# Nitrate-Nitrogen (NO3-N)

## All reporting sites

Final\_Rev1 Date: 2017-11-30





### Introduction

This fact sheet presents the summarised results for Nitrate-Nitrogen (NO3-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, NO3-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 NO3-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, NO3-N is generally considered 'healthy', with all 20 reporting sites simulating A or B bands in the baseline model. The modelled scenarios simulate median (50th) percentile NO3-N reductions at 70% of the reporting sites of between 12–26% in Silver and Gold 2080 (the remaining 30% of sites have <10% NO3-N decreases). However, reductions in the 95th percentiles are smaller, with 75% of the reporting sites showing declines in the range of only 1–10% (with the remaining 25% of sites having >10% decreases in NO3-N 95th percentiles). This is driven by the mitigations described above only being applied to the dry weather concentrations representing leaching, which is assigned to baseflows, while the event mean concentrations (assigned to quickflow) are un-mitigated (except when land retirement or WWTP land treatment occurs). Due to this flow separation approach, it means NO3-N loads generated via baseflows have a greater reduction in concentration, lowering the median percentiles, while event based loads remain the same, leading to 95th percentiles only

While the mitigations are having a positive effect on the catchment by reducing NO3-N loads, the current Attribute State thresholds (to determine A–D bands) are expansive enough to encompass any of the reductions in concentrations that are occurring.

**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 Nitrate (toxicity) Attribute States

Site	Baseline	BAU2025	BAU2040	BAU2080	SILVER 2025	SILVER 2040	SILVER 2080	GOLD 2025	GOLD 2040	GOLD 2080
Huangarua River at Ponatahi Bridge	Α	Α	Α	Α	А	А	А	А	А	А
Kopuaranga River at Stuarts	В	В	В	В	В	В	В	В	В	В
Makahakaha Stream at Mouth	В	В	В	В	В	В	В	В	В	В
Mangatarere River at SH2	В	В	В	В	В	В	В	В	В	В
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	Α	А	А	А	Α	А	А	А	А	А
Ruamahanga River at Pukio	Α	Α	Α	Α	А	А	А	А	А	А
Ruamahanga River at Te Ore Ore	Α	А	А	Α	А	А	А	А	А	А
Ruamahanga River at Gladstone Bridge	Α	Α	А	А	А	А	А	А	А	А
Ruamahanga River at Waihenga	Α	Α	А	Α	А	А	А	А	А	А
Ruamahanga River at Wardells	Α	А	А	Α	А	А	Α	А	А	А
Tauanui River at Mouth	Α	Α	Α	А	А	А	А	А	А	А
Tauherenikau River at Websters	Α	Α	Α	А	А	А	А	А	А	А
Taueru River at Gladstone	Α	А	А	А	А	А	А	А	А	А
Turanganui River at Mouth	А	А	А	А	А	А	А	А	А	А
Waingawa River at South Rd	Α	А	А	А	А	А	А	А	А	А
Waiohine River at Bicknells	Α	Α	Α	Α	А	А	А	А	А	А
Waipoua River at Colombo Rd Bridge	В	В	В	В	В	В	В	В	В	В
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

Section   Mode (mph.)   August (mph.)   Augu	0.2532 -16.0% 0.933 -11.5% 0.7965 -17.6% 1.7769 -15.9% 0.7299 -6.1% 1.5955 -5.6% 0.6874 -8.5% 2.1882 -0.5% 1.2072 -15.5% 1.2918 -18.5% 1.2949 -12.6% 1.7211 -6.8% 0.4092 -18.4% 0.8529 -8.4% 0.3788 -17.2% 0.8791 -7.5% 0.8791 -7.5% 0.874 -7.6% 0.4128 -20.4%
