



greater WELLINGTON
REGIONAL COUNCIL
Te Pane Matua Taiao

Rivers State of the Environment monitoring programme

Annual data report, 2012/13

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Contents

1.	Introduction	1
2.	Overview of RSoE monitoring programme	2
2.1	Monitoring objectives	2
2.2	Monitoring network	2
2.3	Monitoring variables	2
2.3.1	Water quality variables	2
2.3.2	Biological variables	4
3.	Physico-chemical and microbiological water quality	5
3.1	Approach to analysis	5
3.1.1	Water quality index	5
3.1.2	Heavy metals	6
3.2	Results	6
3.2.1	Water quality index	6
3.2.2	Heavy metals	8
4.	Periphyton cover and biomass	10
4.1	Approach to analysis	10
4.2	Results	10
5.	Macroinvertebrates	14
5.1	Approach to analysis	14
5.2	Results	14
	References	17
	Acknowledgements	18
	Appendix 1: RSoE monitoring sites	19
	Appendix 2: Monitoring variables and methods	20
	Physico-chemical and microbiological water quality	20
	Periphyton	22
	Macroinvertebrates	22
	Appendix 3: Physico-chemical and microbiological data	23
	Appendix 4: Additional variables analysed during 2012/13	40
	Appendix 5: Tabulated heavy metal data	56
	Appendix 6: Additional macroinvertebrate indices	58

1. Introduction

This report summarises the key results from the Rivers State of Environment (RSoE) monitoring programme for the period 1 July 2012 to 30 June 2013 inclusive. The RSoE programme incorporates monthly monitoring of water quality and periphyton cover at 55 river and stream sites across the Wellington region, and annual assessments of invertebrate community composition and periphyton biomass.

Note that the suitability of rivers for contact recreation purposes is reported separately under Greater Wellington Regional Council's (GWRC) recreational water quality monitoring programme; for the 2012/13 results, see Morar and Greenfield (2013). Information on river and stream flows is reported under GWRC's hydrological monitoring programme (see Harkness et al. 2013).

2. Overview of RSoE monitoring programme

River and stream water quality has been routinely monitored in the western half of the Wellington region since 1987 and in the Wairarapa since 1991. The monitoring programme has continued to evolve since this time with changes made to the location and number of monitoring sites, the range of variables monitored, and the methods of analysis (see Milne and Perrie (2005) and Perrie et al. (2012) for details). However, since September 2003, the RSoE monitoring programme has remained largely unchanged, with only minor changes to the existing suite of monitoring sites and variables.

2.1 Monitoring objectives

The aims of GWRC's Rivers SoE monitoring programme are to:

1. Assist in the detection of spatial and temporal changes in rivers and streams;
2. Contribute to our understanding of freshwater biodiversity in the Wellington region;
3. Determine the suitability of rivers and streams for designated uses;
4. Provide information to assist in targeted investigations where remediation or mitigation of poor water quality or ecosystem health is desired; and
5. Provide information required to determine the effectiveness of regional plans and policies.

2.2 Monitoring network

Water quality and ecosystem health are currently monitored at 55 river and stream sites (Figure 2.1, Appendix 1). These sites were chosen to represent the major land uses and human activities, and also the natural diversity of rivers and streams, in the Wellington region.

2.3 Monitoring variables

2.3.1 Water quality variables

River and stream water quality is assessed at monthly intervals by measuring a range of physico-chemical and microbiological variables: dissolved oxygen, temperature, pH, conductivity, visual clarity, turbidity, suspended solids, faecal indicator bacteria, total organic carbon, and dissolved and total nutrients. Water samples from ten RSoE sites located in urban catchments with likely exposure to heavy metal inputs, or which discharge into sensitive downstream receiving environments (eg, harbours and estuaries), are also analysed for dissolved concentrations of copper, lead and zinc.

During the 2012/13 year, a suite of additional anions and cations were also analysed from water samples collected at each of the 55 RSoE sites. These additional variables are monitored approximately every five years for a 12-month period and provide useful information on the underlying water chemistry of the region's rivers and streams. The full list of variables monitored, together with details of field and analytical methods, is provided in Appendix 2.

2.3.2 Biological variables

Water quality in the region's rivers and streams is also assessed through annual biological monitoring, incorporating semi-quantitative assessments of macroinvertebrate communities and periphyton biomass during stable/low flows in summer/autumn. Assessments of periphyton (which includes taxonomic identification) are only undertaken at sites with hard substrates such as cobbles and large gravel (46 in total, see Appendix 1 for RSoE site substrate types). Periphyton cover is also assessed monthly at these sites at the time of water sample collection. Details of current biological monitoring methods are summarised in Appendix 2.

3. Physico-chemical and microbiological water quality

3.1 Approach to analysis

In this section a water quality index is used as a comparative measure to summarise water quality across the Wellington region, based on physico-chemical and microbiological data collected monthly from July 2012 to June 2013 inclusive (see Appendices 3 and 4 for full data summaries). Concentrations of heavy metals recorded at selected urban sites are also summarised. The summary information is typically based on 12 sampling events for all 55 sites. However, access to three sites (Motuwaireka Stream at Headwaters, Coles Creek tributary at Lagoon Hill Road and Parkvale tributary at Lowes Reserve) was not always possible due to access issues (eg, during lambing or calving) or safety concerns (eg, access tracks dangerous during winter).

During data processing, any water quality variables reported as less than or greater than detection limits were replaced by values one half of the detection limit or the detection limit respectively (eg, a value of <2 became 1, a value of >400 became 400). The exception is minimum values reported in the tabulated summaries in Appendices 3 and 4 (ie, if a value was reported as <2 the minimum value presented is <2).

3.1.1 Water quality index

A water quality index (WQI), as described in Perrie (2007) and Perrie et al. (2012), is used to facilitate inter-site comparisons of the state of water quality in the region's rivers and streams. The WQI is derived from the *median* values of the following six variables: visual clarity (black disc), dissolved oxygen (% saturation), dissolved reactive phosphorus, ammoniacal nitrogen, nitrite-nitrate nitrogen and *Escherichia coli* (*E. coli*).

The application of the WQI enables water quality at each site to be classified into one of four categories as follows:

- Excellent: median values for all 6 variables comply with guideline values
- Good: median values for 5 of the 6 variables comply with guideline values, of which dissolved oxygen is one variable that must comply¹
- Fair: median values for 3 or 4 of the 6 variables comply with guideline values, of which dissolved oxygen is one variable that must comply¹
- Poor: median values for <3 of the 6 variables comply with guideline values.

The guidelines used in the WQI assessment are listed in Table 3.1. Refer to Perrie (2007) and Perrie et al. (2012) for further discussion on these guidelines.

¹ If the median dissolved oxygen concentration does not comply with the guideline value, then the WQI grade automatically drops to 'poor'.

Table 3.1: Physico-chemical and microbiological variables and guideline values used in GWRC's WQI

Variable	Guideline value	Reference
Dissolved oxygen (% saturation)	≥80	RMA 1991 Third Schedule
Visual clarity (m)	≥1.6	MfE (1994)
Nitrite-nitrate nitrogen (mg/L)	≤0.444	ANZECC & ARMCANZ (2000)
Ammoniacal nitrogen (mg/L)	≤0.021	ANZECC & ARMCANZ (2000)
Dissolved reactive phosphorus (mg/L)	≤0.010	ANZECC & ARMCANZ (2000)
<i>E. coli</i> (cfu/100mL)	≤100	ANZECC & ARMCANZ (2000)

As outlined in Perrie (2007), the WQI is for comparative purposes rather than an absolute measure of water quality; sites with a grade of 'good', 'fair', or 'poor' are all considered degraded to some degree because the median value of at least one of the six physico-chemical or microbiological variables in the WQI exceeded a guideline value. In addition, as the WQI is based on median values (ie, 50% compliance), sites awarded the same water quality grade may exhibit varying degrees of compliance (from 51 to 100%) with the guideline value. Therefore, to differentiate between 'better' and 'poorer' sites, the sites within each WQI class are ranked based on the number of guideline exceedances for each of the six key variables (ie, a site that exceeded a guideline on 40% of sampling occasions will be ranked lower than a site with the same WQI grade that exceeded the guideline on 10% of sampling occasions).

3.1.2 Heavy metals

Median heavy metal concentrations are compared against ANZECC (2000) chronic toxicity 'trigger values' (95% level of protection). Because water hardness affects the toxicity of some heavy metals, where a median concentration exceeds the trigger value, site-specific, hardness-modified trigger values are calculated based on recommendations and equations in ANZECC (2000). These calculations are made using heavy metal and total hardness concentrations for each sampling occasion, with a breach of the chronic toxicity guidelines defined as occurring when a site exceeds its hardness-modified trigger value on more than 50% of sampling occasions.

3.2 Results

3.2.1 Water quality index

Application of the WQI resulted in the following overall water quality grades for the 55 RSoE sites monitored in the Wellington region over the July 2012 to June 2013 reporting period (Table 3.2, Figure 3.1):

- Excellent: 21 sites (38.2%)
- Good: 10 sites (18.2%)
- Fair: 13 sites (23.6%)
- Poor 11 sites (20.0%)

Table 3.2: Water Quality Index grades for RSoE sites sampled at monthly intervals over July 2012 to June 2013 inclusive, based on compliance of median dissolved oxygen (DO), visual clarity (clarity), *E. coli*, nitrite-nitrate nitrogen (NNN), ammoniacal nitrogen (Amm. N) and dissolved reactive phosphorus (DRP) values with guideline values

Rank	Site no.	Site name	Guideline compliance (median values)					
			DO	Clarity	<i>E. coli</i>	NNN	Amm. N	DRP
<i>Excellent water quality</i>								
1=	RS20	Hutt R at Te Marua Intake Site	✓	✓	✓	✓	✓	✓
	RS05	Otaki R at Pukehinou	✓	✓	✓	✓	✓	✓
	RS31	Ruamahanga R at McLays	✓	✓	✓	✓	✓	✓
	RS52	Tauanui R at Whakatomotomo Rd	✓	✓	✓	✓	✓	✓
	RS47	Waiohine R at Gorge	✓	✓	✓	✓	✓	✓
	RS03	Waitohu S at Forest Park	✓	✓	✓	✓	✓	✓
7	RS23	Pakuratahi R 50m below Farm Crk	✓	✓	✓	✓	✓	✓
8	RS43	Motuwaireka S at headwaters	✓	✓	✓	✓	✓	✓
9	RS56	Waiorongomai R at Forest Pk	✓	✓	✓	✓	✓	✓
10=	RS25	Akatarawa R at Hutt confluence	✓	✓	✓	✓	✓	✓
	RS06	Otaki R at mouth	✓	✓	✓	✓	✓	✓
12	RS49	Beef Ck at headwaters	✓	✓	✓	✓	✓	✓
13=	RS21	Hutt R opposite Manor Park GC	✓	✓	✓	✓	✓	✓
	RS55	Tauherenikau R at Websters	✓	✓	✓	✓	✓	✓
15	RS26	Whakatikei R at Riverstone	✓	✓	✓	✓	✓	✓
16=	RS35	Mataikona trib at Sugar Loaf Rd	✓	✓	✓	✓	✓	✓
	RS10	Waikanae R at Greenaway Rd	✓	✓	✓	✓	✓	✓
18	RS44	Totara S at Stronvar	✓	✓	✓	✓	✓	✓
19=	RS22	Hutt R at Boulcott	✓	✓	✓	✓	✓	✓
	RS30	Orongorongo R at Orongorongo Stn	✓	✓	✓	✓	✓	✓
	RS41	Waingawa R at South Rd	✓	✓	✓	✓	✓	✓
<i>Good water quality</i>								
22	RS54	Coles Ck Trib at Lagoon Hill Rd	✓	x	✓	✓	✓	✓
23	RS28	Wainuiomata R at Manuka Track	✓	✓	✓	✓	✓	x
24	RS09	Waikanae R at Mangaone Walkway	✓	✓	✓	✓	✓	x
25	RS40	Waipoua R at Colombo Rd Br	✓	✓	✓	x	✓	✓
26	RS29	Wainuiomata R d/s of White Br	✓	✓	✓	✓	✓	x
27	RS32	Ruamahanga R at Te Ore Ore	✓	✓	x	✓	✓	✓
28	RS48	Waiohine R at Bicknells	✓	✓	✓	✓	✓	x
29	RS53	Awhea R at Tora Rd	✓	x	✓	✓	✓	✓
30	RS42	Whareama R at Gauge	✓	x	✓	✓	✓	✓
31	RS33	Ruamahanga R at Gladstone Br	✓	✓	✓	✓	✓	x
<i>Fair water quality</i>								
32	RS51	Huangaia R at Ponatahi Br	✓	x	x	✓	✓	✓
33	RS36	Taueru R at Castlehill	✓	x	x	✓	✓	✓
34	RS24	Mangaroa R at Te Marua	✓	x	x	✓	✓	✓
35	RS34	Ruamahanga R at Pukio	✓	x	✓	✓	✓	x
36	RS37	Taueru R at Gladstone	✓	x	✓	x	✓	✓
37	RS13	Horokiri S at Snodgrass	✓	✓	x	x	✓	x
38	RS11	Whareroa S at Waterfall Rd	✓	x	x	✓	✓	x
39=	RS17	Makara S at Kennels	✓	x	x	✓	✓	x
	RS14	Pauatahanui S at Elmwood Br	✓	x	x	✓	✓	x
41	RS19	Kaiwharawhara S at Ngaio Gorge	✓	✓	x	x	✓	x
42	RS15	Porirua S at Glenside	✓	✓	x	x	✓	x
43	RS18	Karori S at Makara Peak	✓	✓	x	x	✓	x
44	RS04	Waitohu S at Norfolk Cres	✓	x	x	✓	✓	x
<i>Poor water quality</i>								
45	RS45	Parkvale Trib at Lowes Res.	x	✓	✓	x	✓	x
46	RS46	Parkvale S at Weir	✓	x	x	x	✓	x
47	RS38	Kopuaranga R at Stewarts	✓	x	x	x	✓	x
48	RS50	Mangatarere S at SH 2	✓	✓	x	x	x	x
49	RS16	Porirua S at Wall Park (Milk Depot)	✓	x	x	x	✓	x
50	RS39	Whangaehu R 250m u/s confl.	✓	x	x	x	✓	x
51	RS08	Ngarara S at Field Way	x	x	x	✓	✓	x
52	RS12	Whareroa S at QE Park	x	x	x	✓	x	x
53	RS57	Waiwhetu S at Whites Line East	x	x	x	x	x	x
54	RS02	Mangapouri S at Bennetts Rd	x	x	x	x	x	x
55	RS07	Mangaone S at Sims Rd Br	x	x	x	x	x	x

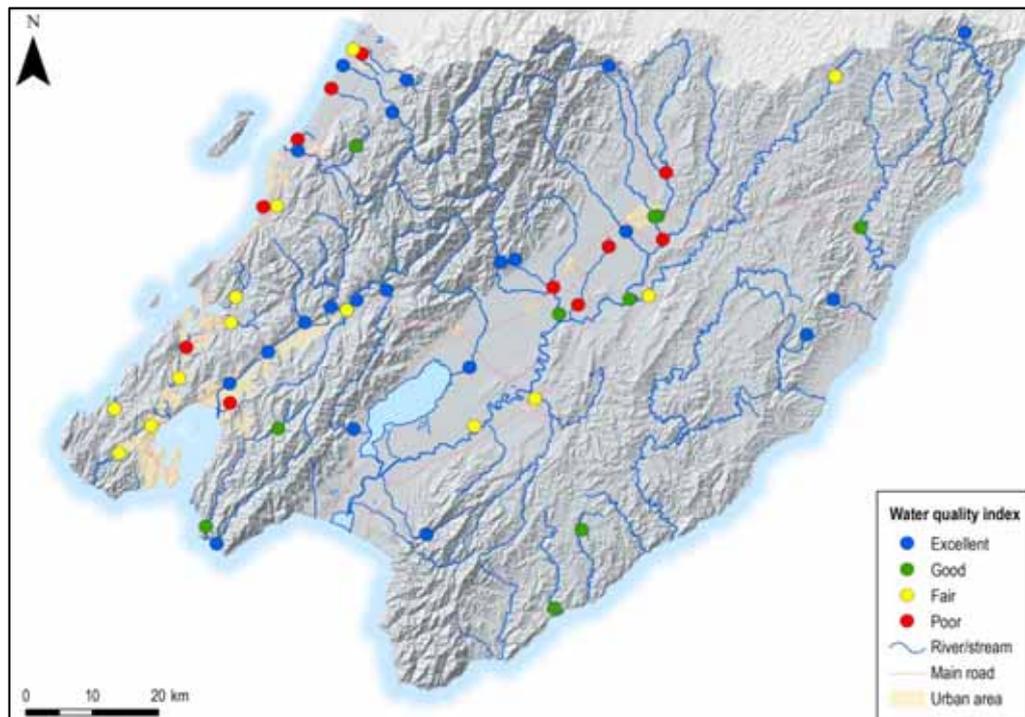


Figure 3.1: Water Quality Index grades for RSoE sites sampled at monthly intervals between July 2012 and June 2013, based on compliance of median dissolved oxygen, visual clarity, nitrite-nitrate nitrogen, ammoniacal nitrogen, dissolved reactive phosphorus and *E. coli* values with guideline values

Nineteen of the 21 RSoE sites graded 'excellent' are located on river and stream reaches in catchments with predominantly unmodified indigenous forest cover (refer Appendix 1 for dominant land cover). These tend to be sites on rivers flowing out of the Aorangi, Tararua and Rimutaka ranges and include the Otaki, Tauanui and Waiorongomai rivers, and the upper reaches of the Hutt, Waitohu and Ruamahanga rivers. In contrast, RSoE sites graded 'poor' are typically located on small rivers or streams draining predominantly pastoral (seven sites) or urban (four sites) catchments. Sites with the poorest water quality during 2012/13 were the Mangaone Stream at Sims Road Bridge, Mangapouri Stream at Bennetts Road and Waiwhetu Stream at Whites Line East (Table 3.2).

The water quality variables that most commonly exceeded guideline values (based on median values) were dissolved reactive phosphorus (25 sites), followed by *E. coli* (22 sites) visual clarity (21 sites) and nitrite-nitrate nitrogen (15 sites). Guidelines for ammoniacal nitrogen and dissolved oxygen were not met at five and six sites, respectively.

3.2.2 Heavy metals

Dissolved lead concentrations were below the ANZECC (2000) default trigger values on all sampling occasions at all ten sites where heavy metals were tested. Median concentrations of dissolved copper and zinc exceeded their respective default trigger values at two and three sites, respectively. Once local water hardness was taken into account and the site-specific, hardness-modified trigger values applied, one site (Porirua Stream at Wall Park) exceeded its modified guideline for dissolved copper, and three sites (Karori Stream at Makara

Mountain Bike Park, Porirua Stream at Wall Park and Waiwhetu Stream at Whites Line East) exceeded their modified guidelines for dissolved zinc. Heavy metal summary statistics, including exceedance of trigger values, can be found in Appendix 5.

4. Periphyton cover and biomass

4.1 Approach to analysis

Assessment of periphyton data is limited to RSoE sites with hard substrates (46 of the 55 sites). Monthly observations of percent streambed periphyton cover, from July 2012 to June 2013 inclusive, and an assessment of periphyton biomass (chlorophyll *a* and Ash Free Dry Mass (AFDM)) undertaken in late summer/early autumn 2013 are compared against various MfE (2000) guidelines (Table 4.1).

Table 4.1: MfE (2000) guidelines used to assess periphyton streambed cover and biomass

Instream value/variable	Mat periphyton	Filamentous periphyton
<i>Aesthetics/recreation</i>		
Maximum cover of visible streambed	60% >0.3 cm thick	30% >2 cm long
<i>Benthic biodiversity</i>		
Maximum chlorophyll <i>a</i>	50 mg/m ²	50 mg/m ²
<i>Trout habitat and angling</i>		
Maximum AFDM	35 g/m ²	35 g/m ²
Maximum cover of visible streambed	N/A	30% >2 cm long

4.2 Results

The number of observations of streambed periphyton cover made during the reporting period varied among the 46 RSoE sites due to either site access being restricted or because turbid water or high flows prevented periphyton assessments being carried out.

Of the 46 RSoE sites, 17 exceeded the MfE (2000) guideline for filamentous periphyton streambed cover on at least one sampling occasion (Table 4.2). The sites that most often exceeded the guideline were Huangarua River at Ponatahi Bridge (six times), Mangatarere Stream at SH 2 (five times) and Taueru River at Gladstone (five times). These sites are all located in the Wairarapa and in catchments dominated by pastoral land use.

No sites exceeded the MfE (2000) guideline for mat-forming periphyton cover during the reporting period. It is important to note that observations of periphyton cover are typically undertaken in run habitat², whereas some mat-forming periphyton (particularly cyanobacteria) tend to proliferate initially in riffle habitat³ and then in runs (MfE & MoH 2009). Thus the results presented here may not accurately represent the presence of mat-forming periphyton, or exceedance of mat-forming periphyton guidelines.

² A run has a character in between that of a riffle and pool, it is moderate in depth and typically has a uniform current and an unbroken surface.

³ A riffle is an area of shallow depth, moderate to fast water velocity, with mixed currents and an unbroken but rippled surface.

Table 4.2: Summary of monthly observations at RSoE sites, over July 2012 to June 2013 inclusive, of visible streambed filamentous and mat-forming periphyton cover in relation to exceedances of the MfE (2000) guidelines

Site no.	Site name	n	Streambed cover (%)			
			Filamentous (>2 cm long)		Mats (>0.3 cm thick)	
			Max	n >30% cover	Max	n >60% cover
RS03	Waitohu S at Forest Pk	12	2	0	6	0
RS05	Otaki R at Pukehinau	11	25	0	2	0
RS06	Otaki R at Mouth	11	70	2	22	0
RS09	Waikanae R at Mangaone Walkway	11	0	0	0	0
RS10	Waikanae R at Greenaway Rd	10	30	0	32	0
RS11	Whareroa S at Waterfall Rd	11	0	0	0	0
RS13	Horokiri S at Snodgrass	10	21	0	8	0
RS14	Pauatahanui S at Elmwood Br	9	13	0	3	0
RS15	Porirua S at Glenside	10	4	0	3	0
RS16	Porirua S at Wall Park (Milk Depot)	8	99	2	0	0
RS17	Makara S at Kennels	10	18	0	0	0
RS18	Karori S at Makara Peak M.B. Park	11	35	1	0	0
RS19	Kaiwharawhara S at Ngaio Gorge	10	95	4	0	0
RS20	Hutt R at Te Marua Intake Site	11	0	0	4	0
RS21	Hutt R opp. Manor Park G.C.	10	7	0	15	0
RS22	Hutt R at Boulcott	8	60	1	52	0
RS23	Pakuratahi R 50m d/s Farm Ck	11	4	0	31	0
RS24	Mangaroa R at Te Marua	11	51	2	16	0
RS25	Akatarawa R at Hutt confl.	11	0	0	17	0
RS26	Whakatikei R at Riverstone	11	14	0	10	0
RS28	Wainuiomata R at Manuka Track	12	0	0	1	0
RS29	Wainuiomata R u/s of White Br	11	50	2	32	0
RS30	Orongorongo R at Orongorongo Stn	9	49	1	2	0
RS31	Ruamahanga R at McLays	10	24	0	0	0
RS32	Ruamahanga R at Te Ore Ore	10	22	0	5	0
RS33	Ruamahanga R at Gladstone Br	10	51	3	21	0
RS34	Ruamahanga R at Pukio	11	52	1	0	0
RS35	Mataikona Trib at Sugar Loaf Rd	10	14	0	30	0
RS37	Taueru R at Gladstone	8	100	5	57	0
RS38	Kopuaranga R at Stewarts	9	92	3	23	0
RS40	Waipoua R at Colombo Rd Br	10	45	1	42	0
RS41	Waingawa R at South Rd	7	7	0	9	0
RS43	Motuwaireka S at Headwaters	10	9	0	0	0
RS44	Totara S at Stronvar	9	71	1	50	0
RS45	Parkvale Trib at Lowes Res.	10	0	0	0	0
RS46	Parkvale S at Weir	8	30	0	11	0
RS47	Waiohine R at Gorge	10	8	0	3	0
RS48	Waiohine R at Bicknells	8	15	0	7	0
RS49	Beef Ck at Headwaters	12	0	0	0	0
RS50	Mangatarere S at SH 2	10	98	5	5	0
RS51	Huangularua R at Ponatahi Br	8	91	6	30	0
RS52	Tauanui R at Whakatomotomo Rd	12	5	0	2	0
RS53	Awhea R at Tora Rd	7	92	4	0	0
RS54	Coles Ck Trib at Lagoon Hill Rd	8	20	0	0	0
RS55	Tauherenikau R at Websters	10	11	0	0	0
RS56	Waiorongomai R at Forest Pk	11	5	0	0	0

Thirteen RSoE sites exceeded the MfE (2000) chlorophyll *a* guideline for benthic biodiversity (Table 4.3). The highest chlorophyll *a* biomass recorded was in the Kopuaranga River at Stewarts (312.8 mg/m²). The Kopuaranga River at Stewarts and Huangarua River at Ponatahi Bridge were the only two sites that exceeded the MfE (2000) AFDM guideline for trout habitat and angling (45.8 g/m² and 61.9 g/m², respectively).

There was a reasonable relationship between periphyton guideline compliance and WQI grades. In general, sites with 'excellent' water quality were more likely to comply with guidelines for both periphyton cover and biomass than sites assigned lower WQI grades. However, at some sites variables other than water quality, such as accrual periods and streamside shade, more strongly influence periphyton growth and hence compliance with guidelines.

