# **Ammoniacal-Nitrogen (NH4-N)**

## **All reporting sites**

Final\_Rev1 Date: 2017-11-30





### Introduction

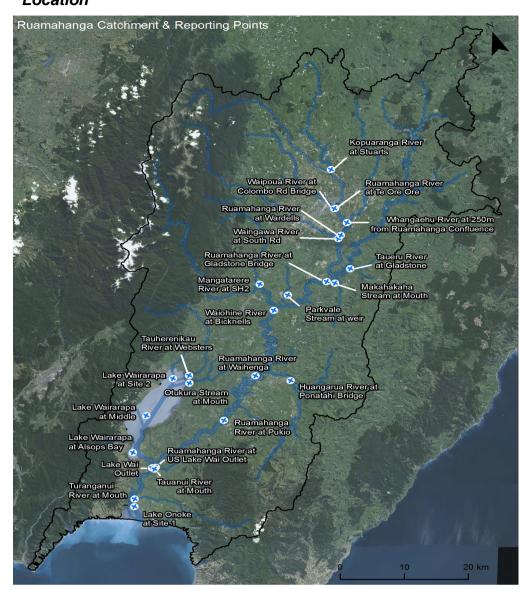
This fact sheet presents the summarised results for Ammoniacal-Nitrogen (NH4-N) generated from modelling nine scenarios for the Ruamahanga Catchment. The results are compared to the baseline model, with a focus on the change in concentrations in the median and 95th percentiles. In addition, NH4-N has concentration limits defined in the National Policy Statement for Freshwater Management 2014 (amended 2017). This sets out Attribute States (bands) based on the median and maximum annual concentrations, with the bands ranging from A (excellent) to D (below the national bottom line).

The mitigations that reduce nitrogen loads are applied to all nitrogen species equally (i.e. Nitrate-N and Ammoniacal-N). These mitigations include (but are not limited to) stock exclusion and dairy effluent management (tier 1), constructed wetlands and optimal fertiliser use (tier 2) and riparian planting/buffer strips (tier 3). The reductions are applied to the model input dry weather concentrations for each of the relevant landuses (sheep and beef, dairy, dairy support and arable farms), and range from ~3.8% for sheep and beef farms, 9.5% for arable and 23.9–25.7% for dairy/dairy support. In addition, retirement of land results in conversion to native bush input concentrations (i.e. from sheep and beef) and land treatment of waste water treatment plants (WWTP) reduces the treated volumes NH4-N load by ~73-77%. This occurs at five WWTP's within Ruamahanga, although only Greytown, Masterton, Carterton and Martinborough are captured in the results at the 20 reporting sites. Pole planting is considered to have no effect in reducing load of nitrogen species.

Within the Ruamahanga Catchment, NH4-N is generally considered 'healthy', with 19 of the 20 reporting sites simulating A or B bands in the baseline model. Only a single site (Mangatarere River at SH2) was modelled as a C band, which is primarily due to discharges from the Carterton WWTP. Mangaterere at SH2 and Waiohine at Bicknells both improve their attribute state (i.e. from C to B) through 2025 and 2040, however in all scenarios by 2080, the Carterton WWTP load has increased due to forecasted population growth which leads to a return back to the baseline attribute state, driven by the annual maximum concentrations. This is despite NH4-N 50th percentile and maximum annual concentrations decreasing at these sites by up to 45–60% in all scenarios. Mitigations applied in BAU, Gold and Silver scenarios results in one of the most downstream site (Ruamahanga River at Pukio) improving its attribute state from B to A. Overall, the most significant mitigation for reductions in NH4-N or the NPS attribute 'Ammonia Toxicity' is land treatment of point source discharges from WWTPs.

**Disclaimer:** This fact sheet should be read in conjunction with the report "IZ090000\_RP\_Rua\_Scenarios\_Ecological Health\_Rev1", which provides further details on the scenario modelling, mitigations, assumptions and limitations. The results presented are based off modelling outputs and may not be an exact match to the observed data, which is dependent on the flow and water quality calibration achieved at various modelling sites. On farm mitigations reduce input concentrations, and are applied to Event Mean Concentrations (EMC's) linked to quickflow, and Dry Weather Concentrations (DWC's) which are linked to baseflows.

### Location



# Scenario Results

### Table 1. National Objectives Framework Ammonia (toxicity) Attribute States

Site	Baseline	BAU 2025	BAU 2040	BAU 2080	SILVER 2025	SILVER 2040	SILVER 2080	GOLD 2025	GOLD 2040	GOLD 2080
Huangarua River at Ponatahi Bridge	Α	А	А	А	А	А	А	А	А	А
Kopuaranga River at Stuarts	Α	А	А	Α	А	А	А	А	А	А
Makahakaha Stream at Mouth	Α	А	А	Α	А	А	А	А	А	А
Mangatarere River at SH2	С	В	В	С	В	В	С	В	В	С
Otukura Stream at Mouth	В	В	В	В	В	В	В	В	В	В
Parkvale Stream at weir	В	В	В	В	В	В	В	В	В	В
Ruamahanga River at U/S Lake Wai Outlet	А	А	Α	А	А	А	А	А	А	А
Ruamahanga River at Pukio	В	А	Α	А	А	А	А	А	А	А
Ruamahanga River at Te Ore Ore	Α	А	А	А	А	А	А	А	А	А
Ruamahanga River at Gladstone Bridge	В	В	Α	А	А	А	А	А	А	А
Ruamahanga River at Waihenga	В	А	Α	А	А	А	А	А	А	А
Ruamahanga River at Wardells	В	В	В	В	В	В	В	В	В	В
Tauanui River at Mouth	А	А	Α	А	А	А	Α	А	А	А
Tauherenikau River at Websters	А	А	Α	А	А	А	А	А	А	А
Taueru River at Gladstone	А	А	Α	А	А	А	А	А	А	А
Turanganui River at Mouth	А	А	Α	А	А	А	А	А	А	А
Waingawa River at South Rd	А	А	А	А	А	А	А	А	А	А
Waiohine River at Bicknells	В	А	А	В	А	А	В	А	А	В
Waipoua River at Colombo Rd Bridge	А	А	А	А	А	А	А	А	А	А
Whangaehu River at 250m from Ruamahanga Confluence	В	В	В	В	В	В	В	В	В	В

Table 2. Concentrations (mg/L) and Percentage Reductions (%) from Baseline Modelling