Median (% Langer from Baseline)	-16.0% 0.933 -11.5% 0.7965 -17.6% 1.7769 -15.9% 0.7299 -6.1% 1.5955 -5.6% 0.6874 -8.5% 2.1882 -0.5% 1.2072 -15.5% 1.2918 -18.5% 1.2949 -12.6% 1.7211 -6.8% 0.4092 -18.4% 0.8529 -8.4% 0.3788 -17.2% 0.8791 -7.5% 0.3207 -12.4% 0.874 -7.6% 0.4128 -20.4%
Harragans River at Portation Biology   Sign Percentals (right)   10562   1,000   1,0539   0,9750   0,033   0,933   0	0.933 -11.5% 0.7965 -17.6% 1.7769 -15.9% 0.7299 -6.1% 1.5955 -5.6% 0.6874 -8.5% 2.1882 -0.5% 1.2072 -15.5% 1.2918 -18.5% 1.2949 -12.6% 1.7211 -6.8% 0.4092 -18.4% 0.8529 -8.4% 0.3788 -17.2% 0.8791 -7.5% 0.3207 -12.4% 0.874 -7.6% 0.4128 -20.4%
Sign Percentic (% Integral to 1,0562   1,0562   1,0563   1,0573	-11.5% 0.7965 -17.6% 1.7769 -15.9% 0.7299 -6.1% 1.5955 -5.6% 0.6874 -8.5% 2.1882 -0.5% 1.2072 -15.5% 1.2918 -18.5% 1.2949 -12.6% 1.7211 -6.8% 0.4092 -18.4% 0.8529 -8.4% 0.3788 -17.2% 0.8791 -7.5% 0.8791 -7.5% 0.874 -7.6% 0.4128 -20.4%
Soft   Pecentate (K. sharage from Baseline)	-11.5% 0.7965 -17.6% 1.7769 -15.9% 0.7299 -6.1% 1.5955 -5.6% 0.6874 -8.5% 2.1882 -0.5% 1.2072 -15.5% 1.2918 -18.5% 1.2949 -12.6% 1.7211 -6.8% 0.4092 -18.4% 0.8529 -8.4% 0.3788 -17.2% 0.8791 -7.5% 0.8791 -7.5% 0.874 -7.6% 0.4128 -20.4%
Modes (mgs)	0.7965 -17.6% 1.7769 -15.9% 0.7299 -6.1% 1.5955 -5.6% 0.6874 -8.5% 2.1882 -0.5% 1.2072 -15.5% 1.2918 -18.5% 1.2949 -12.6% 1.7211 -6.8% 0.4092 -18.4% 0.8529 -8.4% 0.3788 -17.2% 0.8791 -7.5% 0.3207 -12.4% 0.874 -7.6% 0.4128 -20.4%
Modern (% change from Baseline)   1.0.2%   1.0.2%   1.0.2%   1.0.2%   1.0.2%   1.7.2%   1.7.5%   1.7.5%   1.7.6%   1.7	-17.6% 1.7769 -15.9% 0.7299 -6.1% 1.5955 -5.6% 0.6874 -8.5% 2.1882 -0.5% 1.2072 -15.5% 1.2918 -18.5% 1.2949 -12.6% 1.7211 -6.8% 0.4092 -18.4% 0.8529 -8.4% 0.3788 -17.2% 0.8791 -7.5% 0.3207 -12.4% 0.874 -7.6% 0.4128 -20.4%
Sept Percentation (right)   2,1119   1,9206   1,9206   1,9206   1,9206   1,7706	1.7769 -15.9% 0.7299 -6.1% 1.5955 -5.6% 0.6874 -8.5% 2.1882 -0.5% 1.2072 -15.5% 1.2918 -18.5% 1.2949 -12.6% 1.7211 -6.8% 0.4092 -18.4% 0.8529 -8.4% 0.3788 -17.2% 0.8791 -7.5% 0.3207 -12.4% 0.874 -7.6% 0.4128 -20.4%
SSPI Petcanital (right)	-15.9% 0.7299 -6.1% 1.5955 -5.6% 0.6874 -8.5% 2.1882 -0.5% 1.2072 -15.5% 1.2918 -18.5% 1.2949 -12.6% 1.7211 -6.8% 0.4092 -18.4% 0.8529 -8.4% 0.3788 -17.2% 0.8791 -7.5% 0.3207 -12.4% 0.874 -7.6% 0.4128 -20.4%
Seph Percentale (% change from Baseline)	-15.9% 0.7299 -6.1% 1.5955 -5.6% 0.6874 -8.5% 2.1882 -0.5% 1.2072 -15.5% 1.2918 -18.5% 1.2949 -12.6% 1.7211 -6.8% 0.4092 -18.4% 0.8529 -8.4% 0.3788 -17.2% 0.8791 -7.5% 0.3207 -12.4% 0.874 -7.6% 0.4128 -20.4%
Median (mg.)   0.7769   0.7768   0.7768   0.7768   0.7268   0.7269   0.7299   0.72	0.7299 -6.1% 1.5955 -5.6% 0.6874 -8.5% 2.1882 -0.5% 1.2072 -15.5% 1.2918 -18.5% 1.2949 -12.6% 1.7211 -6.8% 0.4092 -18.4% 0.8529 -8.4% 0.3788 -17.2% 0.8791 -7.5% 0.3207 -12.4% 0.874 -7.6% 0.4128 -20.4%