Table 4.3: Periphyton biomass (AFDM and chlorophyll *a*) from one-off sampling during late summer/autumn 2013. Non-compliance with MfE (2000) guidelines is highlighted in bold type

Site no.	Site name	AFDM (g/m ²)	Chlorophyll <i>a</i> (mg/m ²)
RS03	Waitohu S at Forest Pk	0.73	1.58
RS05	Otaki R at Pukehinau	0.85	1.56
RS06	Otaki R at Mouth	1.41	2.04
RS09	Waikanae R at Mangaone Walkway	0.72	0.29
RS10	Waikanae R at Greenaway Rd	4.42	14.02
RS11	Whareroa S at Waterfall Rd	3.05	0.13
RS13	Horokiri S at Snodgrass	3.87	54.29
RS14	Pauatahanui S at Elmwood Br	14.86	76.66
RS15	Porirua S at Glenside	1.43	8.80
RS16	Porirua S at Wall Park (Milk Depot)	6.44	38.82
RS17	Makara S at Kennels	2.57	6.34
RS18	Karori S at Makara Peak M.B. Park	4.96	38.67
RS19	Kaiwharawhara S at Ngaio Gorge	22.85	144.43
RS20	Hutt R at Te Marua Intake Site	1.19	3.52
RS21	Hutt R opp. Manor Park G.C.	2.89	7.20
RS22	Hutt R at Boulcott	10.97	30.83
RS23	Pakuratahi R 50m d/s Farm Ck	2.02	17.87
RS24	Mangaroa R at Te Marua	16.33	96.28
RS25	Akatarawa R at Hutt confl.	0.88	0.86
RS26	Whakatikei R at Riverstone	2.74	9.52
RS28	Wainuiomata R at Manuka Track	1.65	8.14
RS29	Wainuiomata R u/s of White Br	9.60	41.29
RS30	Orongorongo R at Orongorongo Stn	6.67	10.41
RS31	Ruamahanga R at McLays	0.04	0.14
RS32	Ruamahanga R at Te Ore Ore	5.22	35.66
RS33	Ruamahanga R at Gladstone Br	12.45	61.92
RS34	Ruamahanga R at Pukio	34.75	150.67
RS35	Mataikona Trib at Sugar Loaf Rd	1.75	2.13
RS37	Taueru R at Gladstone	27.39	98.44
RS38	Kopuaranga R at Stewarts	45.76	312.80
RS40	Waipoua R at Colombo Rd Br	26.03	149.64
RS41	Waingawa R at South Rd	14.73	88.24
RS43	Motuwaireka S at Headwaters	4.27	3.45
RS44	Totara S at Stronvar	7.47	8.87
RS45	Parkvale Trib at Lowes Res.	5.33	5.71
RS46	Parkvale S at Weir	21.61	140.19
RS47	Waiohine R at Gorge	0.46	1.52
RS48	Waiohine R at Bicknells	4.89	17.61
RS49	Beef Ck at Headwaters	1.03	4.61
RS50	Mangatarere S at SH 2	20.38	170.56
RS51	Huangarua R at Ponatahi Br	61.94	70.07
RS52	Tauanui R at Whakatomotomo Rd	1.05	2.29
RS53	Awhea R at Tora Rd	13.89	22.54
RS54	Coles Ck Trib at Lagoon Hill Rd	15.57	19.03
RS55	Tauherenikau R at Websters	0.20	0.66
RS56	Waiorongomai R at Forest Pk	3.11	28.03

5. Macroinvertebrates

5.1 Approach to analysis

Macroinvertebrate sampling was undertaken at each of the 55 RSoE sites during late summer/early autumn 2013. The Macroinvertebrate Community Index (MCI) – an index of sensitivity to a complex of environmental variables (Stark & Maxted 2007) – is used to summarise macroinvertebrate health. Additional macroinvertebrate indices (QMCI, %EPT taxa, and taxa richness)⁴ are presented in Appendix 6. Refer to Perrie et al. (2012) for further explanation of these indices.

The quality classifications, as recommended by Stark and Maxted (2007), for interpretation of the MCI scores are outlined in Table 5.1. Soft bottomed MCI scores (MCI-sb) have also been calculated for the nine RSoE sites with soft substrates (see Appendix 1).

Table 5.1: Interpretation of MCI-type scores (from Stark & Maxted 2007)

Quality class	MCI and MCI-sb
Excellent	≥ 120
Good	100–119
Fair	80–99
Poor	<80

5.2 Results

The MCI scores based on one sample collected from each monitoring site are presented in Table 5.2. The 55 RSoE sites fell into the following MCI quality classes (Figure 5.1):

- Excellent: 19 sites (34.5%)
- Good: 19 sites (34.5%)
- Fair: 9 sites (16.4 %)
- Poor: 8 sites (14.5 %)

The majority (17 of 19) of the RSoE sites in the ‘excellent’ MCI quality class are located in catchments dominated by indigenous forest cover (eg, Ruamahanga River at McLays). The eight RSoE sites in the ‘poor’ quality class are located in catchments dominated by either pastoral landcover (five sites) or urban landcover (three sites). Sites with soft-sediment substrate are also over-represented in this ‘poor’ class, with eight of the nine soft-sediment sites classed as poor.

There was a reasonable relationship between the MCI quality classes and WQI grades. For example, of the 19 RSoE sites with an ‘excellent’ MCI quality class, 15 had a WQI grade of ‘excellent’ and three a WQI grade of ‘good’ (refer Section 3.2.1). Similarly, six of the eight RSoE sites with an MCI quality class of ‘poor’ also had a WQI grade of ‘poor’. The relationship between water quality and macroinvertebrate health based on WQI grades and MCI quality grades was less clear in the ‘good’ and ‘fair’ classes.

⁴ QMCI = Quantitative MCI and %EPT taxa = the percentage of pollution-sensitive Ephemeroptera (mayfly), Plecoptera (stonefly) and Trichoptera (caddisfly) taxa. See Perrie et al. (2012) for index calculation details.

Table 5.2: MCI scores for RSoE sites sampled in summer/autumn 2013
 (* denotes MCI-sb scores that were used to apply quality classes at soft-bottomed sites while values in brackets are the MCI-hb scores for these sites)

Site no.	Site name	MCI score	MCI quality class
RS02	Mangapouri S at Bennetts Rd	57.2* (71)	Poor
RS03	Waitohu S at Forest Pk	145.4	Excellent
RS04	Waitohu S at Norfolk Cres	74.7* (97)	Poor
RS05	Otaki R at Pukehinau	126.7	Excellent
RS06	Otaki R at Mouth	105	Good
RS07	Mangaone S at Sims Rd Br	59.7* (72)	Poor
RS08	Ngarara S at Field Way	65.5* (87.5)	Poor
RS09	Waikanae R at Mangaone Walkway	136.7	Excellent
RS10	Waikanae R at Greenaway Rd	116.0	Good
RS11	Whareroa S at Waterfall Rd	105.9	Good
RS12	Whareroa S at QE Park	64.1* (81.3)	Poor
RS13	Horokiri S at Snodgrass	116.5	Good
RS14	Pauatahanui S at Elmwood Br	100.0	Good
RS15	Porirua S at Glenside	118.6	Good
RS16	Porirua S at Wall Park (Milk Depot)	93.7	Fair
RS17	Makara S at Kennels	122.7	Excellent
RS18	Karori S at Makara Peak	100.8	Good
RS19	Kaiwharawhara S at Ngaio Gorge	81.1	Fair
RS20	Hutt R at Te Marua Intake Site	140.0	Excellent
RS21	Hutt R opp. Manor Park G.C.	126.7	Excellent
RS22	Hutt R at Boulcott	107.3	Good
RS23	Pakuratahi R 50m d/s Farm Ck	131.0	Excellent
RS24	Mangaroa R at Te Marua	118.3	Good
RS25	Akatarawa R at Hutt confl.	128.0	Excellent
RS26	Whakatikei R at Riverstone	129.6	Excellent
RS28	Wainuiomata R at Manuka Track	138.2	Excellent
RS29	Wainuiomata R d/s of White Br	107.0	Good
RS30	Orongorongo R at Orongorongo Stn	124.8	Excellent
RS31	Ruamahanga R at McLays	144.5	Excellent
RS32	Ruamahanga R at Te Ore Ore	113.3	Good
RS33	Ruamahanga R at Gladstone Br	108.2	Good
RS34	Ruamahanga R at Pukio	113.3	Good
RS35	Mataikona Trib at Sugar Loaf Rd	133.1	Excellent
RS36	Taueru R at Castlehill	118.4* (110)	Good
RS37	Taueru R at Gladstone	94.6	Fair
RS38	Kopuaranga R at Stewarts	94.7	Fair
RS39	Whangaehu R 250m u/s confl.	64.2* (78.6)	Poor
RS40	Waipoua R at Colombo Rd Br	94.2	Fair
RS41	Waingawa R at South Rd	117.9	Good
RS42	Whareama R at Gauge	67.2* (93.3)	Poor
RS43	Motuwaireka S at Headwaters	124.7	Excellent
RS44	Totara S at Stronvar	100.9	Good
RS45	Parkvale Trib at Lowes Res.	98.2	Fair
RS46	Parkvale S at Weir	80.0	Fair
RS47	Waiohine R at Gorge	126.4	Excellent
RS48	Waiohine R at Bicknells	122.1	Excellent
RS49	Beef Ck at Headwaters	124.7	Excellent
RS50	Mangatarere S at SH 2	101.7	Good
RS51	Huangaaru R at Ponatahi Br	97.0	Fair
RS52	Tauanui R at Whakatomotomo Rd	121.4	Excellent
RS53	Awhea R at Tora Rd	80.0	Fair
RS54	Coles Ck Trib at Lagoon Hill Rd	118.7	Good
RS55	Tauherenikau R at Websters	110.7	Good
RS56	Waiorongomai R at Forest Pk	126.9	Excellent
RS57	Waiwhetu S at Whites Line East	47.9* (60)	Poor

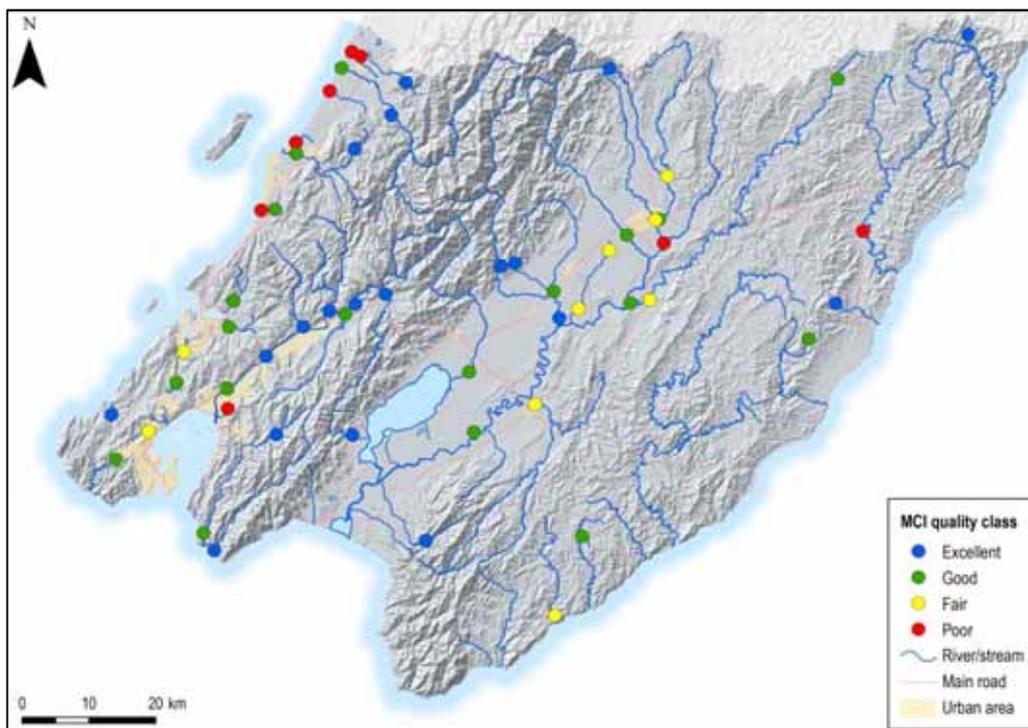


Figure 5.1: MCI quality classes for the 55 RSoE sites, determined from one sampling event over summer/autumn 2012/13

Sites that recorded higher MCI scores were also more likely to comply with both periphyton cover and biomass guidelines. For example, out of the 25 sites that complied with all periphyton guidelines, 18 had MCI grades of ‘excellent’ and six sites had MCI scores of ‘good’.

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Juliet Milne reviewed a draft version of this report.

Appendix 1: RSOE monitoring sites

Site no.	Site name	NZTM site coordinates		Substrate (hard or soft bottomed)	REC	Dominant land cover
		Easting	Northing			
RS02	Mangapouri S at Bennetts Rd*	1780903	5487645	Soft	WD/L/AI/U**	Urban
RS03	Waitohu S at Forest Pk	1787593	5483689	Hard	CW/H/HS/IF	Indigenous forest
RS04	Waitohu S at Norfolk Cres	1779537	5488304	Soft	CW/L/HS/P	Pasture
RS05	Otaki R at Pukehinau	1785426	5478749	Hard	CW/H/HS/IF	Indigenous forest
RS06	Otaki R at Mouth	1777983	5485886	Hard	CW/H/HS/IF	Indigenous forest
RS07	Mangaone S at Sims Rd Br	1776242	5482408	Soft	WW/L/AL/P	Pasture
RS08	Ngarara S at Field Way*	1771180	5474620	Soft	WW/L/AL/U**	Urban
RS09	Waikanae R at Mangaone Walkway	1779974	5473638	Hard	CW/L/HS/IF	Indigenous forest
RS10	Waikanae R at Greenaway Rd*	1771223	5472915	Hard	CW/L/HS/IF**	Indigenous forest
RS11	Whareroa S at Waterfall Rd	1768074	5464532	Hard	WW/L/HS/IF**	Indigenous forest
RS12	Whareroa S at QE Park	1765976	5464400	Soft	WW/L/HS/P	Pasture
RS13	Horokiri S at Snodgrass	1761804	5450653	Hard	CW/L/HS/P	Pasture
RS14	Pauatahanui S at Elmwood Br	1761097	5446783	Hard	CW/L/HS/P	Pasture
RS15	Porirua S at Glenside*	1753289	5438364	Hard	CW/L/HS/U	Urban
RS16	Porirua S at Wall Park (Milk Depot)*	1754366	5443031	Hard	WW/L/HS/U	Urban
RS17	Makara S at Kennels	1743530	5433635	Hard	CW/L/HS/P	Pasture
RS18	Karori S at Makara Peak*	1744213	5426874	Hard	CW/L/HS/U	Urban
RS19	Kaiwharawhara S at Ngaio Gorge*	1749069	5431077	Hard	CW/L/HS/U	Urban
RS20	Hutt R at Te Marua Intake Site	1780071	5450158	Hard	CX/H/HS/IF	Indigenous forest
RS21	Hutt R opp. Manor Park G.C.*	1766679	5442285	Hard	CW/H/HS/IF	Indigenous forest
RS22	Hutt R at Boulcott*	1760858	5437486	Hard	CW/L/HS/IF	Indigenous forest
RS23	Pakuratahi R 50m d/s Farm Ck	1784607	5451677	Hard	CX/H/HS/IF	Indigenous forest
RS24	Mangaroa R at Te Marua	1778543	5448643	Hard	CW/L/HS/P	Pasture
RS25	Akatarawa R at Hutt conf.	1776183	5449184	Hard	CW/L/HS/IF	Indigenous forest
RS26	Whakatikei R at Riverstone	1772256	5446748	Hard	CW/L/HS/S	Indigenous forest
RS28	Wainuiomata R at Manuka Track	1768242	5430634	Hard	CW/L/HS/IF	Indigenous forest
RS29	Wainuiomata R u/s of White Br	1757316	5415724	Hard	CW/L/HS/IF	Indigenous forest
RS30	Orongorongo R at Orongorongo Stn	1758930	5413095	Hard	CW/H/HS/IF	Indigenous forest
RS31	Ruamahanga R at McLays	1818149	5485809	Hard	CX/H/HS/S	Indigenous forest
RS32	Ruamahanga R at Te Ore Ore	1825574	5463019	Hard	CW/L/SS/P	Pasture
RS33	Ruamahanga R at Gladstone Br	1821208	5450327	Hard	CW/L/SS/P	Pasture
RS34	Ruamahanga R at Pukio	1797832	5431010	Hard	CW/L/SS/P	Pasture
RS35	Mataikona Trib at Sugar Loaf Rd	1871844	5490906	Hard	CW/L/SS/IF**	Indigenous forest
RS36	Taueru R at Castlehill	1852300	5484198	Soft	CW/L/SS/P	Pasture
RS37	Taueru R at Gladstone	1824148	5450815	Hard	CD/L/SS/P	Pasture
RS38	Kopuaranga R at Stewarts	1826761	5469569	Hard	CW/L/SS/P	Pasture
RS39	Whangaehu R 250m u/s conf.	1826267	5459407	Soft	CD/L/SS/P	Pasture
RS40	Waipoua R at Colombo Rd Br	1825018	5462890	Hard	CW/L/HS/P	Pasture
RS41	Waingawa R at South Rd	1820716	5460649	Hard	CX/H/HS/IF	Indigenous forest
RS42	Whareama R at Gauge	1856090	5461229	Soft	WW/L/SS/P	Pasture
RS43	Motuwaireka S at Headwaters	1852018	5450302	Hard	CW/L/HS/S	Indigenous forest
RS44	Totara S at Stronvar	1848025	5444916	Hard	CW/L/HS/EF	Exotic forest
RS45	Parkvale Trib at Lowes Res.	1818094	5458352	Hard	WD/L/AI/P	Pasture
RS46	Parkvale S at Weir	1813515	5449469	Hard	WD/L/AI/P	Pasture
RS47	Waiohine R at Gorge	1801889	5455995	Hard	CX/H/HS/IF	Indigenous forest
RS48	Waiohine R at Bicknells	1810615	5448099	Hard	CW/H/HS/P	Pasture
RS49	Beef Ck at Headwaters	1803963	5456398	Hard	CW/L/HS/S	Indigenous forest
RS50	Mangatarere S at SH 2	1809768	5452160	Hard	CW/L/HS/P	Pasture
RS51	Huangarua R at Ponatahi Br	1807009	5435213	Hard	CD/L/SS/P	Pasture
RS52	Tauanui R at Whakatomotomo Rd	1790648	5414515	Hard	CW/H/HS/IF	Indigenous forest
RS53	Awhea R at Tora Rd	1809951	5403289	Hard	WW/L/SS/P	Pasture
RS54	Coles Ck Trib at Lagoon Hill Rd	1814020	5415217	Hard	WW/L/SS/S	Indigenous forest
RS55	Tauherenikau R at Websters	1797082	5439942	Hard	CW/H/HS/P**	Pasture
RS56	Waiorongomai R at Forest Pk	1779604	5430559	Hard	CW/H/HS/IF	Indigenous forest
RS57	Waiwhetu S at Whites Line East	1760977	5434510	Soft	WW/L/HS/U	Urban

*RSOE sites where water samples are also analysed for selected heavy metals.

**REC landcover class changed to reflect more up-to-date catchment scale landcover information from MfE (2010).

Appendix 2: Monitoring variables and methods

Physico-chemical and microbiological water quality

Core water quality variables measured/analysed at each RSoE site are presented in Table A2.1. Additional variables analysed during the 2012/13 period are presented in Table A2.2. As far as practicable, individual RSoE monitoring sites are sampled at the same time of the month (and usually at the same time of the day) throughout the year, and where possible all sites on a river or stream are sampled on the same day. Field meters are calibrated on the morning of the day of sampling. Water samples are collected in mid stream (where possible), typically in run-type habitat from a representative reach of stream. Samples requiring laboratory analysis are placed in chillibins with ice and couriered overnight to RJ Hill Laboratories in Hamilton. Note that water samples for dissolved nutrient and metal testing are field filtered.

Table A2.1: RSoE field and analytical water quality methods and detection limits

Variable	Method	Detection limit
Water temperature	Field meter – generally YSI ProODO	0.01 °C
Dissolved oxygen	Field meter – generally YSI ProODO	0.01 mg/L
Visual clarity	Black disc (20 mm disc if clarity <0.5 m, 60 mm disc for clarity between 0.5 m and 1.5 m, 200 mm disc for clarity >1.5 m)	0.01 m
pH	Field meter – generally YSI Professional Plus	0.01 units
Conductivity	Field meter – generally YSI Professional Plus	0.1 uS/cm
Turbidity	Analysis using a Hach 2100N, Turbidity meter. APHA 2130 B 21st Ed. 2005	0.05 NTU
Total suspended solids	Filtration using Whatman 934 AH, Advantec GC-50 or 1-2 equivalent filters (nominal pore size 1.2 - 1.5µm), gravimetric determination. APHA 2540 D 21st Ed. 2005	2 mg/L
Total organic carbon	Catalytic oxidation, IR detection, for Total C. Acidification, purging for Total Inorganic C. TOC = TC–TIC. APHA5310 B 21st Ed. 2005	0.5 mg/L
Ammoniacal nitrogen	Filtered sample. Phenol/hyperchlorite colorimetry. Discrete Analyser. (NH ₄ -N = NH ₄ ⁺ -N + NH ₃ -N) APHA 4500-NH ₃ F (modified from manual analysis) 21st Ed. 2005	0.01 mg/L
Nitrite	Automated Azo dye colorimetry, Flow injection analyser. APHA 4500-NO ₂ ⁻ I (Modified) 21st Ed. 2005	0.002 mg/L
Nitrate	Calculation: (Nitrate-N + Nitrite-N) – Nitrite-N	0.002 mg/L
Nitrate + nitrite nitrogen	Total oxidised nitrogen. Automated cadmium reduction, Flow injection analyser. APHA 4500-NO ₃ ⁻ I (Modified) 21st Ed. 2005	0.002 mg/L
Total Kjeldahl nitrogen	Kjeldahl digestion, phenol/hyperchlorite colorimetry (Discrete Analysis). APHA 4500-N Org C. (modified) 4500-NH ₃ F (modified) 21st Ed. 2005	0.1 mg/L
Total nitrogen	Calculation: TKN + Nitrate-N + Nitrite-N	0.05 mg/L
Total phosphorus	Total Phosphorus digestion, ascorbic acid colorimetry. Discrete Analyser. APHA 4500-P E (modified from manual analysis) 21st Ed. 2005	0.004 mg/L
Dissolved reactive phosphorus	Filtered sample. Molybdenum blue colorimetry. Discrete Analyser. APHA 4500-P E (modified from manual analysis) 21st Ed. 2005	0.004 mg/L
Faecal coliforms	APHA 21st Ed. Method 9222D	1 cfu/100mL
<i>E. coli</i>	APHA 21st Ed. Method 9222G	1 cfu/100mL
Dissolved copper	Filtered sample, ICP-MS, trace level. APHA 3125 B 21st Ed. 2005	0.0005 mg/L
Dissolved lead	Filtered sample, ICP-MS, trace level. APHA 3125 B 21st Ed. 2005	0.0001 mg/L
Dissolved zinc	Filtered sample, ICP-MS, trace level. APHA 3125 B 21st Ed. 2005	0.0010 mg/L

Table A2.2: Methods and detection limits for additional variables analysed over the 2012/13 period

Variable	Method	Detection limit
Bicarbonate	Calculation: from alkalinity and pH, valid where TDS is not >500 mg/L and alkalinity is almost entirely due to hydroxides, carbonates or bicarbonates. APHA 4500-CO2 D 21st Ed. 2005	1.0 mg/L at 25°C
Chloride	Filtered sample. Ferric thiocyanate colorimetry. Discrete Analyser. APHA 4500 Cl- E (modified from continuous flow analysis) 21st Ed. 2005	0.5 mg/L
Conductivity	Conductivity meter, 25°C. APHA 2510 B 21st Ed. 2005	0.1 µS/cm
Dissolved aluminium	Filtered sample, ICP-MS, trace level. APHA 3125 B 21st Ed. 2005	0.003 mg/L
Dissolved arsenic	Filtered sample, ICP-MS, trace level. APHA 3125 B 21st Ed. 2005	0.001 mg/L
Dissolved boron	Filtered sample, ICP-MS, trace level. APHA 3125 B 21st Ed. 2005	0.005 mg/L
Dissolved calcium	Filtered sample, ICP-MS, trace level. APHA 3125 B 21st Ed. 2005	0.05 mg/L
Dissolved iron	Filtered sample, ICP-MS, trace level. APHA 3125 B 21st Ed. 2005	0.02 mg/L
Dissolved magnesium	Filtered sample, ICP-MS, trace level. APHA 3125 B 21st Ed. 2005	0.02 mg/L
Dissolved manganese	Filtered sample, ICP-MS, trace level. APHA 3125 B 21st Ed. 2005	0.0005 mg/L
Dissolved potassium	Filtered sample, ICP-MS, trace level. APHA 3125 B 21st Ed. 2005	0.05 mg/L
Dissolved sodium	Filtered sample, ICP-MS, trace level. APHA 3125 B 21st Ed. 2005	0.02 mg/L
pH	pH meter. APHA 4500-H+ B 21st Ed. 2005	0.1 pH units
Sulphate	Filtered sample. Ion Chromatography. APHA 4110 B 21st Ed. 2005	0.5 mg/L
Total alkalinity	Titration to pH 4.5 (M-alkalinity), autotitrator. APHA 2320 B (Modified for alk <20) 21st Ed. 2005	1.0 mg/L as CaCO ₃

Periphyton

Formal periphyton assessments are limited to the 46 RSoE sites with hard substrates.

Monthly assessment of visible streambed cover

Periphyton cover is determined by estimating the percentage of visible mats (>0.3 cm thick) and filaments (>2 cm long) present on the stream or river bed within a 20 cm diameter metal ring. Ten observations are made across the width of the stream or river, along a transect. If the stream or river is not wide enough for 10 observations, five observations are made across the width of the waterway in two locations at the site. Two transects of five observations (usually to 0.6 m depth) are also used where it is not possible to wade across more than half of the river's width.

Visible streambed periphyton cover assessments are typically carried out in a run, as opposed to riffle or pool-type habitats.

Annual assessment of biomass and relative abundance

Periphyton samples for quantitative biomass assessments (chlorophyll *a* and Ash Free Dry Matter) and taxa identification and relative abundance are collected during late summer/early autumn at the time of macroinvertebrate sample collection. Sampling protocols follow a modified version of quantitative method 1a (QM-1a), as outlined by Biggs and Kilroy (2000) that involves pooling periphyton samples from 10 rocks into a single composite sample for analysis.

Biomass assessments are carried out on periphyton samples collected in riffle-type habitats in close proximity to macroinvertebrate sampling sites.

Macroinvertebrates

A single macroinvertebrate sample is collected at or adjacent to each RSoE water sampling site during late summer/early autumn. The timing of sampling is determined at random, although macroinvertebrate sampling is, where practicable, avoided within two weeks of any flood event (flood events are defined as flows greater than three times the median river flow).

Samples are collected with the use of a kick-net (0.5 mm mesh size) following Protocol C1 of the national macroinvertebrate sampling protocols (Stark et al. 2001) for the 46 RSoE sites with hard substrate (in riffle habitat) and Protocol C2 for the nine RSoE sites with a soft substrate. All samples are processed in accordance with Protocol P2 (Stark et al. 2001).

