HORNSBY SHIRE COUNCIL

water quality monitoring program annual report

2011/2012

Acknowledgements:

The 2011-2012 Water Quality Monitoring Annual Report was prepared by Kristy Guise under the supervision of David Beharrell, Team Leader Catchment Remediation and the direction of Diane Campbell, Manager Natural Resources Branch. Statistical analysis, graphing and mapping was completed by Paul Fredrickson and David Leggett. Assistance with sampling and data gathering was provided by scientific staff from Council's Natural Resources Branch. Laboratory testing of waters was carried out by Sydney Water Monitoring Services Laboratory; algal identifications by MicroAlgal Services.

A special mention needs to be made of the source of many of the photographs that appear in this report. These have been provided by members of the Community who responded to Council's call for submissions to its annual Photographic Competition. Hundred's of excellent photographs were submitted. This report contains some photos which relate to streams, estuary and water quality issues.

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1.0 Executive Summary

Hornsby Shire Councils water quality monitoring program commenced in October 1994 after the signing of the Statement of Joint Intent (SoJI) by the then Berowra Creek Catchment Committee and Hornsby Shire Council in response to increasing concern about algal blooms in the Berowra Creek estuary (HSC, 2012).

The monitoring program was initially designed to assess, through time, the impact of land use on waterways and to monitor the performance of Council's Catchment Remediation Rate (CRR) Program. Sites have progressively been added and the program expanded to include:

- Aquatic ecosystem health monitoring
- Monitoring and assessment of CRR initiatives
- Recreational water quality monitoring
- Monitoring to detect harmful estuarine algal blooms
- Biological monitoring (macroinvertebrates and diatoms)
- Monitoring of Hornsby Quarry discharge program
- Monitoring for impacts of the Brooklyn Wastewater Treatment Plant before and after commission

To make Council's water quality monitoring program more accessible to the community, Council has produced a Water Quality Report Card as well as this annual report for 2012. The Companion Technical Report to the Water Quality Report Card (HSC, 2012) documents the background context, rationale and methods used to determine waterway health grades of creek and estuarine areas within the Shire.

Grades in the Water Quality Report Card are based on water quality data collected between 2002 and 2010 under Council's water quality monitoring program. As such, this Water Quality Monitoring Annual Report is a condensed report compared with previous years presenting summarised data for the 2011-12 monitoring period only, and should be read in conjunction with the Water Quality Monitoring Report Card and Companion Technical Report (HSC, 2012).

Based on three key water quality parameters used to determine State of the Environment Health Ratings (Appendix B) the measured water quality ratings for 35 selected sites in creeks and the estuary during 2011-2012 were "Good" at 17%, "Fair" at 14% and "Poor" at 69% of our sampling sites Compared with 36%, 8% and 56% for 2010-2011). These results may be explained by the fact that during 2011-2012, there were a significantly higher number of sampling days classified as "wet weather" compared to the previous year. This resulted in generally higher turbidity, suspended solids, nutrients and bacteria at sites in catchments with human developments. In addition, it should be noted that poor sites do appear to dominate due to the monitoring program tending to concentrate on locations in the upper sections of creeks close to intensive industrial, urban and rural developments, or the sewage treatment plants which have been historically highly disturbed.

During 2011-2012 creeks monitored closely downstream of urban and rural areas returned consistently poor water quality results. Nitrogen nutrients in discharge water from West Hornsby and Hornsby Heights Sewage Treatment Plants (STPs) continue to dominate the receiving waters of Berowra Creek and the upper Berowra Creek estuary. High concentrations of nutrients and faecal bacteria contamination were present in sampling sites close downstream of industrial areas and the rural Glenorie Village.

2.0 Hornsby Shire and Catchments

Hornsby Shire is situated approximately 25km north west of Sydney and covers an area of approximately 510 km2, of which 69% is bushland. The main urban and rural developments are concentrated on the southern half of the Shire on the plateau areas. Hornsby Shire rural land uses constitute around 15% whilst around 10% is a mixture of urban, commercial and industrial uses (Figure 2.1). Water catchments within the Shire include Berowra Creek, Cowan Creek, the Hawkesbury River and Lane Cove River (Figure 2.2). The Water Quality Monitoring Program Annual Report 2010-2011 (HSC, 2011) provides a detailed description of the four catchments.