Con-					DALLOOO	CILVED 2025	CILVED 2040	CIL VED 2000	COLD 2025	COLD 2040	COL D 2000
Site	NOF Statistic					SILVER 2025					
Huangarua River at Ponatahi Bridge	Median (mg/L)	0.0043	0.0042	0.0042	0.0042	0.0039	0.0037	0.0037	0.0037	0.0037	0.0037
	Median (% change from Baseline)		-1.7%	-1.9%	-1.9%	-9.6%	-14.3%	-14.3%	-14.3%	-14.3%	-14.3%
	Av. Daily Max (mg/L)	0.022	0.0219	0.0218	0.0218	0.0201	0.0193	0.0193	0.0193	0.0193	0.0193
	Av. Daily Max (% change from Baseline)		-0.5%	-1.0%	-1.0%	-8.9%	-0.1%	-12.4%	-12.4%	-12.4%	-12.4%
	Median (mg/L)	0.0124	0.0124	0.0124	0.0124	0.012	0.0113	0.0113	0.0113	0.0113	0.0113
Kopuaranga River at Stuarts	Median (% change from Baseline)		-0.0%	-0.0%	-0.0%	-3.2%	-9.0%	-9.0%	-9.0%	-9.0%	-9.0%
	Av. Daily Max (mg/L)	0.0468	0.0468	0.0468	0.0468	0.0459	0.044	0.044	0.044	0.044	0.044
	Av. Daily Max (% change from Baseline)		0.0%	0.0%	0.0%	-2.0%	-0.1%	-6.0%	-6.0%	-6.0%	-6.0%
	Median (mg/L)	0.0062	0.0062	0.0062	0.0062	0.006	0.0058	0.0058	0.0058	0.0058	0.0058
	Median (% change from Baseline)		-0.0%	-0.0%	-0.0%	-3.4%	-5.7%	-5.7%	-5.8%	-5.8%	-5.8%
Makahakaha Stream at Mouth	Av. Daily Max (mg/L)	0.0197	0.0197	0.0197	0.0197	0.0191	0.0186	0.0186	0.0186	0.0186	0.0186
		0.0107									
	Av. Daily Max (% change from Baseline)		-0.0%	-0.0%	-0.0%	-3.3%	-0.1%	-5.5%	-5.5%	-5.5%	-5.5%
	Median (mg/L)	0.0985	0.0436	0.0452	0.0545	0.0436	0.0409	0.0494	0.0395	0.0409	0.0494
	Median (% change from Baseline)		-55.7%	-54.2%	-44.7%	-55.7%	-58.5%	-49.9%	-59.9%	-58.5%	-49.9%
Mangatarere River at SH2	Av. Daily Max (mg/L)	0.8842	0.37	0.3823	0.458	0.37	0.3823	0.458	0.37	0.3823	0.458
	, , , ,	0.0042									
	Av. Daily Max (% change from Baseline)		-58.2%	-56.8%	-48.2%	-58.2%	-0.6%	-48.2%	-58.2%	-56.8%	-48.2%
	Median (mg/L)	0.001	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009
	Median (% change from Baseline)		-2.3%	-2.3%	-2.3%	-4.1%	-4.9%	-4.9%	-5.0%	-5.0%	-5.0%
Otukura Stream at Mouth		0.0974		0.0972	0.0972	0.0972		0.0972	0.0972	0.0972	
	Av. Daily Max (mg/L)	0.0974	0.0972				0.0972				0.0972
	Av. Daily Max (% change from Baseline)		-0.2%	-0.2%	-0.2%	-0.2%	-0.0%	-0.2%	-0.2%	-0.2%	-0.2%
	Median (mg/L)	0.0151	0.0156	0.0156	0.0156	0.0156	0.0155	0.0155	0.0155	0.0155	0.0155
	Median (% change from Baseline)		3.4%	3.4%	3.4%	3.2%	3.0%	3.0%	3.0%	3.0%	3.0%
Parkvale Stream at weir		0.05==									
	Av. Daily Max (mg/L)	0.3576	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36
	Av. Daily Max (% change from Baseline)		0.7%	0.7%	0.7%	0.7%	0.0%	0.7%	0.7%	0.7%	0.7%
	Median (mg/L)	0.0121	0.0095	0.0071	0.0075	0.0073	0.0069	0.0073	0.0068	0.0069	0.0073
	,	<del>                                     </del>	-21.6%	-41.4%	-37.4%	-39.3%	-43.2%	-39.1%	-43.8%	-43.2%	-39.1%
Ruamahanga River at U/S Lake Wai Outlet	Median (% change from Baseline)										
	Av. Daily Max (mg/L)	0.043	0.0401	0.036	0.0358	0.0369	0.0335	0.0336	0.0335	0.0335	0.0336
	Av. Daily Max (% change from Baseline)		-6.8%	-16.1%	-16.7%	-14.2%	-0.2%	-21.9%	-22.1%	-22.1%	-21.9%
	Median (mg/L)	0.0162	0.0128	0.0103	0.011	0.0108	0.0099	0.0106	0.0098	0.0099	0.0106
	. ,	3.3.02									
Ruamahanga River at Pukio	Median (% change from Baseline)		-20.7%	-36.2%	-32.2%	-33.3%	-38.6%	-34.8%	-39.3%	-38.6%	-34.8%
<u> </u>	Av. Daily Max (mg/L)	0.0652	0.0459	0.0363	0.0364	0.0378	0.0339	0.0342	0.0338	0.0339	0.0342
	Av. Daily Max (% change from Baseline)		-29.6%	-44.4%	-44.2%	-42.0%	-0.5%	-47.5%	-48.1%	-48.0%	-47.5%
	Median (mg/L)	0.0098	0.0098	0.0098	0.0097	0.0095	0.0092	0.0092	0.0092	0.0092	0.0092
Ruamahanga River at Te Ore Ore	, ,	0.0030									
	Median (% change from Baseline)		-0.0%	-0.0%	-0.9%	-2.7%	-6.2%	-6.2%	-6.2%	-6.2%	-6.2%
	Av. Daily Max (mg/L)	0.0382	0.0382	0.0382	0.038	0.0376	0.0367	0.0367	0.0367	0.0367	0.0367
	Av. Daily Max (% change from Baseline)		-0.0%	-0.0%	-0.5%	-1.5%	-0.0%	-3.8%	-3.8%	-3.8%	-3.8%
	, , ,	0.0400									
	Median (mg/L)	0.0123	0.0095	0.0084	0.0084	0.0083	0.008	0.008	0.008	0.008	0.008
Ruamahanga River at Gladstone Bridge	Median (% change from Baseline)		-22.7%	-31.9%	-31.5%	-32.8%	-35.3%	-34.6%	-35.3%	-35.3%	-34.6%
	Av. Daily Max (mg/L)	0.0887	0.0656	0.0459	0.0452	0.0479	0.0433	0.0438	0.0433	0.0433	0.0438
	Av. Daily Max (% change from Baseline)		-26.0%	-48.2%	-49.1%	-46.0%	-0.5%	-50.7%	-51.2%	-51.2%	-50.7%
	, , ,	0.0454									
Duranah ang Riyanat Waitan an	Median (mg/L)	0.0151	0.0119	0.0103	0.0109	0.0105	0.0099	0.0105	0.0098	0.0099	0.0105
	Median (% change from Baseline)		-21.4%	-32.0%	-27.7%	-30.9%	-34.7%	-30.6%	-35.3%	-34.7%	-30.6%
Ruamahanga River at Waihenga	Av. Daily Max (mg/L)	0.0645	0.0462	0.0366	0.0367	0.0378	0.0342	0.0345	0.0341	0.0342	0.0345
	Av. Daily Max (% change from Baseline)	0.00.0	-28.3%	-43.3%	-43.1%	-41.4%	-0.5%	-46.4%	-47.0%	-47.0%	-46.4%
	, , , , ,										
	Median (mg/L)	0.0169	0.0126	0.0105	0.0107	0.0105	0.01	0.0102	0.01	0.01	0.0102
	Median (% change from Baseline)		-25.2%	-37.7%	-36.8%	-37.8%	-40.5%	-39.4%	-40.5%	-40.5%	-39.4%
Ruamahanga River at Wardells	Av. Daily Max (mg/L)	0.1692	0.1087	0.0596	0.0596	0.0655	0.0564	0.0583	0.0564	0.0564	0.0583
		0.1002									
	Av. Daily Max (% change from Baseline)		-35.8%	-64.8%	-64.8%	-61.3%	-0.7%	-65.5%	-66.7%	-66.7%	-65.5%
	Median (mg/L)	0.006	0.0061	0.0061	0.0061	0.006	0.006	0.006	0.006	0.006	0.006
