

Water quality in the Bayswater Brook winter 2010

Prepared by the South East Regional Centre for Urban Landcare
for the City of Bayswater



South East Regional Centre for Urban Landcare

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Executive Summary

The Bayswater Brook catchment, previously known as the Bayswater Main Drain is a large drainage network with a catchment area of 27,000 ha, receiving stormwater from all or part of the suburbs of Bassendean, Bayswater, Bedford, Dianella, Eden Hill, Embleton, Mirrabooka, Morley, Nollamara and Noranda (Klemm & Switzer 1994). It is the largest urban catchment in the Perth Metropolitan area and flows into the Swan River all year round, with both open and closed sections (Department of Environment 2001).

The drain was constructed by the Water Corporation in the 1960's, and was developed from what was once an extensive wetland system, which has since been significantly modified to provide land for development (Klemm & Switzer 1994). The Brook drains groundwater to prevent flooding of low-lying areas and also receives stormwater from the large catchment area from numerous local government stormwater drains. Some sections of the drain flow all year round, while other areas are ephemeral.

The Bayswater Brook discharges water into the Swan River at Riverside Gardens, Bayswater and flows into the Swan River all year round. The dominant land use of the catchment of the Bayswater Brook is residential; however it also includes several industrial areas and commercial zones, schools and sporting fields, with very little natural areas remaining.

Currently, little is known about the location of the origins of any pollutants. In order to increase our knowledge of the water quality throughout the catchment; since the winter of 2007 to the winter of 2009 a once-off sampling event was conducted throughout the Bayswater Brook catchment. In 2010 the frequency was incremented to three sampling events during the winter season. The results can be seen in the Water Quality of the Bayswater Brook 2007, 2008 and 2009 snapshots (NMCG 2007 and SERCUL 2008 and 2009). They provided some baseline information for the water quality condition for the Bayswater Brook Water Quality Improvement Plan developed by the Swan River Trust in March 2008 (WQIP 2008).

This report highlights the findings of the 2010 water quality sampling. The 2010 water quality sampling in the Bayswater Brook aims to follow up the previous year's snapshot to more accurately determine the location of any pollution sources, which can then be targeted for future management actions.

Key Findings

- Tonkin Highway west (site 6) recorded elevated concentrations of numerous contaminants (nitrogen, phosphorus, total suspended solids, aluminium, copper and zinc) and also recorded pH below, dissolved oxygen below and electrical conductivity above the acceptable ranges.
- Bayswater industrial southern arm (site 16) recorded elevated concentrations of numerous contaminants (nitrogen, phosphorus, aluminium, chromium, copper, nickel and zinc) and also recorded dissolved oxygen below and electrical conductivity above the acceptable ranges.
- The Eric Singleton wetland (sites Ericsing 2 and 3) recorded elevated concentrations of numerous contaminants (nitrogen, phosphorus, total suspended solids and aluminium) and also recorded dissolved oxygen below and electrical conductivity above the acceptable ranges.
- Drake Way (site 24) had elevated concentrations of various metals (aluminium, chromium, copper and zinc) and also recorded dissolved oxygen below and electrical conductivity above the acceptable ranges.
- The Railway Parade branch drain (site 26) had elevated concentrations of numerous contaminants (nitrogen, phosphorus, total suspended solids, aluminium and zinc) and also recorded dissolved oxygen below and electrical conductivity above the acceptable ranges.
- The pH of the surface waters of the Bayswater catchment was generally within the acceptable range. Only 16 out of 67 samples recorded levels below or above the ANZECC acceptable range for lowland rivers. Sites 12 and 13 recorded pHs below the acceptable range when samples were taken. The highest pH (8.29) was recorded at site 25 and the lowest at site 12 (5.86).

- The majority of the samples (46 out of 67) in the surface waters of the Bayswater Brook recorded dissolved oxygen (DO) concentrations outside the ANZECC acceptable range for lowland rivers. Ericising 2 and 3 and sites 1, 6, 7, 8, 24 and 26 recorded concentrations below the acceptable range when samples were taken. The highest DO concentration (187.4 %) was recorded at site 25 and the lowest (7.4 %) at site 26.
- All samples recorded electrical conductivity concentrations above the ANZECC acceptable range for lowland rivers. The highest concentration (2.19 mS/cm) was recorded at Ericising 3 and the lowest (0.362 mS/cm) at site 25.
- The majority of the samples (45 out of 62) recorded total suspended solids below the DoW interim guideline. The highest concentrations were recorded at Ericising 3 and site 6 (41 mg/L).
- 10 out of 24 of sites (26 out of 68 samples) recorded total nitrogen concentrations above the ANZECC trigger value. The highest concentrations were recorded at Ericising 2 and 3 and sites 26, 16 and 6. Eight sites recorded concentrations above the trigger value when samples were taken.
- 7 out of 24 of sites (14 out of 68 samples) recorded total phosphorous concentrations above the ANZECC trigger value. The highest concentrations were recorded at Ericising 3 and site 26; these sites recorded concentrations above the trigger value during all three sampling events.
- Aluminium was detected at concentrations above ANZECC trigger values at all sites however 59 out of 68 samples (19 out of 24 sites) recorded pH above 6.5 (when the trigger value is applicable). Sites 6, 11, 12, 13 and 19 recorded pHs below 6.5. The highest concentration was recorded at site 6 (3.0 mg/L).
- 5 out of 68 samples (3 out of 24 sites) recorded chromium concentrations above the specific trigger value. Site 16 recorded concentrations above the trigger value during all three sampling events and recorded also the highest concentration (0.015 mg/L).
- 17 out of 68 samples (8 out of 24 sites) recorded copper concentrations above the specific trigger value. Sites 1, 3, 4 and 6 recorded concentrations above the trigger value during all three sampling events. The highest concentration was recorded at site 6 (0.026 mg/L).
- All samples recorded lead concentrations below the specific trigger value.
- 3 out of 68 samples (site 16) recorded nickel concentrations above the specific trigger value. The highest concentration recorded at this site was 0.61 mg/L.
- 29 out of 68 samples (at 12 out of 24 sites) recorded zinc concentrations above the specific trigger value. The highest concentration (0.75 mg/L) was recorded at site 26.

Sampling and Analysis Procedures

Selection of Sample Sites

The 30 sites across the catchment area were selected such that:

- They are representative of a small sub-catchment area;
- They are up and downstream of likely pollutant sources;
- They are located up and downstream of rehabilitation projects;

Table 1 provides a detailed description and GPS coordinates of each of the sample sites included in the Sampling Analysis Plan (SAP) for 2010. Figures 1a and 1b show the location of the sampling sites included in 2010.

Table 1: Location of sampling sites in the Bayswater Brook 2010

Site code	Drain section	Sampling point location	Easting	Northing
ERICRING 01	Eric Singleton wetland Bayswater	North shore, next to bird hide	398083.1	6467195.7
ERICRING 02	Eric Singleton wetland Bayswater	Western side. Adjacent to groundwater inlet pipe	398104.2	6467109.4
ERICRING 03	Eric Singleton wetland Bayswater	Southern corner, upstream of outlet to Bayswater Main Drain	398241.4	6467109.4
BWMD01	Memorial Road Bayswater	Open drain Riverside gardens, downstream of bird sanctuary wetland, 10m downstream of footbridge	398393.8	6466808.1
BWMD02	King William St Bayswater	Open drain Before confluence of King William St branch drain with main drain	398011.0	6467301.6
BWMD03	Guildford Road Bayswater	Open drain Downstream of confluence with Railway Pde branch drain	398111.1	6467578.2
BWMD04	Whatley Cr Bayswater	Open drain Upstream of confluence with Railway Pde branch drain	398182.8	6467874.2
BWMD05	Railway Pde Bayswater	Open drain Durham Rd branch drain, before confluence with main drain	398176.8	6468028.8
BWMD06	Tonkin Hwy (west) Bayswater	Open drain Upstream of Durham Road branch drain	398191.1	6468042.0
BWMD07	Mooney St Bayswater	Wetland Outlet from wetland to main drain, on South western edge of wetland (drive in)	398179.8	6468541.2
BWMD08	Bassendean Rd Bayswater	Open drain Upstream of inlet into Mooney St wetland	398179.8	6468600.0
BWMD09	Fairford St Bassendean	Open drain – living stream Downstream of revegetation site, upstream of pipe under Fairford St	399162.7	6469764.2
BWMD10	Fairford St Bassendean	Open drain – living stream Upstream of revegetation site, from Scaddan St	399317.7	6469799.3
BWMD11	Shalford St Bassendean	Open drain Joan Rycroft reserve, from most downstream point (straight forward from Parks entrance)	398343.7	6469793.4
BWMD12	Tonkin Hwy (north) Embleton	Open drain Downstream of confluence with drains from Elstead reserve (access at the end of Walter Rd.)	397680.4	6470785.8
BWMD13	Waltham Way Morley	Downstream of basin adjacent to Waltham reserve, upstream of piping under Morley Dve	396904.4	6471563.6

Site code	Drain section	Sampling point location	Easting	Northing
BWMD14	Clavering Rd Bayswater	Open drain Northern side of Clavering Rd, upstream of piped section under Clavering Rd	397555.2	6468862.6
BWMD15	James St Bayswater	Open drain Before weir and confluence with northern branch of drain	397591.4	6468970.5
BWMD16	Christian St Bayswater	Open drain Northern branch of drain (sample from King St.)	397407.6	6469140.5
BWMD17	Catherine St Morley	Wetland (Brown's Lake) Outlet from wetland into main drain, on southern side of wetland	395649.7	6469351.8
BWMD18	Gummery St Morley	Open drain Downstream of confluence of 2 branching drain	395542.9	6469521.0
BWMD19	Lawrence St Bedford	Open drain At most downstream section of drain	395431.3	6469520.8
BWMD20	Railton Pl Dianella	Open drain Downstream of wetland. South of Morley Dve, at intersection with The Strand.	393454.6	6471028.5
BWMD21	Coode St Morley	Open drain Exiting Rudloc Reserve	395517.1	6469605.2
BWMD22	Jakobsens Way Dianella	Open drain Adjacent to Jakobsens reserve, from footbridge	395236.4	6470514.1
BWMD23	Vera St Morley	Open drain Most downstream point	395398.1	6471145.5
BWMD24	Drake Way Morley	Open drain Upstream of inlet with Nora Hughes Lake, adjacent to intersection with Catherine St	395858.5	6469640.7
BWMD25	Drake Way Morley	Wetland Outlet pipe from Nora Hughes wetland	395871.8	6469477.1
BWMD26	Railway Pde Bayswater	Open drain Downstream of CSBP fertiliser site on Railway Pde branch drain (Railway crossing)	398954.8	6468314.6
BWMD27	Railway Pde Bayswater	Open drain Upstream of CSBP fertiliser site on Railway Pde branch drain	398563.8	6467985.6

Site Location

Water samples were collected from 24 sites throughout the catchment. Six sites were not sampled during any of the three sampling events either due to insufficient water depth to allow sampling, stagnated water, sites being completely dry or lack of access to the site. Table 2 provides details about those sites that were not sampled.

Table 2: Sites that were not sampled at Bayswater Brook

Site code	Condition	Sampling events when samples were not taken
ERICSING 01	Too shallow to sample	August, September and October
ERICSING 02	Too shallow to sample	September and October
BWMD09	Stagnant	August, September and October
BWMD10	Stagnant	August, September and October
BWMD12	Too shallow to sample	October
BWMD15	Dry	August, September and October
BWMD20	Dry	August, September and October
BWMD23	Too shallow to sample	October
BWMD27	No access	August, September and October

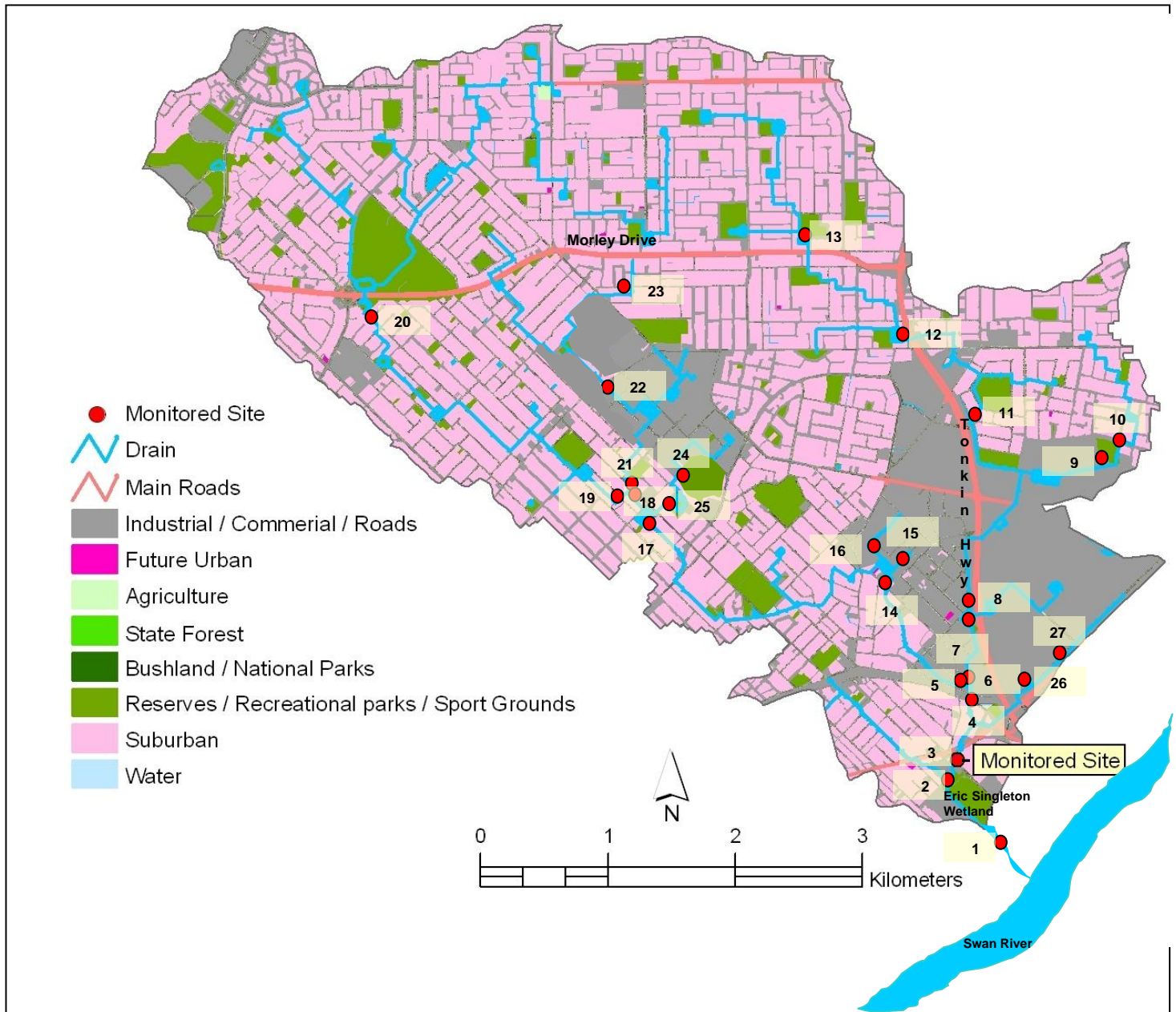


Figure 1: Location of sampling sites

(Source: Adjusted from Swan River Trust)



Figure 2: Location of sampling sites

(Source: Adjusted from SAP 2007)

Legend

- - - Open drainage line
- Boundary of Eric Singleton Bird Sanctuary wetland
- ◆ Water quality sampling site
- Direction of water flow

Sampling

Sampling was conducted on the August 25th, September 15th and October 13th 2010. Field observation forms were filled out at the time of sample collection and all water samples were transported under “chain of custody” to the laboratory and analysed in accordance with the laboratory methods. All samples collected from the Bayswater Brook were analysed by the National Measurement Institute (NMI), which is a National Association of Testing Authorities (NATA) accredited laboratory and independently audited by the Department of Water. Samples were collected in accordance with the Bayswater Brook sampling and analysis plan 2010 (SERCUL 2010), and in accordance with Department of Water standards and protocols.

Water in the Bayswater Brook was measured *in situ* for physical properties, including:

- Dissolved oxygen;
- pH;
- Electrical conductivity; and
- Temperature.

Water samples were collected and analysed for:

- Total suspended solids (TSS);
- Nutrients – total nitrogen (TN), total phosphorus (TP), total organic nitrogen (TOrgN), soluble reactive phosphorus (SRP), nitrogen as ammonia/ammonium (NH₃/NH₄-N) , total oxidised nitrogen (NOx), dissolved organic nitrogen (DOrgN);
- Total heavy metals – aluminium (Al), chromium (Cr), copper (Cu), lead (Pb), nickel (Ni) and zinc (Zn); and
- Total water hardness (as Ca and Mg).

Results and Discussion

Comparison of results with guidelines

To provide a general frame of reference as to the state of water quality in the Bayswater Brook, this report compares the results of sampling with trigger levels from the ANZECC guidelines that are most applicable to this water body. To select which set of guidelines to use, the environmental value (EV) and level of protection applied to a water resource (including its receiving environment) needs to be determined and agreed upon between all key stakeholders. The guidelines recognise three levels of protection for aquatic ecosystem; those with high conservation value, slightly to moderately disturbed ecosystems and highly disturbed ecosystems. To assess the level of toxicant contamination in aquatic ecosystems, trigger values were developed from data using toxicity testing on a range of test species. The trigger values (99%, 95%, 90% and 80%) approximately correspond to the levels of protection described above. An exceedence of the referenced trigger level does not indicate that “standards” are not being met, but is an indication that further consideration should be given to the situation.

Urban and industrial catchments tend to be highly modified and often artificial ecosystems where the risk of toxicant contamination is high and current environmental value is low. On that basis many of the waterways in the Bayswater Brook catchment would be compared to the 80% level based on ANZECC guidance. However, the Bayswater Brook flows directly into the Swan River where environmental values are high and for this reason, the toxicant results will be compared to the trigger values for 95% protection levels. Where no guidelines currently exist, results will be compared to interim or low-reliability guidelines provided by ANZECC (2000) or by other agencies e.g. the interim TSS guideline of 6 mg/L provided by the Department of Water (DoW).

The results are compared to the ‘lowland river’ ecosystem type, as this is considered to be most applicable to this waterway and its receiving environment (Swan River). ANZECC trigger values and other guidelines used in this data analysis are displayed in Appendix C (Tables 10 and 11).

From a human-use perspective, the Bayswater Brook is not a source of drinking water but can be accessed by the public, despite signage that prohibits public access to the drain, and therefore it is reasonable to compare the toxicant results to recreational guidelines that take into account risks to public health. Toxicant concentrations should not exceed the recreational guidelines to ensure that recreational users are not at risk (ANZECC & ARMCANZ 2000).

Temperature and rainfall data

The Bayswater Brook receives storm water from an industrial and residential catchment area. Parts of the brook in the upper catchment flow in response to rainfall events only, while other sections (particularly in the lower ends of the catchment) flow all year round due to interaction with groundwater. Samples were collected from the sites that could be sampled during three sampling events (August 25th, September 15th and October 13th 2010). Figure 2 highlights the sampling dates, the maximum temperature and the daily rainfall recorded at the Perth Metro area station at this time.

Light rain fell on the days prior to sampling (8.6 mm on August 22nd, 10.6 mm on September 9th and 5 mm on October 10th), and there was an adequate amount of flow at the majority of the sites for sampling, but the flow was much lower than would be normally seen at that time of year due to very low winter rainfall. The monthly rainfalls recorded for August, September and October were 63.0 mm, 43.6 mm and 20.6 mm respectively. The air maximum temperatures recorded for the three sampling days were 17.5, 22 and 21.9 °C respectively and the averages for these three months were 19.1 in August, 21.8 September and 24.6 °C in October.

Due to the very much below average rainfall during the year, there was not a substantial amount of flow at some of the sites and some of them were completely dry. The southwest corner in Western Australia has experienced in 2010 its driest year-to-date on record (34 mm below the previous record of 390 mm) and its driest November to October on record (Western Australia Climate Services Centre 2010).

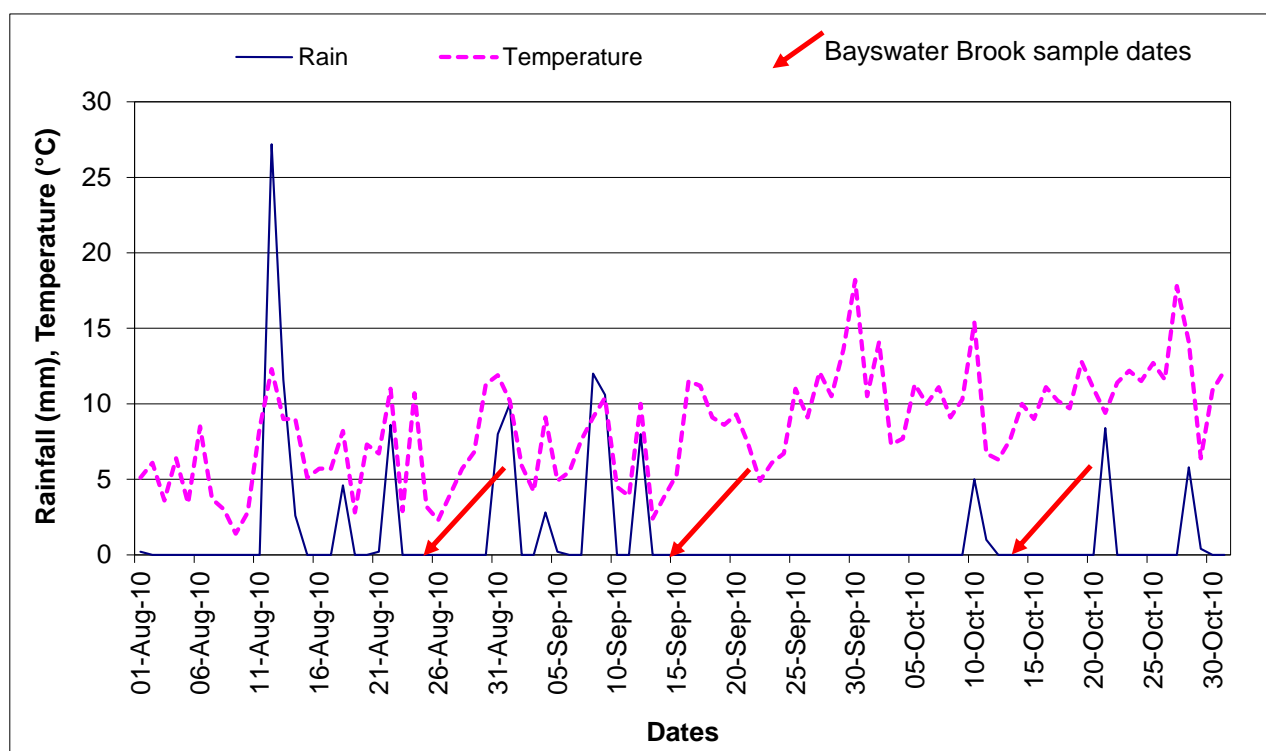


Figure 3: Daily rainfall and temperature in the Perth Metropolitan region from August to October 2010.

(Source: Commonwealth of Australia – Bureau of Meteorology website 2010)

Physical parameters in water

Refer to tables in Appendix B for all physical parameter data (pH, dissolved oxygen, electrical conductivity and temperature) for the Bayswater Brook 2010 sampling events.

Dissolved Oxygen

Dissolved Oxygen (DO) is a measure of the quantity of oxygen present in water and is often used as an indication of the 'general health' of a water body. Low DO levels in water leads to several environmental problems including stresses on the aquatic community and facilitation of chemical reactions (IEA 2003). Stress within the aquatic environment can result in the release of sediment-bound nutrients and toxicants into the water column. Low DO concentrations can also increase the toxicity of certain heavy metals.

Systems generally have natural DO concentrations that fluctuate diurnally. Differences can be noted between morning concentrations where only aeration has introduced oxygen to the ecosystem and late afternoon where photosynthesising organisms have also introduced oxygen to the system during the day. Low DO concentrations are normally a result of processes consuming oxygen at a rate faster than the environments capacity to provide or retain oxygen. These include the decay of organic matter, the oxidation of hydrocarbons, the reduction of metals and the microbial conversion of ammonia to nitrate and nitrites through the process of nitrification. These however are still natural processes within the environment and DO concentrations throughout the year also fluctuate seasonally. When monitoring for DO, low concentrations usually indicate systems which are under some stress or where large amounts of organic material are being decomposed.

A dissolved oxygen saturation of between 80 and 120% is required to sustain aquatic life in freshwater lowland rivers (ANZECC 2000). 42 out of 67 samples recorded DO concentrations below the acceptable range and four samples were above it. Dissolved oxygen can fluctuate greatly over a diurnal cycle and it is preferable to measure it over a full diurnal cycle for a few days (ANZECC & ARM CANZ 2000). This type of DO monitoring was not conducted as part of this monitoring program.

The highest DO concentration of 187.4% saturation was recorded at site 25 (Nora Hughes Wetland outlet) during the September sampling event and the lowest of 7.4% saturation at site 26 (Railway Crossing DS Old CSBP) during the October sampling event.

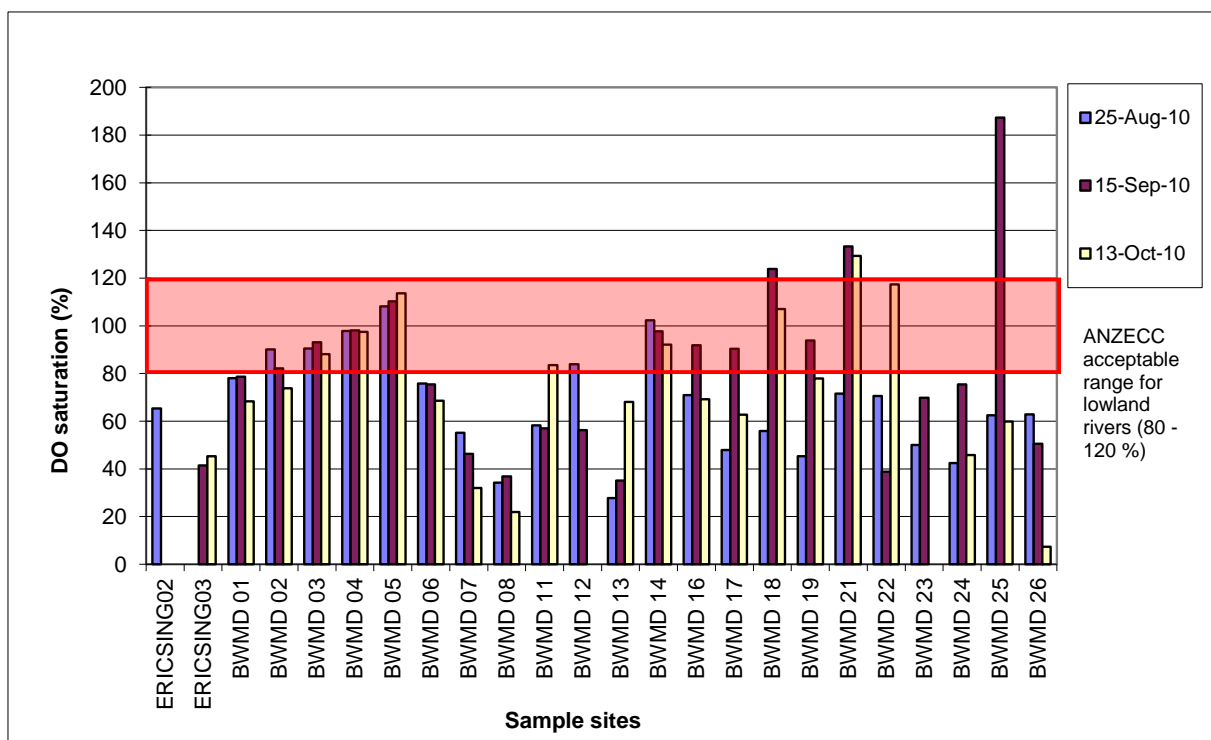


Figure 4: Dissolved oxygen concentrations for the Bayswater Brook surface waters.

Sites 1, 6, 7, 8, 13, 24 and 26 (Bid Sanctuary footbridge, Tonkin Hwy West, Mooney St Wetland - outlet, Mooney St Wetland – upstream, Waltham Way, Drake Way and Railway Crossing DS Old CSBP respectively) recorded DO concentrations below the acceptable range for all three sampling events. Ericising sites 2 and 3 and site 23 (West Side, South Corner and Vera St respectively) also recorded DO concentrations below the acceptable range when samples were taken. Some of these sites have also recorded concentrations below the acceptable range when samples have been taken during previous years. In 2009, DO concentrations below the acceptable range were recorded at sites 7, 23, 24 and 26 and at Ericising 02 and 03. Sites 7, 13, 24 and 26, Ericising 02 and 03 recorded also concentrations below the acceptable range in 2008 and site 24 in 2007.

Table 3 shows the records of DO% that have been below and above the acceptable range for lowland rivers along the four year sampling period. Ericising 1, 2 and 3 and sites 16, 17, 20, 24, 25 and 26 have recorded DO% concentrations below or above this range when samples have been collected.

Table 3: Record of DO saturation (%) below and above the acceptable range in the Bayswater Brook catchment 2007–2010

Site number	2010			2009	2008	2007
	August	September	October			
ERICISING01	NS	NS	NS	NS	22.5	NS
ERICISING02	65.4	NS	NS	25.5	27.5	NS
ERICISING03	NS	41.5	45.3	45.7	3.9	NS
BWMD 01	78	78.7	68.4	NO	NO	NO
BWMD 02	NO	NO	NO	NO	78.9	NO
BWMD 06	75.8	75.4	68.6	NO	NO	NO
BWMD 07	55.1	46.3	32	69.9	77.9	NO
BWMD 08	34.2	36.8	21.9	NO	NO	NO
BWMD 09	NS	NS	NS	22.9	29.2	NO
BWMD 10	NS	NS	NS	40.1	56.1	NO
BWMD 11	58.3	57	NO	NO	74.4	NO
BWMD 12	NO	56.3	NS	128.8	NO	NO
BWMD 13	27.8	35.1	68.1	NO	55.3	NO
BWMD 15	NS	NS	NS	NS	122.1	NO
BWMD 16	71	NO	69.2	24.6	11.6	67.3
BWMD 17	47.9	NO	62.7	60.7	76.7	73.3
BWMD 18	55.9	123.9	NO	65	NO	NO
BWMD 19	45.3	NO	77.9	71.6	NO	71.4
BWMD 20	NS	NS	NS	48.8	29.4	NS
BWMD 21	71.6	133.3	129.3	NO	NO	79.9
BWMD 22	70.6	38.9	NO	NO	NO	62.7
BWMD 23	50	69.8	NS	74.8	NO	NS
BWMD 24	42.5	75.4	45.8	52.6	60.9	50.2
BWMD 25	62.5	187.4	59.9	44.8	38.8	NS
BWMD 26	62.9	50.6	7.4	67.6	64.2	NS

NO= the record was not below or above acceptable range
NS= no sample was taken in this site

pH

pH is a measure of the acidity or alkalinity of a water body. pH is measured on a logarithmic scale, with a pH of 7.0 being neutral, a pH of less than 7 being acidic, and a pH of greater than 7 being alkaline or basic. The importance of pH on water quality lies mainly in its effect on other water quality parameters and on chemical reactions. pH can also affect the solubility and toxicity of a wide range of metallic contaminants (IEA 2003).

A pH between 6.5 and 8.0 is required to sustain aquatic life in lowland rivers (ANZECC & ARMCANZ 2000). The pH of the surface waters of the Bayswater Brook was generally acceptable; 8 out of 67 samples recorded levels below the acceptable range and three were above the acceptable range.