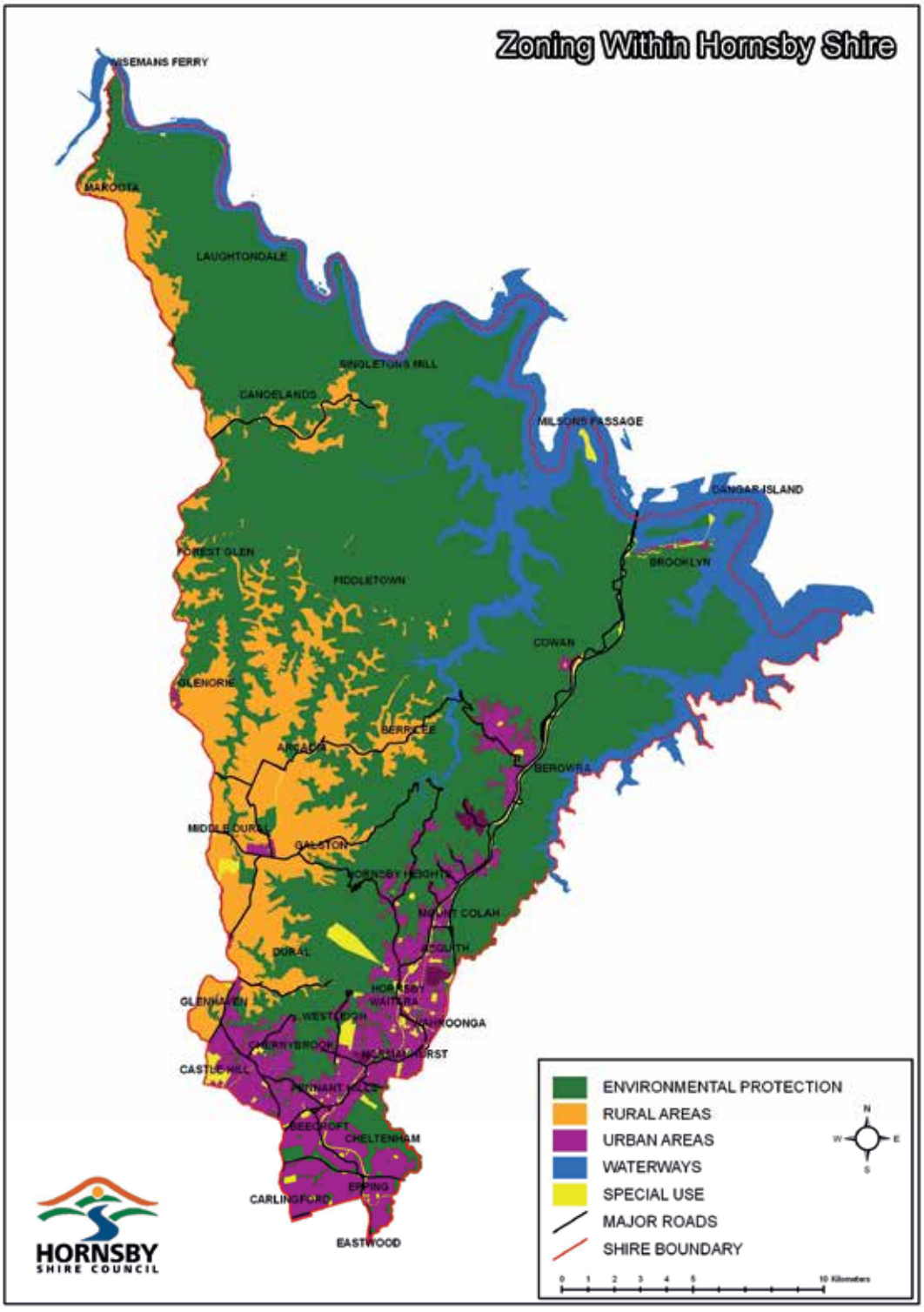

Figure 2.1 Hornsby Shire Council Zoning Map

2.0 Hornsby Shire and Catchments

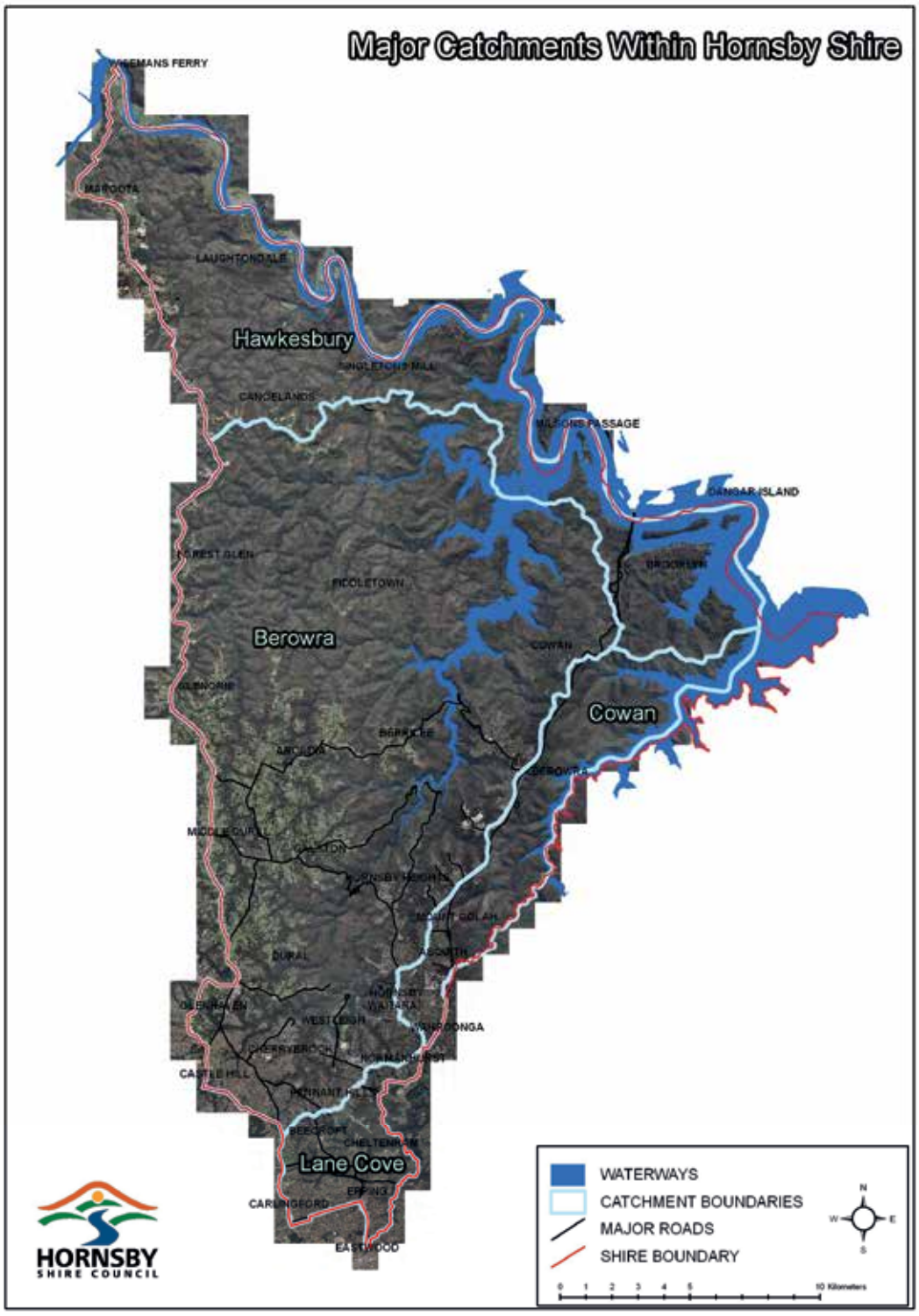

Figure 2.2 Hornsby Shire Council Catchment Boundaries

3.0 Water Quality Monitoring Program

Hornsby Shire Councils water quality monitoring program commenced in October 1994 after the signing of the Statement of Joint Intent (SoJI) by the then Berowra Creek Catchment Committee and Hornsby Shire Council in response to increasing concern about algal blooms in the Berowra Creek estuary (HSC, 2012).