	Median (% change from Baseline)		0.6%	0.6%	0.6%	-0.1%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%
Tauanui River at Mouth		0.0426		0.0436							
	Av. Daily Max (mg/L)	0.0436	0.0436		0.0436	0.0435	0.0434	0.0434	0.0434	0.0434	0.0434
	Av. Daily Max (% change from Baseline)		0.1%	0.1%	0.1%	-0.1%	-0.0%	-0.5%	-0.5%	-0.5%	-0.5%
	Median (mg/L)	0.0037	0.0037	0.0037	0.0037	0.0037	0.0037	0.0037	0.0037	0.0037	0.0037
	Median (% change from Baseline)		1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%
Tauherenikau River at Websters	Av. Daily Max (mg/L)	0.0312	0.0312	0.0312	0.0312	0.0312	0.0312	0.0312	0.0312	0.0312	0.0312
	, , , ,	0.0312									
	Av. Daily Max (% change from Baseline)		0.2%	0.2%	0.2%	0.2%	0.0%	0.2%	0.2%	0.2%	0.2%
	Median (mg/L)	0.012	0.012	0.012	0.012	0.0116	0.0109	0.0109	0.0109	0.0109	0.0109
	Median (% change from Baseline)		-0.0%	-0.0%	-0.0%	-3.4%	-8.7%	-8.7%	-8.7%	-8.7%	-8.7%
Taueru River at Gladstone	Av. Daily Max (mg/L)	0.0355	0.0355	0.0355	0.0355	0.0345	0.0327	0.0327	0.0327	0.0327	0.0327
	, , , , ,	0.0335									
	Av. Daily Max (% change from Baseline)		-0.0%	-0.0%	-0.0%	-2.8%	-0.1%	-7.9%	-7.9%	-7.9%	-7.9%
								0.0088	0.0088	0.0088	0.0088
	Median (mg/L)	0.0092	0.0092	0.009	0.009	0.0088	0.0088	0.0000			
	Median (mg/L)	0.0092	-0.0%			0.0088 -4.1%	0.0088 -4.5%	-4.5%	-4.5%	-4.5%	-4.5%
Turanganui River at Mouth	Median (mg/L) Median (% change from Baseline)		-0.0%	-2.2%	-2.2%	-4.1%	-4.5%	-4.5%			
Turanganui River at Mouth	Median (mg/L) Median (% change from Baseline) Av. Daily Max (mg/L)	0.0092	-0.0% 0.0472	-2.2% 0.0462	-2.2% 0.0462	-4.1% 0.0454	-4.5% 0.0453	-4.5% 0.0453	0.0453	0.0453	0.0453
Turanganui River at Mouth	Median (mg/L) Median (% change from Baseline)		-0.0%	-2.2%	-2.2%	-4.1%	-4.5%	-4.5%			
Turanganui River at Mouth	Median (mg/L) Median (% change from Baseline) Av. Daily Max (mg/L)		-0.0% 0.0472	-2.2% 0.0462	-2.2% 0.0462	-4.1% 0.0454	-4.5% 0.0453	-4.5% 0.0453	0.0453	0.0453	0.0453
Turanganui River at Mouth	Median (mg/L) Median (% change from Baseline) Av. Daily Max (mg/L) Av. Daily Max (% change from Baseline) Median (mg/L)	0.0472	-0.0% 0.0472 -0.0% 0.0036	-2.2% 0.0462 -2.1% 0.0036	-2.2% 0.0462 -2.1% 0.0036	-4.1% 0.0454 -3.8% 0.0036	-4.5% 0.0453 -0.0% 0.0036	-4.5% 0.0453 -4.1% 0.0036	0.0453 -4.1% 0.0036	0.0453 -4.1% 0.0036	0.0453 -4.1% 0.0036
Turanganui River at Mouth  Waingawa River at South Rd	Median (mg/L) Median (% change from Baseline) Av. Daily Max (mg/L) Av. Daily Max (% change from Baseline) Median (mg/L) Median (% change from Baseline)	0.0472	-0.0% 0.0472 -0.0% 0.0036 0.2%	-2.2% 0.0462 -2.1% 0.0036 0.2%	-2.2% 0.0462 -2.1% 0.0036 -0.2%	-4.1% 0.0454 -3.8% 0.0036 -0.0%	-4.5% 0.0453 -0.0% 0.0036 -0.2%	-4.5% 0.0453 -4.1% 0.0036 -0.2%	0.0453 -4.1% 0.0036 -0.2%	0.0453 -4.1% 0.0036 -0.2%	0.0453 -4.1% 0.0036 -0.2%
	Median (mg/L) Median (% change from Baseline) Av. Daily Max (mg/L) Av. Daily Max (% change from Baseline) Median (mg/L) Median (% change from Baseline) Av. Daily Max (mg/L)	0.0472	-0.0% 0.0472 -0.0% 0.0036 0.2% 0.0273	-2.2% 0.0462 -2.1% 0.0036 0.2% 0.0273	-2.2% 0.0462 -2.1% 0.0036 -0.2% 0.0272	-4.1% 0.0454 -3.8% 0.0036 -0.0% 0.0272	-4.5% 0.0453 -0.0% 0.0036 -0.2% 0.0272	-4.5% 0.0453 -4.1% 0.0036 -0.2% 0.0272	0.0453 -4.1% 0.0036 -0.2% 0.0272	0.0453 -4.1% 0.0036 -0.2% 0.0272	0.0453 -4.1% 0.0036 -0.2% 0.0272
	Median (mg/L) Median (% change from Baseline) Av. Daily Max (mg/L) Av. Daily Max (% change from Baseline) Median (mg/L) Median (% change from Baseline)	0.0472	-0.0% 0.0472 -0.0% 0.0036 0.2%	-2.2% 0.0462 -2.1% 0.0036 0.2%	-2.2% 0.0462 -2.1% 0.0036 -0.2%	-4.1% 0.0454 -3.8% 0.0036 -0.0%	-4.5% 0.0453 -0.0% 0.0036 -0.2%	-4.5% 0.0453 -4.1% 0.0036 -0.2%	0.0453 -4.1% 0.0036 -0.2%	0.0453 -4.1% 0.0036 -0.2%	0.0453 -4.1% 0.0036 -0.2%
	Median (mg/L) Median (% change from Baseline) Av. Daily Max (mg/L) Av. Daily Max (% change from Baseline) Median (mg/L) Median (% change from Baseline) Av. Daily Max (mg/L)	0.0472	-0.0% 0.0472 -0.0% 0.0036 0.2% 0.0273	-2.2% 0.0462 -2.1% 0.0036 0.2% 0.0273	-2.2% 0.0462 -2.1% 0.0036 -0.2% 0.0272	-4.1% 0.0454 -3.8% 0.0036 -0.0% 0.0272	-4.5% 0.0453 -0.0% 0.0036 -0.2% 0.0272	-4.5% 0.0453 -4.1% 0.0036 -0.2% 0.0272	0.0453 -4.1% 0.0036 -0.2% 0.0272	0.0453 -4.1% 0.0036 -0.2% 0.0272	0.0453 -4.1% 0.0036 -0.2% 0.0272
	Median (mg/L) Median (% change from Baseline) Av. Daily Max (mg/L) Av. Daily Max (% change from Baseline) Median (mg/L) Median (% change from Baseline) Av. Daily Max (mg/L) Av. Daily Max (% change from Baseline) Median (mg/L)	0.0472 0.0036 0.0273	-0.0% 0.0472 -0.0% 0.0036 0.2% 0.0273 0.0% 0.0111	-2.2% 0.0462 -2.1% 0.0036 0.2% 0.0273 0.0% 0.0113	-2.2% 0.0462 -2.1% 0.0036 -0.2% 0.0272 -0.1% 0.0124	-4.1% 0.0454 -3.8% 0.0036 -0.0% 0.0272 -0.0% 0.0111	-4.5% 0.0453 -0.0% 0.0036 -0.2% 0.0272 -0.0% 0.0104	-4.5% 0.0453 -4.1% 0.0036 -0.2% 0.0272 -0.2% 0.0113	0.0453 -4.1% 0.0036 -0.2% 0.0272 -0.2% 0.0102	0.0453 -4.1% 0.0036 -0.2% 0.0272 -0.2% 0.0104	0.0453 -4.1% 0.0036 -0.2% 0.0272 -0.2% 0.0113