Median (%) Change from Baselino)	-6.1% 1.5955 -5.6% 0.6874 -8.5% 2.1882 -0.5% 1.2072 -15.5% 1.2918 -18.5% 1.2949 -12.6% 1.7211 -6.8% 0.4092 -18.4% 0.8529 -8.4% 0.3788 -17.2% 0.8791 -7.5% 0.3207 -12.4% 0.874 -7.6% 0.4128 -20.4%
Seith Percentile (right)	1.5955 -5.6% 0.6874 -8.5% 2.1882 -0.5% 1.2072 -15.5% 1.2918 -18.5% 1.2949 -12.6% 1.7211 -6.8% 0.4092 -18.4% 0.8529 -8.4% 0.3788 -17.2% 0.8791 -7.5% 0.3207 -12.4% 0.874 -7.6% 0.4128 -20.4%
Seh Percentile (mgL)	-5.6%  0.6874 -8.5% 2.1882 -0.5% 1.2072 -15.5% 1.2918 -18.5% 1.2949 -12.6% 1.7211 -6.8% 0.4092 -18.4% 0.8529 -8.4% 0.3788 -17.2% 0.8791 -7.5% 0.3207 -12.4% 0.874 -7.6% 0.4128 -20.4%
SSth Percentile (K change from Baseline)	0.6874 -8.5% 2.1882 -0.5% 1.2072 -15.5% 1.2918 -18.5% 1.2949 -12.6% 1.7211 -6.8% 0.4092 -18.4% 0.8529 -8.4% 0.3788 -17.2% 0.8791 -7.5% 0.3207 -12.4% 0.874 -7.6% 0.4128 -20.4%
Median (right)	0.6874 -8.5% 2.1882 -0.5% 1.2072 -15.5% 1.2918 -18.5% 1.2949 -12.6% 1.7211 -6.8% 0.4092 -18.4% 0.8529 -8.4% 0.3788 -17.2% 0.8791 -7.5% 0.3207 -12.4% 0.874 -7.6% 0.4128 -20.4%
Median (% change from Baseline)	-8.5% 2.1882 -0.5% 1.2072 -15.5% 1.2918 -18.5% 1.2949 -12.6% 1.7211 -6.8% 0.4092 -18.4% 0.8529 -8.4% 0.3788 -17.2% 0.8791 -7.5% 0.3207 -12.4% 0.874 -7.6% 0.4128 -20.4%
Sigh Percentile (mg/L)   2.2003   2.2009   2.1562   2.1915   2.1899   2.1889   2.1898   2.1898   3.1899   2.1898   3.1899   3.21898   3.21899   3.21898   3.21899   3.21898   3.218999   3.218999	2.1882 -0.5% 1.2072 -15.5% 1.2918 -18.5% 1.2949 -12.6% 1.7211 -6.8% 0.4092 -18.4% 0.8529 -8.4% 0.3788 -17.2% 0.8791 -7.5% 0.3207 -12.4% 0.874 -7.6% 0.4128 -20.4%
Sigh Percentile (right)   2,2003   2,2008   2,1562   2,1595   2,1895   2,	-0.5% 1.2072 -15.5% 1.2918 -18.5% 1.2949 -12.6% 1.7211 -6.8% 0.4092 -18.4% 0.8529 -8.4% 0.3788 -17.2% 0.8791 -7.5% 0.3207 -12.4% 0.874 -7.6% 0.4128 -20.4%
Median (mg/L)	1.2072 -15.5% 1.2918 -18.5% 1.2949 -12.6% 1.7211 -6.8% 0.4092 -18.4% 0.8529 -8.4% 0.3788 -17.2% 0.8791 -7.5% 0.3207 -12.4% 0.874 -7.6% 0.4128 -20.4%
Median (mgL)	1.2072 -15.5% 1.2918 -18.5% 1.2949 -12.6% 1.7211 -6.8% 0.4092 -18.4% 0.8529 -8.4% 0.3788 -17.2% 0.8791 -7.5% 0.3207 -12.4% 0.874 -7.6% 0.4128 -20.4%
Otukura Stream at Mouth         Median (% change from Baseline)         -1.1%         -1.1%         -1.1%         -15.1%         -15.1%         -15.1%         -15.5%         -15.5%         -15.5%         -15.5%         -15.5%         -15.5%         -15.5%         -15.5%         -15.5%         -15.5%         -15.5%         -15.5%         -15.5%         -15.5%         -15.1%         -15.1%         -15.5%         -15.5%         -15.5%         -15.5%         -15.5%         -15.5%         -15.5%         -15.5%         -15.5%         -15.5%         -15.5%         -15.5%         -15.5%         -15.5%         -15.1%         -15.1%         -15.5%         -15.5%         -15.5%         -15.1%         -15.1%         -15.1%         -15.1%         -15.1%         -15.5%         -15.5%         -15.1%         -15.1%         -15.1%         -15.5%         -15.5%         -15.1%         -15.1%         -15.1%         -15.1%         -15.1%         15.2%         12.98           Median (mgL)         1.4818         1.4794         1.4794         1.4794         1.3095         1.3093         1.2949         1.2696         -12.6%         -12.6%         -12.6%         -12.6%         -12.6%         -12.6%         -12.6%         -12.6%         -12.6%         -12.6%         -12.6	-15.5% 1.2918 -18.5% 1.2949 -12.6% 1.7211 -6.8% 0.4092 -18.4% 0.8529 -8.4% 0.3788 -17.2% 0.8791 -7.5% 0.3207 -12.4% 0.874 -7.6% 0.4128 -20.4%
Sth Percentile (mg/L)   1.8856   1.5052   1.5052   1.5052   1.298   1.2981   1.2979   1.2918   1.291	1.2918 -18.5% 1.2949 -12.6% 1.7211 -6.8% 0.4092 -18.4% 0.8529 -8.4% 0.3788 -17.2% 0.8791 -7.5% 0.3207 -12.4% 0.874 -7.6% 0.4128 -20.4%
Sich Percentile (mg/L)	-18.5%  1.2949 -12.6%  1.7211 -6.8%  0.4092 -18.4%  0.8529 -8.4%  0.3788 -17.2%  0.8791 -7.5%  0.3207 -12.4%  0.874 -7.6%  0.4128 -20.4%
Median (mg/L)	1.2949 -12.6% 1.7211 -6.8% 0.4092 -18.4% 0.8529 -8.4% 0.3788 -17.2% 0.8791 -7.5% 0.3207 -12.4% 0.874 -7.6% 0.4128 -20.4%
Median (mg/L)	1.2949 -12.6% 1.7211 -6.8% 0.4092 -18.4% 0.8529 -8.4% 0.3788 -17.2% 0.8791 -7.5% 0.3207 -12.4% 0.874 -7.6% 0.4128 -20.4%
Median (% change from Baseline)   -0.2%   -0.2%   -0.2%   -11.6%   -11.6%   -11.6%   -12.6%	-12.6% 1.7211 -6.8% 0.4092 -18.4% 0.8529 -8.4% 0.3788 -17.2% 0.8791 -7.5% 0.3207 -12.4% 0.874 -7.6% 0.4128 -20.4%
Parkvale Stream at werr   95th Percentile (mg/L)   1.8463   1.8573   1.8573   1.8573   1.7306   1.7306   1.7305   1.7305   1.7211   1.7211   95th Percentile (% change from Baseline)   0.6%   0.6%   0.6%   0.6%   6.3%   -6.3%   -6.3%   -6.8%   -	1.7211 -6.8% 0.4092 -18.4% 0.8529 -8.4% 0.3788 -17.2% 0.8791 -7.5% 0.3207 -12.4% 0.874 -7.6% 0.4128 -20.4%
Stin Percentile (mg/L)   1.9463   1.8573   1.8573   1.7306   1.7306   1.7305   1.7211   1.7211	-6.8% 0.4092 -18.4% 0.8529 -8.4% 0.3788 -17.2% 0.8791 -7.5% 0.3207 -12.4% 0.874 -7.6% 0.4128 -20.4%
Median (mg/L)	0.4092 -18.4% 0.8529 -8.4% 0.3788 -17.2% 0.8791 -7.5% 0.3207 -12.4% 0.874 -7.6% 0.4128 -20.4%
Median (mg/L)	0.4092 -18.4% 0.8529 -8.4% 0.3788 -17.2% 0.8791 -7.5% 0.3207 -12.4% 0.874 -7.6% 0.4128 -20.4%
Median (% change from Baseline)   -5.6%   -5.6%   -5.8%   -17.4%   -18.2%   -18.2%   -18.4%	-18.4% 0.8529 -8.4% 0.3788 -17.2% 0.8791 -7.5% 0.3207 -12.4% 0.874 -7.6% 0.4128 -20.4%
Ruamahanga River at U/S Lake Wai Outlet   95th Percentile (mg/L)   0.9307   0.9209   0.9202   0.9159   0.8796   0.8536   0.8533   0.8531   0.8531   0.8531   95th Percentile (% change from Baseline)   -1.1%   -1.1%   -1.6%   -5.5%   -8.3%   -7.5%   -7.3%   -7.3%   -7.3	0.8529 -8.4% 0.3788 -17.2% 0.8791 -7.5% 0.3207 -12.4% 0.874 -7.6% 0.4128 -20.4%
S5th Percentile (mg/L)	-8.4% 0.3788 -17.2% 0.8791 -7.5% 0.3207 -12.4% 0.874 -7.6% 0.4128 -20.4%
Median (mg/L)	0.3788 -17.2% 0.8791 -7.5% 0.3207 -12.4% 0.874 -7.6% 0.4128 -20.4%