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- Monitoring and assessment of CRR initiatives
- Recreational water quality monitoring
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- Biological monitoring (macroinvertebrates and diatoms)
- Monitoring of Hornsby Quarry discharge program
- Monitoring for impacts of the Brooklyn Wastewater Treatment Plant before and after commission

In 2011-2012 there were 72 sites monitored in both freshwater and estuarine waters across the Shire. Whereas, previous water quality monitoring annual reports contain detailed information on the history of the water quality program and site descriptions, this report only presents summary statistics for data collected during this period and should be read in conjunction with the Water Quality Report Card and Companion Technical Report (HSC, 2012). The Companion Technical Report (HSC, 2012) documents in detail the program context, rationale and recent changes to Council's water quality analysis and reporting methods.

Previous Water Quality Monitoring Annual Reports, the Water Quality Report Card (HSC, 2012) and the Companion Technical Report (HSC, 2012) are available in printed format in local libraries, they can also be accessed on Council's web site www.hornsby.nsw.gov.au/water.

4.0 Water Quality Guidelines

4.1 Aquatic Ecosystem Protection

Traditionally, the water quality data obtained in Hornsby Council's monitoring of freshwater creeks and estuaries has been compared with current National Guidelines for water quality; these are set down in the National Water Quality Management Strategy (NQWMS) and by the National Health and Medical Research Council (NHMRC). Specifically, the water values of *aquatic ecosystem protection and recreational water use* within local creeks and estuaries are of most relevance to Council's water quality monitoring program.

These guidelines (ANZECC/ARMCANZ, 2000) suggest that more appropriate guideline trigger values should be developed based on local or regional information obtained from long-term monitoring of local reference sites. During 2011, Council used data collected between 2002 and 2010 to develop a set of Regional Environmental Health Values (REHVs), specifically for sites in the Hornsby Shire. A summary of the REHVs for freshwater sites are listed in Table 4.1. Comparative trigger values from the ANZECC/ARMCANZ Guidelines for freshwater are presented in Table 4.2. A summary of the REHVs for estuarine/tidal sites are listed in Table 4.3. Comparative trigger values from the ANZECC/ ARMCANZ Guidelines for marine and estuarine waters are presented in Table 4.4. Procedures used to develop these REHVs are documented, in detail, in the Companion Technical Report (HSC, 2012).

Table 4.1 Regional Environmental Health Trigger Values (REHVs) for physical-chemical stressors and faecal bacteria for freshwater sites

Turbidity	Suspended Solids	Total Phosphorus	Total Nitrogen	Oxidised Nitrogen	Ammonium Nitrogen	pH	Electrical Conductivity	Dissolved Oxygen	Faecal Coliforms
<8	<7	<0.01	<0.32	<0.05	<0.02	4.8 to 7	<0.32	75 to 118	Median <150 and 80th% <600
NTU	mg/L	mg/L	mg/L	mg/L	mg/L		mS/cm	%sat	cfu/100mL

Table 4.2 ANZECC/ARMCANZ Freshwater Guideline trigger values for physical-chemical stressors and faecal bacteria

Turbidity	Suspended Solids	Total Phosphorus	Total Nitrogen	Oxidised Nitrogen	Ammonium Nitrogen	pH	Electrical Conductivity	Dissolved Oxygen	Faecal Coliforms
<6	<6	<0.025	<0.350	<0.040	<0.020	6.5 to 8	<0.30	85 to 110	Median <150 and 80th% <600
NTU	mg/L	mg/L	mg/L	mg/L	mg/L		mS/cm	%sat	cfu/100mL

Table 4.3 Regional Environmental Health Trigger Values (REHVs) for physical-chemical, bacteria and aquatic biota indicators for estuarine sites

Turbidity	Suspended Solids	Dissolved Oxygen	pH	Total Phosphorus	Total Nitrogen	Oxidised Nitrogen	Ammonium Nitrogen	Faecal Coliforms	Enterococci	Chlorophyll
<10	<6	80-110	7 to 8.5	<0.03	<0.3	<0.015	<0.015	Median <150 and 80th% <600	95th% <40 (200,500)	<4
NTU	mg/L	%sat		mg/L	mg/L	mg/L	mg/L	cfu/100mL	cfu/100mL	mg/L