<u> </u>	Median (mg/L) Median (% change from Baseline) Av. Daily Max (mg/L) Av. Daily Max (% change from Baseline) Median (mg/L) Median (% change from Baseline) Av. Daily Max (mg/L) Av. Daily Max (% change from Baseline) Median (mg/L) Median (% change from Baseline)	0.0472 0.0036 0.0273	-0.0% 0.0472 -0.0% 0.0036 0.2% 0.0273 0.0% 0.0111 -28.1%	-2.2% 0.0462 -2.1% 0.0036 0.2% 0.0273 0.0% 0.0113 -26.8%	-2.2% 0.0462 -2.1% 0.0036 -0.2% 0.0272 -0.1% 0.0124 -19.2%	-4.1% 0.0454 -3.8% 0.0036 -0.0% 0.0272 -0.0% 0.0111 -28.1%	-4.5% 0.0453 -0.0% 0.0036 -0.2% 0.0272 -0.0% 0.0104 -32.5%	-4.5% 0.0453 -4.1% 0.0036 -0.2% 0.0272 -0.2% 0.0113 -26.4%	0.0453 -4.1% 0.0036 -0.2% 0.0272 -0.2% 0.0102 -33.6%	0.0453 -4.1% 0.0036 -0.2% 0.0272 -0.2% 0.0104 -32.5%	0.0453 -4.1% 0.0036 -0.2% 0.0272 -0.2% 0.0113 -26.4%
Waingawa River at South Rd	Median (mg/L) Median (% change from Baseline) Av. Daily Max (mg/L) Av. Daily Max (% change from Baseline) Median (mg/L) Median (% change from Baseline) Av. Daily Max (mg/L) Av. Daily Max (% change from Baseline) Median (mg/L) Median (mg/L) Median (% change from Baseline) Av. Daily Max (mg/L)	0.0472 0.0036 0.0273	-0.0% 0.0472 -0.0% 0.0036 0.2% 0.0273 0.0% 0.0111 -28.1% 0.0435	-2.2% 0.0462 -2.1% 0.0036 0.2% 0.0273 0.0% 0.0113 -26.8% 0.0448	-2.2% 0.0462 -2.1% 0.0036 -0.2% 0.0272 -0.1% 0.0124 -19.2% 0.0525	-4.1% 0.0454 -3.8% 0.0036 -0.0% 0.0272 -0.0% 0.0111 -28.1% 0.0435	-4.5% 0.0453 -0.0% 0.0036 -0.2% 0.0272 -0.0% 0.0104 -32.5% 0.0431	-4.5% 0.0453 -4.1% 0.0036 -0.2% 0.0272 -0.2% 0.0113 -26.4% 0.0501	0.0453 -4.1% 0.0036 -0.2% 0.0272 -0.2% 0.0102 -33.6% 0.042	0.0453 -4.1% 0.0036 -0.2% 0.0272 -0.2% 0.0104 -32.5% 0.0431	0.0453 -4.1% 0.0036 -0.2% 0.0272 -0.2% 0.0113 -26.4% 0.0501
Waingawa River at South Rd	Median (mg/L) Median (% change from Baseline) Av. Daily Max (mg/L) Av. Daily Max (% change from Baseline) Median (mg/L) Median (% change from Baseline) Av. Daily Max (mg/L) Av. Daily Max (% change from Baseline) Median (mg/L) Median (% change from Baseline)	0.0472 0.0036 0.0273	-0.0% 0.0472 -0.0% 0.0036 0.2% 0.0273 0.0% 0.0111 -28.1%	-2.2% 0.0462 -2.1% 0.0036 0.2% 0.0273 0.0% 0.0113 -26.8%	-2.2% 0.0462 -2.1% 0.0036 -0.2% 0.0272 -0.1% 0.0124 -19.2%	-4.1% 0.0454 -3.8% 0.0036 -0.0% 0.0272 -0.0% 0.0111 -28.1%	-4.5% 0.0453 -0.0% 0.0036 -0.2% 0.0272 -0.0% 0.0104 -32.5%	-4.5% 0.0453 -4.1% 0.0036 -0.2% 0.0272 -0.2% 0.0113 -26.4%	0.0453 -4.1% 0.0036 -0.2% 0.0272 -0.2% 0.0102 -33.6%	0.0453 -4.1% 0.0036 -0.2% 0.0272 -0.2% 0.0104 -32.5%	0.0453 -4.1% 0.0036 -0.2% 0.0272 -0.2% 0.0113 -26.4%
Waingawa River at South Rd	Median (mg/L) Median (% change from Baseline) Av. Daily Max (mg/L) Av. Daily Max (% change from Baseline) Median (mg/L) Median (% change from Baseline) Av. Daily Max (mg/L) Av. Daily Max (% change from Baseline) Median (mg/L) Median (% change from Baseline) Av. Daily Max (mg/L) Av. Daily Max (mg/L) Av. Daily Max (mg/L)	0.0472 0.0036 0.0273 0.0154	-0.0% 0.0472 -0.0% 0.0036 0.2% 0.0273 0.0% 0.0111 -28.1% 0.0435 -64.8%	-2.2% 0.0462 -2.1% 0.0036 0.2% 0.0273 0.0% 0.0113 -26.8% 0.0448 -63.8%	-2.2% 0.0462 -2.1% 0.0036 -0.2% 0.0272 -0.1% 0.0124 -19.2% 0.0525 -57.5%	-4.1% 0.0454 -3.8% 0.0036 -0.0% 0.0272 -0.0% 0.0111 -28.1% 0.0435 -64.8%	-4.5% 0.0453 -0.0% 0.0036 -0.2% 0.0272 -0.0% 0.0104 -32.5% 0.0431 -0.7%	-4.5% 0.0453 -4.1% 0.0036 -0.2% 0.0272 -0.2% 0.0113 -26.4% 0.0501 -59.5%	0.0453 -4.1% 0.0036 -0.2% 0.0272 -0.2% 0.0102 -33.6% 0.042 -66.1%	0.0453 -4.1% 0.0036 -0.2% 0.0272 -0.2% 0.0104 -32.5% 0.0431 -65.2%	0.0453 -4.1% 0.0036 -0.2% 0.0272 -0.2% 0.0113 -26.4% 0.0501 -59.5%
Waingawa River at South Rd	Median (mg/L) Median (% change from Baseline) Av. Daily Max (mg/L) Av. Daily Max (% change from Baseline) Median (mg/L) Median (% change from Baseline) Av. Daily Max (mg/L) Av. Daily Max (% change from Baseline) Median (mg/L) Median (% change from Baseline) Av. Daily Max (mg/L) Av. Daily Max (mg/L) Av. Daily Max (mg/L) Av. Daily Max (mg/L) Median (mg/L)	0.0472 0.0036 0.0273	-0.0% 0.0472 -0.0% 0.0036 0.2% 0.0273 0.0% 0.0111 -28.1% 0.0435 -64.8% 0.0053	-2.2% 0.0462 -2.1% 0.0036 0.2% 0.0273 0.0% 0.0113 -26.8% 0.0448 -63.8% 0.0053	-2.2% 0.0462 -2.1% 0.0036 -0.2% 0.0272 -0.1% 0.0124 -19.2% 0.0525 -57.5% 0.0053	-4.1%  0.0454  -3.8%  0.0036  -0.0%  0.0272  -0.0%  0.0111  -28.1%  0.0435  -64.8%  0.0051	-4.5% 0.0453 -0.0% 0.0036 -0.2% 0.0272 -0.0% 0.0104 -32.5% 0.0431 -0.7% 0.005	-4.5% 0.0453 -4.1% 0.0036 -0.2% 0.0272 -0.2% 0.0113 -26.4% 0.0501 -59.5% 0.005	0.0453 -4.1% 0.0036 -0.2% 0.0272 -0.2% 0.0102 -33.6% 0.042 -66.1% 0.005	0.0453 -4.1% 0.0036 -0.2% 0.0272 -0.2% 0.0104 -32.5% 0.0431 -65.2% 0.005	0.0453 -4.1% 0.0036 -0.2% 0.0272 -0.2% 0.0113 -26.4% 0.0501 -59.5% 0.005
Waingawa River at South Rd	Median (mg/L) Median (% change from Baseline) Av. Daily Max (mg/L) Av. Daily Max (% change from Baseline) Median (mg/L) Median (% change from Baseline) Av. Daily Max (mg/L) Av. Daily Max (% change from Baseline) Median (mg/L) Median (% change from Baseline) Av. Daily Max (mg/L) Av. Daily Max (mg/L) Av. Daily Max (mg/L) Av. Daily Max (% change from Baseline) Median (mg/L) Median (mg/L) Median (% change from Baseline)	0.0472 0.0036 0.0273 0.0154 0.1237	-0.0% 0.0472 -0.0% 0.0036 0.2% 0.0273 0.0% 0.0111 -28.1% 0.0435 -64.8% 0.0053 0.2%	-2.2% 0.0462 -2.1% 0.0036 0.2% 0.0273 0.0% 0.0113 -26.8% 0.0448 -63.8% 0.0053 0.2%	-2.2% 0.0462 -2.1% 0.0036 -0.2% 0.0272 -0.1% 0.0124 -19.2% 0.0525 -57.5% 0.0053	-4.1%  0.0454 -3.8%  0.0036 -0.0%  0.0272 -0.0%  0.0111 -28.1%  0.0435 -64.8%  0.0051 -3.9%	-4.5% 0.0453 -0.0% 0.0036 -0.2% 0.0272 -0.0% 0.0104 -32.5% 0.0431 -0.7% 0.005 -5.4%	-4.5% 0.0453 -4.1% 0.0036 -0.2% 0.0272 -0.2% 0.0113 -26.4% 0.0501 -59.5% 0.005 -5.4%	0.0453 -4.1% 0.0036 -0.2% 0.0272 -0.2% 0.0102 -33.6% 0.042 -66.1% 0.005 -5.4%	0.0453 -4.1% 0.0036 -0.2% 0.0272 -0.2% 0.0104 -32.5% 0.0431 -65.2% 0.005 -5.4%	0.0453 -4.1% 0.0036 -0.2% 0.0272 -0.2% 0.0113 -26.4% 0.0501 -59.5% 0.005 -5.4%