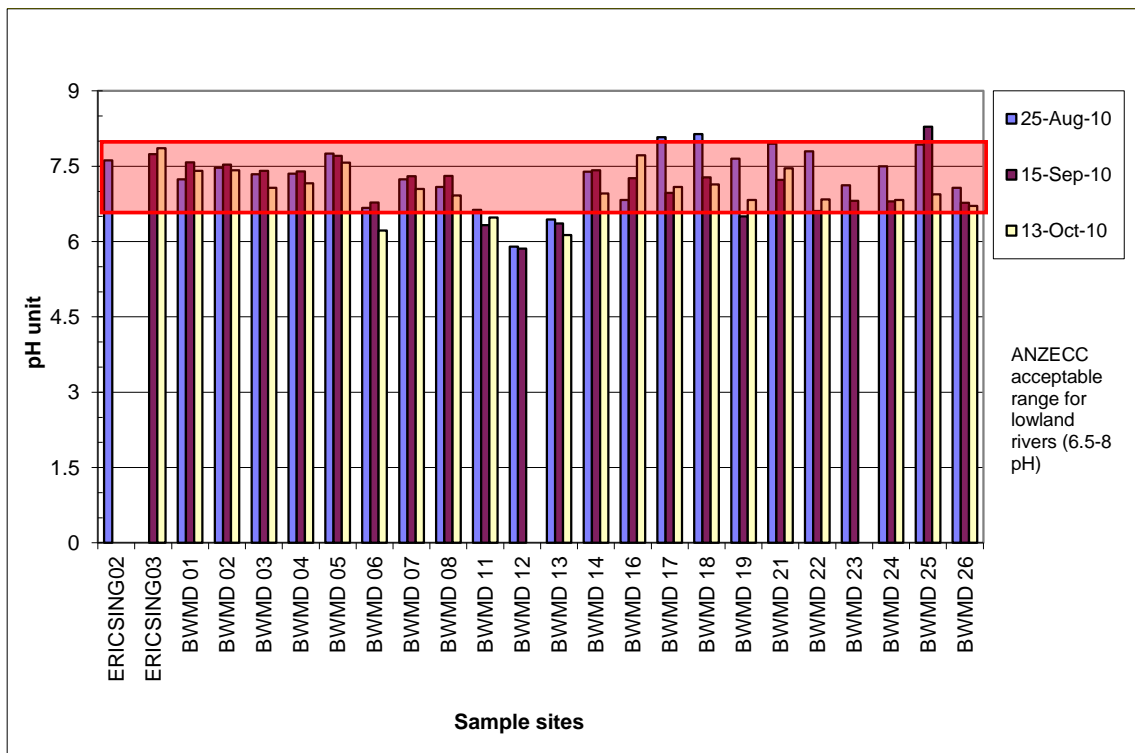


Figure 5: pH of the surface waters of the Bayswater Brook.

Site 13 (Waltham Way) recorded levels below the pH acceptable range during all three sampling events (6.44, 6.36 and 6.13 respectively). Site 12 (Tonkin Hwy North) recorded levels below the acceptable range during the 2 events when samples were taken and also recorded the lowest pH (5.9 in August and 5.86 in September). Site 11 (Joan Rycroft Reserve) recorded pH below the acceptable range during 2 sampling occasions (6.33 in September and 6.48 in October). Site 6 only recorded pH below the acceptable range during October (6.22) but also has recorded low pH in 2008 (6.46) and 2007 (6.48).

The highest pH (9.29, 8.14 and 8.08), exceeding the acceptable range, were recorded at sites 25 during September and sites 18 and 17 during August (Nora Hughes Wetland outlet, Gummery St and Brown's Lake Wetland outlet respectively).

Table 4 shows the sites that have recorded a pH below or above the acceptable range along the four year sampling period. pHs below the acceptable range have been recorded sporadically in some sites but a trend has not been evident. pHs above the acceptable range were not recorded during the 2009, 2008 and 2007 snapshots.

Table 4: Record of pH below and above the acceptable range in the Bayswater Brook catchment 2007 - 2010

Site number	2010			2009	2008	2007
	August	September	October			
BWMD 06	NO	NO	6.22	NO	NO	6.48
BWMD 10	NS	NS	NS	NO	6.45	NO
BWMD 11	NO	6.33	6.48	NO	NO	NO
BWMD 12	5.9	5.86	NS	NO	NO	NO
BWMD 13	6.44	6.36	6.13	NO	6.32	NO
BWMD 16	NO	NO	NO	6.23	NO	NO
BWMD 17	8.08	NO	NO	NO	NO	NO
BWMD 18	8.14	NO	NO	NO	NO	NO
BWMD 25	NO	8.29	NO	NO	NO	NS
BWMD 26	NO	NO	NO	NO	6.34	NS

NO= the record was not below or above acceptable range
 NS= no sample was taken in this site

Electrical Conductivity

Electrical conductivity (EC) is the total concentration of inorganic ions (particularly sodium, chlorides, carbonates, magnesium, calcium, potassium and sulphates). Conductivity is often used as a measure of salinity. The ANZECC acceptable range for lowland rivers is 0.12 to 0.3 mS/cm.

Electrical conductivity in the surface waters of the Bayswater Brook exceeded the ANZECC guidelines upper limit (0.3 mS/cm) for freshwater lowland rivers at all sites during the three sampling events. Average conductivity in the catchment was 0.714 mS/cm.

The highest electrical conductivity levels were recorded at Eric Singleton wetland (sites 3 and 2) when samples were taken. Ericising 03 recorded 2.19 and 1.304 mS/cm during October and September respectively. Ericising 02 recorded 1.265 mS/cm during August. In 2009 both sites recorded 1.85 mS/cm; in 2008 0.901 and 0.786 mS/cm respectively.

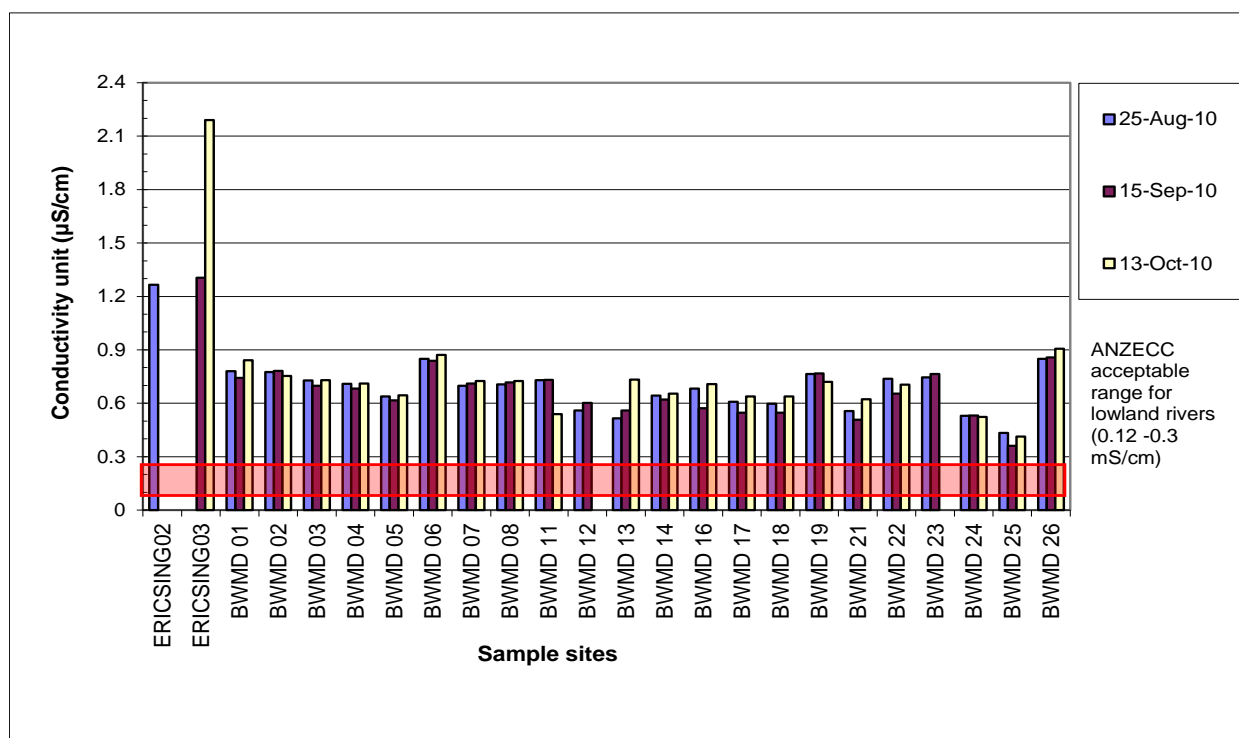


Figure 6: Electrical Conductivity of the surface waters of Bayswater Brook.

Table 5 presents the record of EC throughout the monitoring period (2007-2010). Ericising 1, 2 and 3 and sites 2, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 19, 20, 22, 23, 24, 25 and 26 have recorded concentrations below or above the acceptable range when samples have been taken.

Table 5: Record of EC (mS/cm) below and above the acceptable range in the Bayswater Brook catchment 2007 –2010

Site number	2010			2009	2008	2007
	August	September	October			
ERICISING01	NS	NS	NS	NS	0.901	NS
ERICISING02	1.265	NS	NS	1.85	0.786	NS
ERICISING03	NS	1.304	2.19	1.85	0.696	NS
BWMD 01	0.78	0.743	0.841	0.71	0.698	NO
BWMD 02	0.776	0.782	0.753	0.675	0.86	0.072
BWMD 03	0.728	0.699	0.73	0.665	0.664	NO
BWMD 04	0.71	0.682	0.711	0.657	0.648	NO
BWMD 05	0.639	0.617	0.645	0.612	0.596	NO
BWMD 06	0.849	0.838	0.871	0.707	0.72	NO
BWMD 07	0.698	0.711	0.725	0.605	0.631	0.109
BWMD 08	0.706	0.718	0.725	0.565	0.636	0.094
BWMD 09	NS	NS	NS	0.378	0.743	0.087
BWMD 10	NS	NS	NS	0.577	0.892	0.039
BWMD 11	0.73	0.731	0.539	0.574	0.652	0.065
BWMD 12	0.559	0.603	Oct. NS	0.458	0.584	0.05
BWMD 13	0.516	0.56	0.733	0.26	0.599	0.048
BWMD 14	0.643	0.621	0.654	0.624	0.592	0.118
BWMD 15	NS	NS	NS	NS	0.448	0.092
BWMD 16	0.683	0.572	0.708	0.622	0.643	0.602
BWMD 17	0.609	0.547	0.639	0.606	0.564	NO
BWMD 18	0.598	0.547	0.638	0.595	0.577	NO
BWMD 19	0.764	0.767	0.721	0.544	0.472	0.481
BWMD 20	NS	NS	NS	0.1	0.102	NS
BWMD 21	0.556	0.507	0.622	0.606	0.59	NO
BWMD 22	0.738	0.655	0.704	0.627	0.608	0.15
BWMD 23	0.745	0.765	NS	0.447	0.652	NS
BWMD 24	0.529	0.532	0.523	0.488	0.568	0.375
BWMD 25	0.433	0.362	0.413	0.419	0.516	NS
BWMD 26	0.85	0.858	0.907	0.769	0.866	NS

NO= the record was not below or above acceptable range

NS= no sample was taken in this site

Total Suspended Solids

Total Suspended Solids (TSS) is the total amount of material suspended in the water that can be removed from a water sample by filtration. TSS can include a wide variety of material such as silt, sand, organic material such as algae, microorganisms, decaying plant and animal matter or industrial wastes from a variety of sources including erosion by wind and water, construction and demolition operations as well as wear of roads and vehicles. Deposition of suspended solids can block pipes, change flow conditions in open channels and increase turbidity which reduces light penetration (IEA 2003). Nutrients, particularly phosphorus and other contaminants are often adsorbed to the surface of the particles of suspended solids, and therefore a high suspended solid concentration often coincides with high nutrient (particularly phosphorus) or other contaminant concentrations.

17 out of 62 samples recorded TSS concentrations above the DoW interim guideline of 6 mg/L. The highest concentrations were recorded at site 6 and Ericising 3 (south corner). Site 6 (Tonkin Hwy West) recorded 41, 30 and 36 mg/L. Ericising 3 recorded 19, 16 and 41 mg/L. In 2009 site 6 recorded 16 mg/L and site 3 recorded 14 mg/L. In 2008 site 6 recorded 11 mg/L and 18 mg/L in 2007.

Sites 2, 5, 7, 12, 13, 14, 16, 18, 22, 23, 24 and 25 (King William St, Railway Pde, Mooney St Wetland outlet, Tonkin Hwy North, Waltham Way, Clavering Rd, Christian St, Gummery St, Jakobsen's Way Footbridge, Vera St, Drake Way and Nora Hughes Wetland outlet respectively) recorded TSS concentrations below the interim guideline when samples were taken.

The water entering the Swan River from site 1 (Bird Sanctuary Footbridge) has recorded TSS concentrations above the interim guideline in 2010, 2009 and 2007 (10, 5 and 8 mg/L in 2010, 6 mg/L in 2009 and 8 mg/L in 2007).

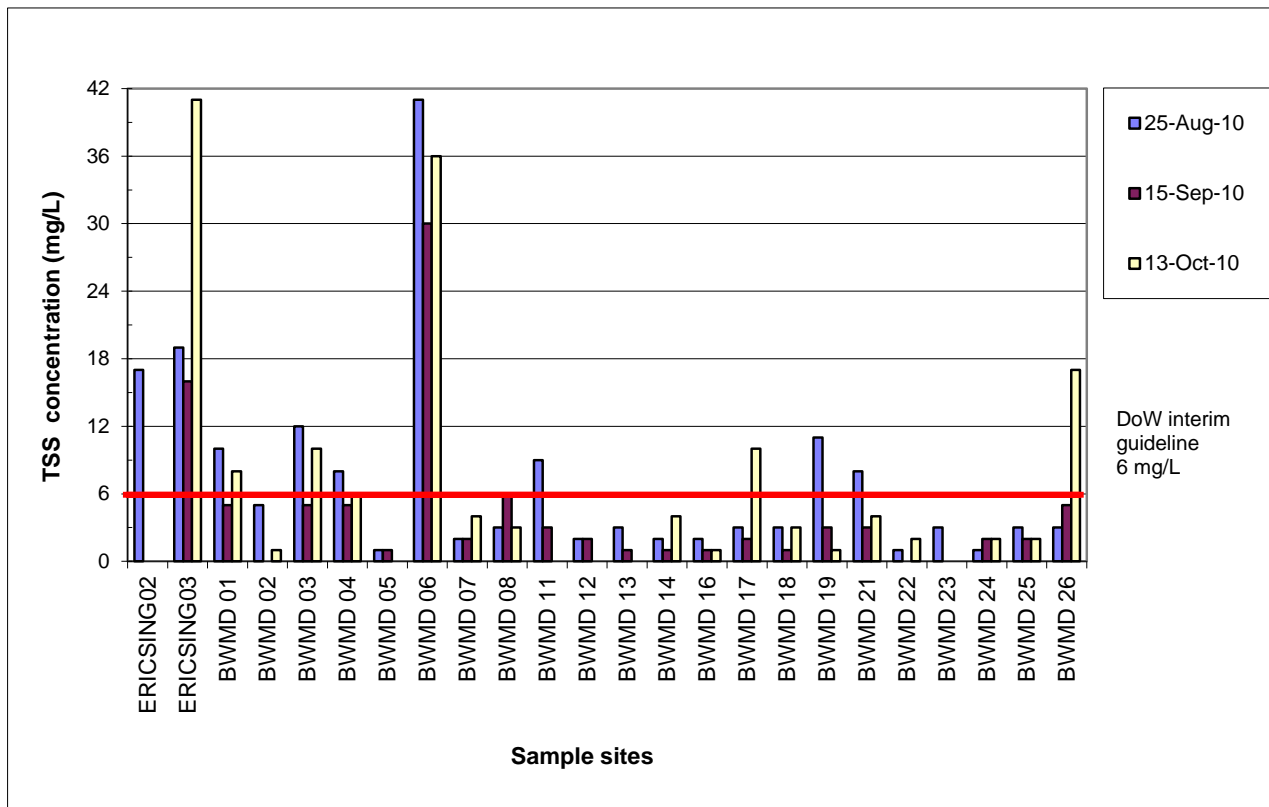


Figure 7: Total suspended solids concentrations in the surface waters of the Bayswater Brook.

Table 6 shows the TSS recorded during the four-year sampling period when samples have recorded concentrations above the interim guideline of 6 mg/L. When this parameter has been analysed, a trend has not been evident. However Ericising 2 and site 8 have recorded concentrations above the interim guideline when samples have been taken.

Table 6: Record of TSS (mg/L) above the DoW interim guideline in the Bayswater Brook catchment 2007 – 2010

Site number	2010			2009	2008	2007
	August	September	October			
ERICRING02	17	NS	NS	10	7	NS
ERICRING03	19	16	41	14	NO	NS
BWMD 01	10	NO	8	NO	NO	8
BWMD 02	NO	NS	NO	NO	NO	30
BWMD 03	12	NO	10	NO	7	54
BWMD 04	8	NO	NO	NO	NO	23
BWMD 05	NO	NO	NS	NO	NO	14
BWMD 06	41	30	36	16	11	18
BWMD 07	NO	NO	NO	NO	NO	14
BWMD 08	NO	NO	NO	NO	NO	19
BWMD 09	NS	NS	NS	NO	NO	NO
BWMD 10	NS	NS	NS	NO	NO	32
BWMD 11	NO	NO	NS	NO	NO	21
BWMD 12	NO	NO	NS	NO	NO	4
BWMD 13	NO	NO	NS	NO	NO	3
BWMD 14	NO	NO	NO	NO	NO	6
BWMD 15	NS	NS	NS	NS	NO	15
BWMD 17	NO	NO	10	NO	NO	NO
BWMD 19	11	NO	NO	NO	NO	NO
BWMD 20	NS	NS	NS	7	NO	NS
BWMD 21	8	NO	NO	NO	NO	NO
BWMD 26	NO	NO	17	NO	14	NO

NO= the record was not above the interim guideline

NS= no sample was taken in this site

Nutrient concentrations in water

The general sources of nutrients in water are from fertilisers, soil erosion, detergents, sewerage, plant matter, animal wastes, organic wastes and vehicle exhausts (IEA 2003). Excessive amounts of nutrients can result in eutrophication of waterways. Eutrophication is broadly described as the enrichment of waters by inorganic (and to a lesser extent organic) plant nutrients (predominantly nitrogen and phosphorus). When an ecosystem is in a eutrophic condition, plant and algae density and productivity generally increases, but species diversity is often reduced, nuisance insect numbers often increase, and eventually the ecosystem becomes less diverse and more degraded with more frequent nuisance algal blooms and higher plant nutrient flux.

Nutrients include total nitrogen, nitrogen in the form of ammonia, nitrate and nitrite, total and dissolved organic nitrogen, total phosphorus and soluble reactive phosphorus.

Nutrient concentration data for water samples of the Bayswater Brook catchment are displayed in tables in Appendix B.

Nitrogen

Nitrogen is recycled continually by plants and animals in a number of inorganic and organic forms. Forms include nitrate, nitrite and ammonium. Nitrogen concentrations vary considerably under natural conditions, depending on factors such as local soil types, vegetation and seasonal conditions. Total nitrogen (TN) is a measure of all forms of nitrogen in the water including ammonia, nitrate and nitrite and organic nitrogen. External or additional sources of nitrogen include fertilisers, industrial and household cleaning products; feed lots, animal droppings combustion of fossil fuels and plant debris (IEA 2003).

The TN concentrations in the surface water varied across the catchment, with the majority of samples (42 out of 68) below the ANZECC trigger value of 1.2 mg/L. However 10 out of 24 sites recorded concentrations above the trigger value.

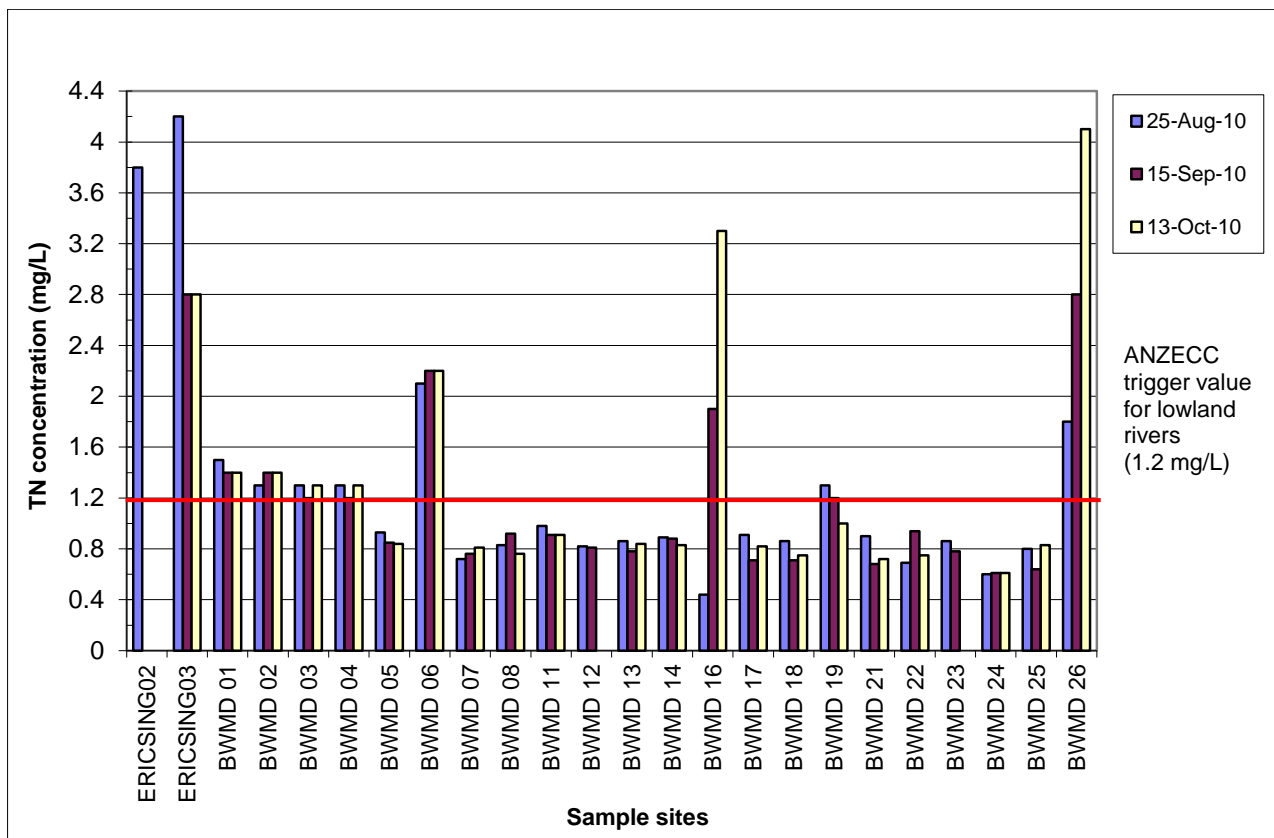


Figure 8: Total nitrogen concentrations in the surface waters of Bayswater Brook.

The highest concentrations were recorded at Ericising 2 and 3 and at site 26 (West side, South corner and Railway crossing d/s of the old CSBP site respectively) which recorded concentrations above the trigger value on all occasions that samples were taken. Ericising 2 recorded 3.8 mg/L during August. Ericising 3 recorded 4.2 mg/L during August and 2.8 mg/L during September and October. Site 26 recorded 1.8 mg/L during August, 2.8 mg/L during September and 4.1 mg/L in October. Ericising 2 and 3 also recorded concentrations above the trigger value during 2009 (7.1 and 7.6 mg/L respectively). Site 26 also recorded a TN concentration above the trigger value during 2009 (3.8 mg/L), into which the CSBP fertiliser production plant once drained.

Again the TN concentrations recorded at sites 1 and 2 (Bird Sanctuary footbridge and King William St) were above the trigger value as recorded during 2009 and 2008. These results indicate that the water quality entering the river from the Bayswater catchment is poor in terms of having a high nitrogen concentration.

Table 7 shows the sites that have recorded TN concentrations above the trigger value throughout the four year sampling period. In 2007 total nitrogen (TN) concentrations of the surface waters of the Bayswater Brook were low, with the concentration at all sites being below the ANZECC trigger value of 1.2 mg/L. By contrast in 2008, more than half of the sites (15 out of 26) recorded concentrations above the ANZECC trigger value. In 2009, just 6 out of 27 sites recorded concentrations above the trigger value. Ericising 2 and 3 and site 26 have recorded concentrations above the trigger value on all occasions that samples have been collected.

Table 7: Sites recording TN concentrations (mg/L) above the trigger value in the Bayswater Brook catchment 2007-2010

Site number	2010			2009	2008	2007
	August	September	October			
ERICISING01	NS	NS	NS	NS	3	NS
ERICISING02	3.8	NS	NS	7.1	3	NS
ERICISING03	4.2	2.8	2.8	7.6	2.5	NS
BWMD 01	1.5	1.5	1.4	1.3	1.8	NO
BWMD 02	1.3	1.4	1.4	1.3	2.6	NO
BWMD 03	1.3	1.2	1.3	1.1	1.5	NO
BWMD 04	1.3	1.2	1.3	NO	1.5	NO
BWMD 05	NO	NO	NO	NO	1.4	NO
BWMD 06	2.1	2.2	2.2	1.3	1.6	NO
BWMD 07	NO	NO	NO	NO	1.3	NO
BWMD 08	NO	NO	NO	NO	1.3	NO
BWMD 11	NO	NO	NO	NO	1.3	NO
BWMD 14	NO	NO	NO	NO	1.3	NO
BWMD 15	NS	NS	NS	NS	NO	NO
BWMD 16	NO	1.9	3.3	NO	1.6	NO
BWMD 19	1.3	1.2	NO	NO	NO	NO
BWMD 22	NO	NO	NO	NO	1.2	NO
BWMD 24	NO	NO	NO	NO	1.4	NO
BWMD 25	NO	NO	NO	NO	1.4	NS
BWMD 26	1.8	2.8	4.1	3.8	4.6	NS

NO= the concentration was not above trigger value

NS= no sample was taken in this site

Total Oxidised Nitrogen

Total oxidised nitrogen (TON or NO_x) is the sum of the oxidised forms of nitrogen and includes nitrite (NO₂) and nitrate (NO₃). Nitrates in excessive amounts with phosphorous can cause eutrophication, causing dramatic increases in aquatic plant growth and changes in the types of plants and animals that live in the waterway. This, in turn, may lower dissolved oxygen levels and increase temperature. TON is a stimulant for algal growth and is a common ingredient in fertilisers.

28 out of 68 samples recorded TON concentrations above the trigger value for lowland rivers of 0.15 mg/L. Eric Singleton 2 (West side) and sites 1, 2, 3, 4, 5, 11 and 14 (Bird Sanctuary footbridge, King William St, Whatley Rd downstream, Whatley Rd upstream, Railway Parade, Joan Rycroft Reserve and Clavering Rd respectively) recorded TON concentrations above the trigger value when samples were taken.

This is the third year that the highest TON concentrations were recorded at sites 2 and 26 (King William St and Railway crossing d/s of the old CSBP site). Site 2 recorded 0.76, 0.78 and 0.71 mg/L during August, September and October in 2010; 0.69 mg/L in 2009 and 1.6 mg/L in 2008. Site 26 recorded 0.84 mg/L during August 2010, 0.62 mg/L in 2009 and 1.4 mg/L in 2008.

TON was a significant component of the total nitrogen at site 2. It represented 58.5, 55.7 and 50.7 % of TN during August, September and October respectively.

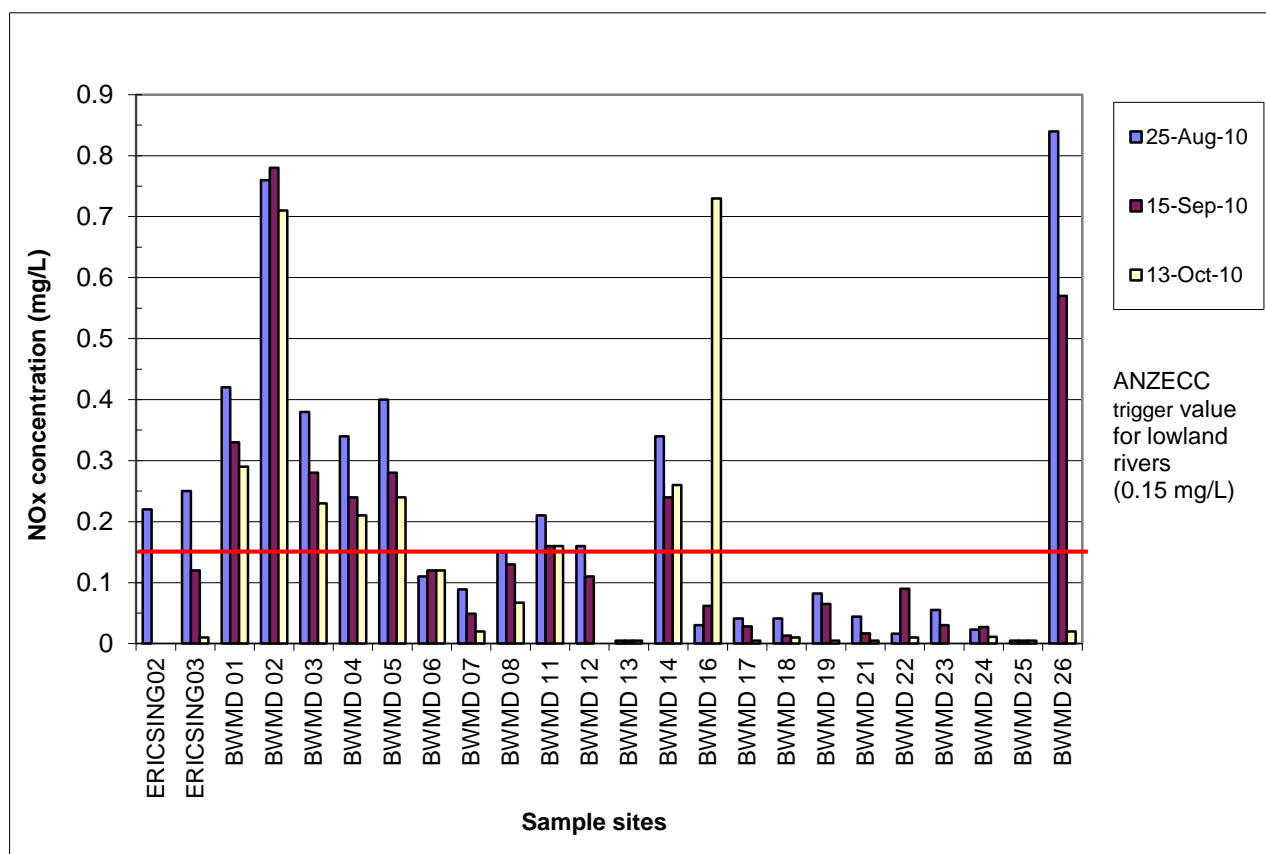


Figure 9: Total oxidised nitrogen concentrations in the surface of Bayswater Brook.

Dissolved Organic Nitrogen

Ericising 2 and 3 (west side and south corner) and sites 13 and 19 (Waltham Way and Catherine St) recorded the highest dissolved organic nitrogen (DON) when samples were taken in 2010. Ericising 2 recorded 1.2 mg/L during August. Ericising 3 recorded 1.2 mg/l during August, September and October. Records at site 13 were 0.71, 0.65 and 0.72 mg/L during August, September and October respectively. Site 19 recorded concentrations of 0.93, 1.0 and 0.93 mg/L during the three sampling events in 2010.