Table 4.4 ANZECC/ARMCANZ Guideline trigger values for physical-chemical stressors, bacteria and aquatic biota indicators for marine and estuarine waters

Turbidity	Suspended Solids	Dissolved Oxygen	pH	Total Phosphorus	Total Nitrogen	Oxidised Nitrogen	Ammonium Nitrogen	Faecal Coliforms	Enterococci	Chlorophyll
<6	<6	80-110	7 to 8.5	<0.03	<0.3	<0.015	<0.015	Median <150 and 80th% <600	95th% <40 (200,500)	<4
NTU	mg/L	%sat		mg/L	mg/L	mg/L	mg/L	cfu/100mL	cfu/100mL	mg/L

4.0 Water Quality Guidelines

4.2 Stormwater Harvesting and Reuse

A series of National Guideline documents on water reuse have been published under the National Water Quality Management Strategy. One of the most recent Guidelines is for Stormwater Harvesting and Reuse (NRMMC, *et. al.*, 2009). The Guideline sets out processes to manage the risks of stormwater capture and reuse in terms of minimising health, environmental and operational risk.

An interim set of sampling and water quality parameters, based on the Stormwater Harvesting and Reuse Guideline (NRMMC, et. al., 2009), together with the ANZECC/ARMCANZ (2000) Guidelines for irrigation waters are used for Hornsby Council purposes (Table 4.5 and Table 4.6).

Table 4.5 Interim sampling requirements for stormwater harvesting projects

Pre-Development Sampling	As part of catchment surveillance water samples should be taken upstream of the proposed stormwater harvesting sites prior to the final design stage. Ideally samples should be taken at monthly intervals from end-of-pipe where the water will be harvested or from nearby downstream creeks. Presence of fluoride in the source water may indicate leaks from townwater supply; if such leaks are later repaired, the quantity and quality of collected 'storm' water could change.
Post-Development Sampling	Sampling points should be identified/installed to take water samples of (1) 'raw' (harvested) stormwater from storage tanks, (2) 'raw' water from the pipework immediately before it enters the sterilisation system, (3) 'treated' water as it exits the sterilisation system (e.g. immediately after the UV lamps), and (4) 'treated' water from the tanks used to hold the water prior to use. This enables measurement of raw and treated water quality, as well as the effectiveness of the sterilisation equipment.
Water testing Requirements	Testing can assess risks to soil structure, to infrastructure/irrigation equipment, the environment, and to human health. Where the stormwater includes runoff from urban or industrial areas, roads or sewered areas (with potential for sewer pipes to surcharge or septic seepages) or seepages from salt affected areas or landfill sites, water testing may need to be tailored to each situation.

Table 4.6 Interim guidelines for harvested stormwater reuse for open space irrigation, giving triggers for further investigation

	Parameter	Trigger		Notes
Catchment issues	Fluoride+#	0.1 mg/L		Presence of fluoride may point to leaking fluoridated townwater. (e.g. Fluoride of 0.3 mg/L implies about 30% townwater)
Soil Structure Risks	Salinity/ Conductivity+#	2000 uS/cm (for very sensitive plants)		Irrigation of sensitive plants. Salt tolerance depends on sand/clay content of soils, and on plant species being grown.
	Sodicity+#	Na 114 mg/L		Acceptable SAR depends on value of conductivity. Waters with high SAR might induce degradation of soil structure by clay aggregate breakdown. Potential problems may be overcome by corrective management (e.g. application of lime or gypsum)
	Sodium Absorption Ratio (SAR)+#	SAR 2 (at EC=200 uS/cm) SAR 7 (at EC=2000 uS/cm)		
	Chloride+#	Cl 175 mg/L		
Infrastructure / irrigation equipment risks	Turbidity O	Turbidity 10 NTU		Effectiveness of UV treatment decreases as turbidity increases.
		20 yr life	100 yr life	
	Total suspended solids (mg/L)# *	50	20	Potential blockages of irrigation pipes and jets
	Hardness (mg CaCO3/L) +#	350	350	" "
	Total Iron #* (mg/L)	10	0.2	" "
	Total Phosphorus #* (mg/L)	0.8	0.05	" "
Health Risks (DEC, 2006)	Reference			
	Bacteria *+O (Median Values)	Faecal coliforms 10 CFU/100mLx E. coli 10 CFU/100mL		Test initially fortnightly, then reduce to monthly if median <10. But increase back to fortnightly after any result > 100.