Waingawa River at South Rd  Waiohine River at Bicknells	Median (mg/L) Median (% change from Baseline) Av. Daily Max (mg/L) Av. Daily Max (% change from Baseline) Median (mg/L) Median (% change from Baseline) Av. Daily Max (mg/L) Av. Daily Max (% change from Baseline) Median (mg/L) Median (% change from Baseline) Av. Daily Max (mg/L) Av. Daily Max (mg/L) Av. Daily Max (mg/L) Av. Daily Max (mg/L) Median (mg/L)	0.0472 0.0036 0.0273 0.0154	-0.0% 0.0472 -0.0% 0.0036 0.2% 0.0273 0.0% 0.0111 -28.1% 0.0435 -64.8% 0.0053	-2.2% 0.0462 -2.1% 0.0036 0.2% 0.0273 0.0% 0.0113 -26.8% 0.0448 -63.8% 0.0053	-2.2% 0.0462 -2.1% 0.0036 -0.2% 0.0272 -0.1% 0.0124 -19.2% 0.0525 -57.5% 0.0053	-4.1%  0.0454  -3.8%  0.0036  -0.0%  0.0272  -0.0%  0.0111  -28.1%  0.0435  -64.8%  0.0051	-4.5% 0.0453 -0.0% 0.0036 -0.2% 0.0272 -0.0% 0.0104 -32.5% 0.0431 -0.7% 0.005	-4.5% 0.0453 -4.1% 0.0036 -0.2% 0.0272 -0.2% 0.0113 -26.4% 0.0501 -59.5% 0.005	0.0453 -4.1% 0.0036 -0.2% 0.0272 -0.2% 0.0102 -33.6% 0.042 -66.1% 0.005	0.0453 -4.1% 0.0036 -0.2% 0.0272 -0.2% 0.0104 -32.5% 0.0431 -65.2% 0.005	0.0453 -4.1% 0.0036 -0.2% 0.0272 -0.2% 0.0113 -26.4% 0.0501 -59.5% 0.005
Waingawa River at South Rd  Waiohine River at Bicknells	Median (mg/L) Median (% change from Baseline) Av. Daily Max (mg/L) Av. Daily Max (% change from Baseline) Median (mg/L) Median (% change from Baseline) Av. Daily Max (mg/L) Av. Daily Max (% change from Baseline) Median (mg/L) Median (% change from Baseline) Av. Daily Max (mg/L) Av. Daily Max (mg/L) Av. Daily Max (mg/L) Av. Daily Max (% change from Baseline) Median (mg/L) Median (mg/L) Median (% change from Baseline)	0.0472 0.0036 0.0273 0.0154 0.1237	-0.0% 0.0472 -0.0% 0.0036 0.2% 0.0273 0.0% 0.0111 -28.1% 0.0435 -64.8% 0.0053 0.2%	-2.2% 0.0462 -2.1% 0.0036 0.2% 0.0273 0.0% 0.0113 -26.8% 0.0448 -63.8% 0.0053 0.2%	-2.2% 0.0462 -2.1% 0.0036 -0.2% 0.0272 -0.1% 0.0124 -19.2% 0.0525 -57.5% 0.0053	-4.1%  0.0454 -3.8%  0.0036 -0.0%  0.0272 -0.0%  0.0111 -28.1%  0.0435 -64.8%  0.0051 -3.9%	-4.5% 0.0453 -0.0% 0.0036 -0.2% 0.0272 -0.0% 0.0104 -32.5% 0.0431 -0.7% 0.005 -5.4%	-4.5% 0.0453 -4.1% 0.0036 -0.2% 0.0272 -0.2% 0.0113 -26.4% 0.0501 -59.5% 0.005 -5.4%	0.0453 -4.1% 0.0036 -0.2% 0.0272 -0.2% 0.0102 -33.6% 0.042 -66.1% 0.005 -5.4%	0.0453 -4.1% 0.0036 -0.2% 0.0272 -0.2% 0.0104 -32.5% 0.0431 -65.2% 0.005 -5.4%	0.0453 -4.1% 0.0036 -0.2% 0.0272 -0.2% 0.0113 -26.4% 0.0501 -59.5% 0.005 -5.4%
Waingawa River at South Rd  Waiohine River at Bicknells	Median (mg/L) Median (% change from Baseline) Av. Daily Max (mg/L) Av. Daily Max (% change from Baseline) Median (mg/L) Median (% change from Baseline) Av. Daily Max (mg/L) Av. Daily Max (% change from Baseline) Median (mg/L) Median (% change from Baseline) Av. Daily Max (mg/L) Av. Daily Max (mg/L) Av. Daily Max (% change from Baseline) Median (mg/L) Median (mg/L) Median (% change from Baseline) Av. Daily Max (mg/L) Av. Daily Max (mg/L) Av. Daily Max (mg/L)	0.0472 0.0036 0.0273 0.0154 0.1237 0.0053	-0.0% 0.0472 -0.0% 0.0036 0.2% 0.0273 0.0% 0.0111 -28.1% 0.0435 -64.8% 0.0053 0.2% 0.0352 0.1%	-2.2% 0.0462 -2.1% 0.0036 0.2% 0.0273 0.0% 0.0113 -26.8% 0.0448 -63.8% 0.0053 0.2% 0.0352 0.1%	-2.2% 0.0462 -2.1% 0.0036 -0.2% 0.0272 -0.1% 0.0124 -19.2% 0.0525 -57.5% 0.0053 -1.1% 0.0349 -0.9%	-4.1% 0.0454 -3.8% 0.0036 -0.0% 0.0272 -0.0% 0.0111 -28.1% 0.0435 -64.8% 0.0051 -3.9% 0.0343 -2.6%	-4.5% 0.0453 -0.0% 0.0036 -0.2% 0.0272 -0.0% 0.0104 -32.5% 0.0431 -0.7% 0.005 -5.4% 0.034 -0.0%	-4.5% 0.0453 -4.1% 0.0036 -0.2% 0.0272 -0.2% 0.0113 -26.4% 0.0501 -59.5% 0.005 -5.4% 0.034 -3.5%	0.0453 -4.1% 0.0036 -0.2% 0.0272 -0.2% 0.0102 -33.6% 0.042 -66.1% 0.005 -5.4% 0.034 -3.5%	0.0453 -4.1% 0.0036 -0.2% 0.0272 -0.2% 0.0104 -32.5% 0.0431 -65.2% 0.005 -5.4% 0.034 -3.5%	0.0453 -4.1% 0.0036 -0.2% 0.0272 -0.2% 0.0113 -26.4% 0.0501 -59.5% 0.005 -5.4% 0.034 -3.5%
Waingawa River at South Rd  Waiohine River at Bicknells	Median (mg/L) Median (% change from Baseline) Av. Daily Max (mg/L) Av. Daily Max (% change from Baseline) Median (mg/L) Median (% change from Baseline) Av. Daily Max (mg/L) Av. Daily Max (% change from Baseline) Median (mg/L) Median (% change from Baseline) Av. Daily Max (mg/L) Av. Daily Max (mg/L) Av. Daily Max (% change from Baseline) Median (mg/L) Median (mg/L) Median (% change from Baseline) Av. Daily Max (mg/L) Av. Daily Max (mg/L) Av. Daily Max (mg/L) Av. Daily Max (% change from Baseline) Median (mg/L)	0.0472 0.0036 0.0273 0.0154 0.1237	-0.0% 0.0472 -0.0% 0.0036 0.2% 0.0273 0.0% 0.0111 -28.1% 0.0435 -64.8% 0.0053 0.2% 0.0352 0.1% 0.0044	-2.2% 0.0462 -2.1% 0.0036 0.2% 0.0273 0.0% 0.0113 -26.8% 0.0448 -63.8% 0.0053 0.2% 0.0352 0.1% 0.0044	-2.2% 0.0462 -2.1% 0.0036 -0.2% 0.0272 -0.1% 0.0124 -19.2% 0.0525 -57.5% 0.0053 -1.1% 0.0349 -0.9% 0.0044	-4.1%  0.0454 -3.8%  0.0036 -0.0%  0.0272 -0.0%  0.0111 -28.1%  0.0435 -64.8%  0.0051 -3.9%  0.0343 -2.6%  0.0042	-4.5% 0.0453 -0.0% 0.0036 -0.2% 0.0272 -0.0% 0.0104 -32.5% 0.0431 -0.7% 0.005 -5.4% 0.034 -0.0% 0.004	-4.5% 0.0453 -4.1% 0.0036 -0.2% 0.0272 -0.2% 0.0113 -26.4% 0.0501 -59.5% 0.005 -5.4% 0.034 -3.5% 0.004	0.0453 -4.1% 0.0036 -0.2% 0.0272 -0.2% 0.0102 -33.6% 0.042 -66.1% 0.005 -5.4% 0.034 -3.5% 0.004	0.0453 -4.1% 0.0036 -0.2% 0.0272 -0.2% 0.0104 -32.5% 0.0431 -65.2% 0.005 -5.4% 0.034 -3.5% 0.004	0.0453 -4.1% 0.0036 -0.2% 0.0272 -0.2% 0.0113 -26.4% 0.0501 -59.5% 0.005 -5.4% 0.034 -3.5% 0.004