DON was a significant component of TN at some of the sites that recorded the highest DON concentrations. At Ericising 3 DON was 42.9 % of TN in September and October. At site 13 DON made up 82.6, 82.3 and 85.7 % of TN in August, September and October respectively. At site 19 DON corresponded to 71.5, 83.3 and 93.0 % of TN in August, September and October respectively. At site 16, DON represented 81.8 and 21.6 % of TN in August and September respectively.

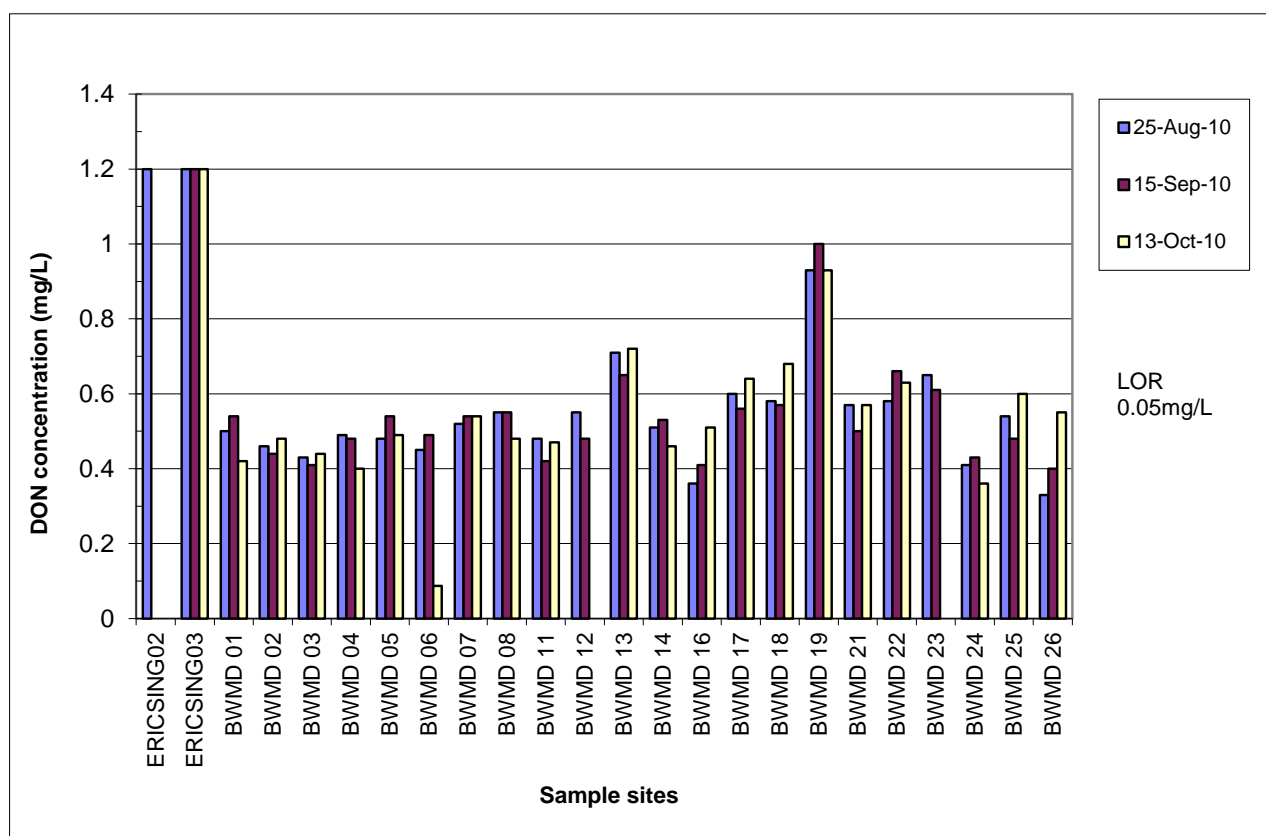


Figure 10: Dissolved organic nitrogen concentrations in the surface of Bayswater Brook.

Nitrogen as Ammonia /Ammonium

When plants and animals die or when animals excrete their wastes, nitrogen is released in the form of ammonium (NH_4), which is oxidised and converted to nitrite (NO_2), which is converted to nitrates (NO_3) by nitrifying bacteria (nitrification process). Nitrites, ammonia (NH_3) and ammonium ions are intermediate forms of nitrogen in aquatic systems and are oxidised by bacteria to nitrate or, in the case of ammonia and ammonium, are returned back to the atmosphere as nitrogen gas (NHT 2002).

Ammonia (NH_3) can be a nutrient or a toxicant. Ammonium (NH_4^+) is the ionised form and is a non-toxic nutrient and ammonia (NH_3) is the unionised form and is a toxin. Sources of ammonia include a range of industrial processes, agricultural fertilisers and the decomposition of organic wastes (IEA 2003).

This measures the portion of nitrogen present as ammonia (NH_3) or ammonium (NH_4^+). Concentrations in the Bayswater catchment were generally below the ANZECC aquatic ecosystem lowland rivers trigger

value of 0.9 mg/L. Only 8 out of 68 samples recorded $\text{NH}_3/\text{NH}_4^+$ concentrations above the trigger value. Those sites were Eric Singleton wetland 2 and 3 (western and southern sites) and sites 6, 16 and 26 (Tonkin Hwy west, Christian St and Railway Crossing DS old CSBP respectively). However, only site 6 recorded concentrations above the trigger value during all three sampling events (1.4 mg/L during August, 1.3 mg/L during September and 1.8 mg/L during October).

At Ericising 2 the concentration was 2.3 mg/L during the August sampling. At Ericising 3 the $\text{NH}_3/\text{NH}_4^+$ concentration only exceeded the trigger value during August with a concentration of 2.5 mg/L. At site 26 the $\text{NH}_3/\text{NH}_4^+$ concentrations exceeded the trigger value during the September and October sampling occasions (1.6 and 2.7 mg/L respectively). These sites have recorded concentrations above the trigger since they were included in the sampling and analysis plan (SAP) in 2008. In 2009 Ericising 2 and 3 and site 26 recorded 6.1, 6.3 and 2.6 mg/L respectively and in 2008, the concentrations were 1.4, 1.4 and 2.6 mg/L respectively.

Nitrogen as ammonia /ammonium was a significant component of TN at some of the sites that recorded the highest $\text{NH}_3/\text{NH}_4^+$ concentrations. During August it represented 60.5 % of TN at Ericising 2 and 59.5 % at Ericising 3. At site 6, it represented 66.7, 59.1 and 81.8 % of TN during August, September and October respectively. At site 16, it represented 57.6 % of TN during October. At site 26, it represented 57.1 and 65.9 % during September and October respectively.

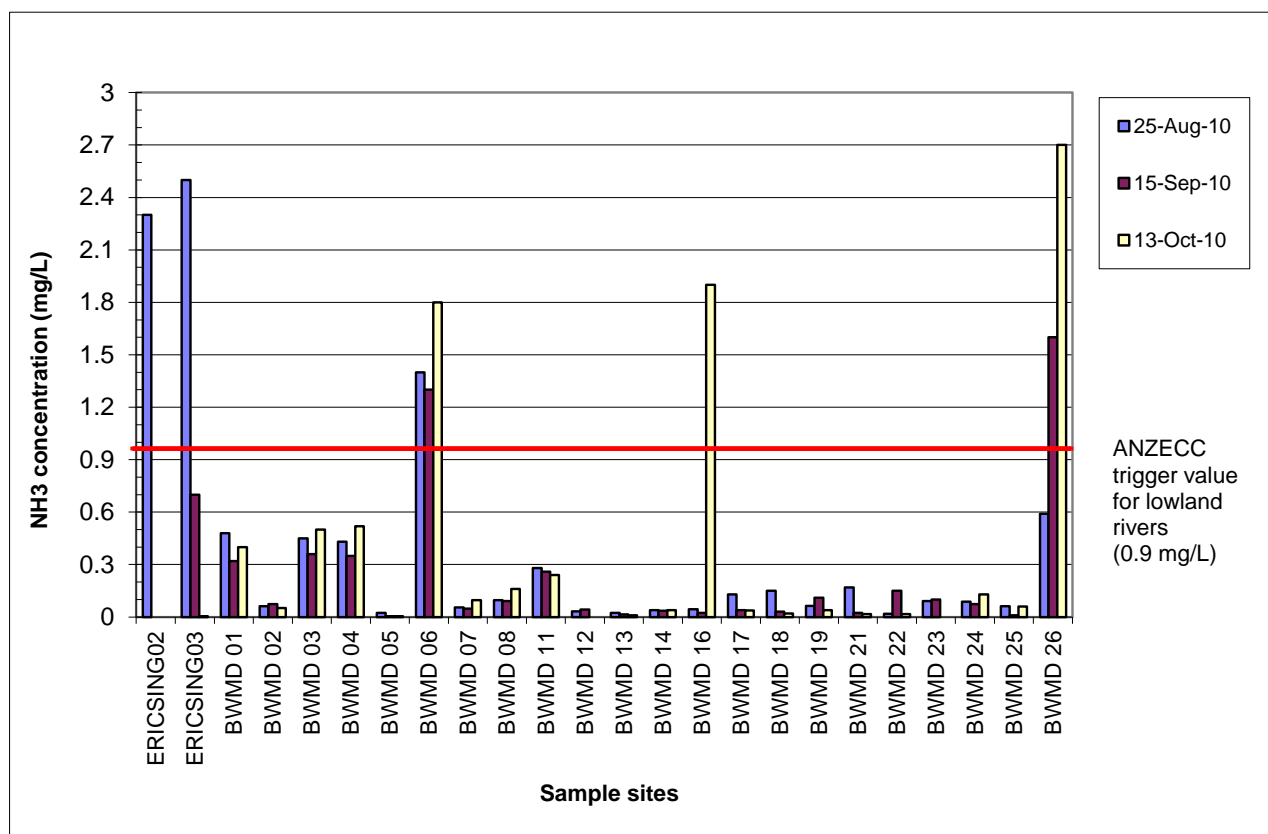


Figure 11: Nitrogen as ammonia/ammonium concentrations in the waters of Bayswater Brook.

Phosphorus

Total Phosphorus (TP) is a measure of all phosphorus in the water including the bio-available, soluble, forms and the unavailable (but potentially available) particulate forms of phosphorus. Sources of phosphorus include fertilisers, plant debris, detergents, industrial wastes and lubricants.

The concentration of total phosphorus (TP) in the surface waters of the Bayswater Brook was varied across the catchment, with the trigger value (0.065 mg/L) being exceeded at seven locations. Ericising 2 and 3 (west side and south corner) and sites 2, 6, 16, 25 and 26 (King William St, Tonkin Hwy west, Christian St, Nora Hughes Wetland outlet and Railway crossing DS old CSBP respectively). However, only Ericising 2 and 3 and site 26 recorded concentrations above the trigger value on all the occasions that samples were taken. Ericising 2 recorded 0.081 mg/L during August. Ericising 3 recorded 0.085, 0.19 and 0.33 mg/L (the

highest concentration) during August, September and October respectively. Site 26 recorded 0.093, 0.14 and 0.23 mg/L during August, September and October respectively.

Table 8 shows the sites that have recorded TP concentrations above the trigger value throughout the four year sampling period. five out of 24 sites recorded in 2007 concentrations above the ANZECC trigger value; seven out of 29 sites in 2008; six out of 27 sites in 2009. Ericising 2 and 3 have recorded concentrations above the trigger value when samples have been taken. Samples from sites 25 and 26 have exceeded the trigger value for three consecutive years (2008 to 2010).

The elevated concentrations recorded at site 25 (0.084 and 0.083 mg/L during August and October 2010, 0.11 mg/L in 2009 and 0.13 mg/L in 2008) highlights the need to revegetate this section of the drain, especially because the concentration of TP at the outlet of the wetland is higher than the inlet concentration at site 24 (Drake Way). However, phosphorus could be bound to the sediment, acting as a source of phosphorus being released back into the water column when the bottom waters in the lake become anoxic.

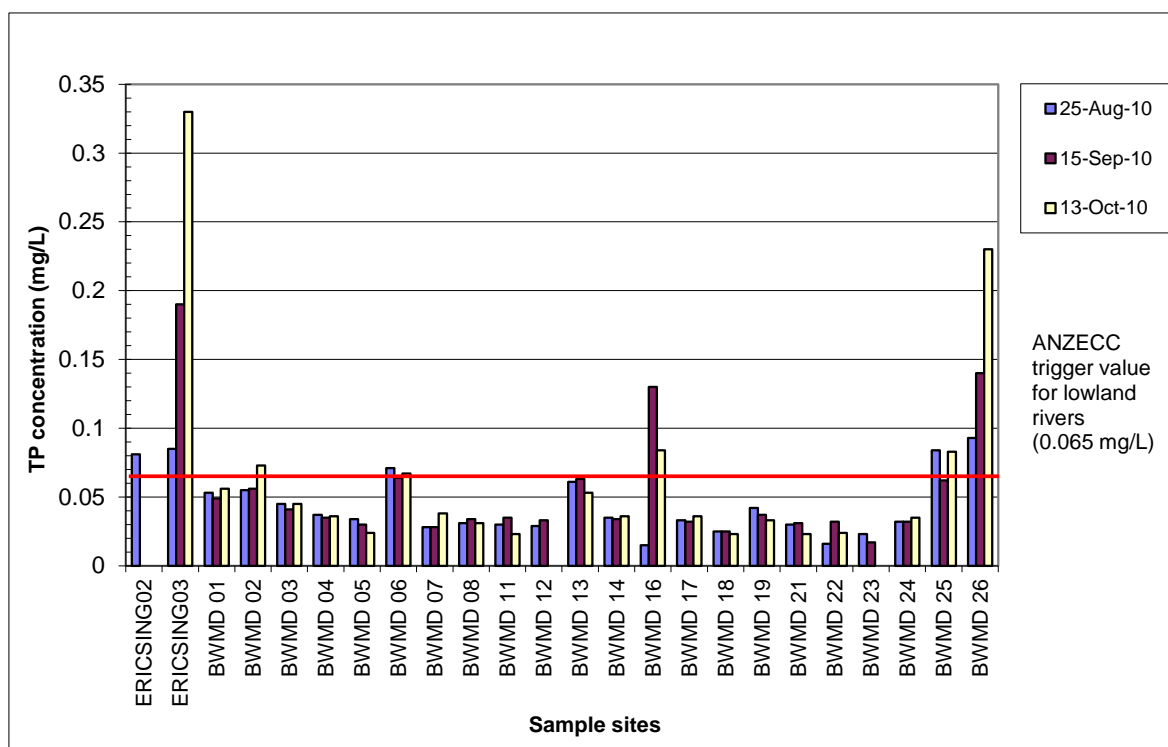


Figure 12: Total phosphorus concentrations in the surface waters of the Bayswater Brook.

In 2007 sampling site 15 (John St. drain) was highlighted as a hotspot area because it had an extremely elevated TP concentration. In 2008 the TP concentration at this site was just below the trigger value (0.064 mg/L). In 2009 and 2010, there was not enough flow to sample this site. Given that this site is within an industrial area it is recommended that monitoring under base flow conditions be undertaken, to give a more accurate picture of nutrient concentrations in the drain throughout the year.

The TP concentration entering the river (site 1) has been below the trigger value throughout the four year sampling period. However, given the elevated nutrient concentrations at the adjacent Eric Singleton Wetland area it is necessary that frequent monitoring is conducted.

As in 2009, during 2010 the Ericising wetland (sites 2 and 3) recorded a high TP concentration, the majority of which was in particulate form. In Ericising 2 it represented 81.5 % during August, 96.8 % during September and 99.2 % during October. In Ericising 3 it represented 89.4 % during August. In 2009 it represented 64.3 % at Ericising 2 and 79.5 % at Ericising 3. These sites also recorded high TSS concentration during both years. Ericising 2 recorded 17 mg/L during August 2010 and 10 mg/L in 2009. Ericising 3 recorded 19, 16 and 41 mg/L during the August, September and October sampling occasions in 2010 and 14 mg/L in 2009. These results demonstrate a link between the two parameters and suggest that actions to reduce sediment loads would contribute to reducing TP concentrations.

Table 8 shows the sites that have recorded TP concentrations above the trigger value throughout the four year sampling period. At Ericising 2 and 3 and sites 26 and 25 TP concentrations have exceeded the trigger value when samples have been collected with a few exceptions (sample during 2007 sampling at site 26 and samples during September 2010 and 2007 samplings at site 25).

Table 8: Sites recording TP concentrations (mg/L) above the trigger value in the Bayswater Brook catchment 2007-2010

Site number	2010			2009	2008	2007
	August	September	October			
ERICISING01	NS	NS	NS	NS	0.11	NS
ERICISING02	0.081	NS	NS	0.21	0.12	NS
ERICISING03	0.085	0.19	0.33	0.19	0.078	NS
BWMD 02	NO	NO	0.073	NO	0.12	0.076
BWMD 03	NO	NO	NO	NO	NO	0.19
BWMD 04	NO	NO	NO	NO	NO	0.074
BWMD 06	0.071	NO	0.067	NO	NO	0.076
BWMD 10	NS	NS	NS	0.065	NO	NO
BWMD 15	NS	NS	NS	NS	NO	0.23
BWMD 16	NO	0.13	0.084	NO	NO	NO
BWMD 20	NS	NS	NS	0.071	NO	NS
BWMD 24	NO	NO	NO	NO	0.12	NO
BWMD 25	0.084	NO	0.083	0.11	0.13	NO
BWMD 26	0.093	0.14	0.23	0.07	0.17	NO

NO= the concentration was not above trigger value

NS= no sample was taken in this site

Soluble Reactive Phosphorus

Soluble Reactive Phosphorus (SRP) measures only the dissolved phosphorus in water and provides a measure of the immediately available phosphate in the system at the time of sampling. SRP is readily available for plant uptake and as such is attributed to algal blooms of rapid growth in aquatic flora.

The majority of samples (65 out of 68) recorded concentrations below the ANZECC trigger value for lowland rivers (0.04 mg/L); only samples collected at sites 25 and 26 (Nora Hughes Wetland outlet and Railway crossing DS old CSBP) exceeded it. Site 25 recorded 0.042 mg/L during the August sampling occasion. Site 26 recorded 0.048 and 0.13 mg/L during the August and October sampling occasions respectively. In 2009 site 25 SRP concentrations also exceeded the trigger value, recording 0.053 mg/L.

In 2010 at the majority of sites the TP was present in the form of particulate phosphorous. The exceptions were sites 2, 11, 22, 25 and 26 (King William St, Joan Rycroft Reserve, Jakobsen's Way Footbridge, Nora Hughes Wetland outlet and Railway crossing DS old CSBP). At site 2, SRP represented 67.3 % of TP during August and 50 % during September. At site 11, it represented 67.3 % during August. At site 22, it represented 59.4 % during September. At site 25, it represented 50.0 % during August. At site 26 it represented 51.6 % during August and 56.5 % during October. In 2009 also the majority of sites recorded very little TP as SRP; the exceptions were sites 2, 16 and 24, where it represented 53.1 %, 87.5 % and 50% respectively of the TP.

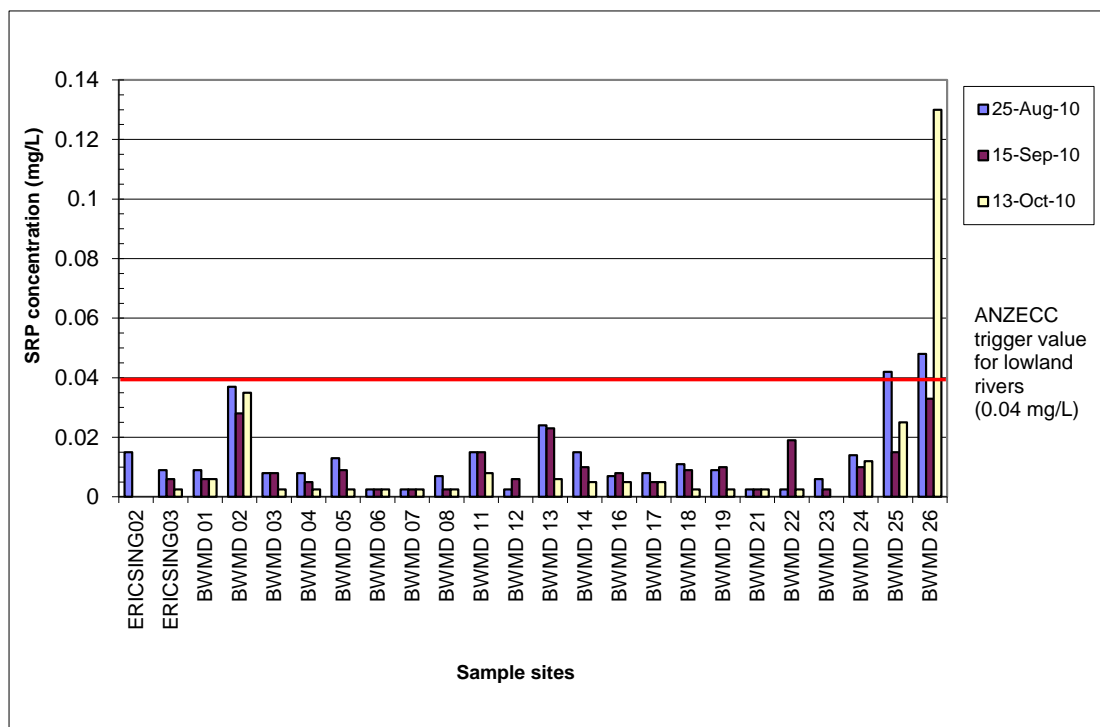


Figure 13: Soluble reactive phosphorus concentrations in the waters of the Bayswater Brook.

Water Hardness

Total hardness, expressed as calcium carbonate (CaCO₃), is the combined concentration of earth-alkali metals, predominantly magnesium (Mg²⁺) and calcium (Ca²⁺), and some strontium (Sr²⁺) in the water. The source of this hardness is limestone dissolved by water that is rich in carbon dioxide. Hardness levels range from <60 mg/L being very soft to >400 mg/L being extremely hard.

Water hardness can have an effect on the toxicity of certain heavy metals (chromium, copper, lead, nickel and zinc), and therefore the trigger values for these metals need to be adjusted accordingly. Water samples with higher concentrations of water hardness need to have the trigger values for these metals amended by a certain multiplication factor, as recommended in ANZECC (2000) guidelines. As water hardness is variable between sites, the trigger values for these particular heavy metals can be different for each site. Trigger values for these metals have been corrected based on the concentration of water hardness for each site, using the hardness-dependant algorithm provided in ANZECC and ARMCANZ (2000). The calculated site-specific trigger values are displayed on the graphs for these metals, where applicable. For the details and calculations see table in appendix B.

In 2010 water hardness in the surface waters of the Bayswater Brook varied from a minimum of 68 mg/L recorded at site 25 (Nora Hughes Wetland outlet) to a maximum of 360 mg/L recorded at the Ericising 3 (south corner). 26 out of 68 samples recorded moderate water hardness (60 to 119 mg/L), 26 samples recorded hard levels (120 to 179 mg/L), five samples were very hard (180-240 mg/L) and four were extremely hard (>240 mg/L). There is no ANZECC guideline regarding water hardness and ecosystem health, however all sites were within the ANZECC recreational guideline of 500 mg/L.

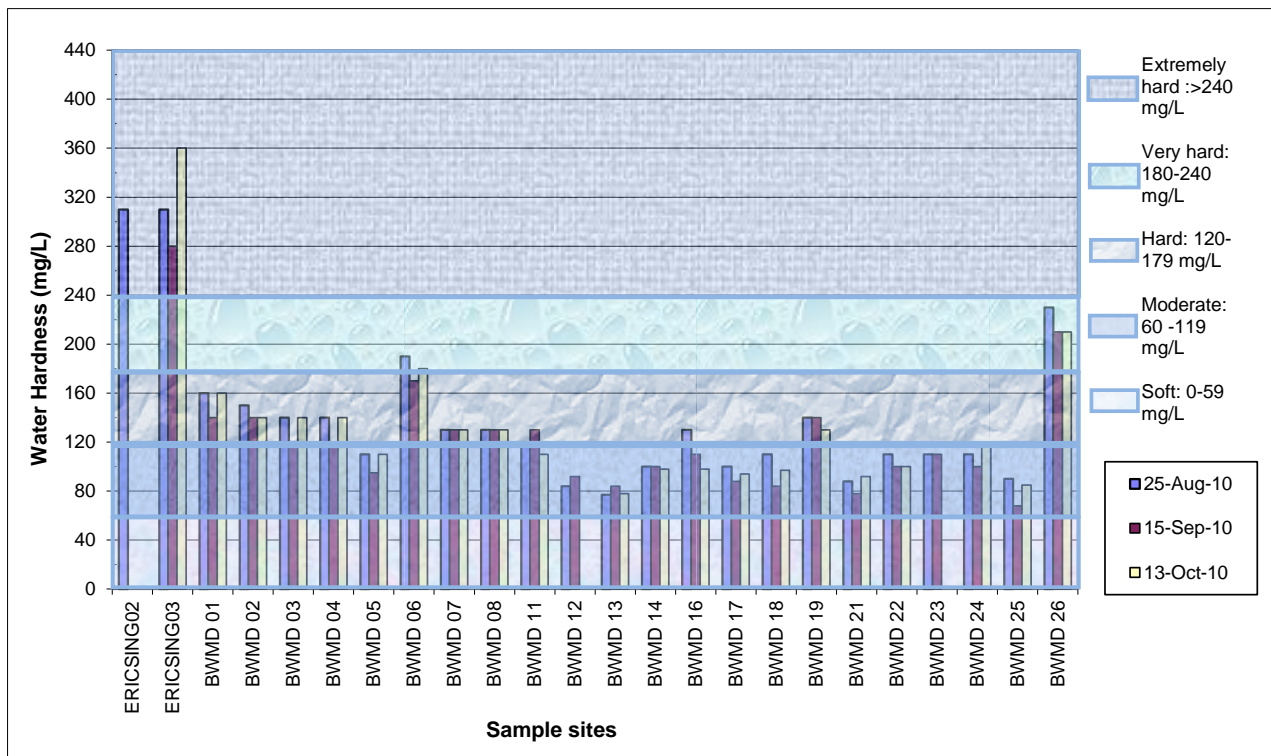


Figure 14: Water Hardness in the surface waters of the Bayswater Brook.

Metals in water

Metals are derived from a variety of sources such as motor vehicles, tyres, rubber, industrial waste, fertilisers and pesticides, refuse leachate and corrosion of pipes and roofs. Some of these metals are toxic to aquatic organisms at varying concentrations and may accumulate in animals and in the human body (IEA 2003).

Metal concentrations in the waters of the Bayswater Brook catchment varied. All lead samples were below the ANZECC trigger value. However, aluminium, chromium, copper, nickel and zinc concentrations were above the specific trigger values on some occasions. For all graphs, a value equal to half the limit of reporting was substituted for those occasions where concentrations were recorded as 'below the laboratory limit of reporting' to allow these 'unknown' values to be represented graphically.

Table 9 shows the sites that have recorded metals concentrations above the trigger value for the whole sampling period (2007-2010). It is difficult to analyse and compare the results found throughout the four year sampling period because the periodicity of the sampling (only once a year between 2007 and 2009) makes it more difficult to have sufficient data to allow a more detailed analysis.

Aluminium

Aluminium (Al) is toxic to aquatic organisms and its toxicity increases as pH decreases (Australian Government 2006). Aluminium may be present in water through natural leaching from soil and rock, and is increased in soluble groundwater concentrations under acidic conditions and therefore it is strongly linked to Acid Sulphate Soils activity (ASS).

The ANZECC trigger value for aluminium is 0.055 mg/L but is only applicable when the pH is greater than 6.5. The concentration of aluminium in the surface waters of the Bayswater Brook was elevated across the catchment, with every site exceeding the ANZECC trigger value (0.055 mg/L) and 59 out of 68 samples recorded pHs above 6.5, so the trigger value was applicable (see figure 15). Only 5 out of 24 sites (sites 6, 11, 12, 13 and 19) recorded pHs below 6.5.

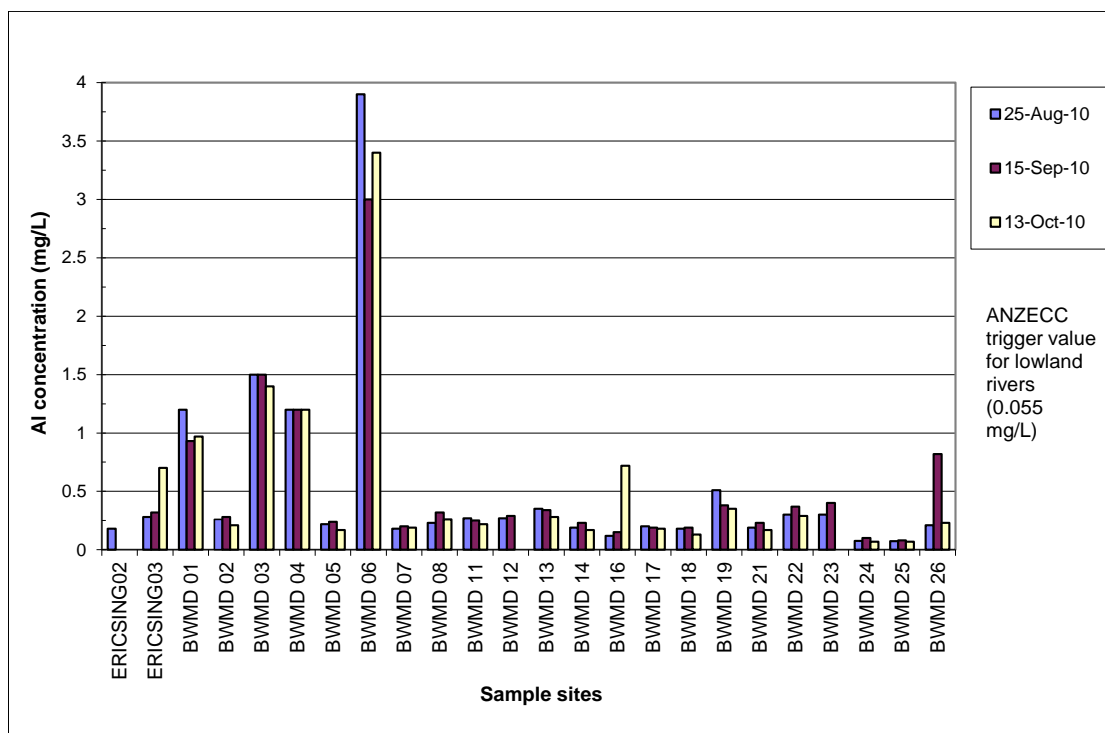


Figure 15: Aluminium concentrations in the surface waters of the Bayswater Brook.

The highest concentrations were recorded in the lower section of the catchment (sites 1-6). The reason for this elevated concentration focused around the bottom of the catchment is unknown and requires further investigation. Site 6 (Tonkin Hwy west) has recorded the highest aluminium concentrations, exceeding the

trigger value, during the entire four year sampling period, however in 2008 and 2007 the pH was below 6.5 and therefore the trigger value was not applicable (see table 9 for more details). However, it seems there is a pattern of contamination from the industrial area, with a high concentration at site 6 and then, the concentrations decrease slowly downstream (through sites 4, 3 and 1 (site 2 is on the other branch so not affected)). These results indicate that there may be a significant source of aluminium entering the Bayswater Brook between sites 6 and 7 and it is recommended that the City of Bayswater undertake industry audits to attempt identify the source of this metal in the vicinity of these sites.