Median (mg/L)	0.3788 -17.2% 0.8791 -7.5% 0.3207 -12.4% 0.874 -7.6% 0.4128 -20.4%
Median (% change from Baseline)   -8.5%   -8.5%   -8.8%   -15.7%   -17.0%   -17.0%   -17.0%   -17.2%	-17.2% 0.8791 -7.5% 0.3207 -12.4% 0.874 -7.6% 0.4128 -20.4%
Sth Percentile (mg/L)   0.9507   0.9405   0.9401   0.9367   0.9049   0.8801   0.8798   0.8794   0.8793   0.8794   0.8793   0.8794   0.8793   0.8794   0.8793   0.8794   0.8793   0.8794   0.8793   0.8794   0.8793   0.8794   0.8793   0.8794   0.8793   0.8794   0.8793   0.8794   0.8793   0.8794   0.8793   0.8794   0.8793   0.8794   0.8793   0.8794   0.8793   0.8794   0.8793   0.8794   0.8793   0.8794   0.8793   0.8794   0.8794   0.8793   0.8794   0.87	0.8791 -7.5% 0.3207 -12.4% 0.874 -7.6% 0.4128 -20.4%
95th Percentile (mg/L) 0.9507 0.9405 0.9401 0.9367 0.9049 0.8801 0.8798 0.8794 0.8793 95th Percentile (% change from Baseline) -1.1% -1.1% -1.5% -4.8% -7.4% -7.5%	-7.5% 0.3207 -12.4% 0.874 -7.6% 0.4128 -20.4%
Median (mg/L)	0.3207 -12.4% 0.874 -7.6% 0.4128 -20.4%
Median (mg/L)	0.3207 -12.4% 0.874 -7.6% 0.4128 -20.4%
Median (% change from Baseline)   -5.9%   -5.9%   -6.4%   -9.0%   -12.5%   -12.5%   -12.4%	-12.4% 0.874 -7.6% 0.4128 -20.4%
Ruamahanga River at Te Ore Ore  95th Percentile (mg/L) 95th Percentile (mg/L) 0.9463 0.9402 0.9402 0.9373 0.9145 0.8744 0.4132 0	0.874 -7.6% 0.4128 -20.4%
Sth Percentile (mg/L)   0.9463   0.9402   0.9402   0.9373   0.9145   0.8744   0.87	-7.6% 0.4128 -20.4%
Ruamahanga River at Gladstone Bridge         Median (mg/L)         0.5187         0.4505         0.4501         0.4482         0.4226         0.4133         0.4131         0.4132         0.4132           Median (% change from Baseline)         -13.2%         -13.2%         -13.6%         -18.5%         -20.3%         -20.4%         -20.3%         -20.4%         -20.3%         -20.3%         -20.3% <t< td=""><td>0.4128</td></t<>	0.4128
Ruamahanga River at Gladstone Bridge         Median (% change from Baseline)         -13.2%         -13.2%         -13.6%         -18.5%         -20.3%         -20.4%         -20.3%	-20.4%
Ruamahanga River at Gladstone Bridge         Median (% change from Baseline)         -13.2%         -13.2%         -13.6%         -18.5%         -20.3%         -20.4%         -20.3%	-20.4%
Ruamahanga River at Gladstone Bridge  95th Percentile (mg/L) 95th Percentile (% change from Baseline)  Nedian (mg/L)  Median (% change from Baseline)  Nedian (% change from Baseline)  Posth Percentile (% change from Baseline)  Nedian (% change from Baseline)  Nedian (% change from Baseline)  Posth Percentile (mg/L)  95th Percentile (mg/L)  95th Percentile (mg/L)  Nedian (mg/L)	
95th Percentile (mg/L)   1.0346   1.0212   1.0204   1.0141   0.9846   0.9532   0.953   0.9529   0.95	
