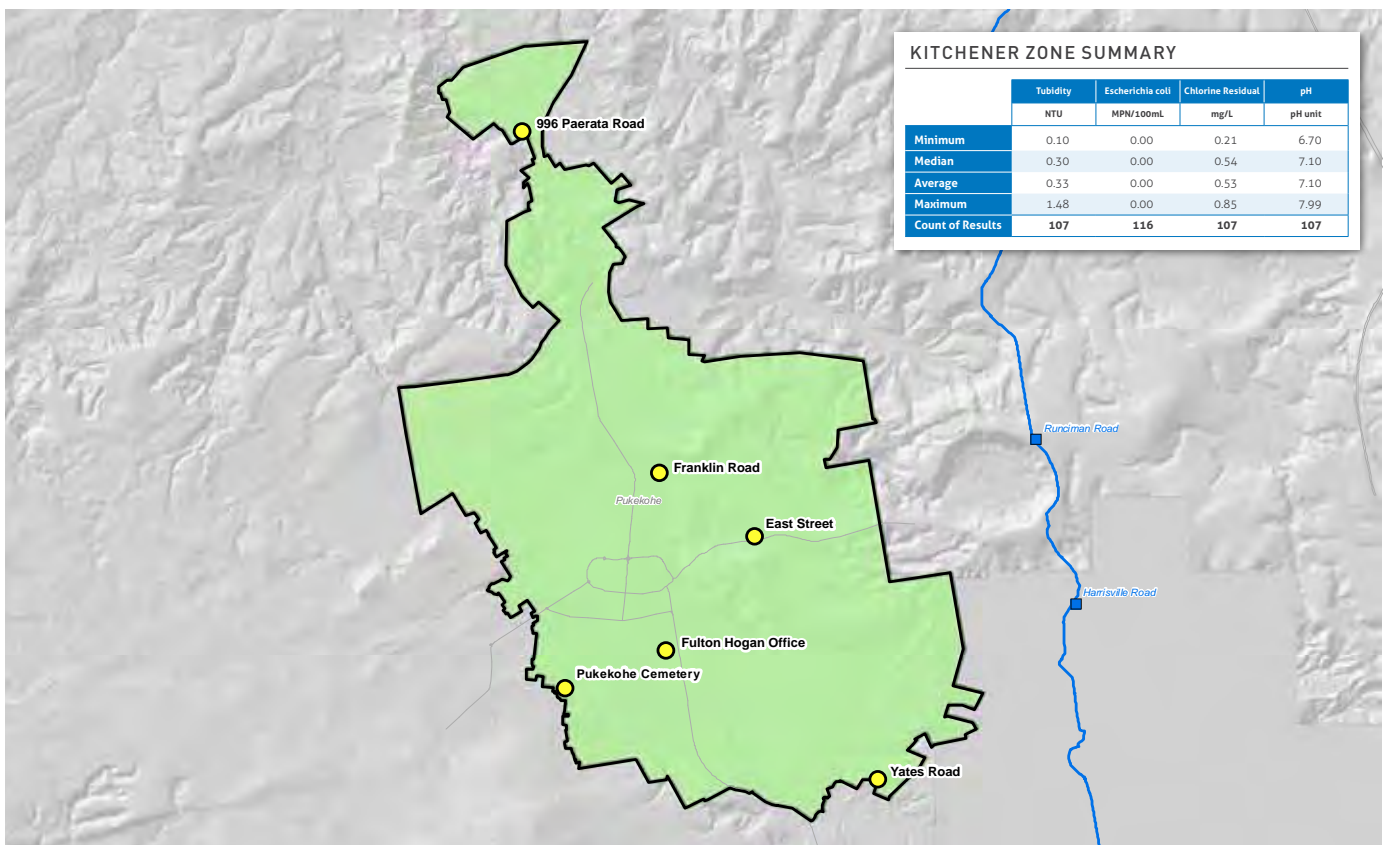
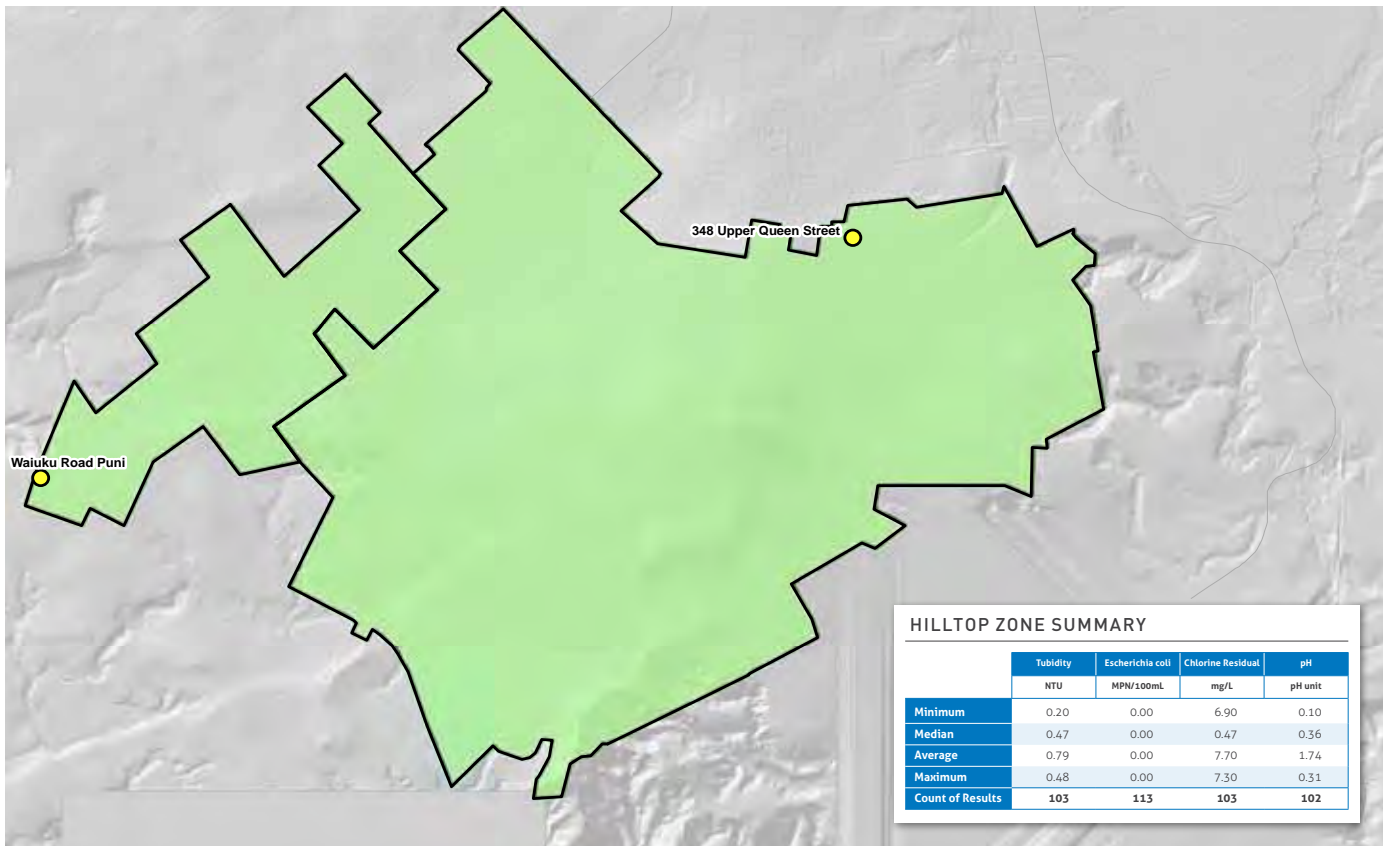