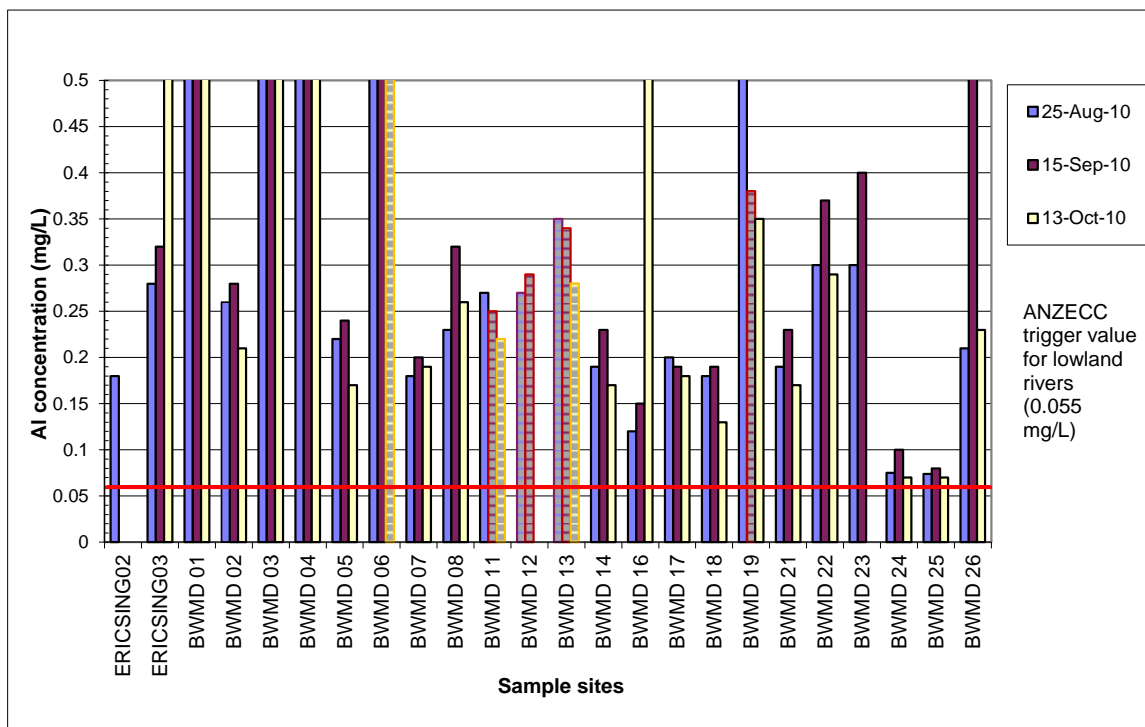


Figure 16: Aluminium concentrations in the surface waters of the Bayswater Brook (zoom in*).

*Please note this graph scale stops at 0.5 mg/L

Chromium

Chromium (Cr) occurs in both trivalent and hexavalent forms. Trivalent chromium is considered to be practically non-toxic. In chlorinated or aerated water, hexavalent chromium is the predominant form and is toxic to aquatic organisms and a carcinogen to animals and humans. Chromium in storm water is mostly associated with suspended solids (IEA 2003).

Sources of chromium include the chemical manufacturing industry (e.g. dyes for paints, rubber and plastic products), the metal finishing industry (e.g. chrome plating), manufacturers of pharmaceuticals, wood, stone, clay and glass products, electrical and aircraft manufacturers, steam and air conditioning supply services, cement producing plants (cement contains chromium), incineration of refuse and sewage sludge, combustions of oil and coal (Australian Gov. 2005).

The trigger value for chromium of 0.001 mg/L is affected by water hardness, therefore the trigger values shown on the graph vary depending on the water hardness recorded at each site. The concentration of chromium in the surface waters of the Bayswater Brook was generally low, only sites 5, 16 and 24 (Railway Pde, Christian St and Drake Way) recorded concentrations exceeding the specific trigger value.

The highest chromium concentrations were recorded at site 16, exceeding the specific trigger value during all three sampling occasions (0.015 mg/L during August and September and 0.01 mg/L during October). In 2009, 2008 and 2007 chromium concentrations at this site have exceeded the specific trigger value (0.015 mg/L, 0.017 mg/L and 0.004 mg/L respectively). Site 5 has recorded chromium concentrations exceeding the specific trigger value during September 2010 and in the 2009 and 2007 snapshots samplings (0.003, 0.003 and 0.004 mg/L respectively). See table 9 for more details.

It is possible that chromium is coming from the industrial area in the immediate vicinity; therefore it is recommended that the City of Bayswater conducts a Light Industry Audit Program to identify potential sources of contamination and also continue monitoring the catchment for chromium.

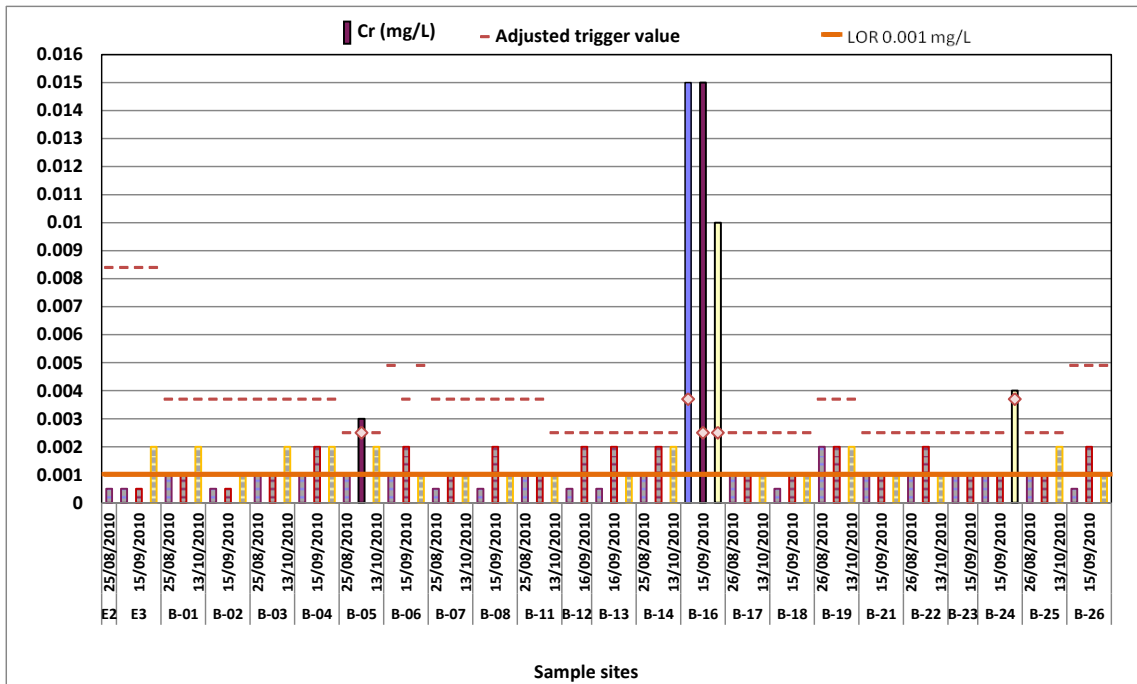


Figure 17: Chromium concentrations in the surface waters of the Bayswater Brook.

Copper

Copper (Cu) is commonly found as the Cu^{2+} ion in natural waters, and this ion is potentially very toxic to aquatic life, both acutely and chronically (Australian Government 2006), and is quickly accumulated in both plants and animals (IEA 2003). The toxicity of copper greatly increases with decreasing water hardness and dissolved oxygen concentrations (Australian Government 2006). Sources of copper include wear of vehicle tyres and brake pads, metal industry and domestic products, corrosion of brass and copper pipes, sewage treatment plant effluent, electroplating wastes, pesticides, fungicides, algacides and brake lining.

The trigger value for copper of 0.0014 mg/L is affected by water hardness. Therefore the trigger values shown on the graph vary, dependant on the water hardness concentration recorded at each site.

The concentrations of copper in the surface waters of the Bayswater Brook were generally high and exceeded the site-specific trigger value in 17 out of 68 samples, at 7 sites (1, 3, 4, 6, 16, 17 and 24). However, only sites 1, 3, 4 and 6 recorded concentrations above the specific trigger value on all three sampling occasions.

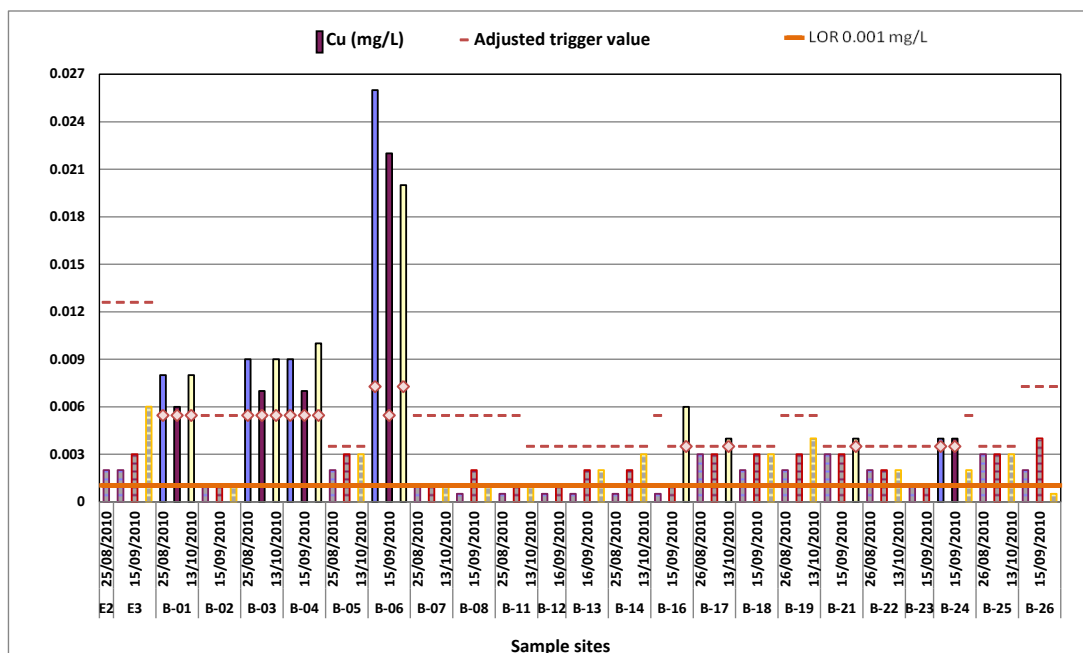


Figure 18: Copper concentrations in the surface waters of the Bayswater Brook.

Site 6 has recorded copper concentrations exceeding the specific trigger value on every occasion samples have been collected. Sites 1, 3 and 4 have also recorded concentrations above the specific trigger value during all sampling events, except for 2009 (see table 9 for specific details). As in the case of aluminium, it seems there is a pattern of copper contamination from the industrial area, around site 6, and then the concentrations decrease slowly downstream (through sites 4, 3 and 1, site 2 is on the King William road branch so is not affected). Therefore, it is recommended that the City of Bayswater conducts a Light Industry Audit Program to identify potential sources of copper contamination and also continue monitoring the movement of the metal through the lower catchment prior to entering the Swan River.

Lead

Lead (Pb) is a cumulative, general metabolic poison which bio-accumulates in animals, plants and bacteria and is highly poisonous to both plants and animals. Lead persists in the environment for long periods and does not readily breakdown (Australian Government 2006). The main source of lead in urban runoff is from petrol additives. Other sources include tyres, industrial and mining emissions, manufacturing and smelting industries, lead water pipes and soldered joints, burning of fossil fuels, plastic pipes and guttering, and paints (IEA 2003).

The trigger value for lead of 0.0034 mg/L is affected by water hardness. Therefore the trigger values shown on the graph are variable, dependent on the water hardness concentration recorded at each site. The lead concentrations in the surface waters of the Bayswater Brook were low, with concentrations at all sites being below the ANZECC site specific trigger value. No site exceeded the recreational guideline of 0.05 mg/L.

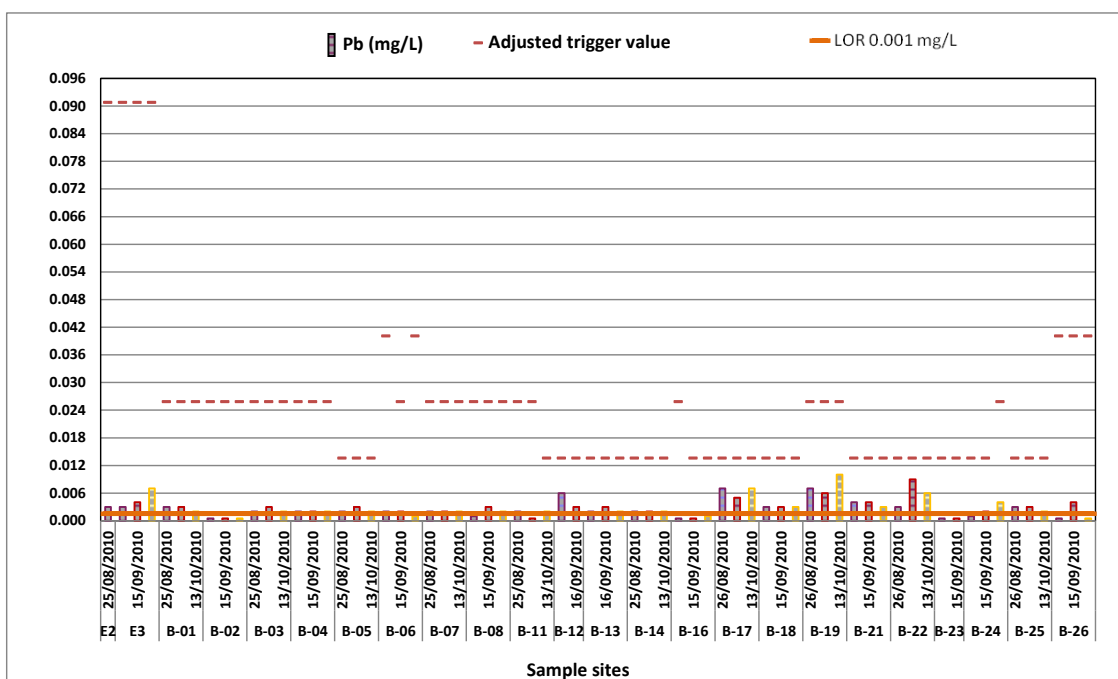


Figure 19: Lead concentrations in the surface waters of the Bayswater Brook.

Nickel

Nickel (Ni) is relatively non-toxic and there is little evidence of bioaccumulation. Nickel in storm water is usually associated with suspended solids and organic matter (IEA 2003). Sources of nickel include corrosion of welded metal plating, wear of moving parts in engines, electroplating and alloy manufacture, and food production equipment (IEA 2003).

The trigger value of 0.011 mg/L for nickel is affected by water hardness. Therefore the trigger values shown on the graph are variable, dependent on the water hardness concentration recorded at each site.

Similar to previous years sampling, in 2010 the nickel concentrations in the surface waters of the Bayswater Brook were generally below the site specific trigger value. 33 out of 68 samples recorded concentrations

below the limit of reporting (0.001 mg/L). Only site 16 (Christian St at Bayswater industrial – northern arm) recorded concentrations above the specific trigger value on all three sampling occasions (0.61 mg/L during August, 0.46 mg/L during September and 0.07 mg/L during October).

Site 16 also recorded concentrations exceeding the specific trigger value in 2009 (0.49 mg/L) and 2008 (0.84 mg/L). These results suggest a source of nickel to the system, localised around this site. This is quite possibly due to inappropriate waste management practices throughout the industrial area, as this site also appears to have a localised source of chromium too; although it could be attributed to other sources. It is recommended that the City of Bayswater conducts a Light Industry Audit Program to identify potential sources of contamination and also continue monitoring the catchment for nickel.

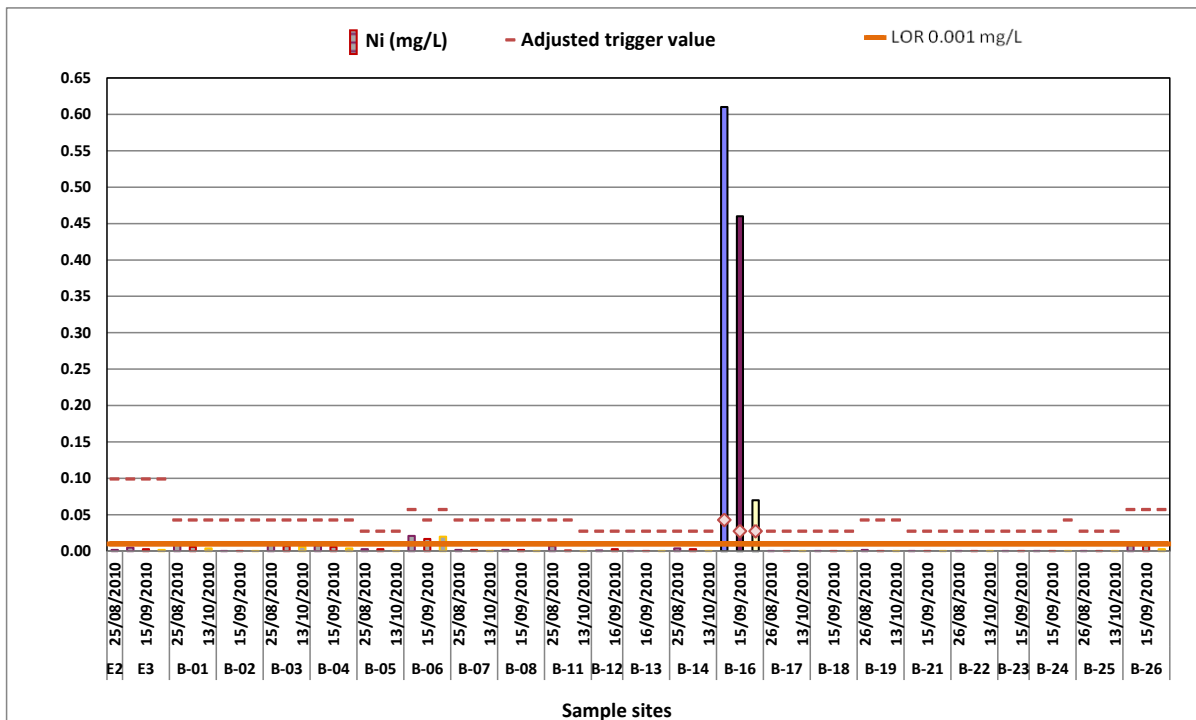
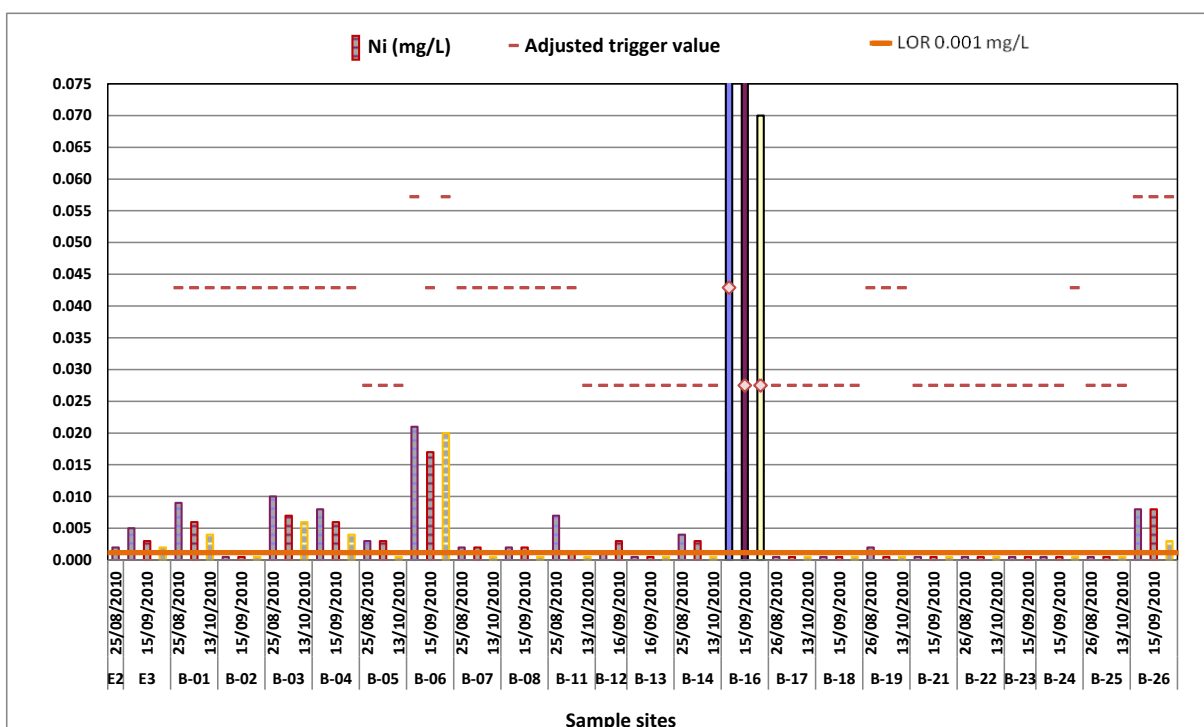


Figure 20: Nickel concentrations in the surface waters of the Bayswater Brook.



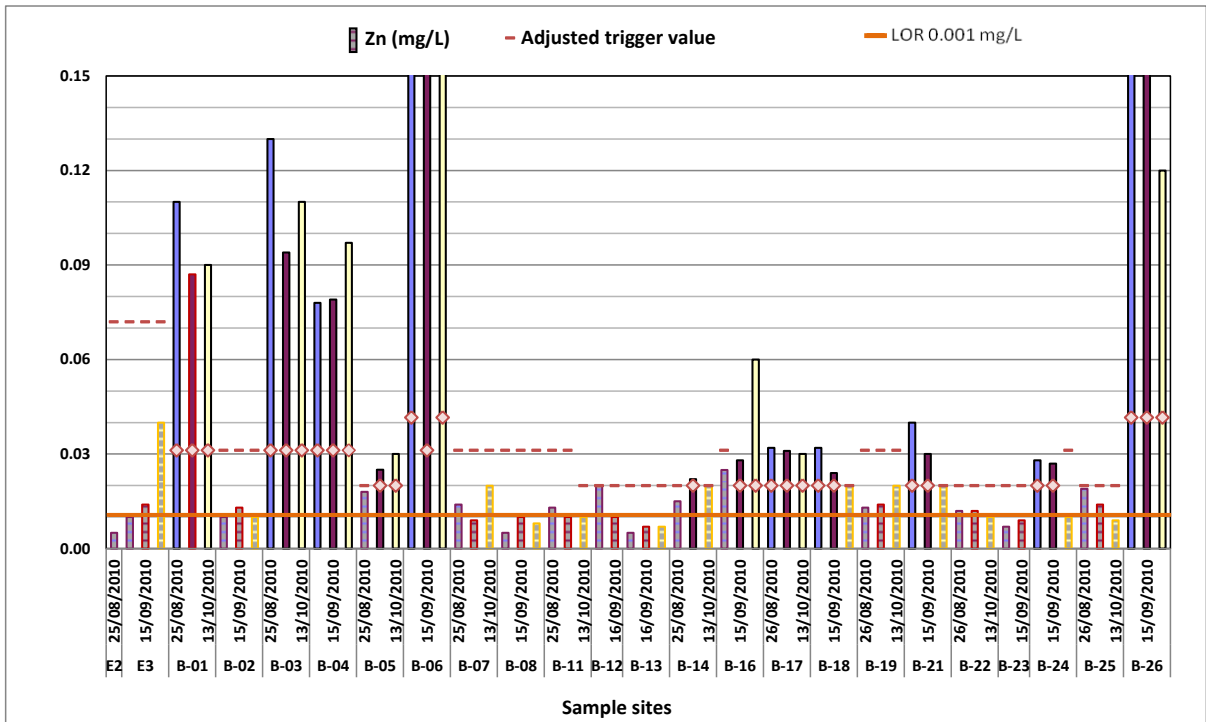


Figure 23: Zinc concentrations in the surface waters of the Bayswater Brook (zoom in*).
 *Please note this graph scale stops at 0.15 mg/L

Table 9: Sites recording heavy metals concentrations (mg/L) in water above the trigger value in the Bennett Brook catchment 2002 – 2010

Site number	Metal (mg/L)	2010			2009	2008	2007
		August	September	October			
ERCSING01	Al	NS	NS	NS	NS	0.21	NS
ERCSING02	Al	0.18	NS	NS	0.22	0.36	NS
ERCSING03	Al	0.28	0.32	0.7	0.18	0.18	NS
BWMD 01	Al	1.2	0.93	0.97	1	1.3	0.42
	Cr	NO	NO	NO	NO	NO	0.002
	Cu	0.008	0.006	0.008	NO	0.006	0.005
	Pb	NO	NO	NO	NO	NO	0.006
	Zn	0.11	0.087	0.09	0.11	0.096	0.08
BWMD 02	Al	0.26	0.28	0.21	0.28	0.33	0.42
	Cr	NO	NO	NO	NO	NO	0.002
	Cu	NO	NO	NO	NO	NO	0.009
	Pb	NO	NO	NO	NO	NO	0.014
	Zn	NO	NO	NO	0.04	NO	0.074
BWMD 03	Al	1.5	1.5	1.4	1.1	1.4	0.7
	Cr	NO	NO	NO	NO	NO	0.005
	Cu	0.009	0.007	0.009	NO	0.007	0.012
	Pb	NO	NO	NO	NO	NO	0.021
	Zn	0.13	0.094	0.11	0.11	0.1	0.15
BWMD 04	Al	1.2	1.2	1.2	1	1.1	0.51
	Cr	NO	NO	NO	NO	NO	0.004
	Cu	0.009	0.007	0.01	NO	0.006	0.008
	Pb	NO	NO	NO	NO	NO	0.012
	Zn	0.078	0.079	0.097	0.086	0.085	0.093
BWMD 05	Al	0.22	0.01	0.17	0.24	0.33	0.29
	Cr	NO	0.003	NO	0.003	NO	0.004
	Cu	NO	NO	NO	NO	NO	0.006
	Pb	NO	NO	NO	NO	NO	0.01
	Zn	NO	0.025	0.03	0.037	0.035	0.056
BWMD 06	Al	3.9	3	3.4	1.9	NO	NO
	Cr	NO	NO	NO	NO	NO	0.002
	Cu	0.026	0.022	0.02	0.008	0.011	0.008
	Pb	NO	NO	NO	NO	NO	0.012
	Zn	0.21	0.23	0.28	0.16	0.17	0.11
BWMD 07	Al	0.18	0.2	0.19	0.26	0.27	0.36
	Cr	NO	NO	NO	NO	NO	0.002
	Cu	NO	NO	NO	NO	NO	0.007
	Pb	NO	NO	NO	NO	NO	0.013
	Zn	NO	NO	NO	0.027	0.035	0.054
BWMD 08	Al	0.23	0.32	0.26	0.33	0.3	0.43
	Cr	NO	NO	NO	NO	NO	0.003
	Cu	NO	NO	NO	0.004	NO	0.009
	Pb	NO	NO	NO	NO	NO	0.021
	Zn	NO	NO	NO	0.03	0.034	0.065
BWMD 09	Al	NS	NS	NS	0.11	0.18	0.08
	Cu	NS	NS	NS	0.002	NO	0.002
	Zn	NO	NO	NO	0.017	0.034	0.02
BWMD 10	Al	NS	NS	NS	0.21	NO	0.27
	Cu	NO	NO	NO	NO	NO	0.003
	Pb	NO	NO	NO	NO	NO	0.01
	Zn	NO	NO	NO	NO	NO	0.018
BWMD 11	Al	0.27	0.25	0.22	0.34	0.34	0.27
	Cr	NO	NO	NO	NO	NO	0.002
	Cu	NO	NO	NO	NO	NO	0.006
	Pb	NO	NO	NO	NO	NO	0.012
	Zn	NO	NO	NO	NO	NO	0.049

Site number	Metal (mg/L)	2010			2009	2008	2007
		August	September	October			
BWMD 12	Al	0.27	0.29	NS	0.27	NO	0.079
	Cu	NO	NO	NO	NO	NO	0.004
	Pb	NO	NO	NO	NO	NO	0.005
	Zn	NO	NO	NO	NO	NO	0.014
BWMD 13	Al	0.35	0.34	0.28	0.22	NO	0.075
	Cu	NO	NO	NO	0.002	NO	0.002
	Pb	NO	NO	NO	NO	NO	0.004
	Zn	NO	NO	NO	0.009	NO	0.01
BWMD 14	Al	0.19	0.23	0.17	0.22	0.31	0.15
	Cr	NO	NO	NO	NO	NO	0.003
	Cu	NO	NO	NO	NO	NO	0.004
	Pb	NO	NO	NO	NO	NO	0.005
	Zn	NO	0.22	NO	0.032	0.03	0.046
BWMD 15	Al	NS	NS	NS	NS	0.92	0.37
	Cr	NO	NO	NO	NO	0.003	0.005
	Cu	NO	NO	NO	NO	NO	0.011
	Pb	NO	NO	NO	NO	NO	0.021
	Zn	NO	NO	NO	NO	0.64	0.95
BWMD 16	Al	0.12	0.15	0.72	NO	0.16	0.15
	Cr	0.015	0.015	0.01	0.015	0.017	0.004
	Cu	NO	NO	0.006	0.003	NO	NO
	Ni	0.61	0.46	0.07	0.49	0.84	NO
	Zn	NO	0.028	0.06	0.047	0.033	0.086
BWMD 17	Al	0.2	0.19	0.18	0.18	0.26	0.06
	Cr	NO	NO	NO	NO	NO	0.002
	Cu	NO	NO	0.004	NO	NO	0.004
	Zn	0.032	0.031	0.03	0.032	0.035	0.06
BWMD 18	Al	0.18	0.19	0.13	0.19	0.3	0.062
	Cu	NO	NO	NO	NO	0.003	0.004
	Pb	NO	NO	NO	NO	0.004	NO
	Zn	0.032	0.024	NO	0.025	0.038	0.063
BWMD 19	Al	0.51	0.38	0.35	0.21	0.31	0.15
	Cu	NO	NO	NO	NO	0.004	0.004
	Zn	NO	NO	NO	0.025	0.056	0.059
BWMD 20	Al	NS	NS	NS	0.12	0.41	NS
	Cu	NS	NS	NS	0.006	0.01	NS
	Pb	NS	NS	NS	0.005	0.01	NS
	Zn	NS	NS	NS	0.032	0.051	NS
BWMD 21	Al	0.19	0.23	0.17	0.18	0.29	NO
	Cu	NO	NO	0.004	NO	NO	0.004
	Zn	0.04	0.03	NO	0.029	0.028	0.067
BWMD 22	Al	0.3	0.37	0.29	0.23	0.36	0.12
	Cu	NO	NO	NO	NO	NO	0.006
	Pb	NO	NO	NO	NO	NO	0.006
	Zn	NO	NO	NO	NO	0.025	0.022
BWMD 23	Al	0.3	0.4	NS	0.25	0.4	NS
BWMD 24	Al	0.075	0.1	0.07	0.11	0.27	0.078
	Cr	NO	NO	0.004	NO	NO	NO
	Cu	0.004	0.004	NO	NO	NO	0.005
	Zn	0.028	0.027	NO	0.031	NO	0.072
BWMD 25	Al	0.074	0.08	0.07	0.11	0.23	NS
	Cu	NO	NO	NO	0.004	NO	NO
	Zn	NO	NO	NO	0.022	0.021	NO
BWMD 26	Al	0.21	0.82	0.23	0.46	NO	NS
	Cu	NO	NO	NO	NO	NO	0.004
	Zn	0.75	0.75	0.12	0.92	0.92	0.067

NO= the concentration was not above trigger value

NS= no sample was taken in this site

Recommendations

The improvement of water quality in the Bayswater Brook catchment involves a wide range of management issues regarding the environment problems at each specific site. However there are some general recommendations, which are listed below:

- Continue monitoring the water quality in the catchment to detect changes in the concentrations of nutrients and metals maintaining, or increasing the frequency to provide enough data about the condition of the catchment and to interpret trends and changes that are happening over time. Snapshots only provide information regarding a specific point in time and space so a greater temporal coverage of the catchment would result in more data and therefore a more detailed picture of the water quality in the catchment. For this reason, maintaining, or increasing the current frequency is paramount to be able to collect more information in order to analyse and discuss better the results and understand better the dynamics in the catchment.
- In light of the consistent, sometimes widespread, contamination from metals in the Bayswater Brook, it is recommended to include soluble metals in future samplings, especially in those sites that are a consistent metals hotspot. However, considering a more cost effective option, it would be recommended to switch from totals metal analysis to soluble metals to have information about the concentrations of metals available for biological uptake and have an idea about the potential impact on the biota.
- Exceedance of a trigger value, for any parameter, indicates that there is the potential for an impact to occur, management responses should be oriented to minimise or alleviate those impacts before water flows to the Swan River.
- Further and intensive investigation into Railway Parade branch drain (site 26) and premises that drain into sites 6 and 16 to isolate localised contaminant sources found at these sites. The numerous metal contaminants found at sites 6 (Al, Cu and Zn), 16 (Al, Cr, Cu, Ni and Zn) and 26 (Al and Zn) are quite possibly coming from the old Cresco site or Small Medium Enterprises (SMEs) in the immediate vicinity. It is recommended that the local government authority monitors downstream of these sites to monitor the movement of metals prior to entering receiving water bodies. It is also recommended that the City of Bayswater conducts a Light Industry Audit Program using information contained within this report to identify potential sources of contamination (i.e. light industrial land uses) which require further investigation. This investigation should also include the legacy of the old Cresco site, looking for the contaminants of concern and, if possible, analyse the groundwater around the vicinity. The City of Bayswater needs to find out which agency is supervising the remediation of the former Cresco site and contact them to know details of the license conditions, the clean-up process and its requirements. It is also important to know what precisely is on the site that qualifies it as being contaminated which could potentially impact the water quality of the Bayswater Brook.
- It is recommended that local government authorities develop a best management practice education program to try and assist land users/industry in addressing the ongoing problems at sites 6 and 16. This recommendation is also based on the results observed during the four year sampling period when concentrations exceeding the trigger value have been recorded for Al, Cr, Cu, Ni, Pb and Zn in some occasions. This could include an awareness program as well as auditing of businesses in the industrial area to prevent inappropriate disposal of wastes throughout this area.
- The high concentrations of nutrients recorded at some sites, particularly Ericising 2 and 3 and at sites 1, 2, 3, 6, 16, 25 and 26, are of concern and should warrant further investigation along with some focus Light Industry Audits and wider community education in the catchment area by local government to address the ongoing problems. Therefore investigation into nutrient reduction strategies at these sites is highly recommended.
- Prepare an analysis of the findings for the four year water quality monitoring program to understand the results better and identify 'hot spots' and align them to specific management actions aimed at improving the water quality in the catchment. Besides, this analysis can provide information to suggest some sites that could be dropped from the sampling.
- Further investigation and monitoring is required to understand:
 - The ongoing source of TN localised around the Eric Singleton Wetland (Ericising 2 and 3) and sites 1, 2, 3, 6 and 26. The ongoing source of TP localised around the Eric Singleton Wetland (Ericising 2 and 3) and sites 2, 25 and 26. Look into the source of high nutrients at the Eric Singleton wetland, which may be a combination of bird droppings, plant organic matter decomposition and phosphorus enriched groundwater.