Median (mg/L)         0.4398         0.3991         0.3987         0.3973         0.3703         0.364         0.3638         0.3629         0.3629           Median (% change from Baseline)         -9.3%         -9.4%         -9.7%         -15.8%         -17.2%         -17.3%         -17.5%         -17.5%           95th Percentile (mg/L)         0.9542         0.9436         0.943         0.9385         0.911         0.8853         0.885         0.8847         0.8846           95th Percentile (% change from Baseline)         -1.1%         -1.2%         -1.7%         -4.5%         -7.2%         -7.3%         -7.3%         -7.3%           Median (mg/L)         0.6625         0.5388         0.5383         0.5352         0.4971         0.4886         0.4882         0.4882         0.4881	0.9528
Ruamahanga River at Waihenga       Median (% change from Baseline)       -9.3%       -9.4%       -9.7%       -15.8%       -17.2%       -17.3%       -17.5%       -17.5%         95th Percentile (mg/L)       0.9542       0.9436       0.943       0.9385       0.911       0.8853       0.885       0.8847       0.8846         95th Percentile (% change from Baseline)       -1.1%       -1.2%       -1.7%       -4.5%       -7.2%       -7.3%       -7.3%       -7.3%         Median (mg/L)       0.6625       0.5388       0.5383       0.5352       0.4971       0.4886       0.4882       0.4882       0.4881	-7.9%
Ruamahanga River at Waihenga       Median (% change from Baseline)       -9.3%       -9.4%       -9.7%       -15.8%       -17.2%       -17.3%       -17.5%       -17.5%         95th Percentile (mg/L)       0.9542       0.9436       0.943       0.9385       0.911       0.8853       0.885       0.8847       0.8846         95th Percentile (% change from Baseline)       -1.1%       -1.2%       -1.7%       -4.5%       -7.2%       -7.3%       -7.3%       -7.3%         Median (mg/L)       0.6625       0.5388       0.5383       0.5352       0.4971       0.4886       0.4882       0.4882       0.4881	0.3627
Ruamahanga River at Waihenga  95th Percentile (mg/L) 95th Percentile (% change from Baseline) -1.1% -1.2% -1.7% -4.5% -7.2% -7.3% -7.3% -7.3% -7.3% -7.3% -7.3% -7.3% -7.3% -7.3% -7.3% -7.3% -7.3% -7.3% -7.3% -7.3% -7.3%	-17.5%
95th Percentile (% change from Baseline) -1.1% -1.2% -1.7% -4.5% -7.2% -7.3% -7.3% -7.3% -7.3% Median (mg/L) 0.6625 0.5388 0.5383 0.5352 0.4971 0.4886 0.4882 0.4882 0.4881	
Median (mg/L)         0.6625         0.5388         0.5383         0.5352         0.4971         0.4886         0.4882         0.4882         0.4881	0.8844
	-7.3%
Median (% change from Raseline)18.7%18.7%19.2%25.0%26.20/26.20/26.20/26.20/	0.4877
	-26.4%
Ruamahanga River at Wardells	
95th Percentile (mg/L) 1.2717 1.2451 1.2449 1.2348 1.2004 1.1669 1.1655 1.1663 1.1663	1.1654
95th Percentile (% change from Baseline) -2.1% -2.1% -2.9% -5.6% -8.2% -8.4% -8.3% -8.3%	-8.4%
Median (mg/L) 0.1271 0.1275 0.1275 0.1267 0.1263 0.1263 0.1262 0.1262	0.1262
Median (% change from Baseline) 0.4% 0.3% 0.3% -0.3% -0.7% -0.7% -0.7% -0.7%	-0.7%
I Tauanui River at Mouth	
95th Percentile (mg/L)	0.3285
95th Percentile (% change from Baseline) 0.0% -0.0% -0.0% -2.3% -2.4% -2.4% -2.4% -2.4% -2.4%	-2.4%