Appendix 3: Physico-chemical and microbiological data

Table A3.1: Water temperature (°C)

Site no.	Site name	Median	Minimum	5th percentile	95th percentile	Maximum	<i>n</i>
RS02	Mangapouri S at Bennetts Rd	14.2	9.7	10.7	18.0	18.4	12
RS03	Waitohu S at Forest Pk	11.3	8.2	8.8	16.0	16.1	12
RS04	Waitohu S at Norfolk Cres	12.8	8.6	9.5	16.3	17.2	12
RS05	Otaki R at Pukehinau	10.0	7.2	8.0	13.8	14.6	12
RS06	Otaki R at Mouth	12.1	7.9	8.8	16.4	17.5	12
RS07	Mangaone S at Sims Rd Br	12.6	8.6	9.6	15.9	16.4	12
RS08	Ngarara S at Field Way	13.8	10.9	11.1	19.0	19.2	12
RS09	Waikanae R at Mangaone Walkway	11.6	8.5	8.9	14.4	14.8	12
RS10	Waikanae R at Greenaway Rd	14.0	10.2	10.3	19.0	19.5	12
RS11	Whareroa S at Waterfall Rd	11.6	9.8	9.9	15.1	15.3	12
RS12	Whareroa S at QE Park	13.1	10.6	10.7	16.0	16.3	12
RS13	Horokiri S at Snodgrass	12.7	9.9	10.3	16.6	16.6	12
RS14	Pauatahanui S at Elmwood Br	12.1	9.7	9.7	16.4	16.7	12
RS15	Porirua S at Glenside	12.3	7.1	8.4	17.1	17.3	12
RS16	Porirua S at Wall Park (Milk Depot)	12.1	7.2	8.3	16.9	17.1	12
RS17	Makara S at Kennels	13.6	7.1	8.4	18.3	18.9	12
RS18	Karori S at Makara Peak	12.5	8.8	9.6	17.2	17.7	12
RS19	Kaiwharawhara S at Ngaio Gorge	12.8	7.9	9.1	18.0	19.3	12
RS20	Hutt R at Te Marua Intake Site	9.8	7.7	7.9	15.3	15.5	12
RS21	Hutt R opp. Manor Park G.C.	13.4	9.0	9.5	19.8	20.1	12
RS22	Hutt R at Boulcott	13.9	9.1	9.8	19.7	19.8	12
RS23	Pakuratahi R 50m d/s Farm Ck	10.3	8.0	8.1	16.1	16.2	12
RS24	Mangaroa R at Te Marua	11.4	8.8	9.0	16.1	16.5	12
RS25	Akatarawa R at Hutt confl.	10.6	7.8	8.1	15.7	15.8	12
RS26	Whakatikei R at Riverstone	10.6	7.7	8.1	15.1	15.8	12
RS28	Wainuiomata R at Manuka Track	10.7	8.3	8.6	14.6	14.8	12
RS29	Wainuiomata R d/s of White Br	15.3	9.5	9.8	19.3	20.7	12
RS30	Orongorongo R at Orongorongo Stn	16.2	9.7	10.0	19.6	19.7	12
RS31	Ruamahanga R at McLays	10.2	4.5	4.8	14.9	15.0	12
RS32	Ruamahanga R at Te Ore Ore	14.8	7.5	7.7	21.2	22.8	12
RS33	Ruamahanga R at Gladstone Br	15.5	8.2	8.5	22.2	23.3	12
RS34	Ruamahanga R at Pukio	15.8	8.1	8.3	23.0	24.0	12
RS35	Mataikona Trib at Sugar Loaf Rd	11.2	8.8	9.4	15.0	15.3	12
RS36	Taueru R at Castlehill	11.3	8.8	9.1	15.6	15.8	12
RS37	Taueru R at Gladstone	12.9	9.7	10.0	17.1	17.8	12
RS38	Kopuaranga R at Stewarts	13.6	6.3	6.4	17.2	17.3	12
RS39	Whangaehu R 250m u/s confl.	15.4	6.6	7.2	20.8	21.5	12
RS40	Waipoua R at Colombo Rd Br	14.5	8.0	9.0	19.9	20.0	12
RS41	Waingawa R at South Rd	12.9	7.5	8.2	20.1	20.5	12
RS42	Whareama R at Gauge	16.0	10.8	10.8	21.9	22.0	12
RS43	Motuwaireka S at Headwaters	13.1	8.5	9.5	17.0	17.1	10
RS44	Totara S at Stronvar	14.7	9.0	9.3	21.9	25.8	12
RS45	Parkvale Trib at Lowes Res.	13.1	10.9	11.0	15.0	15.1	11
RS46	Parkvale S at Weir	15.9	9.0	10.0	24.5	25.6	12
RS47	Waiohine R at Gorge	10.7	6.4	6.5	16.5	17.4	12
RS48	Waiohine R at Bicknells	13.7	8.6	8.8	18.6	19.0	12
RS49	Beef Ck at Headwaters	10.4	7.8	8.2	13.9	14.9	12
RS50	Mangatarere S at SH 2	13.8	8.9	9.2	17.7	18.6	12
RS51	Huangarua R at Ponatahi Br	12.9	6.3	6.5	21.6	24.8	12
RS52	Tauanui R at Whakatomotomo Rd	11.3	7.1	7.3	15.5	16.2	12
RS53	Awhea R at Tora Rd	17.7	8.1	8.2	27.2	27.8	12
RS54	Coles Ck Trib at Lagoon Hill Rd	15.4	6.2	6.5	19.2	20.3	8
RS55	Tauherenikau R at Websters	11.7	6.5	8.4	20.2	20.9	12
RS56	Waiorongomai R at Forest Pk	12.2	8.2	9.1	19.1	20.0	12
RS57	Waiwhetu S at Whites Line East	15.6	10.9	11.2	18.1	19.3	12

Table A3.2: Dissolved oxygen (% saturation)

Site no.	Site name	Median	Minimum	5th percentile	95th percentile	Maximum	<i>n</i>
RS02	Mangapouri S at Bennetts Rd	67.8	41.8	45.4	94.9	95.6	12
RS03	Waitohu S at Forest Pk	99.2	97.1	97.3	103.5	104.0	12
RS04	Waitohu S at Norfolk Cres	90.5	62.2	68.8	94.7	96.6	12
RS05	Otaki R at Pukehinau	98.9	94.5	95.0	101.5	102.0	12
RS06	Otaki R at Mouth	101.0	97.8	98.3	107.6	112.0	12
RS07	Mangaone S at Sims Rd Br	72.7	51.5	56.0	85.1	86.9	12
RS08	Ngarara S at Field Way	54.8	33.8	34.8	65.3	65.3	12
RS09	Waikanae R at Mangaone Walkway	97.8	93.0	93.6	99.7	99.9	12
RS10	Waikanae R at Greenaway Rd	102.0	94.5	96.2	106.4	108.0	12
RS11	Whareroa S at Waterfall Rd	95.8	87.4	88.1	100.2	101.0	12
RS12	Whareroa S at QE Park	75.7	51.4	57.2	80.9	81.0	12
RS13	Horokiri S at Snodgrass	100.0	92.7	93.3	104.8	107.0	12
RS14	Pauatahanui S at Elmwood Br	97.3	88.3	89.3	104.1	109.0	12
RS15	Porirua S at Glenside	105.5	94.3	97.1	116.4	118.0	12
RS16	Porirua S at Wall Park (Milk Depot)	105.5	95.6	98.0	115.0	121.0	12
RS17	Makara S at Kennels	106.5	92.8	93.6	114.6	119.0	12
RS18	Karori S at Makara Peak	104.0	93.6	95.4	106.9	108.0	12
RS19	Kaiwharawhara S at Ngaio Gorge	100.3	95.9	96.7	111.7	115.0	12
RS20	Hutt R at Te Marua Intake Site	99.5	97.8	97.9	104.9	106.0	12
RS21	Hutt R opp. Manor Park G.C.	106.0	96.5	98.4	111.4	113.0	12
RS22	Hutt R at Boulcott	103.0	96.9	97.1	113.9	121.0	12
RS23	Pakuratahi R 50m d/s Farm Ck	96.8	90.0	92.3	102.5	103.0	12
RS24	Mangaroo R at Te Marua	101.5	94.2	96.2	108.9	110.0	12
RS25	Akatarawa R at Hutt confl.	100.5	97.4	97.8	103.9	105.0	12
RS26	Whakatikei R at Riverstone	102.0	98.6	99.2	104.9	106.0	12
RS28	Wainuiomata R at Manuka Track	97.4	94.6	95.5	108.0	108.0	12
RS29	Wainuiomata R d/s of White Br	110.0	98.2	98.3	123.9	125.0	12
RS30	Orongorongo R at Orongorongo Stn	99.7	98.0	98.1	108.3	111.0	12
RS31	Ruamahanga R at McLays	98.3	94.4	94.6	101.5	102.0	12
RS32	Ruamahanga R at Te Ore Ore	102.5	95.5	96.1	117.5	118.0	12
RS33	Ruamahanga R at Gladstone Br	103.5	94.7	95.4	145.9	147.0	12
RS34	Ruamahanga R at Pukio	105.5	95.6	95.7	129.5	130.0	12
RS35	Matakona Trib at Sugar Loaf Rd	97.9	91.6	92.0	100.0	100.0	12
RS36	Taueru R at Castlehill	97.2	90.1	90.6	102.3	105.0	12
RS37	Taueru R at Gladstone	90.3	75.7	77.6	107.9	120.0	12
RS38	Kopuaranga R at Stewarts	99.4	92.4	92.4	115.6	131.0	12
RS39	Whangaehu R 250m u/s confl.	102.0	91.8	92.2	129.2	133.0	12
RS40	Waipoua R at Colombo Rd Br	103.0	93.7	95.0	110.8	113.0	12
RS41	Waingawa R at South Rd	100.5	94.2	94.9	108.9	110.0	12
RS42	Whareama R at Gauge	94.9	73.5	77.8	110.6	121.0	12
RS43	Motuwaireka S at Headwaters	97.6	85.5	90.5	101.1	102.0	10
RS44	Totara S at Stronvar	99.0	86.5	89.0	105.9	107.0	12
RS45	Parkvale Trib at Lowes Res.	71.5	65.2	66.2	76.0	76.6	11
RS46	Parkvale S at Weir	108.0	94.5	94.8	115.8	118.0	12
RS47	Waiohine R at Gorge	99.1	96.0	96.3	102.5	103.0	12
RS48	Waiohine R at Bicknells	101.5	96.2	96.5	112.6	117.0	12
RS49	Beef Ck at Headwaters	97.1	91.8	93.6	101.5	102.0	12
RS50	Mangatarere S at SH 2	98.6	90.4	92.5	111.5	112.0	12
RS51	Huangaaru R at Ponatahi Br	102.0	92.2	93.6	146.1	151.0	12
RS52	Tauanui R at Whakatomotomo Rd	98.5	93.4	94.7	104.7	108.0	12
RS53	Awhea R at Tora Rd	111.0	96.8	97.7	173.1	194.0	12
RS54	Coles Ck Trib at Lagoon Hill Rd	103.0	60.2	72.6	111.3	112.0	8
RS55	Tauherenikau R at Websters	99.5	94.5	95.1	103.0	103.0	12
RS56	Waiorongomai R at Forest Pk	101.0	94.7	94.8	103.5	104.0	12
RS57	Waiwhetu S at Whites Line East	70.3	50.5	50.8	104.8	117.0	12

Table A3.3: Dissolved oxygen (mg/L)

Site no.	Site name	Median	Minimum	5th percentile	95th percentile	Maximum	n
RS02	Mangapouri S at Bennetts Rd	7.0	4.0	4.3	10.3	10.4	12
RS03	Waitohu S at Forest Pk	11.0	9.8	9.9	11.6	11.9	12
RS04	Waitohu S at Norfolk Cres	9.0	6.2	7.2	10.3	10.6	12
RS05	Otaki R at Pukehinau	11.1	9.6	9.8	11.9	12.3	12
RS06	Otaki R at Mouth	10.9	9.6	9.7	12.3	12.6	12
RS07	Mangaone S at Sims Rd Br	7.8	5.3	5.6	9.4	9.4	12
RS08	Ngarara S at Field Way	5.8	3.2	3.2	6.9	7.0	12
RS09	Waikanae R at Mangaone Walkway	10.7	9.4	9.6	11.4	11.5	12
RS10	Waikanae R at Greenaway Rd	10.4	9.2	9.4	11.4	11.5	12
RS11	Whareroa S at Waterfall Rd	10.3	8.8	9.0	11.3	11.5	12
RS12	Whareroa S at QE Park	8.1	5.0	5.6	8.8	8.9	12
RS13	Horokiri S at Snodgrass	10.7	9.1	9.2	11.5	11.7	12
RS14	Pauatahanui S at Elmwood Br	10.6	8.9	8.9	11.1	11.1	12
RS15	Porirua S at Glenside	11.4	9.9	10.0	12.6	13.1	12
RS16	Porirua S at Wall Park (Milk Depot)	11.4	9.9	10.1	12.6	13.3	12
RS17	Makara S at Kennels	10.9	8.9	9.4	12.8	13.5	12
RS18	Karori S at Makara Peak	10.6	9.6	9.7	11.8	12.5	12
RS19	Kaiwharawhara S at Ngaio Gorge	10.5	9.5	9.7	12.3	12.8	12
RS20	Hutt R at Te Marua Intake Site	11.4	9.8	9.9	12.2	12.6	12
RS21	Hutt R opp. Manor Park G.C.	11.0	9.6	9.8	12.0	12.3	12
RS22	Hutt R at Boulcott	10.9	8.9	9.1	11.8	12.1	12
RS23	Pakuratahi R 50m d/s Farm Ck	10.9	9.0	9.2	11.8	12.0	12
RS24	Mangarua R at Te Marua	11.3	9.8	9.9	11.7	12.0	12
RS25	Akatarawa R at Hutt confl.	11.3	9.9	10.0	12.2	12.6	12
RS26	Whakatikei R at Riverstone	11.5	10.0	10.1	12.4	12.8	12
RS28	Wainuiomata R at Manuka Track	11.0	9.6	9.7	12.2	12.5	12
RS29	Wainuiomata R d/s of White Br	11.1	9.7	9.9	12.1	12.2	12
RS30	Orongorongo R at Orongorongo Stn	9.9	9.1	9.1	12.0	12.5	12
RS31	Ruamahanga R at McLays	11.0	9.9	9.9	13.0	13.5	12
RS32	Ruamahanga R at Te Ore Ore	10.4	9.2	9.3	12.5	13.6	12
RS33	Ruamahanga R at Gladstone Br	11.2	9.0	9.5	13.4	13.5	12
RS34	Ruamahanga R at Pukio	11.0	9.5	9.7	12.7	13.3	12
RS35	Matakona Trib at Sugar Loaf Rd	10.7	9.3	9.6	11.6	11.6	12
RS36	Taueru R at Castlehill	10.8	9.0	9.1	11.2	11.3	12
RS37	Taueru R at Gladstone	9.8	7.8	7.9	11.3	12.1	12
RS38	Kopuaranga R at Stewarts	10.4	9.4	9.6	12.7	12.7	12
RS39	Whangaehu R 250m u/s confl.	11.0	9.5	9.5	12.8	14.0	12
RS40	Waipoua R at Colombo Rd Br	10.4	9.4	9.6	11.7	12.0	12
RS41	Waingawa R at South Rd	10.4	8.8	9.0	11.9	12.3	12
RS42	Whareama R at Gauge	10.1	7.1	7.2	10.8	10.9	12
RS43	Motuwaireka S at Headwaters	10.3	8.6	8.8	12.0	12.1	10
RS44	Totara S at Stronvar	10.2	8.3	8.4	11.8	12.1	12
RS45	Parkvale Trib at Lowes Res.	7.3	6.6	6.7	8.4	8.4	11
RS46	Parkvale S at Weir	10.3	9.1	9.1	11.9	12.0	12
RS47	Waiohine R at Gorge	11.0	9.3	9.7	12.3	12.6	12
RS48	Waiohine R at Bicknells	10.7	9.6	9.6	11.8	11.9	12
RS49	Beef Ck at Headwaters	11.0	9.6	9.7	11.8	12.1	12
RS50	Mangatarere S at SH 2	10.7	9.0	9.4	11.2	11.4	12
RS51	Huangaaru R at Ponatahi Br	11.2	9.5	9.5	13.9	15.1	12
RS52	Tauanui R at Whakatomotomo Rd	10.8	9.4	9.7	12.5	13.0	12
RS53	Awhea R at Tora Rd	11.2	9.4	9.6	14.2	15.6	12
RS54	Coles Ck Trib at Lagoon Hill Rd	10.5	6.0	7.0	13.1	13.2	8
RS55	Tauherenikau R at Websters	10.9	9.2	9.3	15.4	19.4	12
RS56	Waiorongomai R at Forest Pk	10.4	9.2	9.3	11.9	12.0	12
RS57	Waiwhetu S at Whites Line East	7.7	5.0	5.0	10.6	11.7	12

Table A3.4: pH – field meter

Site no.	Site name	Median	Minimum	5th percentile	95th percentile	Maximum	<i>n</i> *
RS02	Mangapouri S at Bennetts Rd	6.9	6.7	6.8	7.2	7.4	12
RS03	Waitohu S at Forest Pk	7.5	6.6	7.0	7.8	7.9	12
RS04	Waitohu S at Norfolk Cres	6.9	6.8	6.8	7.2	7.4	12
RS05	Otaki R at Pukehinau	7.5	6.7	7.0	7.7	7.8	12
RS06	Otaki R at Mouth	7.5	6.9	7.1	8.1	8.5	12
RS07	Mangaone S at Sims Rd Br	6.9	6.7	6.7	7.3	7.5	12
RS08	Ngarara S at Field Way	6.9	6.7	6.7	7.4	7.4	12
RS09	Waikanae R at Mangaone Walkway	7.5	6.2	6.8	7.7	7.8	12
RS10	Waikanae R at Greenaway Rd	7.4	6.9	7.1	7.7	7.7	12
RS11	Whareroa S at Waterfall Rd	7.6	6.9	7.0	7.7	7.8	12
RS12	Whareroa S at QE Park	6.9	6.5	6.5	7.2	7.3	12
RS13	Horokiri S at Snodgrass	7.4	6.4	6.8	7.6	7.6	12
RS14	Pauatahanui S at Elmwood Br	7.3	6.0	6.6	7.6	7.6	12
RS15	Porirua S at Glenside	7.8	7.2	7.3	8.3	8.5	12
RS16	Porirua S at Wall Park (Milk Depot)	7.7	7.1	7.1	8.2	8.3	12
RS17	Makara S at Kennels	7.6	7.1	7.1	7.8	7.9	12
RS18	Karori S at Makara Peak	7.4	7.0	7.0	7.6	7.6	12
RS19	Kaiwharawhara S at Ngaio Gorge	7.7	7.4	7.5	8.3	8.5	12
RS20	Hutt R at Te Marua Intake Site	7.5	6.9	6.9	7.7	7.7	11
RS21	Hutt R opp. Manor Park G.C.	7.4	6.9	6.9	7.6	7.7	11
RS22	Hutt R at Boulcott	7.4	6.9	6.9	7.9	8.2	11
RS23	Pakuratahi R 50m d/s Farm Ck	7.0	6.7	6.8	7.4	7.4	11
RS24	Mangaroa R at Te Marua	7.3	6.7	6.7	7.5	7.5	11
RS25	Akatarawa R at Hutt confl.	7.6	7.1	7.1	7.6	7.6	11
RS26	Whakatikei R at Riverstone	7.7	7.2	7.3	7.8	7.9	11
RS28	Wainuiomata R at Manuka Track	7.3	6.6	6.7	7.5	7.6	12
RS29	Wainuiomata R d/s of White Br	7.6	6.9	7.0	8.8	8.9	12
RS30	Orongorongo R at Orongorongo Stn	7.7	7.1	7.3	8.1	8.3	12
RS31	Ruamahanga R at McLays	7.6	6.6	6.8	7.9	8.0	11
RS32	Ruamahanga R at Te Ore Ore	7.9	7.4	7.5	8.4	8.4	11
RS33	Ruamahanga R at Gladstone Br	7.7	7.3	7.4	9.5	9.7	11
RS34	Ruamahanga R at Pukio	7.8	7.5	7.5	8.9	9.1	11
RS35	Mataikona Trib at Sugar Loaf Rd	8.1	7.8	7.8	8.2	8.2	11
RS36	Taueru R at Castlehill	7.8	7.6	7.6	8.0	8.1	11
RS37	Taueru R at Gladstone	7.9	7.7	7.7	8.2	8.3	11
RS38	Kopuaranga R at Stewarts	8.0	7.6	7.6	8.3	8.3	11
RS39	Whangaehu R 250m u/s confl.	7.6	7.2	7.4	8.2	8.3	11
RS40	Waipoua R at Colombo Rd Br	7.4	7.1	7.2	7.9	7.9	11
RS41	Waingawa R at South Rd	7.6	7.2	7.4	7.8	7.9	11
RS42	Whareama R at Gauge	7.8	7.7	7.7	8.1	8.1	11
RS43	Motuwaireka S at Headwaters	7.9	7.6	7.7	8.0	8.0	9
RS44	Totara S at Stronvar	7.7	6.7	7.1	7.9	7.9	11
RS45	Parkvale Trib at Lowes Res.	6.5	6.1	6.1	6.5	6.6	11
RS46	Parkvale S at Weir	7.4	7.0	7.0	8.9	9.1	12
RS47	Waiohine R at Gorge	7.6	6.9	7.0	7.8	7.9	12
RS48	Waiohine R at Bicknells	7.1	6.6	6.7	7.3	7.4	12
RS49	Beef Ck at Headwaters	7.7	7.1	7.1	7.9	7.9	12
RS50	Mangatarere S at SH 2	7.1	6.8	6.8	7.2	7.3	12
RS51	Huangarua R at Ponatahi Br	8.1	7.8	7.8	8.7	8.8	11
RS52	Tauanui R at Whakatomotomo Rd	7.7	7.3	7.4	7.8	7.8	11
RS53	Awhea R at Tora Rd	8.4	7.9	7.9	8.9	9.0	11
RS54	Coles Ck Trib at Lagoon Hill Rd	8.1	7.3	7.5	8.3	8.3	7
RS55	Tauherenikau R at Websters	7.5	7.1	7.2	7.7	7.8	11
RS56	Waiorongomai R at Forest Pk	7.6	7.2	7.3	7.8	7.8	11
RS57	Waiwhetu S at Whites Line East	6.7	6.0	6.3	6.9	7.0	12

*Lower *n* counts for some sites (when compared to other variables) reflects sampling occasions when the field pH meter had malfunctioned and no measurement could be made. In such instances, the lab was asked to measure pH from a supplied water sample.

Table A3.5: Visual clarity (m)

Site no.	Site name	Median	Minimum	Maximum	<i>n</i>
RS02	Mangapouri S at Bennetts Rd	0.56	0.31	1.29	12
RS03	Waitohu S at Forest Pk	2.60	1.50	4.67	11
RS04	Waitohu S at Norfolk Cres	0.67	0.34	1.36	12
RS05	Otaki R at Pukehinau	4.13	0.65	8.98	12
RS06	Otaki R at Mouth	3.53	0.71	7.44	12
RS07	Mangaone S at Sims Rd Br	0.61	0.27	1.16	12
RS08	Ngarara S at Field Way	0.64	0.21	1.27	12
RS09	Waikanae R at Mangaone Walkway	3.28	0.21	4.00	12
RS10	Waikanae R at Greenaway Rd	3.28	0.15	6.45	12
RS11	Whareroa S at Waterfall Rd	0.51	0.07	1.21	12
RS12	Whareroa S at QE Park	0.54	0.26	0.81	12
RS13	Horokiri S at Snodgrass	2.00	0.52	3.65	12
RS14	Pauatahanui S at Elmwood Br	1.57	0.26	2.32	12
RS15	Porirua S at Glenside	1.74	0.35	3.42	12
RS16	Porirua S at Wall Park (Milk Depot)	1.32	0.26	2.77	12
RS17	Makara S at Kennels	1.44	0.20	2.66	12
RS18	Karori S at Makara Peak	2.65	0.18	4.30	12
RS19	Kaiwharawhara S at Ngaio Gorge	2.86	0.10	4.20	12
RS20	Hutt R at Te Marua Intake Site	3.66	0.55	6.23	11
RS21	Hutt R opp. Manor Park G.C.	2.50	0.31	4.74	11
RS22	Hutt R at Boulcott	1.80	0.15	5.00	12
RS23	Pakuratahi R 50m d/s Farm Ck	3.56	0.73	7.64	12
RS24	Mangaroa R at Te Marua	1.21	0.39	2.48	12
RS25	Akatarawa R at Hutt confl.	3.18	0.80	5.84	12
RS26	Whakatikei R at Riverstone	2.51	0.67	4.24	11
RS28	Wainuiomata R at Manuka Track	2.06	1.47	3.03	12
RS29	Wainuiomata R d/s of White Br	1.84	0.71	2.71	12
RS30	Orongorongo R at Orongorongo Stn	3.07	0.12	6.45	12
RS31	Ruamahanga R at McLays	5.07	0.99	8.58	12
RS32	Ruamahanga R at Te Ore Ore	2.40	0.24	5.77	12
RS33	Ruamahanga R at Gladstone Br	1.76	0.30	4.18	12
RS34	Ruamahanga R at Pukio	1.21	0.12	3.24	12
RS35	Mataikona Trib at Sugar Loaf Rd	1.92	0.22	3.00	12
RS36	Taueru R at Castlehill	0.91	0.20	2.46	12
RS37	Taueru R at Gladstone	1.10	0.12	2.90	12
RS38	Kopuaranga R at Stewarts	1.10	0.22	3.01	12
RS39	Whangaehu R 250m u/s confl.	0.91	0.09	1.76	12
RS40	Waipoua R at Colombo Rd Br	3.04	0.14	4.74	12
RS41	Waingawa R at South Rd	1.61	0.06	7.59	12
RS42	Whareama R at Gauge	0.55	0.05	1.96	12
RS43	Motuwaireka S at Headwaters	2.50	1.49	3.37	8
RS44	Totara S at Stronvar	2.90	0.03	4.00	12
RS45	Parkvale Trib at Lowes Res.	2.63	2.00	3.50	11
RS46	Parkvale S at Weir	0.80	0.09	2.97	12
RS47	Waiohine R at Gorge	4.48	0.12	7.03	12
RS48	Waiohine R at Bicknells	2.12	0.08	3.19	12
RS49	Beef Ck at Headwaters	2.12	0.38	3.50	12
RS50	Mangatarere S at SH 2	1.91	0.09	4.41	12
RS51	Huangarua R at Ponatahi Br	1.37	0.05	2.63	12
RS52	Tauanui R at Whakatomotomo Rd	3.13	0.66	5.72	12
RS53	Awhea R at Tora Rd	1.00	0.05	2.54	12
RS54	Coles Ck Trib at Lagoon Hill Rd	1.52	0.53	2.01	8
RS55	Tauherenikau R at Websters	2.96	0.08	6.73	12
RS56	Waiorongomai R at Forest Pk	3.34	0.73	6.51	12
RS57	Waiwhetu S at Whites Line East	0.85	0.09	1.64	12

Table A3.6: Turbidity (NTU)