- The ongoing source of aluminium at sites 1, 3, 4, 5, 6, 7, 8, 11,12, 13, 14, 16, 17, 18, 19, 21, 22, 23, 24, 25 and 26. Especially site 6 which has recorded the highest Al concentrations, exceeding the trigger value, during the four year sampling period. Those results indicate that there is a source of aluminium entering the Bayswater Brook and therefore it is recommended the City of Bayswater conducts light industry audits to attempt identify the source.
- The ongoing source of chromium and nickel in the vicinity of site 16.
- The ongoing source of copper at sites 1, 3, 4 and 6 are of concern due to the potential for downstream flow of contaminated waters and the possible effects on the ecology of the Swan River. The results suggest continued monitoring to follow any trends and changes in copper concentrations.
- The ongoing source of zinc at sites 1, 3, 4, 5, 6, 16, 17, 18, 21, 24 and 26 are of concern due to the potential for downstream flow of contaminated waters and the possible impacts on the Swan River. The results suggest continued monitoring to follow any trends and changes in zinc concentrations.
- Re-vegetation and possible restructuring of the Eric Singleton Bird Sanctuary wetland to facilitate in the intervention and removal of contaminants, allowing time for the natural extraction of the contaminants to occur.
- Include sediment analysis for contaminants at hot-spot sites in future monitoring (sites 6, 16 and 26 as an absolute minimum).
- Business and community awareness strategies on safe waste disposal.
- Implementation of additional living streams with the involvement of the community would be beneficial, having a positive effect by increasing public awareness and improving water quality.

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Appendix A – Glossary

Aesthetic	Aspects of water that are perceived by the senses.
ANZECC	Australian and New Zealand Environment and Conservation Council.
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand.
Catchment	Area of land which intercepts rainfall and contributes the collected water to surface water (streams, drains, rivers, wetlands) or groundwater.
Limit of reporting	Lowest level of detection achievable amongst laboratories; the level that another laboratory should reach given the same instrument, method and sample matrices.
NHMRC	National Health and Medical Research Council.

Appendix B – Bayswater Brook water quality results

(a) Physical parameters results

pH ANZECC trigger value for lowland rivers of SW Australia 6.5 - 8.0
 Max (red) 8.29 Min (blue) 5.86

Comparison to ANZECC trigger

Site name	Site number	Date	pH (none)	pH lower limit 6.5	pH upper limit 8
WEST SIDE	ERICRING02	25/08/2010	7.62	Acceptable	Acceptable
BIRD SANCTUARY FOOTBRIDGE	BWMD 01	25/08/2010	7.24	Acceptable	Acceptable
KING WILLIAM ST	BWMD 02	25/08/2010	7.47	Acceptable	Acceptable
WHATLEY ROAD (DOWNSTREAM)	BWMD 03	25/08/2010	7.34	Acceptable	Acceptable
WHATLEY ROAD (UPSTREAM)	BWMD 04	25/08/2010	7.35	Acceptable	Acceptable
RAILWAY PDE	BWMD 05	25/08/2010	7.75	Acceptable	Acceptable
TONKIN HWY WEST	BWMD 06	25/08/2010	6.67	Acceptable	Acceptable
MOONEY ST WETLAND (OUTLET)	BWMD 07	25/08/2010	7.24	Acceptable	Acceptable
MOONEY ST WETLAND (UPSTREAM)	BWMD 08	25/08/2010	7.09	Acceptable	Acceptable
JOAN RYCROFT RESERVE	BWMD 11	25/08/2010	6.63	Acceptable	Acceptable
TONKIN HWY NORTH	BWMD 12	25/08/2010	5.9	Does not meet guidelines	Acceptable
WALTHAM WAY	BWMD 13	25/08/2010	6.44	Does not meet guidelines	Acceptable
CLAVERING ROAD	BWMD 14	25/08/2010	7.39	Acceptable	Acceptable
CHRISTIAN ST	BWMD 16	25/08/2010	6.83	Acceptable	Acceptable
BROWN'S LAKE WETLAND OUTLET	BWMD 17	26/08/2010	8.08	Acceptable	Does not meet guidelines
GUMMERY ST	BWMD 18	26/08/2010	8.14	Acceptable	Does not meet guidelines
CATHERINE ST	BWMD 19	26/08/2010	7.65	Acceptable	Acceptable
RUDLOC RESERVE EXIT	BWMD 21	26/08/2010	7.95	Acceptable	Acceptable
JAKOBSEN'S WAY FOOTBRIDGE	BWMD 22	26/08/2010	7.8	Acceptable	Acceptable
VERA ST	BWMD 23	26/08/2010	7.12	Acceptable	Acceptable
DRAKE WAY	BWMD 24	26/08/2010	7.5	Acceptable	Acceptable
NORA HUGHES WETLAND OUTLET	BWMD 25	26/08/2010	7.93	Acceptable	Acceptable
RAILWAY CROSSING DS OLD CSBP	BWMD 26	25/08/2010	7.07	Acceptable	Acceptable
SOUTH CORNER	ERICRING03	15/09/2010	7.74	Acceptable	Acceptable
BIRD SANCTUARY FOOTBRIDGE	BWMD 01	15/09/2010	7.58	Acceptable	Acceptable
KING WILLIAM ST	BWMD 02	15/09/2010	7.53	Acceptable	Acceptable
WHATLEY ROAD (DOWNSTREAM)	BWMD 03	15/09/2010	7.41	Acceptable	Acceptable
WHATLEY ROAD (UPSTREAM)	BWMD 04	15/09/2010	7.4	Acceptable	Acceptable
RAILWAY PDE	BWMD 05	15/09/2010	7.71	Acceptable	Acceptable
TONKIN HWY WEST	BWMD 06	15/09/2010	6.78	Acceptable	Acceptable
MOONEY ST WETLAND (OUTLET)	BWMD 07	15/09/2010	7.3	Acceptable	Acceptable
MOONEY ST WETLAND (UPSTREAM)	BWMD 08	15/09/2010	7.31	Acceptable	Acceptable
JOAN RYCROFT RESERVE	BWMD 11	16/09/2010	6.33	Does not meet guidelines	Acceptable
TONKIN HWY NORTH	BWMD 12	16/09/2010	5.86	Does not meet guidelines	Acceptable
WALTHAM WAY	BWMD 13	16/09/2010	6.36	Does not meet guidelines	Acceptable
CLAVERING ROAD	BWMD 14	15/09/2010	7.42	Acceptable	Acceptable
CHRISTIAN ST	BWMD 16	15/09/2010	7.26	Acceptable	Acceptable
BROWN'S LAKE WETLAND OUTLET	BWMD 17	15/09/2010	6.97	Acceptable	Acceptable
GUMMERY ST	BWMD 18	15/09/2010	7.28	Acceptable	Acceptable
CATHERINE ST	BWMD 19	15/09/2010	6.5	Acceptable	Acceptable
RUDLOC RESERVE EXIT	BWMD 21	15/09/2010	7.23	Acceptable	Acceptable
JAKOBSEN'S WAY FOOTBRIDGE	BWMD 22	15/09/2010	6.61	Acceptable	Acceptable
VERA ST	BWMD 23	15/09/2010	6.81	Acceptable	Acceptable
DRAKE WAY	BWMD 24	15/09/2010	6.8	Acceptable	Acceptable
NORA HUGHES WETLAND OUTLET	BWMD 25	15/09/2010	8.29	Acceptable	Does not meet guidelines
RAILWAY CROSSING DS OLD CSBP	BWMD 26	15/09/2010	6.77	Acceptable	Acceptable
SOUTH CORNER	ERICRING03	13/10/2010	7.86	Acceptable	Acceptable
BIRD SANCTUARY FOOTBRIDGE	BWMD 01	13/10/2010	7.41	Acceptable	Acceptable
KING WILLIAM ST	BWMD 02	13/10/2010	7.42	Acceptable	Acceptable
WHATLEY ROAD (DOWNSTREAM)	BWMD 03	13/10/2010	7.07	Acceptable	Acceptable
WHATLEY ROAD (UPSTREAM)	BWMD 04	13/10/2010	7.16	Acceptable	Acceptable
RAILWAY PDE	BWMD 05	13/10/2010	7.57	Acceptable	Acceptable
TONKIN HWY WEST	BWMD 06	13/10/2010	6.22	Does not meet guidelines	Acceptable
MOONEY ST WETLAND (OUTLET)	BWMD 07	13/10/2010	7.05	Acceptable	Acceptable
MOONEY ST WETLAND (UPSTREAM)	BWMD 08	13/10/2010	6.92	Acceptable	Acceptable
JOAN RYCROFT RESERVE	BWMD 11	13/10/2010	6.48	Does not meet guidelines	Acceptable
WALTHAM WAY	BWMD 13	13/10/2010	6.13	Does not meet guidelines	Acceptable
CLAVERING ROAD	BWMD 14	13/10/2010	6.96	Acceptable	Acceptable
CHRISTIAN ST	BWMD 16	13/10/2010	7.72	Acceptable	Acceptable
BROWN'S LAKE WETLAND OUTLET	BWMD 17	13/10/2010	7.09	Acceptable	Acceptable
GUMMERY ST	BWMD 18	13/10/2010	7.14	Acceptable	Acceptable
CATHERINE ST	BWMD 19	13/10/2010	6.83	Acceptable	Acceptable
RUDLOC RESERVE EXIT	BWMD 21	13/10/2010	7.46	Acceptable	Acceptable
JAKOBSEN'S WAY FOOTBRIDGE	BWMD 22	13/10/2010	6.84	Acceptable	Acceptable
DRAKE WAY	BWMD 24	13/10/2010	6.83	Acceptable	Acceptable
NORA HUGHES WETLAND OUTLET	BWMD 25	13/10/2010	6.94	Acceptable	Acceptable
RAILWAY CROSSING DS OLD CSBP	BWMD 26	13/10/2010	6.71	Acceptable	Acceptable

Dissolved oxygen (DO)

ANZECC trigger value 80-120% saturation

Max (red) 187.4 Min (blue) 7.4

Comparison to ANZECC trigger

Site name	Site number	Date	DO (%)	DO lower limit 80	DO upper limit 120
WEST SIDE	ERCSING02	25/08/2010	65.4	Does not meet guidelines	Acceptable
BIRD SANCTUARY FOOTBRIDGE	BWMD 01	25/08/2010	78	Does not meet guidelines	Acceptable
KING WILLIAM ST	BWMD 02	25/08/2010	90.1	Acceptable	Acceptable
WHATLEY ROAD (DOWNSTREAM)	BWMD 03	25/08/2010	90.5	Acceptable	Acceptable
WHATLEY ROAD (UPSTREAM)	BWMD 04	25/08/2010	97.8	Acceptable	Acceptable
RAILWAY PDE	BWMD 05	25/08/2010	108.2	Acceptable	Acceptable
TONKIN HWY WEST	BWMD 06	25/08/2010	75.8	Does not meet guidelines	Acceptable
MOONEY ST WETLAND (OUTLET)	BWMD 07	25/08/2010	55.1	Does not meet guidelines	Acceptable
MOONEY ST WETLAND (UPSTREAM)	BWMD 08	25/08/2010	34.2	Does not meet guidelines	Acceptable
JOAN RYCROFT RESERVE	BWMD 11	25/08/2010	58.3	Does not meet guidelines	Acceptable
TONKIN HWY NORTH	BWMD 12	25/08/2010	83.9	Acceptable	Acceptable
WALTHAM WAY	BWMD 13	25/08/2010	27.8	Does not meet guidelines	Acceptable
CLAVERING ROAD	BWMD 14	25/08/2010	102.3	Acceptable	Acceptable
CHRISTIAN ST	BWMD 16	25/08/2010	71	Does not meet guidelines	Acceptable
BROWNS LAKE WETLAND OUTLET	BWMD 17	26/08/2010	47.9	Does not meet guidelines	Acceptable
GUMMERY ST	BWMD 18	26/08/2010	55.9	Does not meet guidelines	Acceptable
CATHERINE ST	BWMD 19	26/08/2010	45.3	Does not meet guidelines	Acceptable
RUDLOC RESERVE EXIT	BWMD 21	26/08/2010	71.6	Does not meet guidelines	Acceptable
JAKOBSEN'S WAY FOOTBRIDGE	BWMD 22	26/08/2010	70.6	Does not meet guidelines	Acceptable
VERA ST	BWMD 23	26/08/2010	50	Does not meet guidelines	Acceptable
DRAKE WAY	BWMD 24	26/08/2010	42.5	Does not meet guidelines	Acceptable
NORA HUGHES WETLAND OUTLET	BWMD 25	26/08/2010	62.5	Does not meet guidelines	Acceptable
RAILWAY CROSSING DS OLD CSBP	BWMD 26	25/08/2010	62.9	Does not meet guidelines	Acceptable
SOUTH CORNER	ERCSING03	15/09/2010	41.5	Does not meet guidelines	Acceptable
BIRD SANCTUARY FOOTBRIDGE	BWMD 01	15/09/2010	78.7	Does not meet guidelines	Acceptable
KING WILLIAM ST	BWMD 02	15/09/2010	82.2	Acceptable	Acceptable
WHATLEY ROAD (DOWNSTREAM)	BWMD 03	15/09/2010	93.1	Acceptable	Acceptable
WHATLEY ROAD (UPSTREAM)	BWMD 04	15/09/2010	98.1	Acceptable	Acceptable
RAILWAY PDE	BWMD 05	15/09/2010	110.3	Acceptable	Acceptable
TONKIN HWY WEST	BWMD 06	15/09/2010	75.4	Does not meet guidelines	Acceptable
MOONEY ST WETLAND (OUTLET)	BWMD 07	15/09/2010	46.3	Does not meet guidelines	Acceptable
MOONEY ST WETLAND (UPSTREAM)	BWMD 08	15/09/2010	36.8	Does not meet guidelines	Acceptable
JOAN RYCROFT RESERVE	BWMD 11	16/09/2010	57	Does not meet guidelines	Acceptable
TONKIN HWY NORTH	BWMD 12	16/09/2010	56.3	Does not meet guidelines	Acceptable
WALTHAM WAY	BWMD 13	16/09/2010	35.1	Does not meet guidelines	Acceptable
CLAVERING ROAD	BWMD 14	15/09/2010	97.7	Acceptable	Acceptable
CHRISTIAN ST	BWMD 16	15/09/2010	91.9	Acceptable	Acceptable
BROWNS LAKE WETLAND OUTLET	BWMD 17	15/09/2010	90.4	Acceptable	Acceptable
GUMMERY ST	BWMD 18	15/09/2010	123.9	Acceptable	Does not meet guidelines
CATHERINE ST	BWMD 19	15/09/2010	93.9	Acceptable	Acceptable
RUDLOC RESERVE EXIT	BWMD 21	15/09/2010	133.3	Acceptable	Does not meet guidelines
JAKOBSEN'S WAY FOOTBRIDGE	BWMD 22	15/09/2010	38.9	Does not meet guidelines	Acceptable
VERA ST	BWMD 23	15/09/2010	69.8	Does not meet guidelines	Acceptable
DRAKE WAY	BWMD 24	15/09/2010	75.4	Does not meet guidelines	Acceptable
NORA HUGHES WETLAND OUTLET	BWMD 25	15/09/2010	187.4	Acceptable	Does not meet guidelines
RAILWAY CROSSING DS OLD CSBP	BWMD 26	15/09/2010	50.6	Does not meet guidelines	Acceptable
SOUTH CORNER	ERCSING03	13/10/2010	45.3	Does not meet guidelines	Acceptable
BIRD SANCTUARY FOOTBRIDGE	BWMD 01	13/10/2010	68.4	Does not meet guidelines	Acceptable
KING WILLIAM ST	BWMD 02	13/10/2010	73.8	Does not meet guidelines	Acceptable
WHATLEY ROAD (DOWNSTREAM)	BWMD 03	13/10/2010	88.2	Acceptable	Acceptable
WHATLEY ROAD (UPSTREAM)	BWMD 04	13/10/2010	97.5	Acceptable	Acceptable
RAILWAY PDE	BWMD 05	13/10/2010	113.7	Acceptable	Acceptable
TONKIN HWY WEST	BWMD 06	13/10/2010	68.6	Does not meet guidelines	Acceptable
MOONEY ST WETLAND (OUTLET)	BWMD 07	13/10/2010	32	Does not meet guidelines	Acceptable
MOONEY ST WETLAND (UPSTREAM)	BWMD 08	13/10/2010	21.9	Does not meet guidelines	Acceptable
JOAN RYCROFT RESERVE	BWMD 11	13/10/2010	83.5	Acceptable	Acceptable
WALTHAM WAY	BWMD 13	13/10/2010	68.1	Does not meet guidelines	Acceptable
CLAVERING ROAD	BWMD 14	13/10/2010	92.1	Acceptable	Acceptable
CHRISTIAN ST	BWMD 16	13/10/2010	69.2	Does not meet guidelines	Acceptable
BROWNS LAKE WETLAND OUTLET	BWMD 17	13/10/2010	62.7	Does not meet guidelines	Acceptable
GUMMERY ST	BWMD 18	13/10/2010	107.1	Acceptable	Acceptable
CATHERINE ST	BWMD 19	13/10/2010	77.9	Does not meet guidelines	Acceptable
RUDLOC RESERVE EXIT	BWMD 21	13/10/2010	129.3	Acceptable	Does not meet guidelines
JAKOBSEN'S WAY FOOTBRIDGE	BWMD 22	13/10/2010	117.4	Acceptable	Acceptable
DRAKE WAY	BWMD 24	13/10/2010	45.8	Does not meet guidelines	Acceptable
NORA HUGHES WETLAND OUTLET	BWMD 25	13/10/2010	59.9	Does not meet guidelines	Acceptable
RAILWAY CROSSING DS OLD CSBP	BWMD 26	13/10/2010	7.4	Does not meet guidelines	Acceptable

Electrical Conductivity (EC)

ANZECC trigger value 0.12-0.3 mS/cm

Max (red) 2.19 Min (blue) 0.362

Site name	Site number	Date	EC (mS/cm)	lower limit 0.12	upper limit 0.3
WEST SIDE	ERCSING02	25/08/2010	1.265	Acceptable	Does not meet guidelines
BIRD SANCTUARY FOOTBRIDGE	BWMD 01	25/08/2010	0.78	Acceptable	Does not meet guidelines
KING WILLIAM ST	BWMD 02	25/08/2010	0.776	Acceptable	Does not meet guidelines
WHATLEY ROAD (DOWNSTREAM)	BWMD 03	25/08/2010	0.728	Acceptable	Does not meet guidelines
WHATLEY ROAD (UPSTREAM)	BWMD 04	25/08/2010	0.71	Acceptable	Does not meet guidelines
RAILWAY PDE	BWMD 05	25/08/2010	0.639	Acceptable	Does not meet guidelines
TONKIN HWY WEST	BWMD 06	25/08/2010	0.849	Acceptable	Does not meet guidelines
MOONEY ST WETLAND (OUTLET)	BWMD 07	25/08/2010	0.698	Acceptable	Does not meet guidelines
MOONEY ST WETLAND (UPSTREAM)	BWMD 08	25/08/2010	0.706	Acceptable	Does not meet guidelines
JOAN RYCROFT RESERVE	BWMD 11	25/08/2010	0.73	Acceptable	Does not meet guidelines
TONKIN HWY NORTH	BWMD 12	25/08/2010	0.559	Acceptable	Does not meet guidelines
WALTHAM WAY	BWMD 13	25/08/2010	0.516	Acceptable	Does not meet guidelines
CLAVERING ROAD	BWMD 14	25/08/2010	0.643	Acceptable	Does not meet guidelines
CHRISTIAN ST	BWMD 16	25/08/2010	0.683	Acceptable	Does not meet guidelines
BROWNS LAKE WETLAND OUTLET	BWMD 17	26/08/2010	0.609	Acceptable	Does not meet guidelines
GUMMERY ST	BWMD 18	26/08/2010	0.598	Acceptable	Does not meet guidelines
CATHERINE ST	BWMD 19	26/08/2010	0.764	Acceptable	Does not meet guidelines
RUDLOC RESERVE EXIT	BWMD 21	26/08/2010	0.556	Acceptable	Does not meet guidelines
JAKOBSEN'S WAY FOOTBRIDGE	BWMD 22	26/08/2010	0.738	Acceptable	Does not meet guidelines
VERA ST	BWMD 23	26/08/2010	0.745	Acceptable	Does not meet guidelines
DRAKE WAY	BWMD 24	26/08/2010	0.529	Acceptable	Does not meet guidelines
NORA HUGHES WETLAND OUTLET	BWMD 25	26/08/2010	0.433	Acceptable	Does not meet guidelines
RAILWAY CROSSING DS OLD CSBP	BWMD 26	25/08/2010	0.85	Acceptable	Does not meet guidelines
SOUTH CORNER	ERCSING03	15/09/2010	1.304	Acceptable	Does not meet guidelines
BIRD SANCTUARY FOOTBRIDGE	BWMD 01	15/09/2010	0.743	Acceptable	Does not meet guidelines
KING WILLIAM ST	BWMD 02	15/09/2010	0.782	Acceptable	Does not meet guidelines
WHATLEY ROAD (DOWNSTREAM)	BWMD 03	15/09/2010	0.699	Acceptable	Does not meet guidelines
WHATLEY ROAD (UPSTREAM)	BWMD 04	15/09/2010	0.682	Acceptable	Does not meet guidelines
RAILWAY PDE	BWMD 05	15/09/2010	0.617	Acceptable	Does not meet guidelines
TONKIN HWY WEST	BWMD 06	15/09/2010	0.838	Acceptable	Does not meet guidelines
MOONEY ST WETLAND (OUTLET)	BWMD 07	15/09/2010	0.711	Acceptable	Does not meet guidelines
MOONEY ST WETLAND (UPSTREAM)	BWMD 08	15/09/2010	0.718	Acceptable	Does not meet guidelines
JOAN RYCROFT RESERVE	BWMD 11	16/09/2010	0.731	Acceptable	Does not meet guidelines
TONKIN HWY NORTH	BWMD 12	16/09/2010	0.603	Acceptable	Does not meet guidelines
WALTHAM WAY	BWMD 13	16/09/2010	0.56	Acceptable	Does not meet guidelines
CLAVERING ROAD	BWMD 14	15/09/2010	0.621	Acceptable	Does not meet guidelines
CHRISTIAN ST	BWMD 16	15/09/2010	0.572	Acceptable	Does not meet guidelines
BROWNS LAKE WETLAND OUTLET	BWMD 17	15/09/2010	0.547	Acceptable	Does not meet guidelines
GUMMERY ST	BWMD 18	15/09/2010	0.547	Acceptable	Does not meet guidelines
CATHERINE ST	BWMD 19	15/09/2010	0.767	Acceptable	Does not meet guidelines
RUDLOC RESERVE EXIT	BWMD 21	15/09/2010	0.507	Acceptable	Does not meet guidelines
JAKOBSEN'S WAY FOOTBRIDGE	BWMD 22	15/09/2010	0.655	Acceptable	Does not meet guidelines
VERA ST	BWMD 23	15/09/2010	0.765	Acceptable	Does not meet guidelines
DRAKE WAY	BWMD 24	15/09/2010	0.532	Acceptable	Does not meet guidelines
NORA HUGHES WETLAND OUTLET	BWMD 25	15/09/2010	0.362	Acceptable	Does not meet guidelines
RAILWAY CROSSING DS OLD CSBP	BWMD 26	15/09/2010	0.858	Acceptable	Does not meet guidelines
SOUTH CORNER	ERCSING03	13/10/2010	2.19	Acceptable	Does not meet guidelines
BIRD SANCTUARY FOOTBRIDGE	BWMD 01	13/10/2010	0.841	Acceptable	Does not meet guidelines
KING WILLIAM ST	BWMD 02	13/10/2010	0.753	Acceptable	Does not meet guidelines
WHATLEY ROAD (DOWNSTREAM)	BWMD 03	13/10/2010	0.73	Acceptable	Does not meet guidelines
WHATLEY ROAD (UPSTREAM)	BWMD 04	13/10/2010	0.711	Acceptable	Does not meet guidelines
RAILWAY PDE	BWMD 05	13/10/2010	0.645	Acceptable	Does not meet guidelines
TONKIN HWY WEST	BWMD 06	13/10/2010	0.871	Acceptable	Does not meet guidelines
MOONEY ST WETLAND (OUTLET)	BWMD 07	13/10/2010	0.725	Acceptable	Does not meet guidelines
MOONEY ST WETLAND (UPSTREAM)	BWMD 08	13/10/2010	0.725	Acceptable	Does not meet guidelines
JOAN RYCROFT RESERVE	BWMD 11	13/10/2010	0.539	Acceptable	Does not meet guidelines
WALTHAM WAY	BWMD 13	13/10/2010	0.733	Acceptable	Does not meet guidelines
CLAVERING ROAD	BWMD 14	13/10/2010	0.654	Acceptable	Does not meet guidelines
CHRISTIAN ST	BWMD 16	13/10/2010	0.708	Acceptable	Does not meet guidelines
BROWNS LAKE WETLAND OUTLET	BWMD 17	13/10/2010	0.639	Acceptable	Does not meet guidelines
GUMMERY ST	BWMD 18	13/10/2010	0.638	Acceptable	Does not meet guidelines
CATHERINE ST	BWMD 19	13/10/2010	0.721	Acceptable	Does not meet guidelines
RUDLOC RESERVE EXIT	BWMD 21	13/10/2010	0.622	Acceptable	Does not meet guidelines
JAKOBSEN'S WAY FOOTBRIDGE	BWMD 22	13/10/2010	0.704	Acceptable	Does not meet guidelines
DRAKE WAY	BWMD 24	13/10/2010	0.523	Acceptable	Does not meet guidelines
NORA HUGHES WETLAND OUTLET	BWMD 25	13/10/2010	0.413	Acceptable	Does not meet guidelines
RAILWAY CROSSING DS OLD CSBP	BWMD 26	13/10/2010	0.907	Acceptable	Does not meet guidelines

Total Suspended Solids (TSS)