Median (mg/L)         0.0633         0.0623         0.0623         0.0558         0.0557         0.0552         0.0552	0.0552
Median (% change from Baseline) -1.7% -1.7% -1.9% -12.0% -12.0% -12.8% -12.8%	-12.8%
Tauherenikau River at Websters  95th Percentile (mg/L)  0.2872  0.3013  0.3013  0.3013  0.2532  0.2532  0.2532  0.2532  0.2498  0.2498	0.2498
95th Percentile (% change from Baseline) 4.9% 4.9% -11.9% -11.8% -11.9% -13.0%	-13.0%
Median (mg/L)         0.724         0.7236         0.7237         0.7237         0.6594         0.6594         0.6594         0.6594	0.6593
Median (% change from Baseline) -0.0% -0.0% -3.6% -8.9% -8.9% -8.9% -8.9%	-8.9%
Taueru River at Gladstone 95th Percentile (mg/L) 1.4038 1.4037 1.4037 1.4037 1.3625 1.2908 1.2908 1.2908 1.2907	1.2907
, , , , , , , , , , , , , , , , , , , ,	-8.1%
Median (mg/L)         0.1572         0.1571         0.1538         0.1508         0.1502         0.1502         0.1502         0.1502	0.1502
Median (% change from Baseline) -0.0% -2.1% -2.1% -4.0% -4.4% -4.4% -4.4% -4.4%	-4.4%
Turanganui River at Mouth 95th Percentile (mg/L) 0.62 0.6199 0.6069 0.5963 0.5945 0.5945 0.5945 0.5945	0.5945
95th Percentile (% change from Baseline)	-4.1%
Median (mg/L)         0.0952         0.094         0.094         0.0938         0.0927         0.0925         0.0925         0.0925         0.0925	0.0925
Median (% change from Baseline) -1.2% -1.4% -2.6% -2.8% -2.8% -2.8% -2.8%	-2.8%
Waingawa River at South Rd  95th Percentile (mg/L)  0.24  0.2398  0.2398  0.2391  0.2386  0.2386  0.2386  0.2386  0.2386	0.2386
95th Percentile (% change from Baseline)	-0.6%
	_
Median (mg/L) 0.1948 0.182 0.182 0.1805 0.1691 0.1688 0.1688 0.1667 0.1667	0.1666
Median (% change from Baseline) -6.6% -7.4% -13.2% -13.4% -13.4% -14.5% -14.5%	-14.5%
Waiohine River at Bicknells   95th Percentile (mg/L)   0.6632   0.645   0.6377   0.6373   0.6363   0.6362   0.6352   0.6352   0.6352	0.6351
95th Percentile (% change from Baseline)	-4.2%
Median (mg/L)         0.8012         0.6562         0.6562         0.6507         0.6169         0.6115         0.6115         0.6096         0.6096	0.6096
Median (% change from Baseline) -18.1% -18.8% -23.0% -23.7% -23.7% -23.9% -23.9%	-23.9%
Waipoua River at Colombo Rd Bridge 95th Percentile (mg/L) 1.8535 1.8257 1.8257 1.7994 1.7557 1.7355 1.7355 1.7354 1.7354	1.7354
	-6.4%
Median (mg/L)         1.3948         1.3591         1.3591         1.1339         1.1275         1.1273         1.1273	1.1273
Whangachu River et 350m from Buamahanga Confluence Median (% change from Baseline) -2.6% -2.6% -18.7% -19.2% -19.2% -19.2% -19.2%	
Whangaehu River at 250m from Ruamahanga Confluence 95th Percentile (mg/L) 1.5004 1.4636 1.4636 1.2589 1.2202 1.2202 1.22 1.22	-19.2%
95th Percentile (% change from Baseline) -2.5% -2.5% -16.1% -18.7% -18.7% -18.7% -18.7%	
	-19.2%

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

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