Site no.	Site name	Median	Minimum	Maximum	<i>n</i>
RS02	Mangapouri S at Bennetts Rd	9.4	2.3	26	12
RS03	Waitohu S at Forest Pk	1.2	1.1	2.1	12
RS04	Waitohu S at Norfolk Cres	5.5	2.6	15.2	12
RS05	Otaki R at Pukehinau	0.5	0.3	4.4	12
RS06	Otaki R at Mouth	0.7	0.3	5.2	12
RS07	Mangaone S at Sims Rd Br	5.1	4.2	21	12
RS08	Ngarara S at Field Way	6.7	3.7	19.8	12
RS09	Waikanae R at Mangaone Walkway	1.2	0.6	22	12
RS10	Waikanae R at Greenaway Rd	0.7	0.3	42	12
RS11	Whareroa S at Waterfall Rd	10.3	4.1	260	12
RS12	Whareroa S at QE Park	7.2	3.6	22	12
RS13	Horokiri S at Snodgrass	1.3	0.4	10.4	12
RS14	Pauatahanui S at Elmwood Br	3.7	1.1	24	12
RS15	Porirua S at Glenside	1.1	0.6	17.0	12
RS16	Porirua S at Wall Park (Milk Depot)	2.2	1.1	18.0	12
RS17	Makara S at Kennels	2.7	1.9	32	12
RS18	Karori S at Makara Peak	0.8	0.5	27	12
RS19	Kaiwharawhara S at Ngaio Gorge	1.2	0.5	67	12
RS20	Hutt R at Te Marua Intake Site	0.7	0.3	5.4	12
RS21	Hutt R opp. Manor Park G.C.	1.3	0.4	12.7	12
RS22	Hutt R at Boulcott	2.5	0.4	16.9	12
RS23	Pakuratahi R 50m d/s Farm Ck	0.8	0.3	3.9	12
RS24	Mangaroa R at Te Marua	1.5	0.8	10.4	12
RS25	Akatarawa R at Hutt confl.	0.5	0.3	3.0	12
RS26	Whakatikei R at Riverstone	0.9	0.4	4.6	12
RS28	Wainuiomata R at Manuka Track	1.2	0.9	1.7	12
RS29	Wainuiomata R d/s of White Br	1.3	0.8	6.2	12
RS30	Orongorongo R at Orongorongo Stn	1.1	0.5	73	12
RS31	Ruamahanga R at McLays	0.5	0.2	5.4	12
RS32	Ruamahanga R at Te Ore Ore	1.4	0.3	22	12
RS33	Ruamahanga R at Gladstone Br	2.2	0.5	18.4	12
RS34	Ruamahanga R at Pukio	3.6	0.7	59	12
RS35	Mataikona Trib at Sugar Loaf Rd	1.4	0.3	169	12
RS36	Taueru R at Castlehill	4.9	2.5	65	12
RS37	Taueru R at Gladstone	3.1	0.9	310	12
RS38	Kopuaranga R at Stewarts	2.8	1.1	40	12
RS39	Whangaehu R 250m u/s confl.	5.8	1.5	68	12
RS40	Waipoua R at Colombo Rd Br	1.0	0.4	52	12
RS41	Waingawa R at South Rd	2.9	0.4	200	12
RS42	Whareama R at Gauge	7.4	2.0	1,050	12
RS43	Motuwaireka S at Headwaters	0.6	0.3	3.1	10
RS44	Totara S at Stronvar	0.6	0.2	2,100	12
RS45	Parkvale Trib at Lowes Res.	0.9	0.3	1.8	11
RS46	Parkvale S at Weir	2.6	0.9	67	12
RS47	Waiohine R at Gorge	0.6	0.2	34	12
RS48	Waiohine R at Bicknells	2.9	0.9	54	12
RS49	Beef Ck at Headwaters	1.2	0.7	12.0	12
RS50	Mangatarere S at SH 2	1.3	0.6	77	12
RS51	Huangarua R at Ponatahi Br	2.7	0.7	290	12
RS52	Tauanui R at Whakatomotomo Rd	1.2	0.4	10.3	12
RS53	Awhea R at Tora Rd	10.2	1.3	650	12
RS54	Coles Ck Trib at Lagoon Hill Rd	3.2	2.0	9.4	8
RS55	Tauherenikau R at Websters	1.3	0.4	101	12
RS56	Waiorongomai R at Forest Pk	0.8	0.4	9.2	12
RS57	Waiwhetu S at Whites Line East	5.1	2.2	60	12

Table A3.7: Electrical conductivity – field meter ($\mu\text{S}/\text{cm}$)

Site no.	Site name	Median	Minimum	5th percentile	95th percentile	Maximum	n^*
RS02	Mangapouri S at Bennetts Rd	204	174	186	214	216	12
RS03	Waitohu S at Forest Pk	87	71	73	93	96	12
RS04	Waitohu S at Norfolk Cres	153	88	106	376	621	12
RS05	Otaki R at Pukehinau	66	51	53	82	85	12
RS06	Otaki R at Mouth	67	52	55	84	86	12
RS07	Mangaone S at Sims Rd Br	185	121	144	212	213	12
RS08	Ngarara S at Field Way	291	215	230	591	898	12
RS09	Waikanae R at Mangaone Walkway	86	62	69	93	94	12
RS10	Waikanae R at Greenaway Rd	100	78	84	114	115	12
RS11	Whareroa S at Waterfall Rd	219	171	178	247	258	12
RS12	Whareroa S at QE Park	243	198	204	277	286	12
RS13	Horokiri S at Snodgrass	175	164	165	196	204	12
RS14	Pauatahanui S at Elmwood Br	168	142	145	197	197	12
RS15	Porirua S at Glenside	253	194	195	265	266	12
RS16	Porirua S at Wall Park (Milk Depot)	255	211	214	267	269	12
RS17	Makara S at Kennels	273	222	226	304	312	12
RS18	Karori S at Makara Peak	226	193	198	231	233	12
RS19	Kaiwharawhara S at Ngaio Gorge	277	109	172	307	314	12
RS20	Hutt R at Te Marua Intake Site	74	54	59	85	86	11
RS21	Hutt R opp. Manor Park G.C.	97	84	89	107	108	11
RS22	Hutt R at Boulcott	92	73	76	104	106	11
RS23	Pakuratahi R 50m d/s Farm Ck	80	71	74	89	90	11
RS24	Mangaroa R at Te Marua	101	95	95	113	114	11
RS25	Akatarawa R at Hutt confl.	83	64	71	90	91	11
RS26	Whakatikei R at Riverstone	111	89	96	119	119	11
RS28	Wainuiomata R at Manuka Track	108	83	90	121	124	12
RS29	Wainuiomata R d/s of White Br	137	126	129	155	160	12
RS30	Orongorongo R at Orongorongo Stn	145	114	116	165	169	12
RS31	Ruamahanga R at McLays	53	35	36	68	70	11
RS32	Ruamahanga R at Te Ore Ore	145	58	83	195	208	11
RS33	Ruamahanga R at Gladstone Br	133	57	86	153	154	11
RS34	Ruamahanga R at Pukio	171	104	116	187	192	11
RS35	Mataikona Trib at Sugar Loaf Rd	381	234	243	543	570	11
RS36	Taueru R at Castlehill	258	158	172	299	305	11
RS37	Taueru R at Gladstone	435	227	237	496	498	11
RS38	Kopuaranga R at Stewarts	286	212	216	389	390	11
RS39	Whangaehu R 250m u/s confl.	288	229	232	391	396	11
RS40	Waipoua R at Colombo Rd Br	104	65	80	116	118	11
RS41	Waingawa R at South Rd	60	39	42	72	72	11
RS42	Whareama R at Gauge	607	228	290	682	695	11
RS43	Motuwaireka S at Headwaters	329	190	222	422	443	9
RS44	Totara S at Stronvar	274	103	150	364	377	11
RS45	Parkvale Trib at Lowes Res.	173	145	151	188	188	11
RS46	Parkvale S at Weir	135	113	118	183	184	12
RS47	Waiohine R at Gorge	58	28	42	68	71	12
RS48	Waiohine R at Bicknells	83	48	59	89	89	12
RS49	Beef Ck at Headwaters	94	68	73	120	121	12
RS50	Mangatarere S at SH 2	120	76	88	138	141	12
RS51	Huangarua R at Ponatahi Br	406	198	210	462	466	11
RS52	Tauanui R at Whakatomotomo Rd	133	102	111	164	166	11
RS53	Awhea R at Tora Rd	403	239	246	478	489	11
RS54	Coles Ck Trib at Lagoon Hill Rd	687	346	369	1,452	1,594	7
RS55	Tauherenikau R at Websters	67	43	51	81	83	11
RS56	Waiorongomai R at Forest Pk	112	89	97	135	137	11
RS57	Waiwhetu S at Whites Line East	225	186	195	243	245	12

*Lower n counts for some sites (when compared to other variables) reflects sampling occasions when the field conductivity meter had malfunctioned and no measurement could be made. In such instances, the lab was asked to measure conductivity from a supplied water sample.

Table A3.8: Total organic carbon (mg/L)

Site no.	Site name	Median	Minimum	Maximum	<i>n</i>
RS02	Mangapouri S at Bennetts Rd	6.3	5.0	12.7	12
RS03	Waitohu S at Forest Pk	2.2	1.3	4.2	12
RS04	Waitohu S at Norfolk Cres	4.6	3.3	7.0	12
RS05	Otaki R at Pukehinau	1.3	0.3	3.7	12
RS06	Otaki R at Mouth	1.3	0.5	4.0	12
RS07	Mangaone S at Sims Rd Br	5.2	4.2	9.3	12
RS08	Ngarara S at Field Way	14.1	8.6	23.0	12
RS09	Waikanae R at Mangaone Walkway	1.6	0.9	9.8	12
RS10	Waikanae R at Greenaway Rd	1.3	1.0	8.9	12
RS11	Whareroa S at Waterfall Rd	4.7	3.2	16.2	12
RS12	Whareroa S at QE Park	14.0	7.6	21.0	12
RS13	Horokiri S at Snodgrass	2.1	1.0	4.9	12
RS14	Pauatahanui S at Elmwood Br	4.8	3.2	7.7	12
RS15	Porirua S at Glenside	3.8	2.7	8.9	12
RS16	Porirua S at Wall Park (Milk Depot)	3.7	3.1	7.5	12
RS17	Makara S at Kennels	4.8	4.1	10.0	12
RS18	Karori S at Makara Peak	2.9	1.4	4.4	12
RS19	Kaiwharawhara S at Ngaio Gorge	3.7	3.0	8.4	12
RS20	Hutt R at Te Marua Intake Site	2.1	0.8	8.5	12
RS21	Hutt R opp. Manor Park G.C.	2.3	1.2	9.2	12
RS22	Hutt R at Boulcott	2.4	1.0	8.4	12
RS23	Pakuratahi R 50m d/s Farm Ck	2.3	0.7	7.6	12
RS24	Mangaroa R at Te Marua	5.1	1.9	10.7	12
RS25	Akatarawa R at Hutt confl.	1.8	1.3	6.4	12
RS26	Whakatikei R at Riverstone	1.5	1.1	4.8	12
RS28	Wainuiomata R at Manuka Track	2.0	1.4	3.4	12
RS29	Wainuiomata R d/s of White Br	1.9	1.2	2.8	12
RS30	Orongorongo R at Orongorongo Stn	1.8	1.0	2.6	12
RS31	Ruamahanga R at McLays	1.3	0.8	3.7	12
RS32	Ruamahanga R at Te Ore Ore	2.8	1.9	4.8	12
RS33	Ruamahanga R at Gladstone Br	3.3	2.0	5.1	12
RS34	Ruamahanga R at Pukio	3.3	2.5	7.3	12
RS35	Mataikona Trib at Sugar Loaf Rd	3.4	2.2	8.9	12
RS36	Taueru R at Castlehill	5.9	3.9	13.9	12
RS37	Taueru R at Gladstone	5.0	2.4	23.0	12
RS38	Kopuaranga R at Stewarts	3.8	1.9	8.2	12
RS39	Whangaehu R 250m u/s confl.	6.2	3.6	12.9	12
RS40	Waipoua R at Colombo Rd Br	1.8	0.7	8.4	12
RS41	Waingawa R at South Rd	1.6	0.7	5.1	12
RS42	Whareama R at Gauge	7.4	4.3	23.0	12
RS43	Motuwaireka S at Headwaters	2.8	1.5	3.7	10
RS44	Totara S at Stronvar	4.0	2.8	18.2	12
RS45	Parkvale Trib at Lowes Res.	3.2	2.6	8.9	11
RS46	Parkvale S at Weir	6.2	3.5	14.2	12
RS47	Waiohine R at Gorge	1.3	0.8	4.5	12
RS48	Waiohine R at Bicknells	1.3	0.6	5.6	12
RS49	Beef Ck at Headwaters	2.2	1.0	4.4	12
RS50	Mangatarere S at SH 2	2.8	1.4	8.3	12
RS51	Huangaaru R at Ponatahi Br	3.2	1.7	11.5	12
RS52	Tauanui R at Whakatomotomo Rd	2.8	1.8	6.4	12
RS53	Awhea R at Tora Rd	3.8	1.5	12.2	12
RS54	Coles Ck Trib at Lagoon Hill Rd	5.1	2.9	6.0	8
RS55	Tauherenikau R at Websters	1.9	0.7	11.2	12
RS56	Waiorongomai R at Forest Pk	2.7	1.2	5.2	12
RS57	Waiwhetu S at Whites Line East	3.9	3.3	7.5	12

Table A3.9: Ammoniacal nitrogen (mg/L)

Site no.	Site name	Median	Minimum	Maximum	<i>n</i>
RS02	Mangapouri S at Bennetts Rd	0.062	<0.01	0.165	12
RS03	Waitohu S at Forest Pk	0.005	<0.01	0.015	12
RS04	Waitohu S at Norfolk Cres	0.017	<0.01	0.046	12
RS05	Otaki R at Pukehinau	0.005	<0.01	0.005	12
RS06	Otaki R at Mouth	0.005	<0.01	0.012	12
RS07	Mangaone S at Sims Rd Br	0.062	<0.01	0.133	12
RS08	Ngarara S at Field Way	0.015	<0.01	0.035	12
RS09	Waikanae R at Mangaone Walkway	0.005	<0.01	0.012	12
RS10	Waikanae R at Greenaway Rd	0.005	<0.01	0.027	12
RS11	Whareroa S at Waterfall Rd	0.005	<0.01	0.017	12
RS12	Whareroa S at QE Park	0.048	<0.01	0.184	12
RS13	Horokiri S at Snodgrass	0.005	<0.01	0.024	12
RS14	Pauatahanui S at Elmwood Br	0.011	<0.01	0.024	12
RS15	Porirua S at Glenside	0.008	<0.01	0.027	12
RS16	Porirua S at Wall Park (Milk Depot)	0.012	<0.01	0.035	12
RS17	Makara S at Kennels	0.008	<0.01	0.030	12
RS18	Karori S at Makara Peak	0.014	<0.01	0.084	12
RS19	Kaiwharawhara S at Ngaio Gorge	0.008	<0.01	0.041	12
RS20	Hutt R at Te Marua Intake Site	0.005	<0.01	0.005	12
RS21	Hutt R opp. Manor Park G.C.	0.005	<0.01	0.017	12
RS22	Hutt R at Boulcott	0.005	<0.01	0.005	12
RS23	Pakuratahi R 50m d/s Farm Ck	0.005	<0.01	0.017	12
RS24	Mangaroa R at Te Marua	0.005	<0.01	0.005	12
RS25	Akatarawa R at Hutt confl.	0.005	<0.01	0.005	12
RS26	Whakatikei R at Riverstone	0.005	<0.01	0.005	12
RS28	Wainuiomata R at Manuka Track	0.005	<0.01	0.005	12
RS29	Wainuiomata R d/s of White Br	0.005	<0.01	0.020	12
RS30	Orongorongo R at Orongorongo Stn	0.005	<0.01	0.005	12
RS31	Ruamahanga R at McLays	0.005	<0.01	0.005	12
RS32	Ruamahanga R at Te Ore Ore	0.005	<0.01	0.016	12
RS33	Ruamahanga R at Gladstone Br	0.018	<0.01	0.112	12
RS34	Ruamahanga R at Pukio	0.005	<0.01	0.057	12
RS35	Mataikona Trib at Sugar Loaf Rd	0.005	<0.01	0.024	12
RS36	Taueru R at Castlehill	0.005	<0.01	0.043	12
RS37	Taueru R at Gladstone	0.005	<0.01	0.131	12
RS38	Kopuaranga R at Stewarts	0.008	<0.01	0.034	12
RS39	Whangaehu R 250m u/s confl.	0.005	<0.01	0.061	12
RS40	Waipoua R at Colombo Rd Br	0.005	<0.01	0.005	12
RS41	Waingawa R at South Rd	0.005	<0.01	0.012	12
RS42	Whareama R at Gauge	0.005	<0.01	0.058	12
RS43	Motuwaireka S at Headwaters	0.005	<0.01	0.005	10
RS44	Totara S at Stronvar	0.005	<0.01	0.010	12
RS45	Parkvale Trib at Lowes Res.	0.005	<0.01	0.015	11
RS46	Parkvale S at Weir	0.009	<0.01	0.105	12
RS47	Waiohine R at Gorge	0.005	<0.01	0.010	12
RS48	Waiohine R at Bicknells	0.005	<0.01	0.039	12
RS49	Beef Ck at Headwaters	0.005	<0.01	0.005	12
RS50	Mangatarere S at SH 2	0.030	<0.01	0.280	12
RS51	Huangarua R at Ponatahi Br	0.005	<0.01	0.030	12
RS52	Tauanui R at Whakatomotomo Rd	0.005	<0.01	0.005	12
RS53	Awhea R at Tora Rd	0.005	<0.01	0.036	12
RS54	Coles Ck Trib at Lagoon Hill Rd	0.005	<0.01	0.017	8
RS55	Tauherenikau R at Websters	0.005	<0.01	0.011	12
RS56	Waiorongomai R at Forest Pk	0.005	<0.01	0.005	12
RS57	Waiwhetu S at Whites Line East	0.097	<0.01	0.175	12

Table A3.10: Nitrite-nitrate nitrogen (mg/L)

Site no.	Site name	Median	Minimum	Maximum	<i>n</i>
RS02	Mangapouri S at Bennetts Rd	1.450	0.550	2.700	12
RS03	Waitohu S at Forest Pk	0.033	0.003	0.056	12
RS04	Waitohu S at Norfolk Cres	0.350	0.060	0.570	12
RS05	Otaki R at Pukehinau	0.032	0.020	0.073	12
RS06	Otaki R at Mouth	0.036	0.009	0.094	12
RS07	Mangaone S at Sims Rd Br	1.415	0.480	2.100	12
RS08	Ngarara S at Field Way	0.045	<0.02*	0.920	12
RS09	Waikanae R at Mangaone Walkway	0.141	0.064	0.260	12
RS10	Waikanae R at Greenaway Rd	0.215	0.042	0.430	12
RS11	Whareroa S at Waterfall Rd	0.425	0.173	1.200	12
RS12	Whareroa S at QE Park	0.310	0.027	1.320	12
RS13	Horokiri S at Snodgrass	0.665	0.300	1.370	12
RS14	Pauatahanui S at Elmwood Br	0.385	0.100	0.930	12
RS15	Porirua S at Glenside	0.995	0.560	1.870	12
RS16	Porirua S at Wall Park (Milk Depot)	0.910	0.390	1.610	12
RS17	Makara S at Kennels	0.355	0.003	1.570	12
RS18	Karori S at Makara Peak	1.495	1.200	1.870	12
RS19	Kaiwharawhara S at Ngaio Gorge	1.295	0.580	1.480	12
RS20	Hutt R at Te Marua Intake Site	0.087	0.047	0.162	12
RS21	Hutt R opp. Manor Park G.C.	0.198	0.090	0.370	12
RS22	Hutt R at Boulcott	0.172	0.098	0.320	12
RS23	Pakuratahi R 50m d/s Farm Ck	0.197	0.119	0.270	12
RS24	Mangaroa R at Te Marua	0.425	0.270	0.630	12
RS25	Akatarawa R at Hutt confl.	0.091	0.025	0.620	12
RS26	Whakatikei R at Riverstone	0.131	0.026	0.680	12
RS28	Wainuiomata R at Manuka Track	0.092	0.045	0.179	12
RS29	Wainuiomata R d/s of White Br	0.092	0.006	0.470	12
RS30	Orongorongo R at Orongorongo Stn	0.032	<0.002	0.171	12
RS31	Ruamahanga R at McLays	0.032	0.009	0.052	12
RS32	Ruamahanga R at Te Ore Ore	0.435	0.112	1.520	12
RS33	Ruamahanga R at Gladstone Br	0.420	0.109	1.570	12
RS34	Ruamahanga R at Pukio	0.395	0.003	1.470	12
RS35	Mataikona Trib at Sugar Loaf Rd	0.013	0.005	0.330	12
RS36	Taueru R at Castlehill	0.131	0.008	0.850	12
RS37	Taueru R at Gladstone	1.245	0.360	3.500	12
RS38	Kopuaranga R at Stewarts	1.125	0.640	1.630	12
RS39	Whangaehu R 250m u/s confl.	0.950	0.016	2.900	12
RS40	Waipoua R at Colombo Rd Br	0.785	0.230	1.390	12
RS41	Waingawa R at South Rd	0.064	0.009	0.220	12
RS42	Whareama R at Gauge	0.054	<0.002	0.740	12
RS43	Motuwaireka S at Headwaters	0.054	<0.002	0.690	10
RS44	Totara S at Stronvar	0.037	<0.002	1.290	12
RS45	Parkvale Trib at Lowes Res.	5.000	2.600	6.600	11
RS46	Parkvale S at Weir	0.750	<0.002	4.500	12
RS47	Waiohine R at Gorge	0.027	0.009	0.079	12
RS48	Waiohine R at Bicknells	0.425	0.084	1.070	12
RS49	Beef Ck at Headwaters	0.030	0.012	0.113	12
RS50	Mangatarere S at SH 2	0.975	0.500	1.850	12
RS51	Huangaaru R at Ponatahi Br	0.290	<0.002	0.680	12
RS52	Tauanui R at Whakatomotomo Rd	0.022	<0.002	0.063	12
RS53	Awhea R at Tora Rd	0.215	<0.002	0.320	12
RS54	Coles Ck Trib at Lagoon Hill Rd	0.014	0.003	0.034	8
RS55	Tauherenikau R at Websters	0.056	0.010	0.121	12
RS56	Waiorongomai R at Forest Pk	0.033	0.003	0.140	12
RS57	Waiwhetu S at Whites Line East	0.455	0.129	1.460	12

*The laboratory could not achieve the typical detection limit of <0.002 mg/L for this sample.

Table A3.11: Total Kjeldahl nitrogen (mg/L)

Site no.	Site name	Median	Minimum	Maximum	<i>n</i>
RS02	Mangapouri S at Bennetts Rd	0.56	0.30	0.88	12
RS03	Waitohu S at Forest Pk	0.05	<0.10	0.11	12
RS04	Waitohu S at Norfolk Cres	0.23	0.13	1.10	12
RS05	Otaki R at Pukehinau	0.05	<0.10	0.14	12
RS06	Otaki R at Mouth	0.05	<0.10	0.12	12
RS07	Mangaone S at Sims Rd Br	0.41	0.29	0.86	12
RS08	Ngarara S at Field Way	0.67	0.37	1.15	12
RS09	Waikanae R at Mangaone Walkway	0.05	<0.10	0.41	12
RS10	Waikanae R at Greenaway Rd	0.05	<0.10	0.61	12
RS11	Whareroa S at Waterfall Rd	0.20	0.13	2.20	12
RS12	Whareroa S at QE Park	0.60	0.31	1.16	12
RS13	Horokiri S at Snodgrass	0.18	<0.10	0.29	12
RS14	Pauatahanui S at Elmwood Br	0.23	0.15	0.51	12
RS15	Porirua S at Glenside	0.20	0.05	0.50	12
RS16	Porirua S at Wall Park (Milk Depot)	0.22	0.15	0.49	12
RS17	Makara S at Kennels	0.24	<0.10	0.69	12
RS18	Karori S at Makara Peak	0.21	0.10	0.33	12
RS19	Kaiwharawhara S at Ngaio Gorge	0.21	0.11	1.16	12
RS20	Hutt R at Te Marua Intake Site	0.05	<0.10	0.36	12
RS21	Hutt R opp. Manor Park G.C.	0.05	<0.10	0.49	12
RS22	Hutt R at Boulcott	0.05	<0.10	0.45	12
RS23	Pakuratahi R 50m d/s Farm Ck	0.05	<0.10	0.18	12
RS24	Mangaroa R at Te Marua	0.16	0.11	0.34	12
RS25	Akatarawa R at Hutt confl.	0.05	<0.10	0.20	12
RS26	Whakatikei R at Riverstone	0.05	<0.10	0.22	12
RS28	Wainuiomata R at Manuka Track	0.05	<0.10	0.16	12
RS29	Wainuiomata R d/s of White Br	0.10	<0.10	0.64	12
RS30	Orongorongo R at Orongorongo Stn	0.05	<0.10	0.11	12
RS31	Ruamahanga R at McLays	0.05	<0.10	0.22	12
RS32	Ruamahanga R at Te Ore Ore	0.11	<0.10	0.21	12
RS33	Ruamahanga R at Gladstone Br	0.18	<0.10	0.48	12
RS34	Ruamahanga R at Pukio	0.15	<0.10	0.49	12
RS35	Mataikona Trib at Sugar Loaf Rd	0.12	<0.10	0.37	12
RS36	Taueru R at Castlehill	0.25	0.20	0.78	12
RS37	Taueru R at Gladstone	0.31	0.23	1.76	12
RS38	Kopuaranga R at Stewarts	0.23	<0.10	0.52	12
RS39	Whangaehu R 250m u/s confl.	0.38	0.23	1.04	12
RS40	Waipoua R at Colombo Rd Br	0.14	<0.10	0.40	12
RS41	Waingawa R at South Rd	0.05	0.05	0.36	12
RS42	Whareama R at Gauge	0.35	0.24	1.95	12
RS43	Motuwaireka S at Headwaters	0.05	<0.10	0.11	10
RS44	Totara S at Stronvar	0.12	<0.10	2.30	12
RS45	Parkvale Trib at Lowes Res.	0.24	<0.10	0.45	11
RS46	Parkvale S at Weir	0.50	0.27	1.71	12
RS47	Waiohine R at Gorge	0.05	<0.10	0.14	12
RS48	Waiohine R at Bicknells	0.05	<0.10	0.22	12
RS49	Beef Ck at Headwaters	0.05	<0.10	0.21	12
RS50	Mangatarere S at SH 2	0.19	<0.10	0.48	12
RS51	Huangarua R at Ponatahi Br	0.23	0.11	0.93	12
RS52	Tauanui R at Whakatomotomo Rd	0.05	<0.10	0.05	12
RS53	Awhea R at Tora Rd	0.22	0.13	0.88	12
RS54	Coles Ck Trib at Lagoon Hill Rd	0.17	<0.10	0.30	8
RS55	Tauherenikau R at Websters	0.05	<0.10	0.49	12
RS56	Waiorongomai R at Forest Pk	0.05	<0.10	0.15	12
RS57	Waiwhetu S at Whites Line East	0.29	0.17	0.57	12