LEGEND

- Sample Taps
- Distribution
- Transmission
- Watermain
- Treated Built
- Raw Built
- Proposed
- Out of Service
- Tunnel
- Reservoir
- Grading Zone



APPENDIX 3 Water quality in grading zones Southern Area

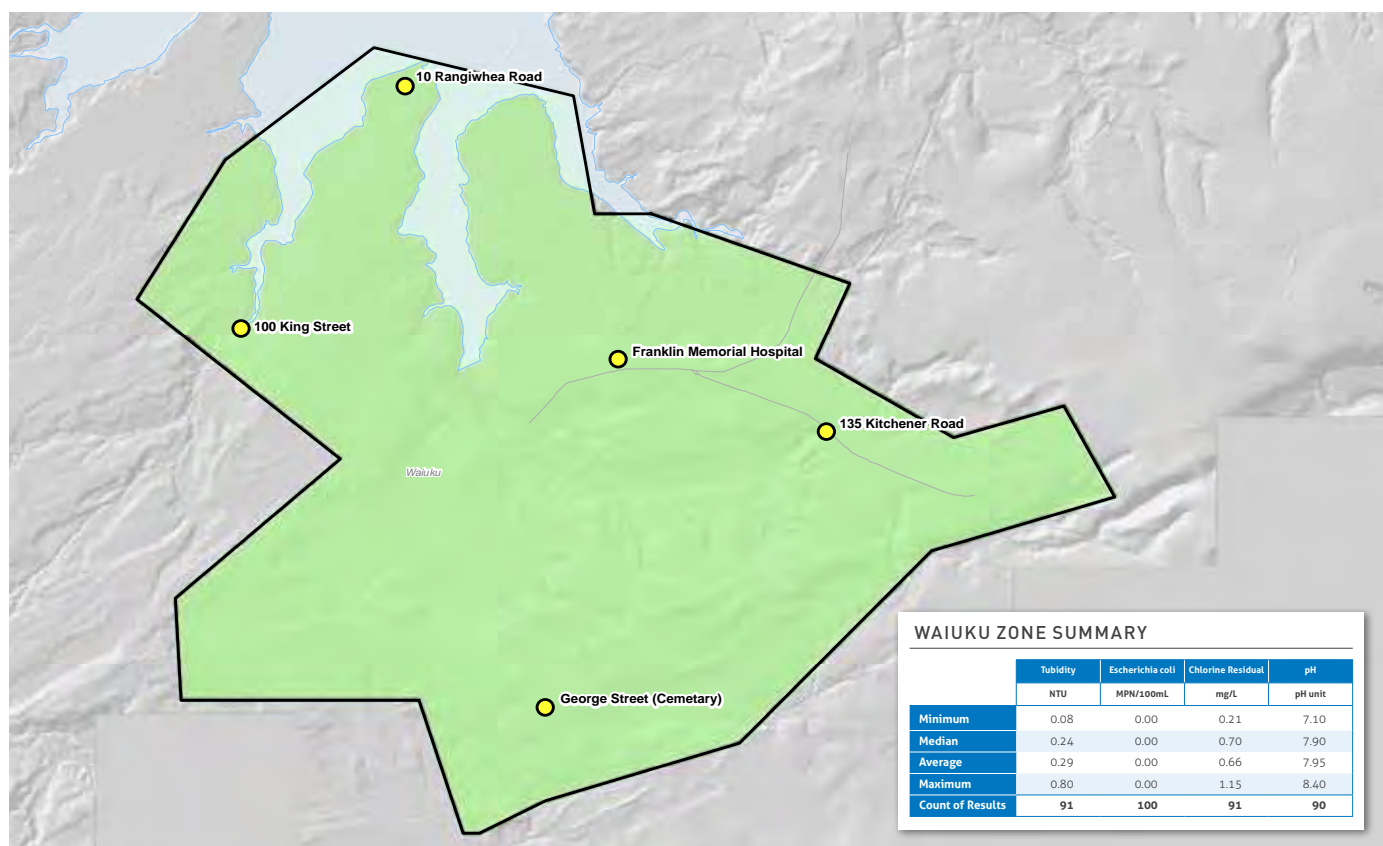
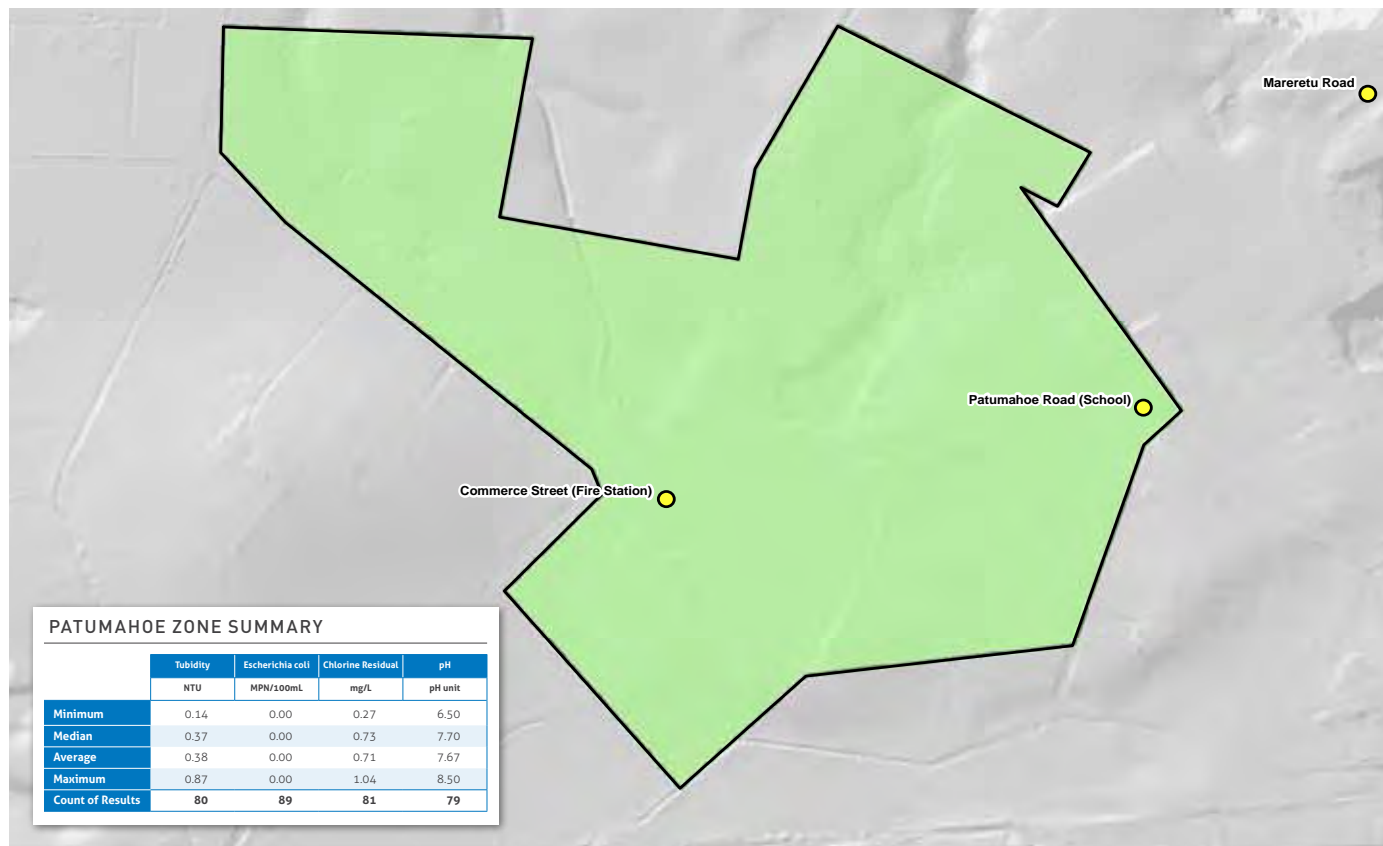