DoW interim guideline 6 mg/L

Max (red) 41

Min (blue) 1

Site name	Site number	Date	TSS (mg/L)*	DoW interim guideline 6 mg/L
WEST SIDE	ERCSING02	25/08/2010	17	Does not meet guidelines
SOUTH CORNER	ERCSING03	25/08/2010	19	Does not meet guidelines
BIRD SANCTUARY FOOTBRIDGE	BWMD 01	25/08/2010	10	Does not meet guidelines
KING WILLIAM ST	BWMD 02	25/08/2010	5	Acceptable
WHATLEY ROAD (DOWNSTREAM)	BWMD 03	25/08/2010	12	Does not meet guidelines
WHATLEY ROAD (UPSTREAM)	BWMD 04	25/08/2010	8	Does not meet guidelines
RAILWAY PDE	BWMD 05	25/08/2010	1	Acceptable
TONKIN HWY WEST	BWMD 06	25/08/2010	41	Does not meet guidelines
MOONEY ST WETLAND (OUTLET)	BWMD 07	25/08/2010	2	Acceptable
MOONEY ST WETLAND (UPSTREAM)	BWMD 08	25/08/2010	3	Acceptable
JOAN RYCROFT RESERVE	BWMD 11	25/08/2010	9	Does not meet guidelines
TONKIN HWY NORTH	BWMD 12	25/08/2010	2	Acceptable
WALTHAM WAY	BWMD 13	25/08/2010	3	Acceptable
CLAVERING ROAD	BWMD 14	25/08/2010	2	Acceptable
CHRISTIAN ST	BWMD 16	25/08/2010	2	Acceptable
BROWN'S LAKE WETLAND OUTLET	BWMD 17	26/08/2010	3	Acceptable
GUMMERY ST	BWMD 18	26/08/2010	3	Acceptable
CATHERINE ST	BWMD 19	26/08/2010	11	Does not meet guidelines
RUDLOC RESERVE EXIT	BWMD 21	26/08/2010	8	Does not meet guidelines
JAKOBSEN'S WAY FOOTBRIDGE	BWMD 22	26/08/2010	1	Acceptable
VERA ST	BWMD 23	26/08/2010	3	Acceptable
DRAKE WAY	BWMD 24	26/08/2010	1	Acceptable
NORA HUGHES WETLAND OUTLET	BWMD 25	26/08/2010	3	Acceptable
RAILWAY CROSSING DS OLD CSBP	BWMD 26	25/08/2010	3	Acceptable
SOUTH CORNER	ERCSING03	15/09/2010	16	Does not meet guidelines
BIRD SANCTUARY FOOTBRIDGE	BWMD 01	15/09/2010	5	Acceptable
WHATLEY ROAD (DOWNSTREAM)	BWMD 03	15/09/2010	5	Acceptable
WHATLEY ROAD (UPSTREAM)	BWMD 04	15/09/2010	5	Acceptable
RAILWAY PDE	BWMD 05	15/09/2010	1	Acceptable
TONKIN HWY WEST	BWMD 06	15/09/2010	30	Does not meet guidelines
MOONEY ST WETLAND (OUTLET)	BWMD 07	15/09/2010	2	Acceptable
MOONEY ST WETLAND (UPSTREAM)	BWMD 08	15/09/2010	6	Acceptable
JOAN RYCROFT RESERVE	BWMD 11	16/09/2010	3	Acceptable
TONKIN HWY NORTH	BWMD 12	16/09/2010	2	Acceptable
WALTHAM WAY	BWMD 13	16/09/2010	1	Acceptable
CLAVERING ROAD	BWMD 14	15/09/2010	1	Acceptable
CHRISTIAN ST	BWMD 16	15/09/2010	1	Acceptable
BROWN'S LAKE WETLAND OUTLET	BWMD 17	15/09/2010	2	Acceptable
GUMMERY ST	BWMD 18	15/09/2010	1	Acceptable
CATHERINE ST	BWMD 19	15/09/2010	3	Acceptable
RUDLOC RESERVE EXIT	BWMD 21	15/09/2010	3	Acceptable
DRAKE WAY	BWMD 24	15/09/2010	2	Acceptable
NORA HUGHES WETLAND OUTLET	BWMD 25	15/09/2010	2	Acceptable
RAILWAY CROSSING DS OLD CSBP	BWMD 26	15/09/2010	5	Acceptable
SOUTH CORNER	ERCSING03	13/10/2010	41	Does not meet guidelines
BIRD SANCTUARY FOOTBRIDGE	BWMD 01	13/10/2010	8	Does not meet guidelines
KING WILLIAM ST	BWMD 02	13/10/2010	1	Acceptable
WHATLEY ROAD (DOWNSTREAM)	BWMD 03	13/10/2010	10	Does not meet guidelines
WHATLEY ROAD (UPSTREAM)	BWMD 04	13/10/2010	6	Acceptable
TONKIN HWY WEST	BWMD 06	13/10/2010	36	Does not meet guidelines
MOONEY ST WETLAND (OUTLET)	BWMD 07	13/10/2010	4	Acceptable
MOONEY ST WETLAND (UPSTREAM)	BWMD 08	13/10/2010	3	Acceptable
WALTHAM WAY	BWMD 13	13/10/2010	4	Acceptable
CLAVERING ROAD	BWMD 14	13/10/2010	1	Acceptable
CHRISTIAN ST	BWMD 16	13/10/2010	10	Does not meet guidelines
BROWN'S LAKE WETLAND OUTLET	BWMD 17	13/10/2010	3	Acceptable
GUMMERY ST	BWMD 18	13/10/2010	1	Acceptable
CATHERINE ST	BWMD 19	13/10/2010	4	Acceptable
RUDLOC RESERVE EXIT	BWMD 21	13/10/2010	2	Acceptable
DRAKE WAY	BWMD 24	13/10/2010	2	Acceptable
NORA HUGHES WETLAND OUTLET	BWMD 25	13/10/2010	2	Acceptable
RAILWAY CROSSING DS OLD CSBP	BWMD 26	13/10/2010	17	Does not meet guidelines

Temperature (°C)

Max (red) 26.38 Min (blue) 11.97

Site name	Site number	Date	Temp (deg C)
WEST SIDE	ERCSING02	25/08/2010	15.03
BIRD SANCTUARY FOOTBRIDGE	BWMD 01	25/08/2010	13.86
KING WILLIAM ST	BWMD 02	25/08/2010	17.84
WHATLEY ROAD (DOWNSTREAM)	BWMD 03	25/08/2010	15.06
WHATLEY ROAD (UPSTREAM)	BWMD 04	25/08/2010	15.53
RAILWAY PDE	BWMD 05	25/08/2010	16.81
TONKIN HWY WEST	BWMD 06	25/08/2010	15.43
MOONEY ST WETLAND (OUTLET)	BWMD 07	25/08/2010	17.66
MOONEY ST WETLAND (UPSTREAM)	BWMD 08	25/08/2010	18.73
JOAN RYCROFT RESERVE	BWMD 11	25/08/2010	19.41
TONKIN HWY NORTH	BWMD 12	25/08/2010	21.25
WALTHAM WAY	BWMD 13	25/08/2010	14.95
CLAVERING ROAD	BWMD 14	25/08/2010	19.57
CHRISTIAN ST	BWMD 16	25/08/2010	18.15
BROWN'S LAKE WETLAND OUTLET	BWMD 17	26/08/2010	11.97
GUMMERY ST	BWMD 18	26/08/2010	12.91
CATHERINE ST	BWMD 19	26/08/2010	13.54
RUDLOC RESERVE EXIT	BWMD 21	26/08/2010	13.58
JAKOBSEN'S WAY FOOTBRIDGE	BWMD 22	26/08/2010	14.26
VERA ST	BWMD 23	26/08/2010	16.04
DRAKE WAY	BWMD 24	26/08/2010	15.59
NORA HUGHES WETLAND OUTLET	BWMD 25	26/08/2010	12.75
RAILWAY CROSSING DS OLD CSBP	BWMD 26	25/08/2010	17.05
SOUTH CORNER	ERCSING03	15/09/2010	13.98
BIRD SANCTUARY FOOTBRIDGE	BWMD 01	15/09/2010	14.82
KING WILLIAM ST	BWMD 02	15/09/2010	17.83
WHATLEY ROAD (DOWNSTREAM)	BWMD 03	15/09/2010	15.53
WHATLEY ROAD (UPSTREAM)	BWMD 04	15/09/2010	15.81
RAILWAY PDE	BWMD 05	15/09/2010	16.74
TONKIN HWY WEST	BWMD 06	15/09/2010	15.6
MOONEY ST WETLAND (OUTLET)	BWMD 07	15/09/2010	16.93
MOONEY ST WETLAND (UPSTREAM)	BWMD 08	15/09/2010	18.19
JOAN RYCROFT RESERVE	BWMD 11	16/09/2010	18.6
TONKIN HWY NORTH	BWMD 12	16/09/2010	19.88
WALTHAM WAY	BWMD 13	16/09/2010	14.68
CLAVERING ROAD	BWMD 14	15/09/2010	18.66
CHRISTIAN ST	BWMD 16	15/09/2010	17.62
BROWN'S LAKE WETLAND OUTLET	BWMD 17	15/09/2010	19.19
GUMMERY ST	BWMD 18	15/09/2010	21.73
CATHERINE ST	BWMD 19	15/09/2010	25.36
RUDLOC RESERVE EXIT	BWMD 21	15/09/2010	22.01
JAKOBSEN'S WAY FOOTBRIDGE	BWMD 22	15/09/2010	22.98
VERA ST	BWMD 23	15/09/2010	18.6
DRAKE WAY	BWMD 24	15/09/2010	20.19
NORA HUGHES WETLAND OUTLET	BWMD 25	15/09/2010	18.23
RAILWAY CROSSING DS OLD CSBP	BWMD 26	15/09/2010	17.22
SOUTH CORNER	ERCSING03	13/10/2010	16.18
BIRD SANCTUARY FOOTBRIDGE	BWMD 01	13/10/2010	16.27
KING WILLIAM ST	BWMD 02	13/10/2010	20.11
WHATLEY ROAD (DOWNSTREAM)	BWMD 03	13/10/2010	17.34
WHATLEY ROAD (UPSTREAM)	BWMD 04	13/10/2010	17.48
RAILWAY PDE	BWMD 05	13/10/2010	18.52
TONKIN HWY WEST	BWMD 06	13/10/2010	16.79
MOONEY ST WETLAND (OUTLET)	BWMD 07	13/10/2010	18.35
MOONEY ST WETLAND (UPSTREAM)	BWMD 08	13/10/2010	19.24
JOAN RYCROFT RESERVE	BWMD 11	13/10/2010	26.38
WALTHAM WAY	BWMD 13	13/10/2010	22.18
CLAVERING ROAD	BWMD 14	13/10/2010	20.03
CHRISTIAN ST	BWMD 16	13/10/2010	19.14
BROWN'S LAKE WETLAND OUTLET	BWMD 17	13/10/2010	18.68
GUMMERY ST	BWMD 18	13/10/2010	23.59
CATHERINE ST	BWMD 19	13/10/2010	20.02
RUDLOC RESERVE EXIT	BWMD 21	13/10/2010	25.78
JAKOBSEN'S WAY FOOTBRIDGE	BWMD 22	13/10/2010	25.77
DRAKE WAY	BWMD 24	13/10/2010	22.61
NORA HUGHES WETLAND OUTLET	BWMD 25	13/10/2010	21.4
RAILWAY CROSSING DS OLD CSBP	BWMD 26	13/10/2010	18.6

(b) Nutrients parameters results

Total Nitrogen (TN)		(mg/L)		N (tot) {TN, pTN} (mg/L)	
ANZECC trigger value: 1.2mg/L		Max (red) 4.2		Min (blue) 0.44	
Site name	Site number	Date	TN	Comparison to ANZECC trigger value (1.2mg/L)	
WEST SIDE	ERICSING02	25/08/2010	3.8	Guideline exceeded	
SOUTH CORNER	ERICSING03	25/08/2010	4.2	Guideline exceeded	
BIRD SANCTUARY FOOTBRIDGE	BWMD 01	25/08/2010	1.5	Guideline exceeded	
KING WILLIAM ST	BWMD 02	25/08/2010	1.3	Guideline exceeded	
WHATLEY ROAD (DOWNSTREAM)	BWMD 03	25/08/2010	1.3	Guideline exceeded	
WHATLEY ROAD (UPSTREAM)	BWMD 04	25/08/2010	1.3	Guideline exceeded	
RAILWAY PDE	BWMD 05	25/08/2010	0.93	Acceptable	
TONKIN HWY WEST	BWMD 06	25/08/2010	2.1	Guideline exceeded	
MOONEY ST WETLAND (OUTLET)	BWMD 07	25/08/2010	0.72	Acceptable	
MOONEY ST WETLAND (UPSTREAM)	BWMD 08	25/08/2010	0.83	Acceptable	
JOAN RYCROFT RESERVE	BWMD 11	25/08/2010	0.98	Acceptable	
TONKIN HWY NORTH	BWMD 12	25/08/2010	0.82	Acceptable	
WALTHAM WAY	BWMD 13	25/08/2010	0.86	Acceptable	
CLAVERING ROAD	BWMD 14	25/08/2010	0.89	Acceptable	
CHRISTIAN ST	BWMD 16	25/08/2010	0.44	Acceptable	
BROWN'S LAKE WETLAND OUTLET	BWMD 17	26/08/2010	0.91	Acceptable	
GUMMERY ST	BWMD 18	26/08/2010	0.86	Acceptable	
CATHERINE ST	BWMD 19	26/08/2010	1.3	Guideline exceeded	
RUDLOC RESERVE EXIT	BWMD 21	26/08/2010	0.9	Acceptable	
JAKOBSEN'S WAY FOOTBRIDGE	BWMD 22	26/08/2010	0.69	Acceptable	
VERA ST	BWMD 23	26/08/2010	0.86	Acceptable	
DRAKE WAY	BWMD 24	26/08/2010	0.6	Acceptable	
NORA HUGHES WETLAND OUTLET	BWMD 25	26/08/2010	0.8	Acceptable	
RAILWAY CROSSING DS OLD CSBP	BWMD 26	25/08/2010	1.8	Guideline exceeded	
SOUTH CORNER	ERICSING03	15/09/2010	2.8	Guideline exceeded	
BIRD SANCTUARY FOOTBRIDGE	BWMD 01	15/09/2010	1.4	Guideline exceeded	
KING WILLIAM ST	BWMD 02	15/09/2010	1.4	Guideline exceeded	
WHATLEY ROAD (DOWNSTREAM)	BWMD 03	15/09/2010	1.2	Guideline exceeded	
WHATLEY ROAD (UPSTREAM)	BWMD 04	15/09/2010	1.2	Guideline exceeded	
RAILWAY PDE	BWMD 05	15/09/2010	0.85	Acceptable	
TONKIN HWY WEST	BWMD 06	15/09/2010	2.2	Guideline exceeded	
MOONEY ST WETLAND (OUTLET)	BWMD 07	15/09/2010	0.76	Acceptable	
MOONEY ST WETLAND (UPSTREAM)	BWMD 08	15/09/2010	0.92	Acceptable	
JOAN RYCROFT RESERVE	BWMD 11	16/09/2010	0.91	Acceptable	
TONKIN HWY NORTH	BWMD 12	16/09/2010	0.81	Acceptable	
WALTHAM WAY	BWMD 13	16/09/2010	0.78	Acceptable	
CLAVERING ROAD	BWMD 14	15/09/2010	0.88	Acceptable	
CHRISTIAN ST	BWMD 16	15/09/2010	1.9	Guideline exceeded	
BROWN'S LAKE WETLAND OUTLET	BWMD 17	15/09/2010	0.71	Acceptable	
GUMMERY ST	BWMD 18	15/09/2010	0.71	Acceptable	
CATHERINE ST	BWMD 19	15/09/2010	1.2	Guideline exceeded	
RUDLOC RESERVE EXIT	BWMD 21	15/09/2010	0.68	Acceptable	
JAKOBSEN'S WAY FOOTBRIDGE	BWMD 22	15/09/2010	0.94	Acceptable	
VERA ST	BWMD 23	15/09/2010	0.78	Acceptable	
DRAKE WAY	BWMD 24	15/09/2010	0.61	Acceptable	
NORA HUGHES WETLAND OUTLET	BWMD 25	15/09/2010	0.64	Acceptable	
RAILWAY CROSSING DS OLD CSBP	BWMD 26	15/09/2010	2.8	Guideline exceeded	
SOUTH CORNER	ERICSING03	13/10/2010	2.8	Guideline exceeded	
BIRD SANCTUARY FOOTBRIDGE	BWMD 01	13/10/2010	1.4	Guideline exceeded	
KING WILLIAM ST	BWMD 02	13/10/2010	1.4	Guideline exceeded	
WHATLEY ROAD (DOWNSTREAM)	BWMD 03	13/10/2010	1.3	Guideline exceeded	
WHATLEY ROAD (UPSTREAM)	BWMD 04	13/10/2010	1.3	Guideline exceeded	
RAILWAY PDE	BWMD 05	13/10/2010	0.84	Acceptable	
TONKIN HWY WEST	BWMD 06	13/10/2010	2.2	Guideline exceeded	
MOONEY ST WETLAND (OUTLET)	BWMD 07	13/10/2010	0.81	Acceptable	
MOONEY ST WETLAND (UPSTREAM)	BWMD 08	13/10/2010	0.76	Acceptable	
JOAN RYCROFT RESERVE	BWMD 11	13/10/2010	0.91	Acceptable	
WALTHAM WAY	BWMD 13	13/10/2010	0.84	Acceptable	
CLAVERING ROAD	BWMD 14	13/10/2010	0.83	Acceptable	
CHRISTIAN ST	BWMD 16	13/10/2010	3.3	Guideline exceeded	
BROWN'S LAKE WETLAND OUTLET	BWMD 17	13/10/2010	0.82	Acceptable	
GUMMERY ST	BWMD 18	13/10/2010	0.75	Acceptable	
CATHERINE ST	BWMD 19	13/10/2010	1	Acceptable	
RUDLOC RESERVE EXIT	BWMD 21	13/10/2010	0.72	Acceptable	
JAKOBSEN'S WAY FOOTBRIDGE	BWMD 22	13/10/2010	0.75	Acceptable	
DRAKE WAY	BWMD 24	13/10/2010	0.61	Acceptable	
NORA HUGHES WETLAND OUTLET	BWMD 25	13/10/2010	0.83	Acceptable	
RAILWAY CROSSING DS OLD CSBP	BWMD 26	13/10/2010	4.1	Guideline exceeded	

Nitrogen as Ammonia (NH3) (mg/L) NH3-N/NH4-N (sol) (mg/L) All data in blue were <0.01 (LOR)
ANZECC trigger value: 0.9mg/L Max (red) 2.7 Min (blue) 0.005

Site name	Site number	Date	NH3/NH4	Comparison to ANZECC trigger value (1.2mg/L)
WEST SIDE	ERICSING02	25/08/2010	2.3	Guideline exceeded
SOUTH CORNER	ERICSING03	25/08/2010	2.5	Guideline exceeded
BIRD SANCTUARY FOOTBRIDGE	BWMD 01	25/08/2010	0.48	Acceptable
KING WILLIAM ST	BWMD 02	25/08/2010	0.062	Acceptable
WHATLEY ROAD (DOWNSTREAM)	BWMD 03	25/08/2010	0.45	Acceptable
WHATLEY ROAD (UPSTREAM)	BWMD 04	25/08/2010	0.43	Acceptable
RAILWAY PDE	BWMD 05	25/08/2010	0.024	Acceptable
TONKIN HWY WEST	BWMD 06	25/08/2010	1.4	Guideline exceeded
MOONEY ST WETLAND (OUTLET)	BWMD 07	25/08/2010	0.054	Acceptable
MOONEY ST WETLAND (UPSTREAM)	BWMD 08	25/08/2010	0.097	Acceptable
JOAN RYCROFT RESERVE	BWMD 11	25/08/2010	0.28	Acceptable
TONKIN HWY NORTH	BWMD 12	25/08/2010	0.033	Acceptable
WALTHAM WAY	BWMD 13	25/08/2010	0.023	Acceptable
CLAVERING ROAD	BWMD 14	25/08/2010	0.039	Acceptable
CHRISTIAN ST	BWMD 16	25/08/2010	0.044	Acceptable
BROWN'S LAKE WETLAND OUTLET	BWMD 17	26/08/2010	0.13	Acceptable
GUMMERY ST	BWMD 18	26/08/2010	0.15	Acceptable
CATHERINE ST	BWMD 19	26/08/2010	0.064	Acceptable
RUDLOC RESERVE EXIT	BWMD 21	26/08/2010	0.17	Acceptable
JAKOBSEN'S WAY FOOTBRIDGE	BWMD 22	26/08/2010	0.019	Acceptable
VERA ST	BWMD 23	26/08/2010	0.091	Acceptable
DRAKE WAY	BWMD 24	26/08/2010	0.088	Acceptable
NORA HUGHES WETLAND OUTLET	BWMD 25	26/08/2010	0.062	Acceptable
RAILWAY CROSSING DS OLD CSBP	BWMD 26	25/08/2010	0.59	Acceptable
SOUTH CORNER	ERICSING03	15/09/2010	0.7	Acceptable
BIRD SANCTUARY FOOTBRIDGE	BWMD 01	15/09/2010	0.32	Acceptable
KING WILLIAM ST	BWMD 02	15/09/2010	0.074	Acceptable
WHATLEY ROAD (DOWNSTREAM)	BWMD 03	15/09/2010	0.36	Acceptable
WHATLEY ROAD (UPSTREAM)	BWMD 04	15/09/2010	0.35	Acceptable
RAILWAY PDE	BWMD 05	15/09/2010	0.005	Acceptable
TONKIN HWY WEST	BWMD 06	15/09/2010	1.3	Guideline exceeded
MOONEY ST WETLAND (OUTLET)	BWMD 07	15/09/2010	0.048	Acceptable
MOONEY ST WETLAND (UPSTREAM)	BWMD 08	15/09/2010	0.091	Acceptable
JOAN RYCROFT RESERVE	BWMD 11	16/09/2010	0.26	Acceptable
TONKIN HWY NORTH	BWMD 12	16/09/2010	0.042	Acceptable
WALTHAM WAY	BWMD 13	16/09/2010	0.015	Acceptable
CLAVERING ROAD	BWMD 14	15/09/2010	0.036	Acceptable
CHRISTIAN ST	BWMD 16	15/09/2010	0.023	Acceptable
BROWN'S LAKE WETLAND OUTLET	BWMD 17	15/09/2010	0.039	Acceptable
GUMMERY ST	BWMD 18	15/09/2010	0.03	Acceptable
CATHERINE ST	BWMD 19	15/09/2010	0.11	Acceptable
RUDLOC RESERVE EXIT	BWMD 21	15/09/2010	0.023	Acceptable
JAKOBSEN'S WAY FOOTBRIDGE	BWMD 22	15/09/2010	0.15	Acceptable
VERA ST	BWMD 23	15/09/2010	0.1	Acceptable
DRAKE WAY	BWMD 24	15/09/2010	0.074	Acceptable
NORA HUGHES WETLAND OUTLET	BWMD 25	15/09/2010	0.01	Acceptable
RAILWAY CROSSING DS OLD CSBP	BWMD 26	15/09/2010	1.6	Guideline exceeded
SOUTH CORNER	ERICSING03	13/10/2010	0.005	Acceptable
BIRD SANCTUARY FOOTBRIDGE	BWMD 01	13/10/2010	0.4	Acceptable
KING WILLIAM ST	BWMD 02	13/10/2010	0.052	Acceptable
WHATLEY ROAD (DOWNSTREAM)	BWMD 03	13/10/2010	0.5	Acceptable
WHATLEY ROAD (UPSTREAM)	BWMD 04	13/10/2010	0.52	Acceptable
RAILWAY PDE	BWMD 05	13/10/2010	0.005	Acceptable
TONKIN HWY WEST	BWMD 06	13/10/2010	1.8	Guideline exceeded
MOONEY ST WETLAND (OUTLET)	BWMD 07	13/10/2010	0.096	Acceptable
MOONEY ST WETLAND (UPSTREAM)	BWMD 08	13/10/2010	0.16	Acceptable
JOAN RYCROFT RESERVE	BWMD 11	13/10/2010	0.24	Acceptable
WALTHAM WAY	BWMD 13	13/10/2010	0.01	Acceptable
CLAVERING ROAD	BWMD 14	13/10/2010	0.04	Acceptable
CHRISTIAN ST	BWMD 16	13/10/2010	1.9	Guideline exceeded
BROWN'S LAKE WETLAND OUTLET	BWMD 17	13/10/2010	0.037	Acceptable
GUMMERY ST	BWMD 18	13/10/2010	0.02	Acceptable
CATHERINE ST	BWMD 19	13/10/2010	0.039	Acceptable
RUDLOC RESERVE EXIT	BWMD 21	13/10/2010	0.017	Acceptable
JAKOBSEN'S WAY FOOTBRIDGE	BWMD 22	13/10/2010	0.016	Acceptable
DRAKE WAY	BWMD 24	13/10/2010	0.13	Acceptable
NORA HUGHES WETLAND OUTLET	BWMD 25	13/10/2010	0.06	Acceptable
RAILWAY CROSSING DS OLD CSBP	BWMD 26	13/10/2010	2.7	Guideline exceeded

Dissolved Organic Nitrogen (DON) (mg/L) N (sum sol org) {DON} (mg/L)
ANZECC trigger value: ND All data in blue were <0.01 (LC)
Max (red) 1.2 **Min (blue) 0.087**

Site name	Site number	Date	DON
WEST SIDE	ERICSING02	25/08/2010	1.2
SOUTH CORNER	ERICSING03	25/08/2010	1.2
BIRD SANCTUARY FOOTBRIDGE	BWMD 01	25/08/2010	0.5
KING WILLIAM ST	BWMD 02	25/08/2010	0.46
WHATLEY ROAD (DOWNSTREAM)	BWMD 03	25/08/2010	0.43
WHATLEY ROAD (UPSTREAM)	BWMD 04	25/08/2010	0.49
RAILWAY PDE	BWMD 05	25/08/2010	0.48
TONKIN HWY WEST	BWMD 06	25/08/2010	0.45
MOONEY ST WETLAND (OUTLET)	BWMD 07	25/08/2010	0.52
MOONEY ST WETLAND (UPSTREAM)	BWMD 08	25/08/2010	0.55
JOAN RYCROFT RESERVE	BWMD 11	25/08/2010	0.48
TONKIN HWY NORTH	BWMD 12	25/08/2010	0.55
WALTHAM WAY	BWMD 13	25/08/2010	0.71
CLAVERING ROAD	BWMD 14	25/08/2010	0.51
CHRISTIAN ST	BWMD 16	25/08/2010	0.36
BROWN'S LAKE WETLAND OUTLET	BWMD 17	26/08/2010	0.6
GUMMERY ST	BWMD 18	26/08/2010	0.58
CATHERINE ST	BWMD 19	26/08/2010	0.93
RUDLOC RESERVE EXIT	BWMD 21	26/08/2010	0.57
JAKOBSEN'S WAY FOOTBRIDGE	BWMD 22	26/08/2010	0.58
VERA ST	BWMD 23	26/08/2010	0.65
DRAKE WAY	BWMD 24	26/08/2010	0.41
NORA HUGHES WETLAND OUTLET	BWMD 25	26/08/2010	0.54
RAILWAY CROSSING DS OLD CSBP	BWMD 26	25/08/2010	0.33
SOUTH CORNER	ERICSING03	15/09/2010	1.2
BIRD SANCTUARY FOOTBRIDGE	BWMD 01	15/09/2010	0.54
KING WILLIAM ST	BWMD 02	15/09/2010	0.44
WHATLEY ROAD (DOWNSTREAM)	BWMD 03	15/09/2010	0.41
WHATLEY ROAD (UPSTREAM)	BWMD 04	15/09/2010	0.48
RAILWAY PDE	BWMD 05	15/09/2010	0.54
TONKIN HWY WEST	BWMD 06	15/09/2010	0.49
MOONEY ST WETLAND (OUTLET)	BWMD 07	15/09/2010	0.54
MOONEY ST WETLAND (UPSTREAM)	BWMD 08	15/09/2010	0.55
JOAN RYCROFT RESERVE	BWMD 11	16/09/2010	0.42
TONKIN HWY NORTH	BWMD 12	16/09/2010	0.48
WALTHAM WAY	BWMD 13	16/09/2010	0.65
CLAVERING ROAD	BWMD 14	15/09/2010	0.53
CHRISTIAN ST	BWMD 16	15/09/2010	0.41
BROWN'S LAKE WETLAND OUTLET	BWMD 17	15/09/2010	0.56
GUMMERY ST	BWMD 18	15/09/2010	0.57
CATHERINE ST	BWMD 19	15/09/2010	1
RUDLOC RESERVE EXIT	BWMD 21	15/09/2010	0.5
JAKOBSEN'S WAY FOOTBRIDGE	BWMD 22	15/09/2010	0.66
VERA ST	BWMD 23	15/09/2010	0.61
DRAKE WAY	BWMD 24	15/09/2010	0.43
NORA HUGHES WETLAND OUTLET	BWMD 25	15/09/2010	0.48
RAILWAY CROSSING DS OLD CSBP	BWMD 26	15/09/2010	0.4
SOUTH CORNER	ERICSING03	13/10/2010	1.2
BIRD SANCTUARY FOOTBRIDGE	BWMD 01	13/10/2010	0.42
KING WILLIAM ST	BWMD 02	13/10/2010	0.48
WHATLEY ROAD (DOWNSTREAM)	BWMD 03	13/10/2010	0.44
WHATLEY ROAD (UPSTREAM)	BWMD 04	13/10/2010	0.4
RAILWAY PDE	BWMD 05	13/10/2010	0.49
TONKIN HWY WEST	BWMD 06	13/10/2010	0.087
MOONEY ST WETLAND (OUTLET)	BWMD 07	13/10/2010	0.54
MOONEY ST WETLAND (UPSTREAM)	BWMD 08	13/10/2010	0.48
JOAN RYCROFT RESERVE	BWMD 11	13/10/2010	0.47
WALTHAM WAY	BWMD 13	13/10/2010	0.72
CLAVERING ROAD	BWMD 14	13/10/2010	0.46
CHRISTIAN ST	BWMD 16	13/10/2010	0.51
BROWN'S LAKE WETLAND OUTLET	BWMD 17	13/10/2010	0.64
GUMMERY ST	BWMD 18	13/10/2010	0.68
CATHERINE ST	BWMD 19	13/10/2010	0.93
RUDLOC RESERVE EXIT	BWMD 21	13/10/2010	0.57
JAKOBSEN'S WAY FOOTBRIDGE	BWMD 22	13/10/2010	0.63
DRAKE WAY	BWMD 24	13/10/2010	0.36
NORA HUGHES WETLAND OUTLET	BWMD 25	13/10/2010	0.6
RAILWAY CROSSING DS OLD CSBP	BWMD 26	13/10/2010	0.55

Total Oxidised Nitrogen (NOx) (mg/L)

N (sum sol ox) (NOx-N, TON) (mg/L)

All data in blue were <0.01 (LOR)