Waingawa River at South Rd  Waiohine River at Bicknells  Waipoua River at Colombo Rd Bridge	Median (mg/L) Median (% change from Baseline) Av. Daily Max (mg/L) Av. Daily Max (% change from Baseline) Median (mg/L) Median (% change from Baseline) Av. Daily Max (mg/L) Av. Daily Max (% change from Baseline) Median (mg/L) Median (% change from Baseline) Av. Daily Max (mg/L) Av. Daily Max (mg/L) Av. Daily Max (% change from Baseline) Median (mg/L) Median (mg/L) Median (% change from Baseline) Av. Daily Max (mg/L) Av. Daily Max (mg/L) Av. Daily Max (% change from Baseline) Median (mg/L) Median (mg/L) Median (mg/L) Median (% change from Baseline)	0.0472 0.0036 0.0273 0.0154 0.1237 0.0053 0.0352	-0.0% 0.0472 -0.0% 0.0036 0.2% 0.0273 0.0% 0.0111 -28.1% 0.0435 -64.8% 0.0053 0.2% 0.0352 0.1% 0.0044 1.3%	-2.2% 0.0462 -2.1% 0.0036 0.2% 0.0273 0.0% 0.0113 -26.8% 0.0448 -63.8% 0.0053 0.2% 0.0352 0.1% 0.0044 1.3%	-2.2% 0.0462 -2.1% 0.0036 -0.2% 0.0272 -0.1% 0.0124 -19.2% 0.0525 -57.5% 0.0053 -1.1% 0.0349 -0.9% 0.0044 1.3%	-4.1%  0.0454 -3.8%  0.0036 -0.0%  0.0272 -0.0%  0.0111 -28.1%  0.0435 -64.8%  0.0051 -3.9%  0.0343 -2.6%  0.0042 -3.7%	-4.5% 0.0453 -0.0% 0.0036 -0.2% 0.0272 -0.0% 0.0104 -32.5% 0.0431 -0.7% 0.005 -5.4% 0.034 -0.0% 0.004 -8.2%	-4.5% 0.0453 -4.1% 0.0036 -0.2% 0.0272 -0.2% 0.0113 -26.4% 0.0501 -59.5% 0.005 -5.4% 0.034 -3.5% 0.004	0.0453 -4.1% 0.0036 -0.2% 0.0272 -0.2% 0.0102 -33.6% 0.042 -66.1% 0.005 -5.4% 0.034 -3.5% 0.004 -8.2%	0.0453 -4.1% 0.0036 -0.2% 0.0272 -0.2% 0.0104 -32.5% 0.0431 -65.2% 0.005 -5.4% 0.034 -3.5% 0.004 -8.2%	0.0453 -4.1% 0.0036 -0.2% 0.0272 -0.2% 0.0113 -26.4% 0.0501 -59.5% 0.005 -5.4% 0.034 -3.5% 0.004 -8.2%
Waingawa River at South Rd  Waiohine River at Bicknells	Median (mg/L) Median (% change from Baseline) Av. Daily Max (mg/L) Av. Daily Max (% change from Baseline) Median (mg/L) Median (% change from Baseline) Av. Daily Max (mg/L) Av. Daily Max (% change from Baseline) Median (mg/L) Median (% change from Baseline) Av. Daily Max (mg/L) Av. Daily Max (mg/L) Av. Daily Max (% change from Baseline) Median (mg/L) Median (mg/L) Median (% change from Baseline) Av. Daily Max (mg/L) Av. Daily Max (mg/L) Av. Daily Max (mg/L) Av. Daily Max (% change from Baseline) Median (mg/L)	0.0472 0.0036 0.0273 0.0154 0.1237 0.0053	-0.0% 0.0472 -0.0% 0.0036 0.2% 0.0273 0.0% 0.0111 -28.1% 0.0435 -64.8% 0.0053 0.2% 0.0352 0.1% 0.0044	-2.2% 0.0462 -2.1% 0.0036 0.2% 0.0273 0.0% 0.0113 -26.8% 0.0448 -63.8% 0.0053 0.2% 0.0352 0.1% 0.0044	-2.2% 0.0462 -2.1% 0.0036 -0.2% 0.0272 -0.1% 0.0124 -19.2% 0.0525 -57.5% 0.0053 -1.1% 0.0349 -0.9% 0.0044	-4.1%  0.0454 -3.8%  0.0036 -0.0%  0.0272 -0.0%  0.0111 -28.1%  0.0435 -64.8%  0.0051 -3.9%  0.0343 -2.6%  0.0042	-4.5% 0.0453 -0.0% 0.0036 -0.2% 0.0272 -0.0% 0.0104 -32.5% 0.0431 -0.7% 0.005 -5.4% 0.034 -0.0% 0.004	-4.5% 0.0453 -4.1% 0.0036 -0.2% 0.0272 -0.2% 0.0113 -26.4% 0.0501 -59.5% 0.005 -5.4% 0.034 -3.5% 0.004	0.0453 -4.1% 0.0036 -0.2% 0.0272 -0.2% 0.0102 -33.6% 0.042 -66.1% 0.005 -5.4% 0.034 -3.5% 0.004	0.0453 -4.1% 0.0036 -0.2% 0.0272 -0.2% 0.0104 -32.5% 0.0431 -65.2% 0.005 -5.4% 0.034 -3.5% 0.004	0.0453 -4.1% 0.0036 -0.2% 0.0272 -0.2% 0.0113 -26.4% 0.0501 -59.5% 0.005 -5.4% 0.034 -3.5% 0.004
Waingawa River at South Rd  Waiohine River at Bicknells  Waipoua River at Colombo Rd Bridge	Median (mg/L) Median (% change from Baseline) Av. Daily Max (mg/L) Av. Daily Max (% change from Baseline) Median (mg/L) Median (% change from Baseline) Av. Daily Max (mg/L) Av. Daily Max (% change from Baseline) Median (mg/L) Median (% change from Baseline) Av. Daily Max (mg/L) Av. Daily Max (mg/L) Av. Daily Max (% change from Baseline) Median (mg/L) Median (mg/L) Median (% change from Baseline) Av. Daily Max (mg/L) Av. Daily Max (mg/L) Av. Daily Max (% change from Baseline) Median (mg/L) Median (mg/L) Median (mg/L) Median (% change from Baseline)	0.0472 0.0036 0.0273 0.0154 0.1237 0.0053 0.0352	-0.0% 0.0472 -0.0% 0.0036 0.2% 0.0273 0.0% 0.0111 -28.1% 0.0435 -64.8% 0.0053 0.2% 0.0352 0.1% 0.0044 1.3%	-2.2% 0.0462 -2.1% 0.0036 0.2% 0.0273 0.0% 0.0113 -26.8% 0.0448 -63.8% 0.0053 0.2% 0.0352 0.1% 0.0044 1.3%	-2.2% 0.0462 -2.1% 0.0036 -0.2% 0.0272 -0.1% 0.0124 -19.2% 0.0525 -57.5% 0.0053 -1.1% 0.0349 -0.9% 0.0044 1.3%	-4.1%  0.0454 -3.8%  0.0036 -0.0%  0.0272 -0.0%  0.0111 -28.1%  0.0435 -64.8%  0.0051 -3.9%  0.0343 -2.6%  0.0042 -3.7%	-4.5% 0.0453 -0.0% 0.0036 -0.2% 0.0272 -0.0% 0.0104 -32.5% 0.0431 -0.7% 0.005 -5.4% 0.034 -0.0% 0.004 -8.2%	-4.5% 0.0453 -4.1% 0.0036 -0.2% 0.0272 -0.2% 0.0113 -26.4% 0.0501 -59.5% 0.005 -5.4% 0.034 -3.5% 0.004	0.0453 -4.1% 0.0036 -0.2% 0.0272 -0.2% 0.0102 -33.6% 0.042 -66.1% 0.005 -5.4% 0.034 -3.5% 0.004 -8.2%	0.0453 -4.1% 0.0036 -0.2% 0.0272 -0.2% 0.0104 -32.5% 0.0431 -65.2% 0.005 -5.4% 0.034 -3.5% 0.004 -8.2%	0.0453 -4.1% 0.0036 -0.2% 0.0272 -0.2% 0.0113 -26.4% 0.0501 -59.5% 0.005 -5.4% 0.034 -3.5% 0.004 -8.2%

