

Annex F: State and Trends of Water Quality in the Lake Horowhenua Catchment

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Introduction

The state and trends of water quality for the Lake Horowhenua Catchment has recently been assessed by Land, Water, People Ltd. as part of the Regional State and Trends of Water Quality Report. This Annex presents the current State and Trends of water quality in the catchment utilising Horizons state of the environment water quality data to 30 June 2017 for the Lake, the inflowing tributaries and the Hōkio Stream at the outlet of the Lake.

Trends

Gaps in the data as a result of health and safety issues and sampling access hinder the ability to assess trends in water quality for the Lake and tributaries. As such only trends in MCI are able to be reported. Over the 10 year period 2007 – 2017 All sites monitored for Macroinvertebrates (Lake Outlet, Patiki and Arawhata Streams) have too much noise in the data to determine a trend with confidence. However, both the Hōkio at Lake Outlet and Patiki Stream are indicating a general degradation in the Macroinvertebrate Community Index (MCI) over the period.

State

The state of water quality for the 5 year period (1 July 2012 – 30 June 2017) has been assessed against both the water quality targets identified in the One Plan (as a pass/fail) and against the attribute state bands in the National Objectives Framework (NOF) (NPS-FM, 2017).

The assessment against the One Plan targets are presented in Table 1 and Table 2.

- Ammoniacal nitrogen targets are met in both the Lake and the tributary streams.
- *E. coli* targets are met in the Lake but not in the tributaries with the exception of the Hōkio Stream at Lake Outlet during the bathing season.
- Nutrient targets are almost uniformly not met in the Lake and tributaries
- Where monitored the tributary stream fail to meet MCI targets.
- Clarity is uniformly not met in the tributaries.
- The Lake does not meet targets for chlorophyll *a*.

The assessment against the NoF is presented in Table 3 and Table 4.

- The Lake is below the national bottom line for all trophic status (nutrient and algae) attributes assessed.
- The tributaries are band E for *E. coli* with the exception of the Hōkio at Lake Horowhenua which is band B.
- Nitrate in the tributaries is band B or C with the exception of the Arawhata which is band D.
- Ammoniacal Nitrogen in the tributaries is spread across bands A-C.
- MCI compared to the Stark bands is poor (<80) at the Arawhata Stream and Hōkio at Lake Horowhenua sites and fair (<81 – 100) at the Patiki Stream site.

Table 1: Assessment of the water quality data for Lake Horowhenua against the One Plan Targets. Green means the site meets the specific target and red means the target is not met at the site.

Site Name	Chlorophyll α (average)	Chlorophyll α (maximum)	Total Nitrogen	Total Phosphorus	Ammoniacal Nitrogen	<i>E. coli</i> bathing	<i>E. coli</i> Year round
Lake Horowhenua	Fail	Fail	Fail	Fail	Pass	Pass	Pass

Table 2: Assessment of the water quality data for the Lake Horowhenua tributaries against the One Plan Targets. Green means the site meets the specific target and red means the target is not met at the site.

Site Name	Clarity	SIN	DRP	MCI	Ammoniacal-N (Max)	Ammoniacal-N (Mean)	<i>E. coli</i> (Bathing)	<i>E. coli</i> (year round)	Dissolved Oxygen Saturation
L Horowhenua Inflow at Lindsay Road	Fail	Fail	Fail	Not assessed	Pass	Pass	Fail	Fail	Fail
Patiki Stream at Kawiu Road	Fail	Fail	Fail	Fail	Pass	Pass	Fail	Fail	Fail
L Horowhenua Inflow at culv d/s Queen St	Not assessed	Fail	Pass	Not assessed	Pass	Pass	Fail	Fail	Fail
Queen Street Drain at L Horowhenua	Fail	Fail	Fail	Not assessed	Pass	Pass	Fail	Fail	Fail
Makomako Road Drain at L Horowhenua	Fail	Fail	Fail	Not assessed	Pass	Pass	Fail	Fail	Pass
Arawhata Drain at Hōkio Beach Road	Fail	Fail	Fail	Fail	Pass	Pass	Fail	Fail	Fail
L Horowhenua Inflow at Hōkio Sand Rd	Fail	Fail	Fail		Pass	Pass	Fail	Fail	Fail
Hōkio at Lake Horowhenua	Fail	Fail	Fail	Fail	Pass	Pass	Pass	Fail	Fail

Table 3: Assessment of the water quality data for Lake Horowhenua against the NoF Targets. Green = Band A, Yellow = Band B, Orange = Band C, Red = Band D (below national bottom line) and Dark Red = Band E (for *E. coli* only).

Site Name	NOF: Lake Phytoplankton (Median)	NOF: Lake Phytoplankton (Max)	NOF: Lake Total Nitrogen	NOF: Lake Total Phosphorus	NOF: Ammoniacal Nitrogen
Lake Horowhenua	D	D	D	D	Not assessed

Table 4: Assessment of the water quality data for the Lake Horowhenua tributaries against the NoF Targets. Green = Band A, Yellow = Band B, Orange = Band C, Red = Band D (below national bottom line) and Dark Red = Band E (for *E. coli* only)..

Site Name	<i>E. coli</i> combined	Nitrate combined	Ammoniacal- N combined
L Horowhenua Inflow at Lindsay Road	E	B	C
Patiki Stream at Kawiu Road	E	C	A
L Horowhenua Inflow at culv d/s Queen St	E	C	B
Queen Street Drain at L Horowhenua	E	C	A
Makomako Road Drain at L Horowhenua	E	C	A
Arawhata Drain at Hokio Beach Road	E	D	B
L Horowhenua Inflow at Hōkio Sand Rd	E	B	B
Hōkio at Lake Horowhenua	B	B	C