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APPENDIX 3 Water quality in grading zones Southern Area



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APPENDIX 4 Water quality at sources

WATER QUALITY AT SOURCES

Source	Total Algae Cells (cell/mL)				Cyanobacteria (cells/mL)			
	Number of Tests	Maximum	Minimum	Average	Number of Tests	Maximum	Minimum	Average
Cosseys	39	1,560	440	1,771	39	11,000	0	1,012
Wairoa	45	6,925	120	1,980	45	6,500	0	922
Mangatawhiri	35	15,484	300	2,200	35	15,144	0	1,004
Mangatangi	34	1,700	129	434	34	1,600	0	68
Waikato River	55	56,000	880	18,419	55	53,000	180	12,286
Hays Creek	34	1,300	43	509	34	350	0	22
Upper Huia	50	27,877	141	1,517	50	27,562	0	844
Lower Huia	44	2,200	162	842	44	1,800	0	155
Upper Nihotupu	34	280	76	625	34	217	0	11
Lower Nihotupu	51	7,600	180	1,436	51	271	0	33
Waitakere	34	1,200	87	543	34	210	0	15
Helensville	39	10,904	0	1,318	39	1,600	0	56
Mahurangi River	40	270	0	282	40	2,500	0	176
Hoteo River	40	3,500	0	177	40	3,100	0	103





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