Table A3.12: Total nitrogen (mg/L)

Site no.	Site name	Median	Minimum	Maximum	<i>n</i>
RS02	Mangapouri S at Bennetts Rd	1.87	1.18	3.50	12
RS03	Waitohu S at Forest Pk	0.06	<0.11	0.14	12
RS04	Waitohu S at Norfolk Cres	0.61	0.26	1.16	12
RS05	Otaki R at Pukehinau	0.06	<0.11	0.17	12
RS06	Otaki R at Mouth	0.06	<0.11	0.13	12
RS07	Mangaone S at Sims Rd Br	2.02	0.86	2.60	12
RS08	Ngarara S at Field Way	0.69	0.38	2.10	12
RS09	Waikanae R at Mangaone Walkway	0.19	0.13	0.56	12
RS10	Waikanae R at Greenaway Rd	0.34	0.11	0.82	12
RS11	Whareroa S at Waterfall Rd	0.62	0.34	2.90	12
RS12	Whareroa S at QE Park	0.96	0.40	2.50	12
RS13	Horokiri S at Snodgrass	0.81	0.39	1.63	12
RS14	Pauatahanui S at Elmwood Br	0.66	0.25	1.31	12
RS15	Porirua S at Glenside	1.18	0.77	2.20	12
RS16	Porirua S at Wall Park (Milk Depot)	1.13	0.62	2.10	12
RS17	Makara S at Kennels	0.55	0.13	2.10	12
RS18	Karori S at Makara Peak	1.71	1.31	2.00	12
RS19	Kaiwharawhara S at Ngaio Gorge	1.54	1.25	1.74	12
RS20	Hutt R at Te Marua Intake Site	0.17	0.11	0.42	12
RS21	Hutt R opp. Manor Park G.C.	0.31	0.22	0.61	12
RS22	Hutt R at Boulcott	0.29	0.20	0.55	12
RS23	Pakuratahi R 50m d/s Farm Ck	0.26	0.19	0.44	12
RS24	Mangaroa R at Te Marua	0.57	0.43	0.97	12
RS25	Akatarawa R at Hutt confl.	0.18	<0.11	0.76	12
RS26	Whakatikei R at Riverstone	0.21	<0.11	0.73	12
RS28	Wainuiomata R at Manuka Track	0.17	<0.11	0.34	12
RS29	Wainuiomata R d/s of White Br	0.21	<0.11	1.12	12
RS30	Orongorongo R at Orongorongo Stn	0.06	<0.11	0.18	12
RS31	Ruamahanga R at McLays	0.06	<0.11	0.23	12
RS32	Ruamahanga R at Te Ore Ore	0.52	0.22	1.72	12
RS33	Ruamahanga R at Gladstone Br	0.62	0.19	2.10	12
RS34	Ruamahanga R at Pukio	0.49	<0.11	1.77	12
RS35	Mataikona Trib at Sugar Loaf Rd	0.14	0.10	0.64	12
RS36	Taueru R at Castlehill	0.41	0.21	1.37	12
RS37	Taueru R at Gladstone	1.56	0.90	3.80	12
RS38	Kopuaranga R at Stewarts	1.35	1.11	2.00	12
RS39	Whangaehu R 250m u/s confl.	1.42	0.25	3.20	12
RS40	Waipoua R at Colombo Rd Br	0.92	0.35	1.68	12
RS41	Waingawa R at South Rd	0.14	0.06	0.42	12
RS42	Whareama R at Gauge	0.42	0.24	2.30	12
RS43	Motuwaireka S at Headwaters	0.10	<0.11	0.80	10
RS44	Totara S at Stronvar	0.16	<0.11	2.90	12
RS45	Parkvale Trib at Lowes Res.	5.20	3.00	6.70	11
RS46	Parkvale S at Weir	1.10	0.30	5.40	12
RS47	Waiohine R at Gorge	0.06	<0.11	0.20	12
RS48	Waiohine R at Bicknells	0.56	0.22	1.23	12
RS49	Beef Ck at Headwaters	0.06	<0.11	0.22	12
RS50	Mangatarere S at SH 2	1.10	0.59	2.10	12
RS51	Huangarua R at Ponatahi Br	0.56	0.11	1.17	12
RS52	Tauanui R at Whakatomotomo Rd	0.08	<0.11	0.13	12
RS53	Awhea R at Tora Rd	0.45	0.14	1.12	12
RS54	Coles Ck Trib at Lagoon Hill Rd	0.19	<0.11	0.33	8
RS55	Tauherenikau R at Websters	0.09	<0.11	0.53	12
RS56	Waiorongomai R at Forest Pk	0.06	<0.11	0.23	12
RS57	Waiwhetu S at Whites Line East	0.84	0.30	1.65	12

Table A3.13: Dissolved reactive phosphorus (mg/L)

Site no.	Site name	Median	Minimum	Maximum	<i>n</i>
RS02	Mangapouri S at Bennetts Rd	0.039	0.018	0.057	12
RS03	Waitohu S at Forest Pk	0.008	<0.004	0.012	12
RS04	Waitohu S at Norfolk Cres	0.016	0.009	0.028	12
RS05	Otaki R at Pukehinau	0.003	<0.004	0.006	12
RS06	Otaki R at Mouth	0.002	<0.004	0.007	12
RS07	Mangaone S at Sims Rd Br	0.026	0.018	0.051	12
RS08	Ngarara S at Field Way	0.047	0.027	0.056	12
RS09	Waikanae R at Mangaone Walkway	0.013	0.007	0.016	12
RS10	Waikanae R at Greenaway Rd	0.008	<0.004	0.015	12
RS11	Whareroa S at Waterfall Rd	0.027	0.014	0.038	12
RS12	Whareroa S at QE Park	0.041	0.019	0.071	12
RS13	Horokiri S at Snodgrass	0.013	0.008	0.018	12
RS14	Pauatahanui S at Elmwood Br	0.016	0.006	0.024	12
RS15	Porirua S at Glenside	0.019	0.014	0.021	12
RS16	Porirua S at Wall Park (Milk Depot)	0.019	0.014	0.027	12
RS17	Makara S at Kennels	0.031	0.018	0.054	12
RS18	Karori S at Makara Peak	0.041	0.022	0.069	12
RS19	Kaiwharawhara S at Ngaio Gorge	0.040	0.021	0.059	12
RS20	Hutt R at Te Marua Intake Site	0.004	<0.004	0.006	12
RS21	Hutt R opp. Manor Park G.C.	0.004	<0.004	0.008	12
RS22	Hutt R at Boulcott	0.004	<0.004	0.008	12
RS23	Pakuratahi R 50m d/s Farm Ck	0.005	<0.004	0.010	12
RS24	Mangaroa R at Te Marua	0.010	<0.004	0.018	12
RS25	Akatarawa R at Hutt confl.	0.002	<0.004	0.006	12
RS26	Whakatikei R at Riverstone	0.008	<0.004	0.010	12
RS28	Wainuiomata R at Manuka Track	0.012	0.009	0.017	12
RS29	Wainuiomata R d/s of White Br	0.012	0.007	0.025	12
RS30	Orongorongo R at Orongorongo Stn	0.002	<0.004	0.006	12
RS31	Ruamahanga R at McLays	0.002	<0.004	0.005	12
RS32	Ruamahanga R at Te Ore Ore	0.007	<0.004	0.014	12
RS33	Ruamahanga R at Gladstone Br	0.020	0.007	0.034	12
RS34	Ruamahanga R at Pukio	0.014	<0.004	0.027	12
RS35	Mataikona Trib at Sugar Loaf Rd	0.005	<0.004	0.009	12
RS36	Taueru R at Castlehill	0.010	0.006	0.017	12
RS37	Taueru R at Gladstone	0.009	<0.004	0.087	12
RS38	Kopuaranga R at Stewarts	0.014	0.005	0.028	12
RS39	Whangaehu R 250m u/s confl.	0.032	0.005	0.067	12
RS40	Waipoua R at Colombo Rd Br	0.005	<0.004	0.010	12
RS41	Waingawa R at South Rd	0.002	<0.004	0.006	12
RS42	Whareama R at Gauge	0.002	<0.004	0.043	12
RS43	Motuwaireka S at Headwaters	0.002	<0.004	0.006	10
RS44	Totara S at Stronvar	0.002	<0.004	0.008	12
RS45	Parkvale Trib at Lowes Res.	0.015	0.008	0.020	11
RS46	Parkvale S at Weir	0.044	0.015	0.136	12
RS47	Waiohine R at Gorge	0.002	<0.004	0.006	12
RS48	Waiohine R at Bicknells	0.011	0.006	0.024	12
RS49	Beef Ck at Headwaters	0.009	<0.004	0.010	12
RS50	Mangatarere S at SH 2	0.044	0.012	0.580	12
RS51	Huangarua R at Ponatahi Br	0.008	<0.004	0.036	12
RS52	Tauanui R at Whakatomotomo Rd	0.005	<0.004	0.009	12
RS53	Awhea R at Tora Rd	0.006	<0.004	0.021	12
RS54	Coles Ck Trib at Lagoon Hill Rd	0.002	<0.004	0.007	8
RS55	Tauherenikau R at Websters	0.002	<0.004	0.008	12
RS56	Waiorongomai R at Forest Pk	0.002	<0.004	0.005	12
RS57	Waiwhetu S at Whites Line East	0.031	0.012	0.052	12

Table A3.14: Total phosphorus (mg/L)

Site no.	Site name	Median	Minimum	Maximum	<i>n</i>
RS02	Mangapouri S at Bennetts Rd	0.085	0.040	0.115	12
RS03	Waitohu S at Forest Pk	0.013	<0.004	0.022	12
RS04	Waitohu S at Norfolk Cres	0.038	0.023	0.260	12
RS05	Otaki R at Pukehinau	0.006	<0.004	0.011	12
RS06	Otaki R at Mouth	0.006	<0.004	0.017	12
RS07	Mangaone S at Sims Rd Br	0.055	0.035	0.135	12
RS08	Ngarara S at Field Way	0.100	0.061	0.280	12
RS09	Waikanae R at Mangaone Walkway	0.017	0.008	0.047	12
RS10	Waikanae R at Greenaway Rd	0.007	<0.004	0.119	12
RS11	Whareroa S at Waterfall Rd	0.047	0.035	0.340	12
RS12	Whareroa S at QE Park	0.085	0.056	0.155	12
RS13	Horokiri S at Snodgrass	0.021	0.012	0.045	12
RS14	Pauatahanui S at Elmwood Br	0.034	0.016	0.070	12
RS15	Porirua S at Glenside	0.026	0.012	0.053	12
RS16	Porirua S at Wall Park (Milk Depot)	0.029	0.020	0.059	12
RS17	Makara S at Kennels	0.051	0.027	0.093	12
RS18	Karori S at Makara Peak	0.055	0.036	0.086	12
RS19	Kaiwharawhara S at Ngaio Gorge	0.046	0.039	0.300	12
RS20	Hutt R at Te Marua Intake Site	0.007	<0.004	0.014	12
RS21	Hutt R opp. Manor Park G.C.	0.011	<0.004	0.029	12
RS22	Hutt R at Boulcott	0.011	<0.004	0.111	12
RS23	Pakuratahi R 50m d/s Farm Ck	0.010	<0.004	0.018	12
RS24	Mangaroa R at Te Marua	0.020	<0.004	0.042	12
RS25	Akatarawa R at Hutt confl.	0.006	<0.004	0.014	12
RS26	Whakatikei R at Riverstone	0.012	<0.004	0.023	12
RS28	Wainuiomata R at Manuka Track	0.016	0.009	0.037	12
RS29	Wainuiomata R d/s of White Br	0.023	0.012	0.040	12
RS30	Orongorongo R at Orongorongo Stn	0.009	<0.004	0.052	12
RS31	Ruamahanga R at McLays	0.003	<0.004	0.012	12
RS32	Ruamahanga R at Te Ore Ore	0.013	<0.004	0.037	12
RS33	Ruamahanga R at Gladstone Br	0.028	0.015	0.047	12
RS34	Ruamahanga R at Pukio	0.022	0.002	0.102	12
RS35	Mataikona Trib at Sugar Loaf Rd	0.009	0.004	0.185	12
RS36	Taueru R at Castlehill	0.027	0.020	0.133	12
RS37	Taueru R at Gladstone	0.037	<0.004	0.500	12
RS38	Kopuaranga R at Stewarts	0.028	0.010	0.099	12
RS39	Whangaehu R 250m u/s confl.	0.066	0.040	0.220	12
RS40	Waipoua R at Colombo Rd Br	0.011	<0.004	0.069	12
RS41	Waingawa R at South Rd	0.012	<0.004	0.250	12
RS42	Whareama R at Gauge	0.026	0.006	1.100	12
RS43	Motuwaireka S at Headwaters	0.005	<0.004	0.011	10
RS44	Totara S at Stronvar	0.005	<0.004	1.630	12
RS45	Parkvale Trib at Lowes Res.	0.020	0.011	0.032	11
RS46	Parkvale S at Weir	0.069	0.037	0.380	12
RS47	Waiohine R at Gorge	0.004	<0.004	0.044	12
RS48	Waiohine R at Bicknells	0.026	0.010	0.080	12
RS49	Beef Ck at Headwaters	0.014	0.006	0.032	12
RS50	Mangatarere S at SH 2	0.069	0.016	0.660	12
RS51	Huangarua R at Ponatahi Br	0.015	<0.004	0.320	12
RS52	Tauanui R at Whakatomotomo Rd	0.009	<0.004	0.020	12
RS53	Awhea R at Tora Rd	0.049	<0.004	0.670	12
RS54	Coles Ck Trib at Lagoon Hill Rd	0.007	<0.004	0.017	8
RS55	Tauherenikau R at Websters	0.006	<0.004	0.131	12
RS56	Waiorongomai R at Forest Pk	0.006	<0.004	0.014	12
RS57	Waiwhetu S at Whites Line East	0.079	0.040	0.152	12

Table A3.15: *E. coli* (cfu/100mL)

Site no.	Site name	Median	Minimum	Maximum	<i>n</i>
RS02	Mangapouri S at Bennetts Rd	1,150	350	3,000	12
RS03	Waitohu S at Forest Pk	11	1	60	12
RS04	Waitohu S at Norfolk Cres	560	150	2,200	12
RS05	Otaki R at Pukehinau	4	<1	28	12
RS06	Otaki R at Mouth	32	7	130	12
RS07	Mangaone S at Sims Rd Br	700	210	3,900	12
RS08	Ngarara S at Field Way	190	50	2,000	12
RS09	Waikanae R at Mangaone Walkway	14	<1	580	12
RS10	Waikanae R at Greenaway Rd	49	14	15,000	12
RS11	Whareroa S at Waterfall Rd	160	8	17,000	12
RS12	Whareroa S at QE Park	130	30	1,100	12
RS13	Horokiri S at Snodgrass	260	80	3,500	12
RS14	Pauatahanui S at Elmwood Br	285	120	2,600	12
RS15	Porirua S at Glenside	200	80	1,500	12
RS16	Porirua S at Wall Park (Milk Depot)	840	220	2,200	12
RS17	Makara S at Kennels	265	30	1,600	12
RS18	Karori S at Makara Peak	1,950	160	8,100	12
RS19	Kaiwharawhara S at Ngaio Gorge	185	30	5,000	12
RS20	Hutt R at Te Marua Intake Site	12	1	100	12
RS21	Hutt R opp. Manor Park G.C.	38	23	1,300	12
RS22	Hutt R at Boulcott	46	25	1,600	12
RS23	Pakuratahi R 50m d/s Farm Ck	49	28	130	12
RS24	Mangaroa R at Te Marua	135	11	2,700	12
RS25	Akatarawa R at Hutt confl.	33	12	500	12
RS26	Whakatikei R at Riverstone	27	3	600	12
RS28	Wainuiomata R at Manuka Track	19	1	220	12
RS29	Wainuiomata R d/s of White Br	85	30	900	12
RS30	Orongorongo R at Orongorongo Stn	19	2	300	12
RS31	Ruamahanga R at McLays	3	<1	29	12
RS32	Ruamahanga R at Te Ore Ore	105	24	1,800	12
RS33	Ruamahanga R at Gladstone Br	33	2	250	12
RS34	Ruamahanga R at Pukio	73	4	800	12
RS35	Mataikona Trib at Sugar Loaf Rd	36	11	1,100	12
RS36	Taueru R at Castlehill	180	39	5,100	12
RS37	Taueru R at Gladstone	78	20	5,300	12
RS38	Kopuaranga R at Stewarts	275	60	1,100	12
RS39	Whangaehu R 250m u/s confl.	305	70	2,100	12
RS40	Waipoua R at Colombo Rd Br	51	19	1,100	12
RS41	Waingawa R at South Rd	26	13	220	12
RS42	Whareama R at Gauge	69	1	18,000	12
RS43	Motuwaireka S at Headwaters	18	1	210	10
RS44	Totara S at Stronvar	28	2	200	12
RS45	Parkvale Trib at Lowes Res.	14	<1	800	11
RS46	Parkvale S at Weir	470	5	4,000	12
RS47	Waiohine R at Gorge	8	<1	80	12
RS48	Waiohine R at Bicknells	44	8	300	12
RS49	Beef Ck at Headwaters	11	<1	410	12
RS50	Mangatarere S at SH 2	190	30	1,300	12
RS51	Huangarua R at Ponatahi Br	105	19	3,000	12
RS52	Tauanui R at Whakatomotomo Rd	7	2	51	12
RS53	Awhea R at Tora Rd	69	12	2,400	12
RS54	Coles Ck Trib at Lagoon Hill Rd	41	7	190	8
RS55	Tauherenikau R at Websters	18	4	1,000	12
RS56	Waiorongomai R at Forest Pk	13	2	40	12
RS57	Waiwhetu S at Whites Line East	495	200	2,000	12

Table A3.16: Faecal coliforms (cfu/100mL)

Site no.	Site name	Median	Minimum	Maximum	<i>n</i>
RS02	Mangapouri S at Bennetts Rd	1,600	420	6,000	12
RS03	Waitohu S at Forest Pk	11	1	60	12
RS04	Waitohu S at Norfolk Cres	650	200	2,200	12
RS05	Otaki R at Pukehinou	5	1	31	12
RS06	Otaki R at Mouth	35	9	130	12
RS07	Mangaone S at Sims Rd Br	800	310	3,900	12
RS08	Ngarara S at Field Way	240	50	2,000	12
RS09	Waikanae R at Mangaone Walkway	16	<1	760	12
RS10	Waikanae R at Greenaway Rd	49	14	15,000	12
RS11	Whareroa S at Waterfall Rd	175	13	23,000	12
RS12	Whareroa S at QE Park	160	50	1,100	12
RS13	Horokiri S at Snodgrass	300	100	3,600	12
RS14	Pauatahanui S at Elmwood Br	350	180	3,500	12
RS15	Porirua S at Glenside	270	80	1,700	12
RS16	Porirua S at Wall Park (Milk Depot)	975	260	3,500	12
RS17	Makara S at Kennels	330	60	1,600	12
RS18	Karori S at Makara Peak	2,200	190	9,400	12
RS19	Kaiwharawhara S at Ngaio Gorge	265	30	7,000	12
RS20	Hutt R at Te Marua Intake Site	12	1	100	12
RS21	Hutt R opp. Manor Park G.C.	54	25	1,700	12
RS22	Hutt R at Boulcott	61	31	2,500	12
RS23	Pakuratahi R 50m d/s Farm Ck	56	28	130	12
RS24	Mangaroa R at Te Marua	175	11	2,700	12
RS25	Akatarawa R at Hutt confl.	38	13	680	12
RS26	Whakatikei R at Riverstone	33	3	600	12
RS28	Wainuiomata R at Manuka Track	20	2	250	12
RS29	Wainuiomata R d/s of White Br	90	30	1,000	12
RS30	Orongorongo R at Orongorongo Stn	20	2	410	12
RS31	Ruamahanga R at McLays	3	<1	34	12
RS32	Ruamahanga R at Te Ore Ore	110	28	1,900	12
RS33	Ruamahanga R at Gladstone Br	33	3	320	12
RS34	Ruamahanga R at Pukio	77	4	1,000	12
RS35	Mataikona Trib at Sugar Loaf Rd	80	13	1,100	12
RS36	Taueru R at Castlehill	190	51	5,700	12
RS37	Taueru R at Gladstone	95	32	6,700	12
RS38	Kopuaranga R at Stewarts	295	60	1,100	12
RS39	Whangaehu R 250m u/s confl.	380	70	2,400	12
RS40	Waipoua R at Colombo Rd Br	58	21	1,200	12
RS41	Waingawa R at South Rd	27	13	220	12
RS42	Whareama R at Gauge	73	1	21,000	12
RS43	Motuwaireka S at Headwaters	20	1	210	10
RS44	Totara S at Stronvar	33	2	230	12
RS45	Parkvale Trib at Lowes Res.	14	<1	800	11
RS46	Parkvale S at Weir	490	5	4,000	12
RS47	Waiohine R at Gorge	9	1	80	12
RS48	Waiohine R at Bicknells	45	9	300	12
RS49	Beef Ck at Headwaters	11	<1	470	12
RS50	Mangatarere S at SH 2	230	39	1,300	12
RS51	Huangarua R at Ponatahi Br	115	19	3,000	12
RS52	Tauanui R at Whakatomotomo Rd	9	2	51	12
RS53	Awhea R at Tora Rd	72	12	2,400	12
RS54	Coles Ck Trib at Lagoon Hill Rd	43	7	210	8
RS55	Tauherenikau R at Websters	22	4	1,000	12
RS56	Waiorongomai R at Forest Pk	13	2	40	12
RS57	Waiwhetu S at Whites Line East	600	240	2,100	12

Table A3.17: Total suspended solids (mg/L)

Site no.	Site name	Median	Minimum	Maximum	<i>n</i>
RS02	Mangapouri S at Bennetts Rd	7	2	32	12
RS03	Waitohu S at Forest Pk	1	<2	2	12
RS04	Waitohu S at Norfolk Cres	6	<2	30	12
RS05	Otaki R at Pukehinau	1	<2	5	12
RS06	Otaki R at Mouth	1	<2	8	12
RS07	Mangaone S at Sims Rd Br	5	2	20	12
RS08	Ngarara S at Field Way	5	2	20	12
RS09	Waikanae R at Mangaone Walkway	2	<2	29	12
RS10	Waikanae R at Greenaway Rd	1	<2	92	12
RS11	Whareroa S at Waterfall Rd	11	3	300	12
RS12	Whareroa S at QE Park	5	<2	35	12
RS13	Horokiri S at Snodgrass	4	<2	14	12
RS14	Pauatahanui S at Elmwood Br	4	<2	18	12
RS15	Porirua S at Glenside	1	<2	16	12
RS16	Porirua S at Wall Park (Milk Depot)	1	<2	46	12
RS17	Makara S at Kennels	3	<2	43	12
RS18	Karori S at Makara Peak	1	<2	23	12
RS19	Kaiwharawhara S at Ngaio Gorge	1	<2	132	12
RS20	Hutt R at Te Marua Intake Site	1	<2	10	12
RS21	Hutt R opp. Manor Park G.C.	1	<2	22	12
RS22	Hutt R at Boulcott	2	<2	79	12
RS23	Pakuratahi R 50m d/s Farm Ck	1	<2	6	12
RS24	Mangaroa R at Te Marua	1	<2	20	12
RS25	Akatarawa R at Hutt confl.	1	<2	5	12
RS26	Whakatikei R at Riverstone	1	<2	7	12
RS28	Wainuiomata R at Manuka Track	1	<2	3	12
RS29	Wainuiomata R d/s of White Br	1	<2	6	12
RS30	Orongorongo R at Orongorongo Stn	3	<2	65	12
RS31	Ruamahanga R at McLays	1	<2	7	12
RS32	Ruamahanga R at Te Ore Ore	4	<2	23	12
RS33	Ruamahanga R at Gladstone Br	3	<2	21	12
RS34	Ruamahanga R at Pukio	4	<2	47	12
RS35	Mataikona Trib at Sugar Loaf Rd	1	<2	280	12
RS36	Taueru R at Castlehill	3	<2	162	12
RS37	Taueru R at Gladstone	2	<2	360	12
RS38	Kopuaranga R at Stewarts	4	<2	51	12
RS39	Whangaehu R 250m u/s confl.	6	<2	71	12
RS40	Waipoua R at Colombo Rd Br	1	<2	73	12
RS41	Waingawa R at South Rd	3	<2	300	12
RS42	Whareama R at Gauge	8	<2	1,580	12
RS43	Motuwaireka S at Headwaters	1	<2	5	10
RS44	Totara S at Stronvar	1	<2	2,300	12
RS45	Parkvale Trib at Lowes Res.	1	<2	8	11
RS46	Parkvale S at Weir	3	<2	61	12
RS47	Waiohine R at Gorge	1	<2	39	12
RS48	Waiohine R at Bicknells	3	<2	64	12
RS49	Beef Ck at Headwaters	1	<2	11	12
RS50	Mangatarere S at SH 2	2	<2	124	12
RS51	Huangarua R at Ponatahi Br	4	<2	320	12
RS52	Tauanui R at Whakatomotomo Rd	1	<2	3	12
RS53	Awhea R at Tora Rd	18	<2	810	12
RS54	Coles Ck Trib at Lagoon Hill Rd	1	<2	6	8
RS55	Tauherenikau R at Websters	1	<2	155	12
RS56	Waiorongomai R at Forest Pk	1	<2	10	12
RS57	Waiwhetu S at Whites Line East	5	<2	53	12

Appendix 4: Additional variables analysed during 2012/13

Table A4.1: Alkalinity (mg/L)