Table 3. Current landuse area in ha (% of total)

Site	Dairy	Dairy Support	Arable	Sheep and Beef	Native Bush	Other	Total
Huangarua River at Ponatahi Bridge	-	46 (0.2%)	-	25581 (84.6%)	693 (2.3%)	3918 (13.0%)	30239
Kopuaranga River at Stuarts	808 (4.8%)	281 (1.7%)	-	14103 (84.5%)	154 (0.9%)	1339 (8.0%)	16686
Makahakaha Stream at Mouth	129 (2.1%)	389 (6.3%)	38 (0.6%)	5155 (83.3%)	4 (0.1%)	477 (7.7%)	6192
Mangatarere River at SH2	2842 (23.8%)	357 (3.0%)	40 (0.3%)	2515 (21.0%)	4190 (35.1%)	2003 (16.8%)	11947
Otukura Stream at Mouth	2790 (29.8%)	2454 (26.2%)	-	1611 (17.2%)	83 (0.9%)	2428 (25.9%)	9366
Parkvale Stream at weir	1246 (24.9%)	553 (11.0%)	-	980 (19.6%)	42 (0.8%)	2185 (43.6%)	5006
Ruamahanga River at Gladstone Bridge	3564 (2.7%)	2095 (1.6%)	791 (0.6%)	81249 (60.8%)	20401 (15.3%)	25593 (19.1%)	133694
Ruamahanga River at Pukio	14438 (5.9%)	5867 (2.4%)	1556 (0.6%)	132684 (53.9%)	45104 (18.3%)	46717 (19.0%)	246366
Ruamahanga River at Te Ore Ore	1115 (3.6%)	549 (1.8%)	3 (0.0%)	17950 (57.8%)	7487 (24.1%)	3974 (12.8%)	31078
Ruamahanga River at U/S Lake Wai Outlet	16146 (6.3%)	6139 (2.4%)	1556 (0.6%)	136133 (53.5%)	47016 (18.5%)	47506 (18.7%)	254496
Ruamahanga River at Waihenga	13451 (5.7%)	5413 (2.3%)	1487 (0.6%)	128058 (54.2%)	44818 (19.0%)	42862 (18.2%)	236089
Ruamahanga River at Wardells	2322 (3.6%)	1518 (2.4%)	161 (0.3%)	38490 (59.9%)	10298 (16.0%)	11495 (17.9%)	64284
Tauanui River at Mouth	-	-	-	617 (14.9%)	2535 (61.0%)	1003 (24.1%)	4155
Taueru River at Gladstone	298 (0.6%)	246 (0.5%)	587 (1.2%)	39655 (80.5%)	242 (0.5%)	8217 (16.7%)	49244
Tauherenikau River at Websters	267 (1.8%)	419 (2.9%)	-	944 (6.5%)	11255 (77.7%)	1596 (11.0%)	14481
Turanganui River at Mouth	260 (3.9%)	38 (0.6%)	-	1810 (26.8%)	3491 (51.8%)	1141 (16.9%)	6740
Waingawa River at South Rd	215 (1.4%)	127 (0.9%)	-	2389 (16.0%)	9856 (65.8%)	2382 (15.9%)	14969
Waiohine River at Bicknells	6070 (15.4%)	1036 (2.6%)	227 (0.6%)	3595 (9.1%)	23641 (60.1%)	4750 (12.1%)	39320
Waipoua River at Colombo Rd Bridge	173 (1.0%)	670 (3.8%)	113 (0.6%)	9862 (56.5%)	2802 (16.1%)	3832 (22.0%)	17452
Whangaehu River at 250m from Ruamahanga Confluence	915 (6.3%)	299 (2.1%)	45 (0.3%)	10335 (70.9%)	5 (0.0%)	2979 (20.4%)	14578