ANZECC trigger value: 0.15mg/L

Max (red) 0.84

Min (blue) 0.005

Site name	Site number	Date	NOx	Comparison to ANZECC trigger value (1.2mg/L)
WEST SIDE	ERICSING02	25/08/2010	0.22	Guideline exceeded
SOUTH CORNER	ERICSING03	25/08/2010	0.25	Guideline exceeded
BIRD SANCTUARY FOOTBRIDGE	BWMD 01	25/08/2010	0.42	Guideline exceeded
KING WILLIAM ST	BWMD 02	25/08/2010	0.76	Guideline exceeded
WHATLEY ROAD (DOWNSTREAM)	BWMD 03	25/08/2010	0.38	Guideline exceeded
WHATLEY ROAD (UPSTREAM)	BWMD 04	25/08/2010	0.34	Guideline exceeded
RAILWAY PDE	BWMD 05	25/08/2010	0.4	Guideline exceeded
TONKIN HWY WEST	BWMD 06	25/08/2010	0.11	Acceptable
MOONEY ST WETLAND (OUTLET)	BWMD 07	25/08/2010	0.089	Acceptable
MOONEY ST WETLAND (UPSTREAM)	BWMD 08	25/08/2010	0.15	Guideline exceeded
JOAN RYCROFT RESERVE	BWMD 11	25/08/2010	0.21	Guideline exceeded
TONKIN HWY NORTH	BWMD 12	25/08/2010	0.16	Guideline exceeded
WALTHAM WAY	BWMD 13	25/08/2010	0.005	Acceptable
CLAVERING ROAD	BWMD 14	25/08/2010	0.34	Guideline exceeded
CHRISTIAN ST	BWMD 16	25/08/2010	0.03	Acceptable
BROWN'S LAKE WETLAND OUTLET	BWMD 17	26/08/2010	0.041	Acceptable
GUMMERY ST	BWMD 18	26/08/2010	0.041	Acceptable
CATHERINE ST	BWMD 19	26/08/2010	0.082	Acceptable
RUDLOC RESERVE EXIT	BWMD 21	26/08/2010	0.044	Acceptable
JAKOBSEN'S WAY FOOTBRIDGE	BWMD 22	26/08/2010	0.016	Acceptable
VERA ST	BWMD 23	26/08/2010	0.055	Acceptable
DRAKE WAY	BWMD 24	26/08/2010	0.023	Acceptable
NORA HUGHES WETLAND OUTLET	BWMD 25	26/08/2010	0.005	Acceptable
RAILWAY CROSSING DS OLD CSBP	BWMD 26	25/08/2010	0.84	Guideline exceeded
SOUTH CORNER	ERICSING03	15/09/2010	0.12	Acceptable
BIRD SANCTUARY FOOTBRIDGE	BWMD 01	15/09/2010	0.33	Guideline exceeded
KING WILLIAM ST	BWMD 02	15/09/2010	0.78	Guideline exceeded
WHATLEY ROAD (DOWNSTREAM)	BWMD 03	15/09/2010	0.28	Guideline exceeded
WHATLEY ROAD (UPSTREAM)	BWMD 04	15/09/2010	0.24	Guideline exceeded
RAILWAY PDE	BWMD 05	15/09/2010	0.28	Guideline exceeded
TONKIN HWY WEST	BWMD 06	15/09/2010	0.12	Acceptable
MOONEY ST WETLAND (OUTLET)	BWMD 07	15/09/2010	0.049	Acceptable
MOONEY ST WETLAND (UPSTREAM)	BWMD 08	15/09/2010	0.13	Acceptable
JOAN RYCROFT RESERVE	BWMD 11	16/09/2010	0.16	Guideline exceeded
TONKIN HWY NORTH	BWMD 12	16/09/2010	0.11	Acceptable
WALTHAM WAY	BWMD 13	16/09/2010	0.005	Acceptable
CLAVERING ROAD	BWMD 14	15/09/2010	0.24	Guideline exceeded
CHRISTIAN ST	BWMD 16	15/09/2010	0.062	Acceptable
BROWN'S LAKE WETLAND OUTLET	BWMD 17	15/09/2010	0.028	Acceptable
GUMMERY ST	BWMD 18	15/09/2010	0.013	Acceptable
CATHERINE ST	BWMD 19	15/09/2010	0.065	Acceptable
RUDLOC RESERVE EXIT	BWMD 21	15/09/2010	0.017	Acceptable
JAKOBSEN'S WAY FOOTBRIDGE	BWMD 22	15/09/2010	0.09	Acceptable
VERA ST	BWMD 23	15/09/2010	0.03	Acceptable
DRAKE WAY	BWMD 24	15/09/2010	0.027	Acceptable
NORA HUGHES WETLAND OUTLET	BWMD 25	15/09/2010	0.005	Acceptable
RAILWAY CROSSING DS OLD CSBP	BWMD 26	15/09/2010	0.57	Guideline exceeded
SOUTH CORNER	ERICSING03	13/10/2010	0.01	Acceptable
BIRD SANCTUARY FOOTBRIDGE	BWMD 01	13/10/2010	0.29	Guideline exceeded
KING WILLIAM ST	BWMD 02	13/10/2010	0.71	Guideline exceeded
WHATLEY ROAD (DOWNSTREAM)	BWMD 03	13/10/2010	0.23	Guideline exceeded
WHATLEY ROAD (UPSTREAM)	BWMD 04	13/10/2010	0.21	Guideline exceeded
RAILWAY PDE	BWMD 05	13/10/2010	0.24	Guideline exceeded
TONKIN HWY WEST	BWMD 06	13/10/2010	0.12	Acceptable
MOONEY ST WETLAND (OUTLET)	BWMD 07	13/10/2010	0.02	Acceptable
MOONEY ST WETLAND (UPSTREAM)	BWMD 08	13/10/2010	0.067	Acceptable
JOAN RYCROFT RESERVE	BWMD 11	13/10/2010	0.16	Guideline exceeded
WALTHAM WAY	BWMD 13	13/10/2010	0.005	Acceptable
CLAVERING ROAD	BWMD 14	13/10/2010	0.26	Guideline exceeded
CHRISTIAN ST	BWMD 16	13/10/2010	0.73	Guideline exceeded
BROWN'S LAKE WETLAND OUTLET	BWMD 17	13/10/2010	0.005	Acceptable
GUMMERY ST	BWMD 18	13/10/2010	0.01	Acceptable
CATHERINE ST	BWMD 19	13/10/2010	0.005	Acceptable
RUDLOC RESERVE EXIT	BWMD 21	13/10/2010	0.005	Acceptable
JAKOBSEN'S WAY FOOTBRIDGE	BWMD 22	13/10/2010	0.01	Acceptable
DRAKE WAY	BWMD 24	13/10/2010	0.011	Acceptable
NORA HUGHES WETLAND OUTLET	BWMD 25	13/10/2010	0.005	Acceptable
RAILWAY CROSSING DS OLD CSBP	BWMD 26	13/10/2010	0.02	Acceptable

Total Phosphorus (TP) (mg/L) P (tot) (TP, pTP) (mg/L)
ANZECC trigger value: 0.065mg/L **Max (red) 0.33** **Min (blue) 0.015**

Site name	Site number	Date	TP	Comparison to ANZECC trigger value (1.2mg/L)
WEST SIDE	ERICSING02	25/08/2010	0.081	Guideline exceeded
SOUTH CORNER	ERICSING03	25/08/2010	0.085	Guideline exceeded
BIRD SANCTUARY FOOTBRIDGE	BWMD 01	25/08/2010	0.053	Acceptable
KING WILLIAM ST	BWMD 02	25/08/2010	0.055	Acceptable
WHATLEY ROAD (DOWNSTREAM)	BWMD 03	25/08/2010	0.045	Acceptable
WHATLEY ROAD (UPSTREAM)	BWMD 04	25/08/2010	0.037	Acceptable
RAILWAY PDE	BWMD 05	25/08/2010	0.034	Acceptable
TONKIN HWY WEST	BWMD 06	25/08/2010	0.071	Guideline exceeded
MOONEY ST WETLAND (OUTLET)	BWMD 07	25/08/2010	0.028	Acceptable
MOONEY ST WETLAND (UPSTREAM)	BWMD 08	25/08/2010	0.031	Acceptable
JOAN RYCROFT RESERVE	BWMD 11	25/08/2010	0.03	Acceptable
TONKIN HWY NORTH	BWMD 12	25/08/2010	0.029	Acceptable
WALTHAM WAY	BWMD 13	25/08/2010	0.061	Acceptable
CLAVERING ROAD	BWMD 14	25/08/2010	0.035	Acceptable
CHRISTIAN ST	BWMD 16	25/08/2010	0.015	Acceptable
BROWN'S LAKE WETLAND OUTLET	BWMD 17	26/08/2010	0.033	Acceptable
GUMMERY ST	BWMD 18	26/08/2010	0.025	Acceptable
CATHERINE ST	BWMD 19	26/08/2010	0.042	Acceptable
RUDLOC RESERVE EXIT	BWMD 21	26/08/2010	0.03	Acceptable
JAKOBSEN'S WAY FOOTBRIDGE	BWMD 22	26/08/2010	0.016	Acceptable
VERA ST	BWMD 23	26/08/2010	0.023	Acceptable
DRAKE WAY	BWMD 24	26/08/2010	0.032	Acceptable
NORA HUGHES WETLAND OUTLET	BWMD 25	26/08/2010	0.084	Guideline exceeded
RAILWAY CROSSING DS OLD CSBP	BWMD 26	25/08/2010	0.093	Guideline exceeded
SOUTH CORNER	ERICSING03	15/09/2010	0.19	Guideline exceeded
BIRD SANCTUARY FOOTBRIDGE	BWMD 01	15/09/2010	0.049	Acceptable
KING WILLIAM ST	BWMD 02	15/09/2010	0.056	Acceptable
WHATLEY ROAD (DOWNSTREAM)	BWMD 03	15/09/2010	0.041	Acceptable
WHATLEY ROAD (UPSTREAM)	BWMD 04	15/09/2010	0.035	Acceptable
RAILWAY PDE	BWMD 05	15/09/2010	0.03	Acceptable
TONKIN HWY WEST	BWMD 06	15/09/2010	0.064	Acceptable
MOONEY ST WETLAND (OUTLET)	BWMD 07	15/09/2010	0.028	Acceptable
MOONEY ST WETLAND (UPSTREAM)	BWMD 08	15/09/2010	0.034	Acceptable
JOAN RYCROFT RESERVE	BWMD 11	16/09/2010	0.035	Acceptable
TONKIN HWY NORTH	BWMD 12	16/09/2010	0.033	Acceptable
WALTHAM WAY	BWMD 13	16/09/2010	0.063	Acceptable
CLAVERING ROAD	BWMD 14	15/09/2010	0.034	Acceptable
CHRISTIAN ST	BWMD 16	15/09/2010	0.13	Guideline exceeded
BROWN'S LAKE WETLAND OUTLET	BWMD 17	15/09/2010	0.032	Acceptable
GUMMERY ST	BWMD 18	15/09/2010	0.025	Acceptable
CATHERINE ST	BWMD 19	15/09/2010	0.037	Acceptable
RUDLOC RESERVE EXIT	BWMD 21	15/09/2010	0.031	Acceptable
JAKOBSEN'S WAY FOOTBRIDGE	BWMD 22	15/09/2010	0.032	Acceptable
VERA ST	BWMD 23	15/09/2010	0.017	Acceptable
DRAKE WAY	BWMD 24	15/09/2010	0.032	Acceptable
NORA HUGHES WETLAND OUTLET	BWMD 25	15/09/2010	0.062	Acceptable
RAILWAY CROSSING DS OLD CSBP	BWMD 26	15/09/2010	0.14	Guideline exceeded
SOUTH CORNER	ERICSING03	13/10/2010	0.33	Guideline exceeded
BIRD SANCTUARY FOOTBRIDGE	BWMD 01	13/10/2010	0.056	Acceptable
KING WILLIAM ST	BWMD 02	13/10/2010	0.073	Guideline exceeded
WHATLEY ROAD (DOWNSTREAM)	BWMD 03	13/10/2010	0.045	Acceptable
WHATLEY ROAD (UPSTREAM)	BWMD 04	13/10/2010	0.036	Acceptable
RAILWAY PDE	BWMD 05	13/10/2010	0.024	Acceptable
TONKIN HWY WEST	BWMD 06	13/10/2010	0.067	Guideline exceeded
MOONEY ST WETLAND (OUTLET)	BWMD 07	13/10/2010	0.038	Acceptable
MOONEY ST WETLAND (UPSTREAM)	BWMD 08	13/10/2010	0.031	Acceptable
JOAN RYCROFT RESERVE	BWMD 11	13/10/2010	0.023	Acceptable
WALTHAM WAY	BWMD 13	13/10/2010	0.053	Acceptable
CLAVERING ROAD	BWMD 14	13/10/2010	0.036	Acceptable
CHRISTIAN ST	BWMD 16	13/10/2010	0.084	Guideline exceeded
BROWN'S LAKE WETLAND OUTLET	BWMD 17	13/10/2010	0.036	Acceptable
GUMMERY ST	BWMD 18	13/10/2010	0.023	Acceptable
CATHERINE ST	BWMD 19	13/10/2010	0.033	Acceptable
RUDLOC RESERVE EXIT	BWMD 21	13/10/2010	0.023	Acceptable
JAKOBSEN'S WAY FOOTBRIDGE	BWMD 22	13/10/2010	0.024	Acceptable
DRAKE WAY	BWMD 24	13/10/2010	0.035	Acceptable
NORA HUGHES WETLAND OUTLET	BWMD 25	13/10/2010	0.083	Guideline exceeded
RAILWAY CROSSING DS OLD CSBP	BWMD 26	13/10/2010	0.23	Guideline exceeded

Soluble Reactive Phosphorus (SRP) (mg/L)

PO4-P (sol react) (SRP, FRP) (mg/L)

ANZECC trigger value: 0.04mg/L

All data in blue were <0.005 (LOR)

Max (red) 0.13

Min (blue) 0.0025

Site name	Site number	Date	SRP	Comparison to ANZECC trigger value (1.2mg/L)
WEST SIDE	ERICSING02	25/08/2010	0.015	Acceptable
SOUTH CORNER	ERICSING03	25/08/2010	0.009	Acceptable
BIRD SANCTUARY FOOTBRIDGE	BWMD 01	25/08/2010	0.009	Acceptable
KING WILLIAM ST	BWMD 02	25/08/2010	0.037	Acceptable
WHATLEY ROAD (DOWNSTREAM)	BWMD 03	25/08/2010	0.008	Acceptable
WHATLEY ROAD (UPSTREAM)	BWMD 04	25/08/2010	0.008	Acceptable
RAILWAY PDE	BWMD 05	25/08/2010	0.013	Acceptable
TONKIN HWY WEST	BWMD 06	25/08/2010	0.0025	Acceptable
MOONEY ST WETLAND (OUTLET)	BWMD 07	25/08/2010	0.0025	Acceptable
MOONEY ST WETLAND (UPSTREAM)	BWMD 08	25/08/2010	0.007	Acceptable
JOAN RYCROFT RESERVE	BWMD 11	25/08/2010	0.015	Acceptable
TONKIN HWY NORTH	BWMD 12	25/08/2010	0.0025	Acceptable
WALTHAM WAY	BWMD 13	25/08/2010	0.024	Acceptable
CLAVERING ROAD	BWMD 14	25/08/2010	0.015	Acceptable
CHRISTIAN ST	BWMD 16	25/08/2010	0.007	Acceptable
BROWN'S LAKE WETLAND OUTLET	BWMD 17	26/08/2010	0.008	Acceptable
GUMMERY ST	BWMD 18	26/08/2010	0.011	Acceptable
CATHERINE ST	BWMD 19	26/08/2010	0.009	Acceptable
RUDLOC RESERVE EXIT	BWMD 21	26/08/2010	0.0025	Acceptable
JAKOBSEN'S WAY FOOTBRIDGE	BWMD 22	26/08/2010	0.0025	Acceptable
VERA ST	BWMD 23	26/08/2010	0.006	Acceptable
DRAKE WAY	BWMD 24	26/08/2010	0.014	Acceptable
NORA HUGHES WETLAND OUTLET	BWMD 25	26/08/2010	0.042	Guideline exceeded
RAILWAY CROSSING DS OLD CSBP	BWMD 26	25/08/2010	0.048	Guideline exceeded
SOUTH CORNER	ERICSING03	15/09/2010	0.006	Acceptable
BIRD SANCTUARY FOOTBRIDGE	BWMD 01	15/09/2010	0.006	Acceptable
KING WILLIAM ST	BWMD 02	15/09/2010	0.028	Acceptable
WHATLEY ROAD (DOWNSTREAM)	BWMD 03	15/09/2010	0.008	Acceptable
WHATLEY ROAD (UPSTREAM)	BWMD 04	15/09/2010	0.005	Acceptable
RAILWAY PDE	BWMD 05	15/09/2010	0.009	Acceptable
TONKIN HWY WEST	BWMD 06	15/09/2010	0.0025	Acceptable
MOONEY ST WETLAND (OUTLET)	BWMD 07	15/09/2010	0.0025	Acceptable
MOONEY ST WETLAND (UPSTREAM)	BWMD 08	15/09/2010	0.0025	Acceptable
JOAN RYCROFT RESERVE	BWMD 11	16/09/2010	0.015	Acceptable
TONKIN HWY NORTH	BWMD 12	16/09/2010	0.006	Acceptable
WALTHAM WAY	BWMD 13	16/09/2010	0.023	Acceptable
CLAVERING ROAD	BWMD 14	15/09/2010	0.01	Acceptable
CHRISTIAN ST	BWMD 16	15/09/2010	0.008	Acceptable
BROWN'S LAKE WETLAND OUTLET	BWMD 17	15/09/2010	0.005	Acceptable
GUMMERY ST	BWMD 18	15/09/2010	0.009	Acceptable
CATHERINE ST	BWMD 19	15/09/2010	0.01	Acceptable
RUDLOC RESERVE EXIT	BWMD 21	15/09/2010	0.0025	Acceptable
JAKOBSEN'S WAY FOOTBRIDGE	BWMD 22	15/09/2010	0.019	Acceptable
VERA ST	BWMD 23	15/09/2010	0.0025	Acceptable
DRAKE WAY	BWMD 24	15/09/2010	0.01	Acceptable
NORA HUGHES WETLAND OUTLET	BWMD 25	15/09/2010	0.015	Acceptable
RAILWAY CROSSING DS OLD CSBP	BWMD 26	15/09/2010	0.033	Acceptable
SOUTH CORNER	ERICSING03	13/10/2010	0.0025	Acceptable
BIRD SANCTUARY FOOTBRIDGE	BWMD 01	13/10/2010	0.006	Acceptable
KING WILLIAM ST	BWMD 02	13/10/2010	0.035	Acceptable
WHATLEY ROAD (DOWNSTREAM)	BWMD 03	13/10/2010	0.0025	Acceptable
WHATLEY ROAD (UPSTREAM)	BWMD 04	13/10/2010	0.0025	Acceptable
RAILWAY PDE	BWMD 05	13/10/2010	0.0025	Acceptable
TONKIN HWY WEST	BWMD 06	13/10/2010	0.0025	Acceptable
MOONEY ST WETLAND (OUTLET)	BWMD 07	13/10/2010	0.0025	Acceptable
MOONEY ST WETLAND (UPSTREAM)	BWMD 08	13/10/2010	0.0025	Acceptable
JOAN RYCROFT RESERVE	BWMD 11	13/10/2010	0.008	Acceptable
WALTHAM WAY	BWMD 13	13/10/2010	0.006	Acceptable
CLAVERING ROAD	BWMD 14	13/10/2010	0.005	Acceptable
CHRISTIAN ST	BWMD 16	13/10/2010	0.005	Acceptable
BROWN'S LAKE WETLAND OUTLET	BWMD 17	13/10/2010	0.005	Acceptable
GUMMERY ST	BWMD 18	13/10/2010	0.0025	Acceptable
CATHERINE ST	BWMD 19	13/10/2010	0.0025	Acceptable
RUDLOC RESERVE EXIT	BWMD 21	13/10/2010	0.0025	Acceptable
JAKOBSEN'S WAY FOOTBRIDGE	BWMD 22	13/10/2010	0.0025	Acceptable
DRAKE WAY	BWMD 24	13/10/2010	0.012	Acceptable
NORA HUGHES WETLAND OUTLET	BWMD 25	13/10/2010	0.025	Acceptable
RAILWAY CROSSING DS OLD CSBP	BWMD 26	13/10/2010	0.13	Guideline exceeded

(c) Total Metal results

Aluminium (Al) (mg/L) (Note: ANZECC guideline only applicable if pH>6.5)
ANZECC trigger value: 0.055mg/L Max (red) 3.9 Min (blue) 0.07

Site name	Site number	Date	Al	Comparison to ANZECC trigger value (0.055mg/L)
WEST SIDE	ERCSING02	25/08/2010	0.18	Guideline exceeded
SOUTH CORNER	ERCSING03	25/08/2010	0.28	Guideline exceeded
BIRD SANCTUARY FOOTBRIDGE	BWMD 01	25/08/2010	1.2	Guideline exceeded
KING WILLIAM ST	BWMD 02	25/08/2010	0.26	Guideline exceeded
WHATLEY ROAD (DOWNSTREAM)	BWMD 03	25/08/2010	1.5	Guideline exceeded
WHATLEY ROAD (UPSTREAM)	BWMD 04	25/08/2010	1.2	Guideline exceeded
RAILWAY PDE	BWMD 05	25/08/2010	0.22	Guideline exceeded
TONKIN HWY WEST	BWMD 06	25/08/2010	3.9	Guideline exceeded
MOONEY ST WETLAND (OUTLET)	BWMD 07	25/08/2010	0.18	Guideline exceeded
MOONEY ST WETLAND (UPSTREAM)	BWMD 08	25/08/2010	0.23	Guideline exceeded
JOAN RYCROFT RESERVE	BWMD 11	25/08/2010	0.27	Guideline exceeded
TONKIN HWY NORTH	BWMD 12	25/08/2010	0.27	Guideline exceeded
WALTHAM WAY	BWMD 13	25/08/2010	0.35	Guideline exceeded
CLAVERING ROAD	BWMD 14	25/08/2010	0.19	Guideline exceeded
CHRISTIAN ST	BWMD 16	25/08/2010	0.12	Guideline exceeded
BROWN'S LAKE WETLAND OUTLET	BWMD 17	26/08/2010	0.2	Guideline exceeded
GUMMERY ST	BWMD 18	26/08/2010	0.18	Guideline exceeded
CATHERINE ST	BWMD 19	26/08/2010	0.51	Guideline exceeded
RUDLOC RESERVE EXIT	BWMD 21	26/08/2010	0.19	Guideline exceeded
JAKOBSEN'S WAY FOOTBRIDGE	BWMD 22	26/08/2010	0.3	Guideline exceeded
VERA ST	BWMD 23	26/08/2010	0.3	Guideline exceeded
DRAKE WAY	BWMD 24	26/08/2010	0.075	Guideline exceeded
NORA HUGHES WETLAND OUTLET	BWMD 25	26/08/2010	0.074	Guideline exceeded
RAILWAY CROSSING DS OLD CSBP	BWMD 26	25/08/2010	0.21	Guideline exceeded
SOUTH CORNER	ERCSING03	15/09/2010	0.32	Guideline exceeded
BIRD SANCTUARY FOOTBRIDGE	BWMD 01	15/09/2010	0.93	Guideline exceeded
KING WILLIAM ST	BWMD 02	15/09/2010	0.28	Guideline exceeded
WHATLEY ROAD (DOWNSTREAM)	BWMD 03	15/09/2010	1.5	Guideline exceeded
WHATLEY ROAD (UPSTREAM)	BWMD 04	15/09/2010	1.2	Guideline exceeded
RAILWAY PDE	BWMD 05	15/09/2010	0.24	Guideline exceeded
TONKIN HWY WEST	BWMD 06	15/09/2010	3	Guideline exceeded
MOONEY ST WETLAND (OUTLET)	BWMD 07	15/09/2010	0.2	Guideline exceeded
MOONEY ST WETLAND (UPSTREAM)	BWMD 08	15/09/2010	0.32	Guideline exceeded
JOAN RYCROFT RESERVE	BWMD 11	16/09/2010	0.25	Guideline exceeded
TONKIN HWY NORTH	BWMD 12	16/09/2010	0.29	Guideline exceeded
WALTHAM WAY	BWMD 13	16/09/2010	0.34	Guideline exceeded
CLAVERING ROAD	BWMD 14	15/09/2010	0.23	Guideline exceeded
CHRISTIAN ST	BWMD 16	15/09/2010	0.15	Guideline exceeded
BROWN'S LAKE WETLAND OUTLET	BWMD 17	15/09/2010	0.19	Guideline exceeded
GUMMERY ST	BWMD 18	15/09/2010	0.19	Guideline exceeded
CATHERINE ST	BWMD 19	15/09/2010	0.38	Guideline exceeded
RUDLOC RESERVE EXIT	BWMD 21	15/09/2010	0.23	Guideline exceeded
JAKOBSEN'S WAY FOOTBRIDGE	BWMD 22	15/09/2010	0.37	Guideline exceeded
VERA ST	BWMD 23	15/09/2010	0.4	Guideline exceeded
DRAKE WAY	BWMD 24	15/09/2010	0.1	Guideline exceeded
NORA HUGHES WETLAND OUTLET	BWMD 25	15/09/2010	0.08	Guideline exceeded
RAILWAY CROSSING DS OLD CSBP	BWMD 26	15/09/2010	0.82	Guideline exceeded
SOUTH CORNER	ERCSING03	13/10/2010	0.7	Guideline exceeded
BIRD SANCTUARY FOOTBRIDGE	BWMD 01	13/10/2010	0.97	Guideline exceeded
KING WILLIAM ST	BWMD 02	13/10/2010	0.21	Guideline exceeded
WHATLEY ROAD (DOWNSTREAM)	BWMD 03	13/10/2010	1.4	Guideline exceeded
WHATLEY ROAD (UPSTREAM)	BWMD 04	13/10/2010	1.2	Guideline exceeded
RAILWAY PDE	BWMD 05	13/10/2010	0.17	Guideline exceeded
TONKIN HWY WEST	BWMD 06	13/10/2010	3.4	Guideline exceeded
MOONEY ST WETLAND (OUTLET)	BWMD 07	13/10/2010	0.19	Guideline exceeded
MOONEY ST WETLAND (UPSTREAM)	BWMD 08	13/10/2010	0.26	Guideline exceeded
JOAN RYCROFT RESERVE	BWMD 11	13/10/2010	0.22	Guideline exceeded
WALTHAM WAY	BWMD 13	13/10/2010	0.28	Guideline exceeded
CLAVERING ROAD	BWMD 14	13/10/2010	0.17	Guideline exceeded
CHRISTIAN ST	BWMD 16	13/10/2010	0.72	Guideline exceeded
BROWN'S LAKE WETLAND OUTLET	BWMD 17	13/10/2010	0.18	Guideline exceeded
GUMMERY ST	BWMD 18	13/10/2010	0.13	Guideline exceeded
CATHERINE ST	BWMD 19	13/10/2010	0.35	Guideline exceeded
RUDLOC RESERVE EXIT	BWMD 21	13/10/2010	0.17	Guideline exceeded
JAKOBSEN'S WAY FOOTBRIDGE	BWMD 22	13/10/2010	0.29	Guideline exceeded
DRAKE WAY	BWMD 24	13/10/2010	0.07	Guideline exceeded
NORA HUGHES WETLAND OUTLET	BWMD 25	13/10/2010	0.07	Guideline exceeded
RAILWAY CROSSING DS OLD CSBP	BWMD 26	13/10/2010	0.23	Guideline exceeded

Chromium (Cr)

All data in blue were <0.001 (LOR)

Site name	Site number	Date	Cr (mg/L)	Water Hardness (mg/L)	Adjust factor	Adjusted trigger value	Comparison to ANZECC trigger ADJUSTED value	Hardness (mg/L)	Cr	ANZECC trigger value*
WEST SIDE	E2	25/08/2010	0.0005	310	8.4	0.0084	Acceptable	0-59	1	0.001
SOUTH CORNER	E3	25/08/2010	0.0005	310	8.4	0.0084	Acceptable	60-119	2.5	
		15/09/2010	0.0005	280	8.4	0.0084	Acceptable	120-179	3.7	
BIRD SANCTUARY FOOTBRIDGE	B-01	13/10/2010	0.002	360	8.4	0.0084	Acceptable	180-240	4.9	
		25/08/2010	0.001	160	3.7	0.0037	Acceptable	400	8.4	
		15/09/2010	0.001	140	3.7	0.0037	Acceptable			
KING WILLIAM ST	B-02	13/10/2010	0.002	160	3.7	0.0037	Acceptable			
		25/08/2010	0.0005	150	3.7	0.0037	Acceptable			
		15/09/2010	0.0005	140	3.7	0.0037	Acceptable			
WHATLEY ROAD (DOWNSTREAM)	B-03	13/10/2010	0.001	140	3.7	0.0037	Acceptable			
		15/09/2010	0.001	120	3.7	0.0037	Acceptable			
		13/10/2010	0.002	140	3.7	0.0037	Acceptable			
WHATLEY ROAD (UPSTREAM)	B-04	25/08/2010	0.001	140	3.7	0.0037	Acceptable			
		15/09/2010	0.002	120	3.7	0.0037	Acceptable			
		13/10/2010	0.002	140	3.7	0.0037	Acceptable			
RAILWAY PDE	B-05	25/08/2010	0.001	110	2.5	0.0025	Acceptable			
		15/09/2010	0.003	95	2.5	0.0025	Guideline exceeded			
		13/10/2010	0.002	110	2.5	0.0025	Acceptable			
TONKIN HWY WEST	B-06	25/08/2010	0.001	190	4.9	0.0049	Acceptable			
		15/09/2010	0.002	170	3.7	0.0037	Acceptable			
		13/10/2010	0.001	180	4.9	0.0049	Acceptable			
MOONEY ST WETLAND (OUTLET)	B-07	25/08/2010	0.0005	130	3.7	0.0037	Acceptable			
		15/09/2010	0.001	130	3.7	0.0037	Acceptable			
		13/10/2010	0.001	130	3.7	0.0037	Acceptable			
MOONEY ST WETLAND (UPSTREAM)	B-08	25/08/2010	0.0005	130	3.7	0.0037	Acceptable			
		15/09/2010	0.002	130	3.7	0.0037	Acceptable			
		13/10/2010	0.001	130	3.7	0.0037	Acceptable			
JOAN RYCROFT RESERVE	B-11	25/08/2010	0.001	120	3.7	0.0037	Acceptable			
		16/09/2010	0.001	130	3.7	0.0037	Acceptable			
		13/10/2010	0.001	110	2.5	0.0025	Acceptable			
TONKIN HWY NORTH	B-12	25/08/2010	0.0005	84	2.5	0.0025	Acceptable			
		16/09/2010	0.002	92	2.5	0.0025	Acceptable			
WALTHAM WAY	B-13	25/08/2010	0.0005	77	2.5	0.0025	Acceptable			
		16/09/2010	0.002	84	2.5	0.0025	Acceptable			
		13/10/2010	0.001	78	2.5	0.0025	Acceptable			
CLAVERING ROAD	B-14	25/08/2010	0.001	100	2.5	0.0025	Acceptable			
		15/09/2010	0.002	100	2.5	0.0025	Acceptable			
		13/10/2010	0.002	98	2.5	0.0025	Acceptable			
CHRISTIAN ST	B-16	25/08/2010	0.015	130	3.7	0.0037	Guideline exceeded			
		15/09/2010	0.015	110	2.5	0.0025	Guideline exceeded			
		13/10/2010	0.01	98	2.5	0.0025	Guideline exceeded			
BROWN'S LAKE WETLAND OUTLET	B-17	26/08/2010	0.001	100	2.5	0.0025	Acceptable			
		15/09/2010	0.001	88	2.5	0.0025	Acceptable			
		13/10/2010	0.001	94	2.5	0.0025	Acceptable			
GUMMERY ST	B-18	26/08/2010	0.0005	110	2.5	0.0025	Acceptable			
		15/09/2010	0.001	84	2.5	0.0025	Acceptable			
		13/10/2010	0.001	97	2.5	0.0025	Acceptable			
CATHERINE ST	B-19	26/08/2010	0.002	140	3.7	0.0037	Acceptable			
		15/09/2010	0.002	140	3.7	0.0037	Acceptable			
		13/10/2010	0.002	130	3.7	0.0037	Acceptable			
RUDLOC RESERVE EXIT	B-21	26/08/2010	0.001	88	2.5	0.0025	Acceptable			
		15/09/2010	0.001	78	2.5	0.0025	Acceptable			
		13/10/2010	0.001	92	2.5	0.0025	Acceptable			
JAKOBSEN'S WAY FOOTBRIDGE	B-22	26/08/2010	0.001	110	2.5	0.0025	Acceptable			
		15/09/2010	0.002	100	2.5	0.0025	Acceptable			
		13/10/2010	0.001	100	2.5	0.0025	Acceptable			
VERA ST	B-23	26/08/2010	0.001	110	2.5	0.0025	Acceptable			
		15/09/2010	0.001	110	2.5	0.0025	Acceptable			
DRAKE WAY	B-24	26/08/2010	0.001	110	2.5	0.0025	Acceptable			
		15/09/2010	0.001	100	2.5	0.0025	Acceptable			
		13/10/2010	0.004	120	3.7	0.0037	Guideline exceeded			
NORA HUGHES WETLAND OUTLET	B-25	26/08/2010	0.001	90	2.5	0.0025	Acceptable			
		15/09/2010	0.001	68	2.5	0.0025	Acceptable			
		13/10/2010	0.002	85	2.5	0.0025	Acceptable			
RAILWAY CROSSING DS OLD CSBP	B-26	25/08/2010	0.0005	230	4.9	0.0049	Acceptable			
		15/09/2010	0.002	210	4.9	0.0049	Acceptable			
		13/10/2010	0.001	210	4.9	0.0049	Acceptable			

Copper (Cu)

All data in blue were <0.001 (LOR)