Site no.	Site name	Median	Minimum	Maximum	<i>n</i>
RS02	Mangapouri S at Bennetts Rd	46	37	50	12
RS03	Waitohu S at Forest Pk	20	14	28	12
RS04	Waitohu S at Norfolk Cres	36	19	56	12
RS05	Otaki R at Pukehinau	21	13	32	12
RS06	Otaki R at Mouth	20	13	31	12
RS07	Mangaone S at Sims Rd Br	40	21	45	12
RS08	Ngarara S at Field Way	63	31	89	12
RS09	Waikanae R at Mangaone Walkway	17	11	22	12
RS10	Waikanae R at Greenaway Rd	21	14	26	12
RS11	Whareroa S at Waterfall Rd	35	19	49	12
RS12	Whareroa S at QE Park	46	26	56	12
RS13	Horokiri S at Snodgrass	26	18	29	12
RS14	Pauatahanui S at Elmwood Br	30	20	37	12
RS15	Porirua S at Glenside	41	29	46	12
RS16	Porirua S at Wall Park (Milk Depot)	41	29	47	12
RS17	Makara S at Kennels	37	20	43	12
RS18	Karori S at Makara Peak	32	23	34	12
RS19	Kaiwharawhara S at Ngaio Gorge	44	16	51	12
RS20	Hutt R at Te Marua Intake Site	19	10	30	12
RS21	Hutt R opp. Manor Park G.C.	21	15	28	12
RS22	Hutt R at Boulcott	20	15	29	12
RS23	Pakuratahi R 50m d/s Farm Ck	19	14	22	12
RS24	Mangaroa R at Te Marua	21	13	26	12
RS25	Akatarawa R at Hutt confl.	19	16	26	12
RS26	Whakatikei R at Riverstone	21	16	26	12
RS28	Wainuiomata R at Manuka Track	19	16	35	12
RS29	Wainuiomata R d/s of White Br	25	21	45	12
RS30	Orongorongo R at Orongorongo Stn	36	28	57	12
RS31	Ruamahanga R at McLays	18	9	33	12
RS32	Ruamahanga R at Te Ore Ore	52	17	87	12
RS33	Ruamahanga R at Gladstone Br	45	18	56	12
RS34	Ruamahanga R at Pukio	51	26	59	12
RS35	Mataikona Trib at Sugar Loaf Rd	87	46	135	12
RS36	Taueru R at Castlehill	66	21	100	12
RS37	Taueru R at Gladstone	163	41	210	12
RS38	Kopuaranga R at Stewarts	131	66	182	12
RS39	Whangaehu R 250m u/s confl.	92	51	117	12
RS40	Waipoua R at Colombo Rd Br	30	15	42	12
RS41	Waingawa R at South Rd	22	12	34	12
RS42	Whareama R at Gauge	165	61	260	12
RS43	Motuwaireka S at Headwaters	46	24	82	10
RS44	Totara S at Stronvar	42	11	66	12
RS45	Parkvale Trib at Lowes Res.	32	26	34	11
RS46	Parkvale S at Weir	32	27	43	12
RS47	Waiohine R at Gorge	18	9	30	12
RS48	Waiohine R at Bicknells	24	13	30	12
RS49	Beef Ck at Headwaters	31	18	43	12
RS50	Mangatarere S at SH 2	29	18	36	12
RS51	Huangarua R at Ponatahi Br	135	65	169	12
RS52	Tauanui R at Whakatomotomo Rd	34	21	40	12
RS53	Awhea R at Tora Rd	130	68	171	12
RS54	Coles Ck Trib at Lagoon Hill Rd	152	46	210	8
RS55	Tauherenikau R at Websters	24	12	30	12
RS56	Waiorongomai R at Forest Pk	29	21	42	12
RS57	Waiwhetu S at Whites Line East	52	44	60	12

Table A4.2: Bicarbonate (mg/L)

Site no.	Site name	Median	Minimum	Maximum	<i>n</i>
RS02	Mangapouri S at Bennetts Rd	56	45	61	12
RS03	Waitohu S at Forest Pk	24	17	33	12
RS04	Waitohu S at Norfolk Cres	44	23	68	12
RS05	Otaki R at Pukehinau	25	16	39	12
RS06	Otaki R at Mouth	25	16	38	12
RS07	Mangaone S at Sims Rd Br	48	25	55	12
RS08	Ngarara S at Field Way	77	38	108	12
RS09	Waikanae R at Mangaone Walkway	21	14	27	12
RS10	Waikanae R at Greenaway Rd	26	17	32	12
RS11	Whareroa S at Waterfall Rd	43	23	59	12
RS12	Whareroa S at QE Park	56	31	68	12
RS13	Horokiri S at Snodgrass	32	22	35	12
RS14	Pauatahanui S at Elmwood Br	37	25	45	12
RS15	Porirua S at Glenside	50	35	56	12
RS16	Porirua S at Wall Park (Milk Depot)	50	35	57	12
RS17	Makara S at Kennels	44	24	52	12
RS18	Karori S at Makara Peak	39	28	42	12
RS19	Kaiwharawhara S at Ngaio Gorge	53	20	62	12
RS20	Hutt R at Te Marua Intake Site	23	13	36	12
RS21	Hutt R opp. Manor Park G.C.	26	18	35	12
RS22	Hutt R at Boulcott	25	18	36	12
RS23	Pakuratahi R 50m d/s Farm Ck	24	18	27	12
RS24	Mangaroa R at Te Marua	25	16	32	12
RS25	Akatarawa R at Hutt confl.	24	20	32	12
RS26	Whakatikei R at Riverstone	25	19	32	12
RS28	Wainuiomata R at Manuka Track	23	20	42	12
RS29	Wainuiomata R d/s of White Br	29	26	55	12
RS30	Orongorongo R at Orongorongo Stn	44	34	69	12
RS31	Ruamahanga R at McLays	22	11	40	12
RS32	Ruamahanga R at Te Ore Ore	64	21	105	12
RS33	Ruamahanga R at Gladstone Br	51	22	64	12
RS34	Ruamahanga R at Pukio	61	31	72	12
RS35	Mataikona Trib at Sugar Loaf Rd	104	56	163	12
RS36	Taueru R at Castlehill	79	26	121	12
RS37	Taueru R at Gladstone	195	50	250	12
RS38	Kopuaranga R at Stewarts	159	81	220	12
RS39	Whangaehu R 250m u/s confl.	111	62	142	12
RS40	Waipoua R at Colombo Rd Br	37	18	51	12
RS41	Waingawa R at South Rd	27	14	42	12
RS42	Whareama R at Gauge	198	74	320	12
RS43	Motuwaireka S at Headwaters	55	29	99	10
RS44	Totara S at Stronvar	51	13	80	12
RS45	Parkvale Trib at Lowes Res.	39	32	41	11
RS46	Parkvale S at Weir	39	33	52	12
RS47	Waiohine R at Gorge	22	11	36	12
RS48	Waiohine R at Bicknells	29	16	36	12
RS49	Beef Ck at Headwaters	37	22	53	12
RS50	Mangatarere S at SH 2	35	22	44	12
RS51	Huangarua R at Ponatahi Br	161	79	200	12
RS52	Tauanui R at Whakatomotomo Rd	42	25	49	12
RS53	Awhea R at Tora Rd	154	82	210	12
RS54	Coles Ck Trib at Lagoon Hill Rd	183	56	250	8
RS55	Tauherenikau R at Websters	29	14	37	12
RS56	Waiorongomai R at Forest Pk	35	26	52	12
RS57	Waiwhetu S at Whites Line East	63	53	73	12

Table A4.3: Dissolved aluminium (mg/L)

Site no.	Site name	Median	Minimum	Maximum	<i>n</i>
RS02	Mangapouri S at Bennetts Rd	0.0135	0.0070	0.1270	12
RS03	Waitohu S at Forest Pk	0.0240	0.0160	0.0620	12
RS04	Waitohu S at Norfolk Cres	0.0130	0.0070	0.0820	12
RS05	Otaki R at Pukehinau	0.0135	0.0050	0.0640	12
RS06	Otaki R at Mouth	0.0120	<0.003	0.0640	12
RS07	Mangaone S at Sims Rd Br	0.0165	0.0100	0.1200	12
RS08	Ngarara S at Field Way	0.0195	0.0100	0.1720	12
RS09	Waikanae R at Mangaone Walkway	0.0165	0.0100	0.1130	12
RS10	Waikanae R at Greenaway Rd	0.0125	0.0070	0.0820	12
RS11	Whareroa S at Waterfall Rd	0.0595	0.0190	0.5100	12
RS12	Whareroa S at QE Park	0.0975	0.0310	0.2100	12
RS13	Horokiri S at Snodgrass	0.0105	0.0040	0.0690	12
RS14	Pauatahanui S at Elmwood Br	0.0145	0.0070	0.1570	12
RS15	Porirua S at Glenside	0.0140	0.0070	0.0470	12
RS16	Porirua S at Wall Park (Milk Depot)	0.0100	0.0060	0.0530	12
RS17	Makara S at Kennels	0.0155	0.0080	0.1650	12
RS18	Karori S at Makara Peak	0.0105	0.0060	0.0820	12
RS19	Kaiwharawhara S at Ngaio Gorge	0.0095	0.0050	0.0750	12
RS20	Hutt R at Te Marua Intake Site	0.0340	0.0120	0.1910	12
RS21	Hutt R opp. Manor Park G.C.	0.0245	0.0080	0.1020	12
RS22	Hutt R at Boulcott	0.0250	0.0080	0.1140	12
RS23	Pakuratahi R 50m d/s Farm Ck	0.0330	0.0100	0.1720	12
RS24	Mangaroa R at Te Marua	0.0485	0.0130	0.1130	12
RS25	Akatarawa R at Hutt confl.	0.0250	0.0140	0.1630	12
RS26	Whakatikei R at Riverstone	0.0185	0.0090	0.0670	12
RS28	Wainuiomata R at Manuka Track	0.0215	0.0140	0.0460	12
RS29	Wainuiomata R d/s of White Br	0.0135	0.0040	0.0320	12
RS30	Orongorongo R at Orongorongo Stn	0.0110	0.0060	0.0360	12
RS31	Ruamahanga R at McLays	0.0190	0.0120	0.0470	12
RS32	Ruamahanga R at Te Ore Ore	0.0110	0.0050	0.0280	12
RS33	Ruamahanga R at Gladstone Br	0.0095	0.0040	0.0220	12
RS34	Ruamahanga R at Pukio	0.0130	0.0050	0.0240	12
RS35	Mataikona Trib at Sugar Loaf Rd	0.0065	<0.003	0.0340	12
RS36	Taueru R at Castlehill	0.0280	0.0080	0.1090	12
RS37	Taueru R at Gladstone	0.0023	<0.003	0.0310	12
RS38	Kopuaranga R at Stewarts	0.0070	<0.003	0.0180	12
RS39	Whangaehu R 250m u/s confl.	0.0095	<0.003	0.0360	12
RS40	Waipoua R at Colombo Rd Br	0.0095	<0.003	0.0830	12
RS41	Waingawa R at South Rd	0.0135	0.0070	0.0690	12
RS42	Whareama R at Gauge	0.0030	<0.003	0.0250	12
RS43	Motuwaireka S at Headwaters	0.0055	0.0040	0.0290	10
RS44	Totara S at Stronvar	0.0130	0.0040	0.1370	12
RS45	Parkvale Trib at Lowes Res.	0.0040	<0.003	0.0340	11
RS46	Parkvale S at Weir	0.0200	0.0040	0.0820	12
RS47	Waiohine R at Gorge	0.0120	0.0080	0.0940	12
RS48	Waiohine R at Bicknells	0.0090	<0.003	0.0780	12
RS49	Beef Ck at Headwaters	0.0110	0.0080	0.1560	12
RS50	Mangatarere S at SH 2	0.0050	<0.003	0.0620	12
RS51	Huangarua R at Ponatahi Br	0.0080	<0.003	0.0460	12
RS52	Tauanui R at Whakatomotomo Rd	0.0210	0.0050	0.1460	12
RS53	Awhea R at Tora Rd	0.0065	<0.003	0.0510	12
RS54	Coles Ck Trib at Lagoon Hill Rd	0.0080	0.0030	0.0650	8
RS55	Tauherenikau R at Websters	0.0190	0.0050	0.0790	12
RS56	Waiorongomai R at Forest Pk	0.0330	0.0140	0.1090	12
RS57	Waiwhetu S at Whites Line East	0.0095	<0.003	0.0360	12

Table A4.4: Dissolved arsenic (mg/L)

Site no.	Site name	Median	Minimum	Maximum	<i>n</i>
RS02	Mangapouri S at Bennetts Rd	0.0005	<0.001	0.0014	12
RS03	Waitohu S at Forest Pk	0.0005	<0.001	0.0005	12
RS04	Waitohu S at Norfolk Cres	0.0005	<0.001	0.0012	12
RS05	Otaki R at Pukehinau	0.0005	<0.001	0.0005	12
RS06	Otaki R at Mouth	0.0005	<0.001	0.0005	12
RS07	Mangaone S at Sims Rd Br	0.0005	<0.001	0.0005	12
RS08	Ngarara S at Field Way	0.0005	<0.001	0.0005	12
RS09	Waikanae R at Mangaone Walkway	0.0005	<0.001	0.0005	12
RS10	Waikanae R at Greenaway Rd	0.0005	<0.001	0.0005	12
RS11	Whareroa S at Waterfall Rd	0.0005	<0.001	0.0005	12
RS12	Whareroa S at QE Park	0.0005	<0.001	0.0011	12
RS13	Horokiri S at Snodgrass	0.0005	<0.001	0.0005	12
RS14	Pauatahanui S at Elmwood Br	0.0005	<0.001	0.0005	12
RS15	Porirua S at Glenside	0.0005	<0.001	0.0005	12
RS16	Porirua S at Wall Park (Milk Depot)	0.0005	<0.001	0.0005	12
RS17	Makara S at Kennels	0.0005	<0.001	0.0011	12
RS18	Karori S at Makara Peak	0.0005	<0.001	0.0005	12
RS19	Kaiwharawhara S at Ngaio Gorge	0.0005	<0.001	0.0013	12
RS20	Hutt R at Te Marua Intake Site	0.0005	<0.001	0.0005	12
RS21	Hutt R opp. Manor Park G.C.	0.0005	<0.001	0.0005	12
RS22	Hutt R at Boulcott	0.0005	<0.001	0.0005	12
RS23	Pakuratahi R 50m d/s Farm Ck	0.0005	<0.001	0.0005	12
RS24	Mangaroa R at Te Marua	0.0005	<0.001	0.0005	12
RS25	Akatarawa R at Hutt confl.	0.0005	<0.001	0.0005	12
RS26	Whakatikei R at Riverstone	0.0005	<0.001	0.0005	12
RS28	Wainuiomata R at Manuka Track	0.0005	<0.001	0.0005	12
RS29	Wainuiomata R d/s of White Br	0.0005	<0.001	0.0005	12
RS30	Orongorongo R at Orongorongo Stn	0.0005	<0.001	0.0005	12
RS31	Ruamahanga R at McLays	0.0005	<0.001	0.0005	12
RS32	Ruamahanga R at Te Ore Ore	0.0005	<0.001	0.0005	12
RS33	Ruamahanga R at Gladstone Br	0.0005	<0.001	0.0005	12
RS34	Ruamahanga R at Pukio	0.0005	<0.001	0.0005	12
RS35	Mataikona Trib at Sugar Loaf Rd	0.0005	<0.001	0.0005	12
RS36	Taueru R at Castlehill	0.0005	<0.001	0.0005	12
RS37	Taueru R at Gladstone	0.0005	<0.001	0.0005	12
RS38	Kopuaranga R at Stewarts	0.0005	<0.001	0.0005	12
RS39	Whangaehu R 250m u/s confl.	0.0005	<0.001	0.0010	12
RS40	Waipoua R at Colombo Rd Br	0.0005	<0.001	0.0005	12
RS41	Waingawa R at South Rd	0.0005	<0.001	0.0005	12
RS42	Whareama R at Gauge	0.0005	<0.001	0.0010	12
RS43	Motuwaireka S at Headwaters	0.0005	<0.001	0.0005	10
RS44	Totara S at Stronvar	0.0005	<0.001	0.0005	12
RS45	Parkvale Trib at Lowes Res.	0.0005	<0.001	0.0005	11
RS46	Parkvale S at Weir	0.0005	<0.001	0.0012	12
RS47	Waiohine R at Gorge	0.0005	<0.001	0.0005	12
RS48	Waiohine R at Bicknells	0.0005	<0.001	0.0005	12
RS49	Beef Ck at Headwaters	0.0005	<0.001	0.0005	12
RS50	Mangatarere S at SH 2	0.0005	<0.001	0.0005	12
RS51	Huangarua R at Ponatahi Br	0.0005	<0.001	0.0005	12
RS52	Tauanui R at Whakatomotomo Rd	0.0005	<0.001	0.0005	12
RS53	Awhea R at Tora Rd	0.0008	<0.001	0.0013	12
RS54	Coles Ck Trib at Lagoon Hill Rd	0.0005	<0.001	0.0005	8
RS55	Tauherenikau R at Websters	0.0005	<0.001	0.0005	12
RS56	Waiorongomai R at Forest Pk	0.0005	<0.001	0.0005	12
RS57	Waiwhetu S at Whites Line East	0.0005	<0.001	0.0011	12

Table A4.5: Dissolved boron (mg/L)

Site no.	Site name	Median	Minimum	Maximum	<i>n</i>
RS02	Mangapouri S at Bennetts Rd	0.0285	0.0250	0.0310	12
RS03	Waitohu S at Forest Pk	0.0120	0.0100	0.0180	12
RS04	Waitohu S at Norfolk Cres	0.0200	0.0150	0.0490	12
RS05	Otaki R at Pukehinau	0.0110	0.0080	0.0200	12
RS06	Otaki R at Mouth	0.0110	0.0080	0.0190	12
RS07	Mangaone S at Sims Rd Br	0.0240	0.0190	0.0340	12
RS08	Ngarara S at Field Way	0.0380	0.0320	0.0890	12
RS09	Waikanae R at Mangaone Walkway	0.0110	0.0100	0.0130	12
RS10	Waikanae R at Greenaway Rd	0.0140	0.0120	0.0170	12
RS11	Whareroa S at Waterfall Rd	0.0275	0.0220	0.0330	12
RS12	Whareroa S at QE Park	0.0320	0.0270	0.0380	12
RS13	Horokiri S at Snodgrass	0.0230	0.0190	0.0270	12
RS14	Pauatahanui S at Elmwood Br	0.0315	0.0220	0.0370	12
RS15	Porirua S at Glenside	0.0340	0.0280	0.0390	12
RS16	Porirua S at Wall Park (Milk Depot)	0.0370	0.0280	0.0450	12
RS17	Makara S at Kennels	0.0325	0.0270	0.0420	12
RS18	Karori S at Makara Peak	0.0325	0.0280	0.0360	12
RS19	Kaiwharawhara S at Ngaio Gorge	0.0570	0.0200	0.0730	12
RS20	Hutt R at Te Marua Intake Site	0.0130	0.0100	0.0230	12
RS21	Hutt R opp. Manor Park G.C.	0.0180	0.0130	0.0210	12
RS22	Hutt R at Boulcott	0.0150	0.0120	0.0220	12
RS23	Pakuratahi R 50m d/s Farm Ck	0.0175	0.0140	0.0240	12
RS24	Mangaroa R at Te Marua	0.0170	0.0140	0.0240	12
RS25	Akatarawa R at Hutt confl.	0.0110	0.0090	0.0120	12
RS26	Whakatikei R at Riverstone	0.0130	0.0110	0.0140	12
RS28	Wainuiomata R at Manuka Track	0.0160	0.0120	0.0200	12
RS29	Wainuiomata R d/s of White Br	0.0190	0.0160	0.0250	12
RS30	Orongorongo R at Orongorongo Stn	0.0225	0.0170	0.0300	12
RS31	Ruamahanga R at McLays	0.0095	0.0050	0.0160	12
RS32	Ruamahanga R at Te Ore Ore	0.0125	0.0080	0.0170	12
RS33	Ruamahanga R at Gladstone Br	0.0155	0.0100	0.0200	12
RS34	Ruamahanga R at Pukio	0.0200	0.0120	0.0230	12
RS35	Mataikona Trib at Sugar Loaf Rd	0.1110	0.0520	0.1710	12
RS36	Taueru R at Castlehill	0.0745	0.0270	0.1050	12
RS37	Taueru R at Gladstone	0.0415	0.0230	0.0660	12
RS38	Kopuaranga R at Stewarts	0.0150	0.0130	0.0200	12
RS39	Whangaehu R 250m u/s confl.	0.0285	0.0170	0.0370	12
RS40	Waipoua R at Colombo Rd Br	0.0140	0.0120	0.0180	12
RS41	Waingawa R at South Rd	0.0115	0.0080	0.0200	12
RS42	Whareama R at Gauge	0.1770	0.0510	0.4400	12
RS43	Motuwaireka S at Headwaters	0.0520	0.0300	0.1000	10
RS44	Totara S at Stronvar	0.0400	0.0240	0.0570	12
RS45	Parkvale Trib at Lowes Res.	0.0530	0.0390	0.0590	11
RS46	Parkvale S at Weir	0.0315	0.0190	0.0490	12
RS47	Waiohine R at Gorge	0.0130	0.0070	0.0190	12
RS48	Waiohine R at Bicknells	0.0150	0.0080	0.0180	12
RS49	Beef Ck at Headwaters	0.0330	0.0120	0.0590	12
RS50	Mangatarere S at SH 2	0.0220	0.0120	0.0290	12
RS51	Huangarua R at Ponatahi Br	0.0330	0.0210	0.0440	12
RS52	Tauanui R at Whakatomotomo Rd	0.0210	0.0150	0.0310	12
RS53	Awhea R at Tora Rd	0.0700	0.0400	0.0990	12
RS54	Coles Ck Trib at Lagoon Hill Rd	0.1435	0.0450	0.2700	8
RS55	Tauherenikau R at Websters	0.0160	0.0110	0.0220	12
RS56	Waiorongomai R at Forest Pk	0.0160	0.0130	0.0210	12
RS57	Waiwhetu S at Whites Line East	0.0500	0.0400	0.0630	12

Table A4.6: Dissolved calcium (mg/L)

Site no.	Site name	Median	Minimum	Maximum	<i>n</i>
RS02	Mangapouri S at Bennetts Rd	9.0	7.4	10.5	12
RS03	Waitohu S at Forest Pk	4.6	3.4	5.2	12
RS04	Waitohu S at Norfolk Cres	8.1	4.1	14.3	12
RS05	Otaki R at Pukehinau	5.3	3.6	7.4	12
RS06	Otaki R at Mouth	5.5	3.7	7.2	12
RS07	Mangaone S at Sims Rd Br	10.1	4.6	12.5	12
RS08	Ngarara S at Field Way	18.7	11.9	22.0	12
RS09	Waikanae R at Mangaone Walkway	3.5	2.4	4.0	12
RS10	Waikanae R at Greenaway Rd	5.1	3.6	5.6	12
RS11	Whareroa S at Waterfall Rd	7.1	5.4	9.6	12
RS12	Whareroa S at QE Park	13.2	7.4	15.5	12
RS13	Horokiri S at Snodgrass	5.8	5.0	6.6	12
RS14	Pauatahanui S at Elmwood Br	5.6	4.4	6.7	12
RS15	Porirua S at Glenside	8.9	6.8	9.7	12
RS16	Porirua S at Wall Park (Milk Depot)	9.1	7.7	10.3	12
RS17	Makara S at Kennels	7.3	5.0	8.1	12
RS18	Karori S at Makara Peak	7.6	5.6	8.3	12
RS19	Kaiwharawhara S at Ngaio Gorge	11.4	4.0	12.7	12
RS20	Hutt R at Te Marua Intake Site	4.8	3.0	5.7	12
RS21	Hutt R opp. Manor Park G.C.	5.3	4.1	5.9	12
RS22	Hutt R at Boulcott	5.1	3.5	5.9	12
RS23	Pakuratahi R 50m d/s Farm Ck	4.7	3.7	4.9	12
RS24	Mangaroa R at Te Marua	4.7	4.2	5.2	12
RS25	Akatarawa R at Hutt confl.	4.5	3.2	4.9	12
RS26	Whakatikei R at Riverstone	4.6	3.3	4.9	12
RS28	Wainuiomata R at Manuka Track	4.1	3.5	4.3	12
RS29	Wainuiomata R d/s of White Br	4.6	4.3	5.0	12
RS30	Orongorongo R at Orongorongo Stn	12.3	9.3	13.2	12
RS31	Ruamahanga R at McLays	4.8	2.7	7.5	12
RS32	Ruamahanga R at Te Ore Ore	19.9	6.2	35.0	12
RS33	Ruamahanga R at Gladstone Br	14.4	5.7	19.3	12
RS34	Ruamahanga R at Pukio	17.2	7.9	21.0	12
RS35	Mataikona Trib at Sugar Loaf Rd	43.5	27.0	76.0	12
RS36	Taueru R at Castlehill	25.0	9.6	31.0	12
RS37	Taueru R at Gladstone	63.0	22.0	81.0	12
RS38	Kopuaranga R at Stewarts	45.5	29.0	70.0	12
RS39	Whangaehu R 250m u/s confl.	32.0	18.5	41.0	12
RS40	Waipoua R at Colombo Rd Br	8.6	5.0	10.3	12
RS41	Waingawa R at South Rd	5.9	3.8	7.4	12
RS42	Whareama R at Gauge	67.5	27.0	101.0	12
RS43	Motuwaireka S at Headwaters	24.5	11.8	39.0	10
RS44	Totara S at Stronvar	24.5	5.6	36.0	12
RS45	Parkvale Trib at Lowes Res.	10.8	8.5	13.7	11
RS46	Parkvale S at Weir	9.3	7.5	13.4	12
RS47	Waiohine R at Gorge	5.1	2.3	6.7	12
RS48	Waiohine R at Bicknells	6.8	3.3	7.7	12
RS49	Beef Ck at Headwaters	6.7	3.8	8.9	12
RS50	Mangatarere S at SH 2	7.8	5.0	9.0	12
RS51	Huangarua R at Ponatahi Br	48.5	23.0	60.0	12
RS52	Tauanui R at Whakatomotomo Rd	9.3	5.7	11.6	12
RS53	Awhea R at Tora Rd	46.5	24.0	59.0	12
RS54	Coles Ck Trib at Lagoon Hill Rd	51.5	19.5	75.0	8
RS55	Tauherenikau R at Websters	5.8	3.4	7.1	12
RS56	Waiorongomai R at Forest Pk	7.0	5.1	9.4	12
RS57	Waiwhetu S at Whites Line East	12.8	11.3	14.5	12

Table A4.7: Dissolved chloride (mg/L)