### Table 4. Retirement (area in ha)

Site	BAU 2025	BAU 2040	BAU 2080	SILVER 2025	SILVER 2040	SILVER 2080	GOLD 2025	GOLD 2040	GOLD 2080
Huangarua River at Ponatahi Bridge	107	107	107	2285	3240	3240	3240	3240	3240
Kopuaranga River at Stuarts	0	0	0	353	1068	1068	1068	1068	1068
Makahakaha Stream at Mouth	0	0	0	218	341	341	341	341	341
Mangatarere River at SH2	0	0	0	0	0	0	0	0	0
Otukura Stream at Mouth	0	0	0	0	1	1	1	1	1
Parkvale Stream at weir	0	0	0	0	0	0	0	0	0
Ruamahanga River at U/S Lake Wai Outlet	107	245	347	5634	11092	11092	11092	11092	11092
Ruamahanga River at Pukio	107	245	347	5376	10812	10812	10812	10812	10812
Ruamahanga River at Te Ore Ore	0	52	61	452	1244	1244	1244	1244	1244
Ruamahanga River at Gladstone Bridge	0	138	231	2468	6340	6340	6340	6340	6340
Ruamahanga River at Waihenga	107	245	347	5272	10637	10637	10637	10637	10637
Ruamahanga River at Wardells	0	132	225	1241	3008	3008	3008	3008	3008
Tauanui River at Mouth	0	0	0	5	8	8	8	8	8
Tauherenikau River at Websters	0	0	0	0	0	0	0	0	0
Taueru River at Gladstone	0	0	0	1213	3310	3310	3310	3310	3310
Turanganui River at Mouth	2	67	152	123	131	131	131	131	131
Waingawa River at South Rd	0	7	7	0	5	5	5	5	5
Waiohine River at Bicknells	0	0	0	0	0	0	0	0	0
Waipoua River at Colombo Rd Bridge	0	79	163	314	454	454	454	454	454
Whangaehu River at 250m from Ruamahanga Confluence	0	0	0	452	1286	1286	1286	1286	1286

### Important note about your report

This document has been prepared by Jacobs for Greater Wellington Regional Council (the *Client*) for the purposes of the Ruamahanga Catchment Modelling Scenarios project. Jacobs accepts no liability or responsibility whatsoever for, or in respect of, any use of, or reliance upon, this report (or any part of it) for any other purpose.

In preparing this report, Jacobs has relied upon, and presumed accurate, any information (or confirmation of the absence thereof) provided by the Client and/or others sources of external model inputs such as from Geological Nuclear Science (GNS) or National Institute of Water and Atmospheric Research (NIWA). If the information is subsequently determined to be false, inaccurate or incomplete then it is possible that our observations and conclusions as expressed in this report may change. Jacobs derived the data in this report from information sourced from the Client (if any) and/or available in the public domain at the time or times outlined in this report. The passage of time, manifestation of latent conditions or impacts of future events may require further examination of the project and subsequent data analysis, and re-evaluation of the data, findings, observations and conclusions expressed in this report.

Jacobs has prepared this report in accordance with the usual care and thoroughness of the consulting profession, for the sole purpose described above and by reference to applicable standards, guidelines, procedures and practices at the date of issue of this report. For the reasons outlined above, however, no other warranty or guarantee, whether expressed or implied, is made as to the data, observations and findings expressed in this report, to the extent permitted by law.

This report may also describe specific limitations and/or uncertainties which qualify its findings. Accordingly, this report should be read in full and no excerpts are to be taken as representative of the findings unless any such excerpt and the context in which it is intended to be used have been approved by Jacobs in writing.