Site name	Site number	Date	Cu (mg/L)	Water Hardness (mg/L)	Adjust factor	Adjusted trigger value	Comparison to ANZECC trigger ADJUSTED value	Hardness (mg/L)	Cu	ANZECC trigger value*
WEST SIDE	E2	25/08/2010	0.002	310	9	0.0126	Acceptable	0-59	1	0.0014
SOUTH CORNER	E3	25/08/2010	0.002	310	9	0.0126	Acceptable	60-119	2.5	
		15/09/2010	0.003	280	9	0.0126	Acceptable	120-179	3.9	
		13/10/2010	0.006	360	9	0.0126	Acceptable	180-240	5.2	
BIRD SANCTUARY FOOTBRIDGE	B-01	25/08/2010	0.008	160	3.9	0.00546	Guideline exceeded	400	9	
		15/09/2010	0.006	140	3.9	0.00546	Guideline exceeded			
		13/10/2010	0.008	160	3.9	0.00546	Guideline exceeded			
KING WILLIAM ST	B-02	25/08/2010	0.001	150	3.9	0.00546	Acceptable			
		15/09/2010	0.001	140	3.9	0.00546	Acceptable			
		13/10/2010	0.001	140	3.9	0.00546	Acceptable			
WHATLEY ROAD (DOWNSTREAM)	B-03	25/08/2010	0.009	140	3.9	0.00546	Guideline exceeded			
		15/09/2010	0.007	120	3.9	0.00546	Guideline exceeded			
		13/10/2010	0.009	140	3.9	0.00546	Guideline exceeded			
WHATLEY ROAD (UPSTREAM)	B-04	25/08/2010	0.009	140	3.9	0.00546	Guideline exceeded			
		15/09/2010	0.007	120	3.9	0.00546	Guideline exceeded			
		13/10/2010	0.01	140	3.9	0.00546	Guideline exceeded			
RAILWAY PDE	B-05	25/08/2010	0.002	110	2.5	0.0035	Acceptable			
		15/09/2010	0.003	95	2.5	0.0035	Acceptable			
		13/10/2010	0.003	110	2.5	0.0035	Acceptable			
TONKIN HWY WEST	B-06	25/08/2010	0.026	190	5.2	0.00728	Guideline exceeded			
		15/09/2010	0.022	170	3.9	0.00546	Guideline exceeded			
		13/10/2010	0.02	180	5.2	0.00728	Guideline exceeded			
MOONEY ST WETLAND (OUTLET)	B-07	25/08/2010	0.001	130	3.9	0.00546	Acceptable			
		15/09/2010	0.001	130	3.9	0.00546	Acceptable			
		13/10/2010	0.001	130	3.9	0.00546	Acceptable			
MOONEY ST WETLAND (UPSTREAM)	B-08	25/08/2010	0.0005	130	3.9	0.00546	Acceptable			
		15/09/2010	0.002	130	3.9	0.00546	Acceptable			
		13/10/2010	0.001	130	3.9	0.00546	Acceptable			
JOAN RYCROFT RESERVE	B-11	25/08/2010	0.0005	120	3.9	0.00546	Acceptable			
		16/09/2010	0.001	130	3.9	0.00546	Acceptable			
		13/10/2010	0.001	110	2.5	0.0035	Acceptable			
TONKIN HWY NORTH	B-12	25/08/2010	0.0005	84	2.5	0.0035	Acceptable			
		16/09/2010	0.001	92	2.5	0.0035	Acceptable			
WALTHAM WAY	B-13	25/08/2010	0.0005	77	2.5	0.0035	Acceptable			
		16/09/2010	0.002	84	2.5	0.0035	Acceptable			
		13/10/2010	0.002	78	2.5	0.0035	Acceptable			
CLAVERING ROAD	B-14	25/08/2010	0.0005	100	2.5	0.0035	Acceptable			
		15/09/2010	0.002	100	2.5	0.0035	Acceptable			
		13/10/2010	0.003	98	2.5	0.0035	Acceptable			
CHRISTIAN ST	B-16	25/08/2010	0.0005	130	3.9	0.00546	Acceptable			
		15/09/2010	0.001	110	2.5	0.0035	Acceptable			
		13/10/2010	0.006	98	2.5	0.0035	Guideline exceeded			
BROWN'S LAKE WETLAND OUTLET	B-17	26/08/2010	0.003	100	2.5	0.0035	Acceptable			
		15/09/2010	0.003	88	2.5	0.0035	Acceptable			
		13/10/2010	0.004	94	2.5	0.0035	Guideline exceeded			
GUMMERY ST	B-18	26/08/2010	0.002	110	2.5	0.0035	Acceptable			
		15/09/2010	0.003	84	2.5	0.0035	Acceptable			
		13/10/2010	0.003	97	2.5	0.0035	Acceptable			
CATHERINE ST	B-19	26/08/2010	0.002	140	3.9	0.00546	Acceptable			
		15/09/2010	0.003	140	3.9	0.00546	Acceptable			
		13/10/2010	0.004	130	3.9	0.00546	Acceptable			
RUDLOC RESERVE EXIT	B-21	26/08/2010	0.003	88	2.5	0.0035	Acceptable			
		15/09/2010	0.003	78	2.5	0.0035	Acceptable			
		13/10/2010	0.004	92	2.5	0.0035	Guideline exceeded			
JAKOBSEN'S WAY FOOTBRIDGE	B-22	26/08/2010	0.002	110	2.5	0.0035	Acceptable			
		15/09/2010	0.002	100	2.5	0.0035	Acceptable			
		13/10/2010	0.002	100	2.5	0.0035	Acceptable			
VERA ST	B-23	26/08/2010	0.001	110	2.5	0.0035	Acceptable			
		15/09/2010	0.001	110	2.5	0.0035	Acceptable			
DRAKE WAY	B-24	26/08/2010	0.004	110	2.5	0.0035	Guideline exceeded			
		15/09/2010	0.004	100	2.5	0.0035	Guideline exceeded			
		13/10/2010	0.002	120	3.9	0.00546	Acceptable			
NORA HUGHES WETLAND OUTLET	B-25	26/08/2010	0.003	90	2.5	0.0035	Acceptable			
		15/09/2010	0.003	68	2.5	0.0035	Acceptable			
		13/10/2010	0.003	85	2.5	0.0035	Acceptable			
RAILWAY CROSSING DS OLD CSBP	B-26	25/08/2010	0.002	230	5.2	0.00728	Acceptable			
		15/09/2010	0.004	210	5.2	0.00728	Acceptable			
		13/10/2010	0.0005	210	5.2	0.00728	Acceptable			

Lead (Pb)

All data in blue were <0.001 (LOR)

Site name	Site number	Date	Pb (mg/L)	Water Hardness (mg/L)	Adjust factor	Adjusted trigger value	Comparison to ANZECC trigger ADJUSTED value	Hardness (mg/L)	Pb	ANZECC trigger value*
WEST SIDE	E2	25/08/2010	0.003	310	26.7	0.09078	Acceptable	0-59	1	0.0034
SOUTH CORNER	E3	25/08/2010	0.003	310	26.7	0.09078	Acceptable	60-119	4	
		15/09/2010	0.004	280	26.7	0.09078	Acceptable	120-179	7.6	
BIRD SANCTUARY FOOTBRIDGE	B-01	13/10/2010	0.007	360	26.7	0.09078	Acceptable	180-240	11.8	
		25/08/2010	0.003	160	7.6	0.02584	Acceptable	400	26.7	
		15/09/2010	0.003	140	7.6	0.02584	Acceptable			
KING WILLIAM ST	B-02	13/10/2010	0.002	160	7.6	0.02584	Acceptable			
		25/08/2010	0.0005	150	7.6	0.02584	Acceptable			
		15/09/2010	0.0005	140	7.6	0.02584	Acceptable			
WHATLEY ROAD (DOWNSTREAM)	B-03	13/10/2010	0.0005	140	7.6	0.02584	Acceptable			
		25/08/2010	0.002	140	7.6	0.02584	Acceptable			
		15/09/2010	0.003	120	7.6	0.02584	Acceptable			
WHATLEY ROAD (UPSTREAM)	B-04	13/10/2010	0.002	140	7.6	0.02584	Acceptable			
		25/08/2010	0.002	140	7.6	0.02584	Acceptable			
		15/09/2010	0.002	120	7.6	0.02584	Acceptable			
RAILWAY PDE	B-05	13/10/2010	0.002	110	4	0.0136	Acceptable			
		25/08/2010	0.002	110	4	0.0136	Acceptable			
		15/09/2010	0.003	95	4	0.0136	Acceptable			
TONKIN HWY WEST	B-06	13/10/2010	0.001	180	11.8	0.04012	Acceptable			
		25/08/2010	0.002	190	11.8	0.04012	Acceptable			
		15/09/2010	0.002	170	7.6	0.02584	Acceptable			
MOONEY ST WETLAND (OUTLET)	B-07	13/10/2010	0.002	130	7.6	0.02584	Acceptable			
		25/08/2010	0.002	130	7.6	0.02584	Acceptable			
		15/09/2010	0.002	130	7.6	0.02584	Acceptable			
MOONEY ST WETLAND (UPSTREAM)	B-08	13/10/2010	0.002	130	7.6	0.02584	Acceptable			
		25/08/2010	0.001	130	7.6	0.02584	Acceptable			
		15/09/2010	0.003	130	7.6	0.02584	Acceptable			
JOAN RYCROFT RESERVE	B-11	13/10/2010	0.002	110	4	0.0136	Acceptable			
		25/08/2010	0.002	120	7.6	0.02584	Acceptable			
		16/09/2010	0.0005	130	7.6	0.02584	Acceptable			
TONKIN HWY NORTH	B-12	16/09/2010	0.003	92	4	0.0136	Acceptable			
		25/08/2010	0.002	77	4	0.0136	Acceptable			
WALTHAM WAY	B-13	13/10/2010	0.002	78	4	0.0136	Acceptable			
		16/09/2010	0.003	84	4	0.0136	Acceptable			
		25/08/2010	0.002	100	4	0.0136	Acceptable			
CLAVERING ROAD	B-14	13/10/2010	0.002	98	4	0.0136	Acceptable			
		15/09/2010	0.002	100	4	0.0136	Acceptable			
		25/08/2010	0.0005	130	7.6	0.02584	Acceptable			
CHRISTIAN ST	B-16	13/10/2010	0.001	98	4	0.0136	Acceptable			
		15/09/2010	0.0005	110	4	0.0136	Acceptable			
		26/08/2010	0.007	100	4	0.0136	Acceptable			
BROWN'S LAKE WETLAND OUTLET	B-17	13/10/2010	0.007	94	4	0.0136	Acceptable			
		15/09/2010	0.005	88	4	0.0136	Acceptable			
		26/08/2010	0.003	110	4	0.0136	Acceptable			
GUMMERY ST	B-18	13/10/2010	0.003	97	4	0.0136	Acceptable			
		15/09/2010	0.003	84	4	0.0136	Acceptable			
		26/08/2010	0.007	140	7.6	0.02584	Acceptable			
CATHERINE ST	B-19	13/10/2010	0.01	130	7.6	0.02584	Acceptable			
		15/09/2010	0.006	140	7.6	0.02584	Acceptable			
		26/08/2010	0.004	88	4	0.0136	Acceptable			
RUDLOC RESERVE EXIT	B-21	13/10/2010	0.003	92	4	0.0136	Acceptable			
		15/09/2010	0.004	78	4	0.0136	Acceptable			
		26/08/2010	0.003	110	4	0.0136	Acceptable			
JAKOBSEN'S WAY FOOTBRIDGE	B-22	13/10/2010	0.006	100	4	0.0136	Acceptable			
		15/09/2010	0.009	100	4	0.0136	Acceptable			
		26/08/2010	0.0005	110	4	0.0136	Acceptable			
VERA ST	B-23	15/09/2010	0.0005	110	4	0.0136	Acceptable			
		26/08/2010	0.001	110	4	0.0136	Acceptable			
DRAKE WAY	B-24	13/10/2010	0.004	120	7.6	0.02584	Acceptable			
		15/09/2010	0.002	100	4	0.0136	Acceptable			
		26/08/2010	0.003	90	4	0.0136	Acceptable			
NORA HUGHES WETLAND OUTLET	B-25	13/10/2010	0.002	85	4	0.0136	Acceptable			
		15/09/2010	0.003	68	4	0.0136	Acceptable			
		26/08/2010	0.003	90	4	0.0136	Acceptable			
RAILWAY CROSSING DS OLD CSBP	B-26	13/10/2010	0.0005	210	11.8	0.04012	Acceptable			
		15/09/2010	0.004	210	11.8	0.04012	Acceptable			
		25/08/2010	0.0005	230	11.8	0.04012	Acceptable			

Nickel (Ni)

All data in blue were <0.001 (LOR)

Site name	Site number	Date	Ni (mg/L)	Water Hardness (mg/L)	Adjust factor	Adjusted trigger value	Comparison to ANZECC trigger ADJUSTED value	Hardness (mg/L)	Ni	ANZECC trigger value*
WEST SIDE	E2	25/08/2010	0.002	310	9	0.099	Acceptable	0-59	1	0.011
SOUTH CORNER	E3	25/08/2010	0.005	310	9	0.099	Acceptable	60-119	2.5	
		15/09/2010	0.003	280	9	0.099	Acceptable	120-179	3.9	
		13/10/2010	0.002	360	9	0.099	Acceptable	180-240	5.2	
BIRD SANCTUARY FOOTBRIDGE	B-01	25/08/2010	0.009	160	3.9	0.0429	Acceptable	400	9	
		15/09/2010	0.006	140	3.9	0.0429	Acceptable			
		13/10/2010	0.004	160	3.9	0.0429	Acceptable			
KING WILLIAM ST	B-02	25/08/2010	0.0005	150	3.9	0.0429	Acceptable			
		15/09/2010	0.0005	140	3.9	0.0429	Acceptable			
		13/10/2010	0.0005	140	3.9	0.0429	Acceptable			
WHATLEY ROAD (DOWNSTREAM)	B-03	25/08/2010	0.01	140	3.9	0.0429	Acceptable			
		15/09/2010	0.007	120	3.9	0.0429	Acceptable			
		13/10/2010	0.006	140	3.9	0.0429	Acceptable			
WHATLEY ROAD (UPSTREAM)	B-04	25/08/2010	0.008	140	3.9	0.0429	Acceptable			
		15/09/2010	0.006	120	3.9	0.0429	Acceptable			
		13/10/2010	0.004	140	3.9	0.0429	Acceptable			
RAILWAY PDE	B-05	25/08/2010	0.003	110	2.5	0.0275	Acceptable			
		15/09/2010	0.003	95	2.5	0.0275	Acceptable			
		13/10/2010	0.0005	110	2.5	0.0275	Acceptable			
TONKIN HWY WEST	B-06	25/08/2010	0.021	190	5.2	0.0572	Acceptable			
		15/09/2010	0.017	170	3.9	0.0429	Acceptable			
		13/10/2010	0.02	180	5.2	0.0572	Acceptable			
MOONEY ST WETLAND (OUTLET)	B-07	25/08/2010	0.002	130	3.9	0.0429	Acceptable			
		15/09/2010	0.002	130	3.9	0.0429	Acceptable			
		13/10/2010	0.0005	130	3.9	0.0429	Acceptable			
MOONEY ST WETLAND (UPSTREAM)	B-08	25/08/2010	0.002	130	3.9	0.0429	Acceptable			
		15/09/2010	0.002	130	3.9	0.0429	Acceptable			
		13/10/2010	0.0005	130	3.9	0.0429	Acceptable			
JOAN RYCROFT RESERVE	B-11	25/08/2010	0.007	120	3.9	0.0429	Acceptable			
		16/09/2010	0.001	130	3.9	0.0429	Acceptable			
		13/10/2010	0.0005	110	2.5	0.0275	Acceptable			
TONKIN HWY NORTH	B-12	25/08/2010	0.001	84	2.5	0.0275	Acceptable			
		16/09/2010	0.003	92	2.5	0.0275	Acceptable			
WALTHAM WAY	B-13	25/08/2010	0.0005	77	2.5	0.0275	Acceptable			
		16/09/2010	0.0005	84	2.5	0.0275	Acceptable			
		13/10/2010	0.0005	78	2.5	0.0275	Acceptable			
CLAVERING ROAD	B-14	25/08/2010	0.004	100	2.5	0.0275	Acceptable			
		15/09/2010	0.003	100	2.5	0.0275	Acceptable			
		13/10/2010	0.0005	98	2.5	0.0275	Acceptable			
CHRISTIAN ST	B-16	25/08/2010	0.61	130	3.9	0.0429	Guideline exceeded			
		15/09/2010	0.46	110	2.5	0.0275	Guideline exceeded			
		13/10/2010	0.07	98	2.5	0.0275	Guideline exceeded			
BROWN'S LAKE WETLAND OUTLET	B-17	26/08/2010	0.0005	100	2.5	0.0275	Acceptable			
		15/09/2010	0.0005	88	2.5	0.0275	Acceptable			
		13/10/2010	0.0005	94	2.5	0.0275	Acceptable			
GUMMERY ST	B-18	26/08/2010	0.0005	110	2.5	0.0275	Acceptable			
		15/09/2010	0.0005	84	2.5	0.0275	Acceptable			
		13/10/2010	0.0005	97	2.5	0.0275	Acceptable			
CATHERINE ST	B-19	26/08/2010	0.002	140	3.9	0.0429	Acceptable			
		15/09/2010	0.0005	140	3.9	0.0429	Acceptable			
		13/10/2010	0.0005	130	3.9	0.0429	Acceptable			
RUDLOC RESERVE EXIT	B-21	26/08/2010	0.0005	88	2.5	0.0275	Acceptable			
		15/09/2010	0.0005	78	2.5	0.0275	Acceptable			
		13/10/2010	0.0005	92	2.5	0.0275	Acceptable			
JAKOBSEN'S WAY FOOTBRIDGE	B-22	26/08/2010	0.0005	110	2.5	0.0275	Acceptable			
		15/09/2010	0.0005	100	2.5	0.0275	Acceptable			
		13/10/2010	0.0005	100	2.5	0.0275	Acceptable			
VERA ST	B-23	26/08/2010	0.0005	110	2.5	0.0275	Acceptable			
		15/09/2010	0.0005	110	2.5	0.0275	Acceptable			
DRAKE WAY	B-24	26/08/2010	0.0005	110	2.5	0.0275	Acceptable			
		15/09/2010	0.0005	100	2.5	0.0275	Acceptable			
		13/10/2010	0.0005	120	3.9	0.0429	Acceptable			
NORA HUGHES WETLAND OUTLET	B-25	26/08/2010	0.0005	90	2.5	0.0275	Acceptable			
		15/09/2010	0.0005	68	2.5	0.0275	Acceptable			
		13/10/2010	0.0005	85	2.5	0.0275	Acceptable			
RAILWAY CROSSING DS OLD CSBP	B-26	25/08/2010	0.008	230	5.2	0.0572	Acceptable			
		15/09/2010	0.008	210	5.2	0.0572	Acceptable			
		13/10/2010	0.003	210	5.2	0.0572	Acceptable			

Zinc (Zn)

All data in blue were <0.001 (LOR)

Site name	Site number	Date	Zn (mg/L)	Water Hardness (mg/L)	Adjust factor	Adjusted trigger value	Comparison to ANZECC trigger ADJUSTED value	Hardness (mg/L)	Zn	ANZECC trigger value*
WEST SIDE	E2	25/08/2010	0.005	310	9	0.072	Acceptable	0-59	1	0.008
SOUTH CORNER	E3	25/08/2010	0.01	310	9	0.072	Acceptable	60-119	2.5	
		15/09/2010	0.014	280	9	0.072	Acceptable	120-179	3.9	
		13/10/2010	0.04	360	9	0.072	Acceptable	180-240	5.2	
BIRD SANCTUARY FOOTBRIDGE	B-01	25/08/2010	0.11	160	3.9	0.0312	Guideline exceeded	400	9	
		15/09/2010	0.087	140	3.9	0.0312	Guideline exceeded			
		13/10/2010	0.09	160	3.9	0.0312	Guideline exceeded			
KING WILLIAM ST	B-02	25/08/2010	0.01	150	3.9	0.0312	Acceptable			
		15/09/2010	0.013	140	3.9	0.0312	Acceptable			
		13/10/2010	0.01	140	3.9	0.0312	Acceptable			
WHATLEY ROAD (DOWNSTREAM)	B-03	25/08/2010	0.13	140	3.9	0.0312	Guideline exceeded			
		15/09/2010	0.094	120	3.9	0.0312	Guideline exceeded			
		13/10/2010	0.11	140	3.9	0.0312	Guideline exceeded			
WHATLEY ROAD (UPSTREAM)	B-04	25/08/2010	0.078	140	3.9	0.0312	Guideline exceeded			
		15/09/2010	0.079	120	3.9	0.0312	Guideline exceeded			
		13/10/2010	0.097	140	3.9	0.0312	Guideline exceeded			
RAILWAY PDE	B-05	25/08/2010	0.018	110	2.5	0.02	Acceptable			
		15/09/2010	0.025	95	2.5	0.02	Guideline exceeded			
		13/10/2010	0.03	110	2.5	0.02	Guideline exceeded			
TONKIN HWY WEST	B-06	25/08/2010	0.21	190	5.2	0.0416	Guideline exceeded			
		15/09/2010	0.23	170	3.9	0.0312	Guideline exceeded			
		13/10/2010	0.28	180	5.2	0.0416	Guideline exceeded			
MOONEY ST WETLAND (OUTLET)	B-07	25/08/2010	0.014	130	3.9	0.0312	Acceptable			
		15/09/2010	0.009	130	3.9	0.0312	Acceptable			
		13/10/2010	0.02	130	3.9	0.0312	Acceptable			
MOONEY ST WETLAND (UPSTREAM)	B-08	25/08/2010	0.005	130	3.9	0.0312	Acceptable			
		15/09/2010	0.01	130	3.9	0.0312	Acceptable			
		13/10/2010	0.008	130	3.9	0.0312	Acceptable			
JOAN RYCROFT RESERVE	B-11	25/08/2010	0.013	120	3.9	0.0312	Acceptable			
		16/09/2010	0.01	130	3.9	0.0312	Acceptable			
		13/10/2010	0.01	110	2.5	0.02	Acceptable			
TONKIN HWY NORTH	B-12	25/08/2010	0.02	84	2.5	0.02	Acceptable			
		16/09/2010	0.01	92	2.5	0.02	Acceptable			
WALTHAM WAY	B-13	25/08/2010	0.005	77	2.5	0.02	Acceptable			
		16/09/2010	0.007	84	2.5	0.02	Acceptable			
		13/10/2010	0.007	78	2.5	0.02	Acceptable			
CLAVERING ROAD	B-14	25/08/2010	0.015	100	2.5	0.02	Acceptable			
		15/09/2010	0.022	100	2.5	0.02	Guideline exceeded			
		13/10/2010	0.02	98	2.5	0.02	Acceptable			
CHRISTIAN ST	B-16	25/08/2010	0.025	130	3.9	0.0312	Acceptable			
		15/09/2010	0.028	110	2.5	0.02	Guideline exceeded			
		13/10/2010	0.06	98	2.5	0.02	Guideline exceeded			
BROWN'S LAKE WETLAND OUTLET	B-17	26/08/2010	0.032	100	2.5	0.02	Guideline exceeded			
		15/09/2010	0.031	88	2.5	0.02	Guideline exceeded			
		13/10/2010	0.03	94	2.5	0.02	Guideline exceeded			
GUMMERY ST	B-18	26/08/2010	0.032	110	2.5	0.02	Guideline exceeded			
		15/09/2010	0.024	84	2.5	0.02	Guideline exceeded			
		13/10/2010	0.02	97	2.5	0.02	Acceptable			
CATHERINE ST	B-19	26/08/2010	0.013	140	3.9	0.0312	Acceptable			
		15/09/2010	0.014	140	3.9	0.0312	Acceptable			
		13/10/2010	0.02	130	3.9	0.0312	Acceptable			
RUDLOC RESERVE EXIT	B-21	26/08/2010	0.04	88	2.5	0.02	Guideline exceeded			
		15/09/2010	0.03	78	2.5	0.02	Guideline exceeded			
		13/10/2010	0.02	92	2.5	0.02	Acceptable			
JAKOBSEN'S WAY FOOTBRIDGE	B-22	26/08/2010	0.012	110	2.5	0.02	Acceptable			
		15/09/2010	0.012	100	2.5	0.02	Acceptable			
		13/10/2010	0.01	100	2.5	0.02	Acceptable			
VERA ST	B-23	26/08/2010	0.007	110	2.5	0.02	Acceptable			
		15/09/2010	0.009	110	2.5	0.02	Acceptable			
DRAKE WAY	B-24	26/08/2010	0.028	110	2.5	0.02	Guideline exceeded			
		15/09/2010	0.027	100	2.5	0.02	Guideline exceeded			
		13/10/2010	0.01	120	3.9	0.0312	Acceptable			
NORA HUGHES WETLAND OUTLET	B-25	26/08/2010	0.019	90	2.5	0.02	Acceptable			
		15/09/2010	0.014	68	2.5	0.02	Acceptable			
		13/10/2010	0.009	85	2.5	0.02	Acceptable			
RAILWAY CROSSING DS OLD CSBP	B-26	25/08/2010	0.75	230	5.2	0.0416	Guideline exceeded			
		15/09/2010	0.75	210	5.2	0.0416	Guideline exceeded			
		13/10/2010	0.12	210	5.2	0.0416	Guideline exceeded			

Water Hardness

(CaCO₃) {Ca+Mg} (mg/L)

Max (red) 360

Min (blue) 68

Site name	Site number	Date	Hardness	Comparison to recreational trigger value (500 mg/L)
WEST SIDE	ERCSING02	25/08/2010	310	Acceptable
SOUTH CORNER	ERCSING03	25/08/2010	310	Acceptable
BIRD SANCTUARY FOOTBRIDGE	BWMD 01	25/08/2010	160	Acceptable
KING WILLIAM ST	BWMD 02	25/08/2010	150	Acceptable
WHATLEY ROAD (DOWNSTREAM)	BWMD 03	25/08/2010	140	Acceptable
WHATLEY ROAD (UPSTREAM)	BWMD 04	25/08/2010	140	Acceptable
RAILWAY PDE	BWMD 05	25/08/2010	110	Acceptable
TONKIN HWY WEST	BWMD 06	25/08/2010	190	Acceptable
MOONEY ST WETLAND (OUTLET)	BWMD 07	25/08/2010	130	Acceptable
MOONEY ST WETLAND (UPSTREAM)	BWMD 08	25/08/2010	130	Acceptable
JOAN RYCROFT RESERVE	BWMD 11	25/08/2010	120	Acceptable
TONKIN HWY NORTH	BWMD 12	25/08/2010	84	Acceptable
WALTHAM WAY	BWMD 13	25/08/2010	77	Acceptable
CLAVERING ROAD	BWMD 14	25/08/2010	100	Acceptable
CHRISTIAN ST	BWMD 16	25/08/2010	130	Acceptable
BROWN'S LAKE WETLAND OUTLET	BWMD 17	26/08/2010	100	Acceptable
GUMMERY ST	BWMD 18	26/08/2010	110	Acceptable
CATHERINE ST	BWMD 19	26/08/2010	140	Acceptable
RUDLOC RESERVE EXIT	BWMD 21	26/08/2010	88	Acceptable
JAKOBSEN'S WAY FOOTBRIDGE	BWMD 22	26/08/2010	110	Acceptable
VERA ST	BWMD 23	26/08/2010	110	Acceptable
DRAKE WAY	BWMD 24	26/08/2010	110	Acceptable
NORA HUGHES WETLAND OUTLET	BWMD 25	26/08/2010	90	Acceptable
RAILWAY CROSSING DS OLD CSBP	BWMD 26	25/08/2010	230	Acceptable
SOUTH CORNER	ERCSING03	15/09/2010	280	Acceptable
BIRD SANCTUARY FOOTBRIDGE	BWMD 01	15/09/2010	140	Acceptable
KING WILLIAM ST	BWMD 02	15/09/2010	140	Acceptable
WHATLEY ROAD (DOWNSTREAM)	BWMD 03	15/09/2010	120	Acceptable
WHATLEY ROAD (UPSTREAM)	BWMD 04	15/09/2010	120	Acceptable
RAILWAY PDE	BWMD 05	15/09/2010	95	Acceptable
TONKIN HWY WEST	BWMD 06	15/09/2010	170	Acceptable
MOONEY ST WETLAND (OUTLET)	BWMD 07	15/09/2010	130	Acceptable
MOONEY ST WETLAND (UPSTREAM)	BWMD 08	15/09/2010	130	Acceptable
JOAN RYCROFT RESERVE	BWMD 11	16/09/2010	130	Acceptable
TONKIN HWY NORTH	BWMD 12	16/09/2010	92	Acceptable
WALTHAM WAY	BWMD 13	16/09/2010	84	Acceptable
CLAVERING ROAD	BWMD 14	15/09/2010	100	Acceptable
CHRISTIAN ST	BWMD 16	15/09/2010	110	Acceptable
BROWN'S LAKE WETLAND OUTLET	BWMD 17	15/09/2010	88	Acceptable
GUMMERY ST	BWMD 18	15/09/2010	84	Acceptable
CATHERINE ST	BWMD 19	15/09/2010	140	Acceptable
RUDLOC RESERVE EXIT	BWMD 21	15/09/2010	78	Acceptable
JAKOBSEN'S WAY FOOTBRIDGE	BWMD 22	15/09/2010	100	Acceptable
VERA ST	BWMD 23	15/09/2010	110	Acceptable
DRAKE WAY	BWMD 24	15/09/2010	100	Acceptable
NORA HUGHES WETLAND OUTLET	BWMD 25	15/09/2010	68	Acceptable
RAILWAY CROSSING DS OLD CSBP	BWMD 26	15/09/2010	210	Acceptable
SOUTH CORNER	ERCSING03	13/10/2010	360	Acceptable
BIRD SANCTUARY FOOTBRIDGE	BWMD 01	13/10/2010	160	Acceptable
KING WILLIAM ST	BWMD 02	13/10/2010	140	Acceptable
WHATLEY ROAD (DOWNSTREAM)	BWMD 03	13/10/2010	140	Acceptable
WHATLEY ROAD (UPSTREAM)	BWMD 04	13/10/2010	140	Acceptable
RAILWAY PDE	BWMD 05	13/10/2010	110	Acceptable
TONKIN HWY WEST	BWMD 06	13/10/2010	180	Acceptable
MOONEY ST WETLAND (OUTLET)	BWMD 07	13/10/2010	130	Acceptable
MOONEY ST WETLAND (UPSTREAM)	BWMD 08	13/10/2010	130	Acceptable
JOAN RYCROFT RESERVE	BWMD 11	13/10/2010	110	Acceptable
WALTHAM WAY	BWMD 13	13/10/2010	78	Acceptable
CLAVERING ROAD	BWMD 14	13/10/2010	98	Acceptable
CHRISTIAN ST	BWMD 16	13/10/2010	98	Acceptable
BROWN'S LAKE WETLAND OUTLET	BWMD 17	13/10/2010	94	Acceptable
GUMMERY ST	BWMD 18	13/10/2010	97	Acceptable
CATHERINE ST	BWMD 19	13/10/2010	130	Acceptable
RUDLOC RESERVE EXIT	BWMD 21	13/10/2010	92	Acceptable
JAKOBSEN'S WAY FOOTBRIDGE	BWMD 22	13/10/2010	100	Acceptable
DRAKE WAY	BWMD 24	13/10/2010	120	Acceptable
NORA HUGHES WETLAND OUTLET	BWMD 25	13/10/2010	85	Acceptable
RAILWAY CROSSING DS OLD CSBP	BWMD 26	13/10/2010	210	Acceptable

Appendix C – Trigger values and guidelines

Table 10: ANZECC default trigger values for nutrient concentrations and physical properties for lowland rivers of South-West Australia.

Guideline	D0 (% saturation)	pH	EC (µS/cm)	TN (mg/L)	NOx (mg/L)	TP (mg/L)	SRP (mg/L)	TSS* (mg/L)
ANZECC Water Quality Guideline – Recreational (2000)	>80	6.5 - 8.5	-	-	10	-	-	-
ANZECC Water Quality Trigger Values - Lowland Rivers (2000)	80-120	6.5 - 8.0	0.12 - 0.3	1.2	0.15	0.065	0.04	6.0

*DoW interim guideline

Table 11: ANZECC trigger values for metals in freshwater.

Guideline	Al (mg/L)	Cr (mg/L)*	Cu (mg/L)*	Pb (mg/L)*	Ni (mg/L)*	Zn (mg/L)*
ANZECC Water quality trigger value – Freshwater 95% protection level	0.055	0.001	0.0014	0.0034	0.011	0.008
ANZECC Water quality guideline - Recreational	0.2	0.05	1	0.05	0.1	5
NMI Limit of Reporting	0.005	0.001	0.001	0.001	0.001	0.001

*Trigger values not corrected for hardness.