Site no.	Site name	Median	Minimum	Maximum	<i>n</i>
RS02	Mangapouri S at Bennetts Rd	26	22	29	12
RS03	Waitohu S at Forest Pk	13	10	15	12
RS04	Waitohu S at Norfolk Cres	19	14	102	12
RS05	Otaki R at Pukehinau	7	6	9	12
RS06	Otaki R at Mouth	8	6	9	12
RS07	Mangaone S at Sims Rd Br	25	19	27	12
RS08	Ngarara S at Field Way	43	32	280	12
RS09	Waikanae R at Mangaone Walkway	14	11	16	12
RS10	Waikanae R at Greenaway Rd	16	13	19	12
RS11	Whareroa S at Waterfall Rd	38	32	46	12
RS12	Whareroa S at QE Park	36	27	39	12
RS13	Horokiri S at Snodgrass	33	29	39	12
RS14	Pauatahanui S at Elmwood Br	28	23	33	12
RS15	Porirua S at Glenside	45	33	49	12
RS16	Porirua S at Wall Park (Milk Depot)	44	37	47	12
RS17	Makara S at Kennels	58	46	66	12
RS18	Karori S at Makara Peak	40	36	42	12
RS19	Kaiwharawhara S at Ngaio Gorge	52	17	58	12
RS20	Hutt R at Te Marua Intake Site	10	8	11	12
RS21	Hutt R opp. Manor Park G.C.	14	13	16	12
RS22	Hutt R at Boulcott	13	11	16	12
RS23	Pakuratahi R 50m d/s Farm Ck	12	11	13	12
RS24	Mangaroa R at Te Marua	16	14	18	12
RS25	Akatarawa R at Hutt confl.	13	11	14	12
RS26	Whakatikei R at Riverstone	20	15	22	12
RS28	Wainuiomata R at Manuka Track	20	18	21	12
RS29	Wainuiomata R d/s of White Br	25	23	27	12
RS30	Orongorongo R at Orongorongo Stn	17	15	19	12
RS31	Ruamahanga R at McLays	5	4	6	12
RS32	Ruamahanga R at Te Ore Ore	9	6	11	12
RS33	Ruamahanga R at Gladstone Br	9	5	11	12
RS34	Ruamahanga R at Pukio	13	7	15	12
RS35	Mataikona Trib at Sugar Loaf Rd	23	17	34	12
RS36	Taueru R at Castlehill	21	15	26	12
RS37	Taueru R at Gladstone	24	17	33	12
RS38	Kopuaranga R at Stewarts	12	10	15	12
RS39	Whangaehu R 250m u/s confl.	21	10	39	12
RS40	Waipoua R at Colombo Rd Br	9	8	10	12
RS41	Waingawa R at South Rd	5	4	6	12
RS42	Whareama R at Gauge	34	15	53	12
RS43	Motuwaireka S at Headwaters	27	23	38	10
RS44	Totara S at Stronvar	21	12	28	12
RS45	Parkvale Trib at Lowes Res.	12	11	14	11
RS46	Parkvale S at Weir	14	10	21	12
RS47	Waiohine R at Gorge	5	3	6	12
RS48	Waiohine R at Bicknells	7	5	9	12
RS49	Beef Ck at Headwaters	11	9	12	12
RS50	Mangatarere S at SH 2	13	9	17	12
RS51	Huangarua R at Ponatahi Br	28	18	40	12
RS52	Tauanui R at Whakatomotomo Rd	19	16	22	12
RS53	Awhea R at Tora Rd	34	25	44	12
RS54	Coles Ck Trib at Lagoon Hill Rd	157	42	400	8
RS55	Tauherenikau R at Websters	7	5	8	12
RS56	Waiorongomai R at Forest Pk	17	16	20	12
RS57	Waiwhetu S at Whites Line East	31	25	33	12

Table A4.8: Dissolved iron (mg/L)

Site no.	Site name	Median	Minimum	Maximum	<i>n</i>
RS02	Mangapouri S at Bennetts Rd	0.50	0.27	0.89	12
RS03	Waitohu S at Forest Pk	0.03	0.02	0.06	12
RS04	Waitohu S at Norfolk Cres	0.29	0.21	0.61	12
RS05	Otaki R at Pukehinau	0.01	<0.02	0.04	12
RS06	Otaki R at Mouth	0.01	<0.02	0.04	12
RS07	Mangaone S at Sims Rd Br	0.35	0.21	0.54	12
RS08	Ngarara S at Field Way	0.88	0.34	1.16	12
RS09	Waikanae R at Mangaone Walkway	0.01	<0.02	0.07	12
RS10	Waikanae R at Greenaway Rd	0.01	<0.02	0.29	12
RS11	Whareroa S at Waterfall Rd	0.11	0.05	0.33	12
RS12	Whareroa S at QE Park	0.71	0.37	1.42	12
RS13	Horokiri S at Snodgrass	0.05	<0.02	0.09	12
RS14	Pauatahanui S at Elmwood Br	0.25	0.20	0.32	12
RS15	Porirua S at Glenside	0.07	0.04	0.12	12
RS16	Porirua S at Wall Park (Milk Depot)	0.13	0.06	0.34	12
RS17	Makara S at Kennels	0.28	0.08	0.48	12
RS18	Karori S at Makara Peak	0.05	0.03	0.08	12
RS19	Kaiwharawhara S at Ngaio Gorge	0.07	0.04	0.11	12
RS20	Hutt R at Te Marua Intake Site	0.03	<0.02	0.12	12
RS21	Hutt R opp. Manor Park G.C.	0.06	<0.02	0.11	12
RS22	Hutt R at Boulcott	0.04	<0.02	0.10	12
RS23	Pakuratahi R 50m d/s Farm Ck	0.03	<0.02	0.11	12
RS24	Mangaroa R at Te Marua	0.16	0.07	0.21	12
RS25	Akatarawa R at Hutt confl.	0.02	<0.02	0.09	12
RS26	Whakatikei R at Riverstone	0.02	<0.02	0.05	12
RS28	Wainuiomata R at Manuka Track	0.03	<0.02	0.05	12
RS29	Wainuiomata R d/s of White Br	0.09	0.07	0.13	12
RS30	Orongorongo R at Orongorongo Stn	0.01	<0.02	0.04	12
RS31	Ruamahanga R at McLays	0.01	<0.02	0.02	12
RS32	Ruamahanga R at Te Ore Ore	0.03	<0.02	0.09	12
RS33	Ruamahanga R at Gladstone Br	0.02	<0.02	0.08	12
RS34	Ruamahanga R at Pukio	0.03	0.02	0.06	12
RS35	Mataikona Trib at Sugar Loaf Rd	0.01	<0.02	0.06	12
RS36	Taueru R at Castlehill	0.26	0.09	0.31	12
RS37	Taueru R at Gladstone	0.06	0.02	0.30	12
RS38	Kopuaranga R at Stewarts	0.10	0.03	0.19	12
RS39	Whangaehu R 250m u/s confl.	0.10	0.06	0.16	12
RS40	Waipoua R at Colombo Rd Br	0.01	<0.02	0.07	12
RS41	Waingawa R at South Rd	0.01	<0.02	0.04	12
RS42	Whareama R at Gauge	0.06	0.02	0.11	12
RS43	Motuwaireka S at Headwaters	0.01	<0.02	0.01	10
RS44	Totara S at Stronvar	0.04	<0.02	0.10	12
RS45	Parkvale Trib at Lowes Res.	0.01	<0.02	0.09	11
RS46	Parkvale S at Weir	0.16	0.06	0.44	12
RS47	Waiohine R at Gorge	0.01	<0.02	0.05	12
RS48	Waiohine R at Bicknells	0.03	<0.02	0.06	12
RS49	Beef Ck at Headwaters	0.01	<0.02	0.11	12
RS50	Mangatarere S at SH 2	0.02	<0.02	0.06	12
RS51	Huangarua R at Ponatahi Br	0.02	<0.02	0.09	12
RS52	Tauanui R at Whakatomotomo Rd	0.01	<0.02	0.10	12
RS53	Awhea R at Tora Rd	0.01	<0.02	0.09	12
RS54	Coles Ck Trib at Lagoon Hill Rd	0.09	0.04	0.19	8
RS55	Tauherenikau R at Websters	0.01	<0.02	0.04	12
RS56	Waiorongomai R at Forest Pk	0.01	<0.02	0.06	12
RS57	Waiwhetu S at Whites Line East	0.37	0.11	0.72	12

Table A4.9: Dissolved magnesium (mg/L)

Site no.	Site name	Median	Minimum	Maximum	<i>n</i>
RS02	Mangapouri S at Bennetts Rd	5.0	4.2	5.7	12
RS03	Waitohu S at Forest Pk	1.6	1.2	1.9	12
RS04	Waitohu S at Norfolk Cres	3.5	1.7	11.6	12
RS05	Otaki R at Pukehinau	1.1	0.8	1.5	12
RS06	Otaki R at Mouth	1.2	0.9	1.5	12
RS07	Mangaone S at Sims Rd Br	4.3	2.2	5.8	12
RS08	Ngarara S at Field Way	6.9	4.6	22.0	12
RS09	Waikanae R at Mangaone Walkway	1.5	1.1	1.6	12
RS10	Waikanae R at Greenaway Rd	1.8	1.5	2.0	12
RS11	Whareroa S at Waterfall Rd	4.4	3.3	5.6	12
RS12	Whareroa S at QE Park	5.5	3.6	6.6	12
RS13	Horokiri S at Snodgrass	3.2	2.9	3.7	12
RS14	Pauatahanui S at Elmwood Br	3.1	2.6	4.0	12
RS15	Porirua S at Glenside	5.3	3.6	6.1	12
RS16	Porirua S at Wall Park (Milk Depot)	5.1	3.8	6.1	12
RS17	Makara S at Kennels	5.5	3.9	6.4	12
RS18	Karori S at Makara Peak	4.2	3.5	4.5	12
RS19	Kaiwharawhara S at Ngaio Gorge	5.7	1.9	6.9	12
RS20	Hutt R at Te Marua Intake Site	1.5	1.0	1.7	12
RS21	Hutt R opp. Manor Park G.C.	1.9	1.4	2.2	12
RS22	Hutt R at Boulcott	1.8	1.3	2.1	12
RS23	Pakuratahi R 50m d/s Farm Ck	1.7	1.4	1.8	12
RS24	Mangaroa R at Te Marua	2.2	1.7	2.4	12
RS25	Akatarawa R at Hutt confl.	1.6	1.3	1.7	12
RS26	Whakatikei R at Riverstone	2.1	1.5	2.2	12
RS28	Wainuiomata R at Manuka Track	1.9	1.7	2.2	12
RS29	Wainuiomata R d/s of White Br	2.6	2.4	2.9	12
RS30	Orongorongo R at Orongorongo Stn	2.2	1.7	2.5	12
RS31	Ruamahanga R at McLays	0.9	0.6	1.2	12
RS32	Ruamahanga R at Te Ore Ore	2.0	0.8	2.6	12
RS33	Ruamahanga R at Gladstone Br	2.2	0.9	2.5	12
RS34	Ruamahanga R at Pukio	2.7	1.2	3.6	12
RS35	Mataikona Trib at Sugar Loaf Rd	5.3	3.0	7.3	12
RS36	Taueru R at Castlehill	5.0	2.8	6.3	12
RS37	Taueru R at Gladstone	4.6	3.6	9.9	12
RS38	Kopuaranga R at Stewarts	2.9	2.4	3.1	12
RS39	Whangaehu R 250m u/s confl.	6.4	2.3	8.3	12
RS40	Waipoua R at Colombo Rd Br	2.1	1.2	2.7	12
RS41	Waingawa R at South Rd	1.0	0.6	1.3	12
RS42	Whareama R at Gauge	9.5	3.7	12.4	12
RS43	Motuwaireka S at Headwaters	6.3	4.3	10.5	10
RS44	Totara S at Stronvar	6.0	1.7	8.5	12
RS45	Parkvale Trib at Lowes Res.	3.7	2.9	4.2	11
RS46	Parkvale S at Weir	3.5	2.3	4.2	12
RS47	Waiohine R at Gorge	0.9	0.5	1.2	12
RS48	Waiohine R at Bicknells	1.5	0.7	1.8	12
RS49	Beef Ck at Headwaters	2.0	1.3	2.7	12
RS50	Mangatarere S at SH 2	2.8	1.6	3.5	12
RS51	Huangarua R at Ponatahi Br	6.3	2.7	7.6	12
RS52	Tauanui R at Whakatomotomo Rd	2.7	1.9	3.7	12
RS53	Awhea R at Tora Rd	6.5	3.7	7.7	12
RS54	Coles Ck Trib at Lagoon Hill Rd	7.4	4.6	13.7	8
RS55	Tauherenikau R at Websters	1.2	0.7	1.4	12
RS56	Waiorongomai R at Forest Pk	2.1	1.6	2.6	12
RS57	Waiwhetu S at Whites Line East	4.6	3.7	5.1	12

Table A4.10: Dissolved manganese (mg/L)

Site no.	Site name	Median	Minimum	Maximum	<i>n</i>
RS02	Mangapouri S at Bennetts Rd	0.0400	0.0240	0.1720	12
RS03	Waitohu S at Forest Pk	0.0011	0.0008	0.0015	12
RS04	Waitohu S at Norfolk Cres	0.0365	0.0118	0.1080	12
RS05	Otaki R at Pukehinau	0.0003	<0.0005	0.0008	12
RS06	Otaki R at Mouth	0.0003	<0.0005	0.0011	12
RS07	Mangaone S at Sims Rd Br	0.0370	0.0130	0.0870	12
RS08	Ngarara S at Field Way	0.0595	0.0310	0.4800	12
RS09	Waikanae R at Mangaone Walkway	0.0007	<0.0005	0.0020	12
RS10	Waikanae R at Greenaway Rd	0.0009	<0.0005	0.0025	12
RS11	Whareroa S at Waterfall Rd	0.0048	0.0020	0.0240	12
RS12	Whareroa S at QE Park	0.0780	0.0122	0.1400	12
RS13	Horokiri S at Snodgrass	0.0032	0.0015	0.0066	12
RS14	Pauatahanui S at Elmwood Br	0.0265	0.0141	0.0470	12
RS15	Porirua S at Glenside	0.0042	0.0030	0.0182	12
RS16	Porirua S at Wall Park (Milk Depot)	0.0158	0.0034	0.0270	12
RS17	Makara S at Kennels	0.0305	0.0124	0.0460	12
RS18	Karori S at Makara Peak	0.0100	0.0047	0.0159	12
RS19	Kaiwharawhara S at Ngaio Gorge	0.0091	0.0018	0.0187	12
RS20	Hutt R at Te Marua Intake Site	0.0007	<0.0005	0.0019	12
RS21	Hutt R opp. Manor Park G.C.	0.0015	0.0010	0.0065	12
RS22	Hutt R at Boulcott	0.0010	0.0006	0.0032	12
RS23	Pakuratahi R 50m d/s Farm Ck	0.0012	0.0007	0.0026	12
RS24	Mangaroa R at Te Marua	0.0045	0.0036	0.0101	12
RS25	Akatarawa R at Hutt confl.	0.0007	0.0005	0.0016	12
RS26	Whakatikei R at Riverstone	0.0006	<0.0005	0.0014	12
RS28	Wainuiomata R at Manuka Track	0.0009	0.0007	0.0016	12
RS29	Wainuiomata R d/s of White Br	0.0087	0.0061	0.0127	12
RS30	Orongorongo R at Orongorongo Stn	0.0003	<0.0005	0.0016	12
RS31	Ruamahanga R at McLays	0.0003	<0.0005	0.0008	12
RS32	Ruamahanga R at Te Ore Ore	0.0036	0.0016	0.0107	12
RS33	Ruamahanga R at Gladstone Br	0.0032	0.0016	0.0072	12
RS34	Ruamahanga R at Pukio	0.0060	0.0018	0.0107	12
RS35	Mataikona Trib at Sugar Loaf Rd	0.0015	0.0006	0.0073	12
RS36	Taueru R at Castlehill	0.0280	0.0140	0.0490	12
RS37	Taueru R at Gladstone	0.0108	0.0016	0.0220	12
RS38	Kopuaranga R at Stewarts	0.0125	0.0053	0.0196	12
RS39	Whangaehu R 250m u/s confl.	0.0305	0.0200	0.2300	12
RS40	Waipoua R at Colombo Rd Br	0.0014	0.0010	0.0033	12
RS41	Waingawa R at South Rd	0.0006	<0.0005	0.0033	12
RS42	Whareama R at Gauge	0.0285	0.0011	0.0720	12
RS43	Motuwaireka S at Headwaters	0.0006	<0.0005	0.0018	10
RS44	Totara S at Stronvar	0.0098	0.0046	0.0178	12
RS45	Parkvale Trib at Lowes Res.	0.0041	0.0029	0.0059	11
RS46	Parkvale S at Weir	0.0305	0.0082	0.4400	12
RS47	Waiohine R at Gorge	0.0003	<0.0005	0.0015	12
RS48	Waiohine R at Bicknells	0.0050	0.0022	0.0089	12
RS49	Beef Ck at Headwaters	0.0005	<0.0005	0.0015	12
RS50	Mangatarere S at SH 2	0.0044	0.0020	0.0073	12
RS51	Huangarua R at Ponatahi Br	0.0028	0.0012	0.0083	12
RS52	Tauanui R at Whakatomotomo Rd	0.0003	<0.0005	0.0017	12
RS53	Awhea R at Tora Rd	0.0056	0.0019	0.0440	12
RS54	Coles Ck Trib at Lagoon Hill Rd	0.0220	0.0032	0.0530	8
RS55	Tauherenikau R at Websters	0.0008	0.0006	0.0034	12
RS56	Waiorongomai R at Forest Pk	0.0006	<0.0005	0.0014	12
RS57	Waiwhetu S at Whites Line East	0.0505	0.0200	0.1140	12

Table A4.11: Dissolved potassium (mg/L)

Site no.	Site name	Median	Minimum	Maximum	<i>n</i>
RS02	Mangapouri S at Bennetts Rd	3.85	2.50	4.50	12
RS03	Waitohu S at Forest Pk	0.74	0.61	0.83	12
RS04	Waitohu S at Norfolk Cres	1.87	1.24	4.10	12
RS05	Otaki R at Pukehinau	0.50	0.38	0.62	12
RS06	Otaki R at Mouth	0.55	0.41	0.69	12
RS07	Mangaone S at Sims Rd Br	2.30	1.90	2.90	12
RS08	Ngarara S at Field Way	3.45	2.10	8.30	12
RS09	Waikanae R at Mangaone Walkway	0.75	0.69	0.92	12
RS10	Waikanae R at Greenaway Rd	0.85	0.76	1.11	12
RS11	Whareroa S at Waterfall Rd	2.10	1.44	2.50	12
RS12	Whareroa S at QE Park	2.35	2.00	3.40	12
RS13	Horokiri S at Snodgrass	1.42	1.21	1.68	12
RS14	Pauatahanui S at Elmwood Br	1.51	1.10	1.80	12
RS15	Porirua S at Glenside	1.74	1.57	2.10	12
RS16	Porirua S at Wall Park (Milk Depot)	1.86	1.68	2.30	12
RS17	Makara S at Kennels	1.99	1.54	2.60	12
RS18	Karori S at Makara Peak	1.61	1.38	1.82	12
RS19	Kaiwharawhara S at Ngaio Gorge	2.05	1.39	2.40	12
RS20	Hutt R at Te Marua Intake Site	0.65	0.54	0.72	12
RS21	Hutt R opp. Manor Park G.C.	0.90	0.68	1.05	12
RS22	Hutt R at Boulcott	0.85	0.67	0.99	12
RS23	Pakuratahi R 50m d/s Farm Ck	0.80	0.69	0.88	12
RS24	Mangaroa R at Te Marua	1.12	0.96	1.38	12
RS25	Akatarawa R at Hutt confl.	0.71	0.57	0.73	12
RS26	Whakatikei R at Riverstone	0.87	0.72	0.99	12
RS28	Wainuiomata R at Manuka Track	0.93	0.84	1.02	12
RS29	Wainuiomata R d/s of White Br	1.15	1.05	1.33	12
RS30	Orongorongo R at Orongorongo Stn	1.04	0.87	1.20	12
RS31	Ruamahanga R at McLays	0.35	0.24	0.56	12
RS32	Ruamahanga R at Te Ore Ore	0.98	0.49	1.16	12
RS33	Ruamahanga R at Gladstone Br	1.13	0.54	1.39	12
RS34	Ruamahanga R at Pukio	1.12	0.65	1.59	12
RS35	Mataikona Trib at Sugar Loaf Rd	1.58	1.21	2.50	12
RS36	Taueru R at Castlehill	1.53	0.95	3.70	12
RS37	Taueru R at Gladstone	1.89	0.95	2.80	12
RS38	Kopuaranga R at Stewarts	1.39	0.96	1.94	12
RS39	Whangaehu R 250m u/s confl.	2.17	1.18	3.20	12
RS40	Waipoua R at Colombo Rd Br	1.07	0.92	1.18	12
RS41	Waingawa R at South Rd	0.52	0.37	0.79	12
RS42	Whareama R at Gauge	3.10	2.20	5.50	12
RS43	Motuwaireka S at Headwaters	1.99	1.42	2.60	10
RS44	Totara S at Stronvar	1.80	1.38	2.30	12
RS45	Parkvale Trib at Lowes Res.	5.40	4.00	5.70	11
RS46	Parkvale S at Weir	1.96	0.88	4.40	12
RS47	Waiohine R at Gorge	0.44	0.33	0.58	12
RS48	Waiohine R at Bicknells	0.84	0.43	1.07	12
RS49	Beef Ck at Headwaters	0.87	0.71	1.15	12
RS50	Mangatarere S at SH 2	1.36	1.09	2.00	12
RS51	Huangarua R at Ponatahi Br	1.85	1.38	2.10	12
RS52	Tauanui R at Whakatomotomo Rd	1.01	0.39	1.27	12
RS53	Awhea R at Tora Rd	2.75	2.10	3.50	12
RS54	Coles Ck Trib at Lagoon Hill Rd	2.65	1.49	3.80	8
RS55	Tauherenikau R at Websters	0.58	0.50	0.76	12
RS56	Waiorongomai R at Forest Pk	0.81	0.71	0.92	12
RS57	Waiwhetu S at Whites Line East	1.86	1.79	2.20	12

Table A4.12: Dissolved sodium (mg/L)

Site no.	Site name	Median	Minimum	Maximum	<i>n</i>
RS02	Mangapouri S at Bennetts Rd	22.0	16.9	25.0	12
RS03	Waitohu S at Forest Pk	9.3	8.5	10.3	12
RS04	Waitohu S at Norfolk Cres	14.7	9.7	69.0	12
RS05	Otaki R at Pukehinau	5.6	5.0	7.2	12
RS06	Otaki R at Mouth	5.9	5.1	7.2	12
RS07	Mangaone S at Sims Rd Br	19.3	13.9	22.0	12
RS08	Ngarara S at Field Way	30.0	21.0	167.0	12
RS09	Waikanae R at Mangaone Walkway	10.7	8.1	11.1	12
RS10	Waikanae R at Greenaway Rd	11.6	9.5	13.2	12
RS11	Whareroa S at Waterfall Rd	30.5	21.0	33.0	12
RS12	Whareroa S at QE Park	27.0	23.0	29.0	12
RS13	Horokiri S at Snodgrass	23.5	21.0	26.0	12
RS14	Pauatahanui S at Elmwood Br	21.5	18.2	25.0	12
RS15	Porirua S at Glenside	34.0	24.0	38.0	12
RS16	Porirua S at Wall Park (Milk Depot)	31.5	25.0	37.0	12
RS17	Makara S at Kennels	39.0	30.0	45.0	12
RS18	Karori S at Makara Peak	29.5	24.0	32.0	12
RS19	Kaiwharawhara S at Ngaio Gorge	36.5	13.2	41.0	12
RS20	Hutt R at Te Marua Intake Site	7.3	5.8	8.4	12
RS21	Hutt R opp. Manor Park G.C.	10.6	8.6	11.5	12
RS22	Hutt R at Boulcott	9.8	8.0	11.9	12
RS23	Pakuratahi R 50m d/s Farm Ck	8.5	7.3	9.8	12
RS24	Mangaroa R at Te Marua	11.6	10.1	13.1	12
RS25	Akatarawa R at Hutt confl.	9.1	7.1	9.8	12
RS26	Whakatikei R at Riverstone	13.6	11.0	14.8	12
RS28	Wainuiomata R at Manuka Track	13.5	12.8	15.4	12
RS29	Wainuiomata R d/s of White Br	17.0	16.0	20.0	12
RS30	Orongorongo R at Orongorongo Stn	12.5	10.5	14.1	12
RS31	Ruamahanga R at McLays	4.3	2.7	4.9	12
RS32	Ruamahanga R at Te Ore Ore	7.3	4.0	8.5	12
RS33	Ruamahanga R at Gladstone Br	7.7	4.2	8.9	12
RS34	Ruamahanga R at Pukio	10.1	5.2	12.8	12
RS35	Mataikona Trib at Sugar Loaf Rd	26.0	16.1	39.0	12
RS36	Taueru R at Castlehill	17.6	11.0	22.0	12
RS37	Taueru R at Gladstone	20.3	14.2	36.0	12
RS38	Kopuaranga R at Stewarts	10.3	8.7	12.5	12
RS39	Whangaehu R 250m u/s confl.	19.8	7.7	31.0	12
RS40	Waipoua R at Colombo Rd Br	7.9	6.0	8.9	12
RS41	Waingawa R at South Rd	4.2	3.1	5.4	12
RS42	Whareama R at Gauge	37.0	15.4	54.0	12
RS43	Motuwaireka S at Headwaters	26.5	17.1	39.0	10
RS44	Totara S at Stronvar	19.8	9.1	23.0	12
RS45	Parkvale Trib at Lowes Res.	13.9	11.8	15.5	11
RS46	Parkvale S at Weir	12.1	8.6	15.0	12
RS47	Waiohine R at Gorge	4.4	2.9	5.0	12
RS48	Waiohine R at Bicknells	5.9	3.6	7.0	12
RS49	Beef Ck at Headwaters	10.0	8.2	12.4	12
RS50	Mangatarere S at SH 2	10.2	7.5	15.5	12
RS51	Huangarua R at Ponatahi Br	25.0	13.6	31.0	12
RS52	Tauanui R at Whakatomotomo Rd	13.9	11.0	18.3	12
RS53	Awhea R at Tora Rd	31.0	20.0	41.0	12
RS54	Coles Ck Trib at Lagoon Hill Rd	104.0	33.0	240.0	8
RS55	Tauherenikau R at Websters	5.5	3.9	6.1	12
RS56	Waiorongomai R at Forest Pk	11.6	10.0	12.8	12
RS57	Waiwhetu S at Whites Line East	23.5	19.1	25.0	12

Table A4.13: Dissolved sulphate (mg/L)

Site no.	Site name	Median	Minimum	Maximum	<i>n</i>
RS02	Mangapouri S at Bennetts Rd	9.8	8.3	15.8	12
RS03	Waitohu S at Forest Pk	3.6	3.0	4.1	12
RS04	Waitohu S at Norfolk Cres	6.6	4.0	21.0	12
RS05	Otaki R at Pukehinau	3.3	2.4	4.8	12
RS06	Otaki R at Mouth	3.4	2.4	4.6	12
RS07	Mangaone S at Sims Rd Br	10.9	6.2	12.9	12
RS08	Ngarara S at Field Way	13.8	3.8	37.0	12
RS09	Waikanae R at Mangaone Walkway	3.4	2.1	4.0	12
RS10	Waikanae R at Greenaway Rd	4.6	3.0	5.4	12
RS11	Whareroa S at Waterfall Rd	10.7	6.8	12.3	12
RS12	Whareroa S at QE Park	14.0	8.5	15.8	12
RS13	Horokiri S at Snodgrass	7.1	6.4	8.2	12
RS14	Pauatahanui S at Elmwood Br	6.2	5.2	7.7	12
RS15	Porirua S at Glenside	10.8	9.0	11.8	12
RS16	Porirua S at Wall Park (Milk Depot)	10.8	9.4	12.2	12
RS17	Makara S at Kennels	10.2	8.7	12.9	12
RS18	Karori S at Makara Peak	11.0	9.3	11.7	12
RS19	Kaiwharawhara S at Ngaio Gorge	12.7	5.4	13.2	12
RS20	Hutt R at Te Marua Intake Site	2.7	1.9	3.9	12
RS21	Hutt R opp. Manor Park G.C.	3.9	3.4	4.6	12
RS22	Hutt R at Boulcott	3.7	2.7	5.0	12
RS23	Pakuratahi R 50m d/s Farm Ck	3.4	2.7	3.9	12
RS24	Mangaroa R at Te Marua	4.8	4.2	5.7	12
RS25	Akatarawa R at Hutt confl.	3.2	2.4	3.8	12
RS26	Whakatikei R at Riverstone	4.1	3.0	4.5	12
RS28	Wainuiomata R at Manuka Track	3.9	2.9	4.5	12
RS29	Wainuiomata R d/s of White Br	5.0	4.7	5.7	12
RS30	Orongorongo R at Orongorongo Stn	7.6	5.6	9.0	12
RS31	Ruamahanga R at McLays	2.5	1.4	3.7	12
RS32	Ruamahanga R at Te Ore Ore	6.5	2.9	13.6	12
RS33	Ruamahanga R at Gladstone Br	6.9	3.2	11.4	12
RS34	Ruamahanga R at Pukio	8.4	3.3	17.0	12
RS35	Mataikona Trib at Sugar Loaf Rd	71.0	41.0	122.0	12
RS36	Taueru R at Castlehill	25.0	18.4	46.0	12
RS37	Taueru R at Gladstone	25.0	9.1	56.0	12
RS38	Kopuaranga R at Stewarts	9.6	4.9	22.0	12
RS39	Whangaehu R 250m u/s confl.	24.0	6.2	46.0	12
RS40	Waipoua R at Colombo Rd Br	6.0	2.8	7.0	12
RS41	Waingawa R at South Rd	3.2	1.0	4.8	12
RS42	Whareama R at Gauge	78.0	32.0	139.0	12
RS43	Motuwaireka S at Headwaters	60.5	35.0	89.0	10
RS44	Totara S at Stronvar	64.5	15.3	88.0	12
RS45	Parkvale Trib at Lowes Res.	15.1	13.3	17.1	11
RS46	Parkvale S at Weir	9.1	6.4	15.5	12
RS47	Waiohine R at Gorge	2.9	1.1	4.5	12
RS48	Waiohine R at Bicknells	4.1	1.9	6.4	12
RS49	Beef Ck at Headwaters	4.2	2.4	5.2	12
RS50	Mangatarere S at SH 2	7.0	4.0	9.2	12
RS51	Huanguaru R at Ponatahi Br	20.5	12.6	34.0	12
RS52	Tauanui R at Whakatomotomo Rd	6.7	4.7	9.4	12
RS53	Awhea R at Tora Rd	32.0	18.8	51.0	12
RS54	Coles Ck Trib at Lagoon Hill Rd	30.5	25.0	38.0	8
RS55	Tauherenikau R at Websters	3.3	1.1	4.5	12
RS56	Waiorongomai R at Forest Pk	5.2	2.8	6.4	12
RS57	Waiwhetu S at Whites Line East	8.4	6.7	10.2	12

Table A4.14: Electrical conductivity – laboratory meter ($\mu\text{S}/\text{cm}$)

Site no.	Site name	Median	Minimum	5th percentile	95th percentile	Maximum	<i>n</i>
RS02	Mangapouri S at Bennetts Rd	203	176	184	220	222	12
RS03	Waitohu S at Forest Pk	87	72	75	95	97	12
RS04	Waitohu S at Norfolk Cres	149	89	107	331	522	12
RS05	Otaki R at Pukehinau	66	52	55	82	86	12
RS06	Otaki R at Mouth	68	53	56	83	86	12
RS07	Mangaone S at Sims Rd Br	187	122	146	210	212	12
RS08	Ngarara S at Field Way	298	215	233	691	1134	12
RS09	Waikanae R at Mangaone Walkway	87	63	70	93	96	12
RS10	Waikanae R at Greenaway Rd	102	80	85	113	116	12
RS11	Whareroa S at Waterfall Rd	226	179	185	249	254	12
RS12	Whareroa S at QE Park	244	192	197	264	266	12
RS13	Horokiri S at Snodgrass	180	166	167	193	194	12
RS14	Pauatahanui S at Elmwood Br	174	144	146	186	187	12
RS15	Porirua S at Glenside	258	194	211	271	273	12
RS16	Porirua S at Wall Park (Milk Depot)	257	213	222	269	270	12
RS17	Makara S at Kennels	284	229	232	316	317	12
RS18	Karori S at Makara Peak	231	201	202	236	237	12
RS19	Kaiwharawhara S at Ngaio Gorge	294	106	170	315	319	12
RS20	Hutt R at Te Marua Intake Site	76	54	61	86	87	12
RS21	Hutt R opp. Manor Park G.C.	99	84	90	106	108	12
RS22	Hutt R at Boulcott	93	72	76	108	110	12
RS23	Pakuratahi R 50m d/s Farm Ck	86	69	73	89	90	12
RS24	Mangaroa R at Te Marua	106	95	97	115	116	12
RS25	Akatarawa R at Hutt confl.	86	65	74	91	92	12
RS26	Whakatikei R at Riverstone	114	89	101	120	121	12
RS28	Wainuiomata R at Manuka Track	112	97	101	125	135	12
RS29	Wainuiomata R d/s of White Br	138	129	131	149	150	12
RS30	Orongorongo R at Orongorongo Stn	145	114	119	157	159	12
RS31	Ruamahanga R at McLays	54	36	37	68	70	12
RS32	Ruamahanga R at Te Ore Ore	154	60	78	204	207	12
RS33	Ruamahanga R at Gladstone Br	133	59	73	151	152	12
RS34	Ruamahanga R at Pukio	161	76	94	191	191	12
RS35	Mataikona Trib at Sugar Loaf Rd	367	242	251	551	578	12
RS36	Taueru R at Castlehill	268	139	152	308	309	12
RS37	Taueru R at Gladstone	444	230	243	504	510	12
RS38	Kopuaranga R at Stewarts	296	213	218	389	390	12
RS39	Whangaehu R 250m u/s confl.	304	146	190	385	394	12
RS40	Waipoua R at Colombo Rd Br	104	66	81	117	121	12
RS41	Waingawa R at South Rd	62	40	43	72	72	12
RS42	Whareama R at Gauge	629	235	304	710	733	12
RS43	Motuwaireka S at Headwaters	317	194	226	439	450	10
RS44	Totara S at Stronvar	280	98	154	366	380	12
RS45	Parkvale Trib at Lowes Res.	173	143	150	191	191	11
RS46	Parkvale S at Weir	136	113	120	184	186	12
RS47	Waiohine R at Gorge	57	29	31	69	71	12
RS48	Waiohine R at Bicknells	84	40	45	88	89	12
RS49	Beef Ck at Headwaters	100	70	74	122	123	12
RS50	Mangatarere S at SH 2	122	76	88	145	150	12
RS51	Huangaaru R at Ponatahi Br	392	208	217	453	470	12
RS52	Tauanui R at Whakatomotomo Rd	137	102	113	165	166	12
RS53	Awhea R at Tora Rd	416	242	288	478	488	12
RS54	Coles Ck Trib at Lagoon Hill Rd	863	283	333	1,429	1,588	8
RS55	Tauherenikau R at Websters	70	43	52	80	82	12
RS56	Waiorongomai R at Forest Pk	115	91	99	135	138	12
RS57	Waiwhetu S at Whites Line East	228	191	200	236	237	12

Table A4.15: pH – laboratory meter

Site no.	Site name	Median	Minimum	5th percentile	95th percentile	Maximum	<i>n</i>
RS02	Mangapouri S at Bennetts Rd	7.0	6.8	6.8	7.2	7.2	12
RS03	Waitohu S at Forest Pk	7.3	7.0	7.0	7.4	7.5	12
RS04	Waitohu S at Norfolk Cres	6.9	6.7	6.7	7.2	7.2	12
RS05	Otaki R at Pukehinau	7.3	6.9	7.0	7.6	7.7	12
RS06	Otaki R at Mouth	7.3	7.0	7.0	7.7	7.9	12
RS07	Mangaone S at Sims Rd Br	7.0	6.6	6.7	7.3	7.3	12
RS08	Ngarara S at Field Way	7.0	6.7	6.8	7.1	7.2	12
RS09	Waikanae R at Mangaone Walkway	7.2	7.0	7.0	7.4	7.4	12
RS10	Waikanae R at Greenaway Rd	7.3	7.0	7.0	7.5	7.6	12
RS11	Whareroa S at Waterfall Rd	7.3	7.1	7.2	7.6	7.7	12
RS12	Whareroa S at QE Park	7.0	6.6	6.7	7.1	7.2	12
RS13	Horokiri S at Snodgrass	7.2	6.9	7.0	7.4	7.4	12
RS14	Pauatahanui S at Elmwood Br	7.3	7.0	7.0	7.5	7.6	12
RS15	Porirua S at Glenside	7.7	7.0	7.2	8.1	8.1	12
RS16	Porirua S at Wall Park (Milk Depot)	7.5	7.0	7.2	7.9	8.1	12
RS17	Makara S at Kennels	7.5	7.0	7.1	7.7	7.8	12
RS18	Karori S at Makara Peak	7.4	6.8	6.9	7.5	7.6	12
RS19	Kaiwharawhara S at Ngaio Gorge	7.6	7.0	7.1	8.2	8.4	12
RS20	Hutt R at Te Marua Intake Site	7.2	6.9	7.0	7.5	7.5	12
RS21	Hutt R opp. Manor Park G.C.	7.2	6.8	7.0	7.4	7.5	12
RS22	Hutt R at Boulcott	7.2	6.7	6.9	7.5	7.6	12
RS23	Pakuratahi R 50m d/s Farm Ck	7.1	6.8	6.8	7.4	7.5	12
RS24	Mangaroa R at Te Marua	7.2	6.8	6.9	7.3	7.4	12
RS25	Akatarawa R at Hutt confl.	7.3	6.9	7.0	7.6	7.7	12
RS26	Whakatikei R at Riverstone	7.3	7.0	7.1	7.5	7.5	12
RS28	Wainuiomata R at Manuka Track	7.3	6.9	7.0	7.6	7.6	12
RS29	Wainuiomata R d/s of White Br	7.4	6.9	7.0	8.1	8.4	12
RS30	Orongorongo R at Orongorongo Stn	7.6	6.9	7.2	7.8	7.9	12
RS31	Ruamahanga R at McLays	7.3	6.9	7.0	7.7	7.9	12
RS32	Ruamahanga R at Te Ore Ore	7.9	6.9	7.3	8.0	8.1	12
RS33	Ruamahanga R at Gladstone Br	7.6	7.3	7.4	9.4	9.6	12
RS34	Ruamahanga R at Pukio	7.7	7.1	7.3	8.5	8.8	12
RS35	Mataikona Trib at Sugar Loaf Rd	8.0	7.6	7.7	8.1	8.2	12
RS36	Taueru R at Castlehill	7.8	7.4	7.4	7.9	8.0	12
RS37	Taueru R at Gladstone	8.0	7.4	7.5	8.2	8.3	12
RS38	Kopuaranga R at Stewarts	8.0	7.5	7.6	8.2	8.2	12
RS39	Whangaehu R 250m u/s confl.	7.7	7.3	7.4	7.9	8.0	12
RS40	Waipoua R at Colombo Rd Br	7.3	7.0	7.0	7.6	7.6	12
RS41	Waingawa R at South Rd	7.3	6.8	6.9	7.7	7.9	12
RS42	Whareama R at Gauge	8.0	7.6	7.7	8.0	8.1	12
RS43	Motuwaireka S at Headwaters	7.8	7.1	7.4	7.9	7.9	10
RS44	Totara S at Stronvar	7.6	6.4	6.7	7.7	7.7	12
RS45	Parkvale Trib at Lowes Res.	6.8	6.5	6.6	7.0	7.0	11
RS46	Parkvale S at Weir	7.4	7.1	7.1	8.1	8.4	12
RS47	Waiohine R at Gorge	7.3	7.0	7.1	7.8	7.9	12
RS48	Waiohine R at Bicknells	7.1	6.8	6.9	7.4	7.4	12
RS49	Beef Ck at Headwaters	7.4	7.0	7.0	8.0	8.0	12
RS50	Mangatarere S at SH 2	7.1	6.8	6.8	7.5	7.6	12
RS51	Huangaaru R at Ponatahi Br	8.0	7.7	7.8	8.6	8.8	12
RS52	Tauanui R at Whakatomotomo Rd	7.5	6.8	6.9	7.8	7.8	12
RS53	Awhea R at Tora Rd	8.1	7.7	7.7	8.7	8.8	12
RS54	Coles Ck Trib at Lagoon Hill Rd	8.0	7.6	7.6	8.1	8.2	8
RS55	Tauherenikau R at Websters	7.2	7.0	7.1	7.4	7.4	12
RS56	Waiorongomai R at Forest Pk	7.3	6.9	7.0	7.6	7.6	12
RS57	Waiwhetu S at Whites Line East	7.0	6.7	6.8	7.2	7.3	12

Table A4.16: Total hardness (mg/L)

Site no.	Site name	Median	Minimum	Maximum	<i>n</i>
RS02	Mangapouri S at Bennetts Rd	44	37	50	12
RS03	Waitohu S at Forest Pk	18	14	20	12
RS04	Waitohu S at Norfolk Cres	34	17	84	12
RS05	Otaki R at Pukehinau	18	12	25	12
RS06	Otaki R at Mouth	18	13	24	12
RS07	Mangaone S at Sims Rd Br	43	20	55	12
RS08	Ngarara S at Field Way	75	49	144	12
RS09	Waikanae R at Mangaone Walkway	15	11	17	12
RS10	Waikanae R at Greenaway Rd	20	15	22	12
RS11	Whareroa S at Waterfall Rd	35	27	46	12
RS12	Whareroa S at QE Park	55	33	66	12
RS13	Horokiri S at Snodgrass	28	24	32	12
RS14	Pauatahanui S at Elmwood Br	27	22	33	12
RS15	Porirua S at Glenside	44	32	49	12
RS16	Porirua S at Wall Park (Milk Depot)	44	35	50	12
RS17	Makara S at Kennels	40	29	46	12
RS18	Karori S at Makara Peak	37	28	39	12
RS19	Kaiwharawhara S at Ngaio Gorge	52	18	59	12
RS20	Hutt R at Te Marua Intake Site	18	12	21	12
RS21	Hutt R opp. Manor Park G.C.	21	16	24	12
RS22	Hutt R at Boulcott	20	14	23	12
RS23	Pakuratahi R 50m d/s Farm Ck	19	15	19	12
RS24	Mangaroa R at Te Marua	21	17	23	12
RS25	Akatarawa R at Hutt confl.	18	13	19	12
RS26	Whakatikei R at Riverstone	20	15	21	12
RS28	Wainuiomata R at Manuka Track	18	16	20	12
RS29	Wainuiomata R d/s of White Br	22	21	24	12
RS30	Orongorongo R at Orongorongo Stn	40	30	43	12
RS31	Ruamahanga R at McLays	16	9	24	12
RS32	Ruamahanga R at Te Ore Ore	59	19	99	12
RS33	Ruamahanga R at Gladstone Br	46	18	59	12
RS34	Ruamahanga R at Pukio	55	25	66	12
RS35	Mataikona Trib at Sugar Loaf Rd	130	79	220	12
RS36	Taueru R at Castlehill	84	36	104	12
RS37	Taueru R at Gladstone	185	73	220	12
RS38	Kopuaranga R at Stewarts	126	84	186	12
RS39	Whangaehu R 250m u/s confl.	104	55	137	12
RS40	Waipoua R at Colombo Rd Br	30	17	37	12
RS41	Waingawa R at South Rd	19	12	24	12
RS42	Whareama R at Gauge	215	82	300	12
RS43	Motuwaireka S at Headwaters	87	47	142	10
RS44	Totara S at Stronvar	85	21	124	12
RS45	Parkvale Trib at Lowes Res.	42	34	47	11
RS46	Parkvale S at Weir	38	29	50	12
RS47	Waiohine R at Gorge	16	8	22	12
RS48	Waiohine R at Bicknells	24	11	26	12
RS49	Beef Ck at Headwaters	25	15	33	12
RS50	Mangatarere S at SH 2	31	19	37	12
RS51	Huangarua R at Ponatahi Br	149	71	181	12
RS52	Tauanui R at Whakatomotomo Rd	34	22	44	12
RS53	Awhea R at Tora Rd	143	75	174	12
RS54	Coles Ck Trib at Lagoon Hill Rd	162	68	240	8
RS55	Tauherenikau R at Websters	19	11	24	12
RS56	Waiorongomai R at Forest Pk	26	19	34	12
RS57	Waiwhetu S at Whites Line East	52	43	57	12

Appendix 5: Tabulated heavy metal data

The default trigger values presented here represent the ANZECC (2000) 95% species protection level for slightly modified freshwater ecosystems.

Table A5.1: Summary of dissolved copper (mg/L) concentrations measured at 10 RSoE sites between July 2012 and June 2013 (D.L.= detection limit). The percentages of samples exceeding the ANZECC (2000) default and hardness-modified trigger values (TVs) are also presented

Site no.	Site name	Median	Minimum	Maximum	n	n < D.L.	% of samples (n) exceeding ANZECC (2000)	
							Default TV (≤ 0.0014)	Hardness modified TV*
RS02	Mangapouri S at Bennetts Rd	0.0008	<0.0005	0.0022	12	1	25.0	8.3
RS08	Ngarara S at Field Way	0.0003	<0.0005	0.0015	12	8	8.3	0
RS10	Waikanae R at Greenaway Rd	0.0003	<0.0005	0.0003	12	12	0	0
RS15	Porirua S at Glenside	0.0010	0.0006	0.0019	12	0	8.3	8.3
RS16	Porirua S at Wall Park (Milk Depot)	0.0020	0.0008	0.0083	12	0	58.3	58.3
RS18	Karori S at Makara Peak	0.0014	0.0010	0.0020	12	0	41.7	33.3
RS19	Kaiwharawhara S at Ngaio Gorge	0.0017	0.0012	0.0049	12	0	66.7	33.3
RS21	Hutt R opp. Manor Park G.C.	0.0003	<0.0005	0.0010	12	10	0	8.3
RS22	Hutt R at Boulcott	0.0003	<0.0005	0.0016	12	7	8.3	16.7
RS57	Waiwhetu S at Whites Line East	0.0011	0.0006	0.0037	12	0	41.7	16.7

* These calculations were undertaken using dissolved copper and total hardness concentrations for each sampling occasion.

Table A5.2: Summary of dissolved lead (mg/L) concentrations measured at 10 RSoE sites between July 2012 and June 2013 (D.L.= detection limit). The percentages of samples exceeding the ANZECC (2000) default and hardness-modified trigger values (TVs) are also presented

Site no.	Site name	Median	Minimum	Maximum	n	n < D.L.	% of samples (n) exceeding ANZECC (2000)	
							Default TV (≤ 0.0034)	Hardness modified TV*
RS02	Mangapouri S at Bennetts Rd	0.00021	<0.0001	0.00034	12	3	0	0
RS08	Ngarara S at Field Way	0.00005	<0.0001	0.00024	12	10	0	0
RS10	Waikanae R at Greenaway Rd	0.00005	<0.0001	<0.0001	12	12	0	0
RS15	Porirua S at Glenside	0.00005	<0.0001	0.00014	12	9	0	0
RS16	Porirua S at Wall Park (Milk Depot)	0.00027	<0.0001	0.00069	12	5	0	0
RS18	Karori S at Makara Peak	0.00014	<0.0001	0.00025	12	3	0	0
RS19	Kaiwharawhara S at Ngaio Gorge	0.00005	<0.0001	0.00041	12	7	0	0
RS21	Hutt R opp. Manor Park G.C.	0.00005	<0.0001	0.00017	12	8	0	0
RS22	Hutt R at Boulcott	0.00005	<0.0001	0.00013	12	9	0	0
RS57	Waiwhetu S at Whites Line East	0.00038	0.0001	0.00071	12	0	0	0

* These calculations were undertaken using dissolved lead and total hardness concentrations for each sampling occasion.

Table A5.3: Summary of dissolved zinc (mg/L) concentrations measured at 10 RSoE sites between July 2012 and June 2013 (D.L.= detection limit). The percentages of samples exceeding the ANZECC (2000) default and hardness-modified trigger values (TVs) are also presented

Site no.	Site name	Median	Minimum	Maximum	n	n < D.L.	% of samples (n) exceeding ANZECC (2000)	
							Default TV (≤ 0.008)	Hardness modified TV*
RS02	Mangapouri S at Bennetts Rd	0.0027	0.0017	0.0070	12	0	0	0
RS08	Ngarara S at Field Way	0.0005	<0.001	0.0035	12	7	0	0
RS10	Waikanae R at Greenaway Rd	0.0005	<0.001	<0.001	12	12	0	0
RS15	Porirua S at Glenside	0.0041	0.0016	0.0086	12	0	8.3	8.3
RS16	Porirua S at Wall Park (Milk Depot)	0.0136	0.0060	0.0640	12	0	75.0	58.3
RS18	Karori S at Makara Peak	0.0176	0.0113	0.0280	12	0	100	100
RS19	Kaiwharawhara S at Ngaio Gorge	0.0054	0.0026	0.0240	12	0	33.3	16.7
RS21	Hutt R opp. Manor Park G.C.	0.0008	<0.001	0.0055	12	6	0	8.3
RS22	Hutt R at Boulcott	0.0005	<0.001	0.0069	12	7	0	8.3
RS57	Waiwhetu S at Whites Line East	0.0210	0.0071	0.0450	12	0	91.7	66.7

* These calculations were undertaken using dissolved zinc and total hardness concentrations for each sampling occasion.

Appendix 6: Additional macroinvertebrate indices

Table A6.1: QMCI, %EPT* taxa and taxa richness scores for RSoE sites sampled in summer/autumn 2013

Site no.	Site name	QMCI	%EPT* taxa	Taxa richness
RS02	Mangapouri S at Bennetts Rd	4.51	0	20
RS03	Waitohu S at Forest Pk	8.21	69.2	26
RS04	Waitohu S at Norfolk Cres	4.83	20.0	20
RS05	Otaki R at Pukehinau	6.97	55.6	18
RS06	Otaki R at Mouth	5.58	35.0	20
RS07	Mangaone S at Sims Rd Br	3.99	0	15
RS08	Ngarara S at Field Way	4.69	6.3	16
RS09	Waikanae R at Mangaone Walkway	7.87	56.7	30
RS10	Waikanae R at Greenaway Rd	4.36	50	20
RS11	Whareroa S at Waterfall Rd	6.23	33.3	27
RS12	Whareroa S at QE Park	4.06	0	16
RS13	Horokiri S at Snodgrass	6.01	56.5	23
RS14	Pauatahanui S at Elmwood Br	4.12	37.0	27
RS15	Porirua S at Glenside	6.81	50.0	14
RS16	Porirua S at Wall Park (Milk Depot)	4.34	31.6	19
RS17	Makara S at Kennels	5.14	54.5	22
RS18	Karori S at Makara Peak	3.18	25.0	24
RS19	Kaiwharawhara S at Ngaio Gorge	3.18	15.8	19
RS20	Hutt R at Te Marua Intake Site	7.95	69.2	26
RS21	Hutt R opp. Manor Park G.C.	6.38	50.0	24
RS22	Hutt R at Boulcott	5.3	45.5	22
RS23	Pakuratahi R 50m d/s Farm Ck	6.84	55.2	29
RS24	Mangaroa R at Te Marua	5.68	54.2	24
RS25	Akatarawa R at Hutt confl.	7.43	56.0	25
RS26	Whakatikei R at Riverstone	6.97	51.9	27
RS28	Wainuiomata R at Manuka Track	7.52	61.8	34
RS29	Wainuiomata R d/s of White Br	4.80	39.1	23
RS30	Orongorongo R at Orongorongo Stn	6.21	47.6	21
RS31	Ruamahanga R at McLays	8.12	72.7	22
RS32	Ruamahanga R at Te Ore Ore	6.48	46.7	15
RS33	Ruamahanga R at Gladstone Br	6.24	52.9	17
RS34	Ruamahanga R at Pukio	4.97	50.0	18
RS35	Mataikona Trib at Sugar Loaf Rd	7.09	55.2	29
RS36	Taueru R at Castlehill	4.55	29.2	24
RS37	Taueru R at Gladstone	4.89	30.8	26
RS38	Kopuaranga R at Stewarts	3.63	42.1	19
RS39	Whangaehu R 250m u/s confl.	3.74	13.8	29
RS40	Waipoua R at Colombo Rd Br	3.68	29.2	24
RS41	Waingawa R at South Rd	4.17	52.6	19
RS42	Whareama R at Gauge	3.98	20.0	15
RS43	Motuwaireka S at Headwaters	6.73	57.9	38
RS44	Totara S at Stronvar	5.13	27.3	22
RS45	Parkvale Trib at Lowes Res.	4.38	31.8	22
RS46	Parkvale S at Weir	3.55	25.0	20
RS47	Waiohine R at Gorge	7.60	59.1	22
RS48	Waiohine R at Bicknells	3.87	57.9	19
RS49	Beef Ck at Headwaters	6.47	60.0	30
RS50	Mangatarere S at SH 2	5.04	34.8	23
RS51	Huangarua R at Ponatahi Br	4.03	35.0	20
RS52	Tauanui R at Whakatomotomo Rd	6.88	53.6	28
RS53	Awhea R at Tora Rd	2.16	12.0	25
RS54	Coles Ck Trib at Lagoon Hill Rd	4.58	41.9	31
RS55	Tauherenikau R at Websters	7.47	46.7	15
RS56	Waiorongomai R at Forest Pk	6.53	53.8	26
RS57	Waiwhetu S at Whites Line East	3.78	0	14

*Pollution tolerant EPT taxa (*Oxyethira* and *Paroxythira*) were excluded from this calculation.