4.0 Water Quality Guidelines

4.3 Estuarine Phytoplankton/Algal Bloom Hazards

The criteria against which the phytoplankton identifications are assessed in this program are based on those species which potentially cause harm to fish, invertebrates or humans. (NSW Food Authority, 2008; Brett, 2007; RACC, 2009). The NSW Food Authority (2008) sets out recommended Phytoplankton Action Levels based on the concentrations of specific algal species that affect shellfish aquaculture. Whenever monitoring indicates that these triggers are exceeded, the Regional Algal Co-ordinating Committee (RACC) is notified. This may result in closure of the estuary to fishing (by the Department of Primary Industries – Fisheries Division), or closure of shellfish harvesting (by the NSW Food Authority), and/or erection of public warning notices by Council's Natural Resources Branch.

Council has developed preliminary guidelines for monitoring algal blooms based on Table 4.7 from Coad *et. al.* (2010). Recommended management actions are based on mean daily chlorophyll-a concentrations. The findings are compared with the Phytoplankton Action Levels of the NSW Food Authority (2008) and actions taken as discussed in the previous paragraph.

Table 4.7 Management response to real-time chlorophyll monitoring probes from Coad et. al. (2012)

Threshold	CHLa Daily Mean Concentration (ug/L)	Example Bloom Management Response	Ecosystem Protection Risk	Management Mode			Management Mode Key	
				Summer	Autumn/ Spring	Winter		
Extreme	64+	Estuary closure recommended	High >8ug/L					Alert mode **Bloom**= Seasonal Mean exceeded ≥ 3 consecutive days **Perturbation**= Seasonal Mean exceeded < 3 consecutive days
Very High	32 to 64	Secondary contact cautioned						
High	16 to 32	Primary contact cautioned						
Medium	8 to 16	Community alert						
Moderate	4 to 8	Agency alert	Moderate >4ug/L and < 8ug/L (HRC, 1998)	8ug/L	6ug/L			Action mode Increasing CHLa < Seasonal mean
Low	0 to 4	Estuary open	Low <4ug/L (ANZECC, 2000)			4ug/L		Surveillance Mode Decreasing or stable CHLa < Seasonal mean

4.4 Recreational Water Quality

In addition to the changes in REHVs and changes in reporting methods, Council is also transitioning from routine recreational water quality monitoring and reporting to real-time monitoring and assessment of swimming risks.

Salinity and temperature data, collected by five remote water quality monitoring probes, is being used to predict the likelihood of bacterial contamination at swimming sites in the Hawkesbury River. Data is downloaded at 2am each morning and the model is run based on the previous days monitored data. The results show interpolated contour maps based on the previous day.

The system utilises recorded data captured by Manly Hydraulics Laboratory (MHL), on behalf of Council, and a 3D hydrodynamic model of the Hawkesbury River estuary, configured by Office of Environment (OEH) and Heritage for Council. Model input data is sourced from various agencies including Bureau of Meteorology, MHL, Sydney Catchment Authority, OEH and NSW Office of Water.

Detailed information on the real-time swimming conditions maps is available at www.hornsby.nsw.gov.au/water, select Water Quality then Swimming Risk Indicator.

5.0 Water Quality Sites

During 2011-2012 water quality was monitored at 72 sites across the Shire (Appendix A). These included representative sites for the assessment of:

1) long term ecosystem health in estuarine and freshwater sites located below different land use types (urban, industrial, rural, bushland)
2) the performance of Council catchment remediation and stormwater harvesting programs aimed at reducing the impact of stormwater pollution and flows and providing alternative water sources, thus conserving potable water

The following tables present a summary of freshwater, estuarine and water treatment sites monitored during the 2011-2012 reporting period (Table 5.1, Table 5.2, Table 5.3 and Table 5.4). Detailed site descriptions for all water quality sites can be found in previous Water Quality Monitoring Annual Reports and also in the Water Quality Report Card and Companion Technical Report (HSC, 2012).

Table 5.1 Location of monitoring sites on freshwater creeks

Site	Location and Access	Sampling Frequency	Catchment	Reference Site
1	Berowra Creek, 200m downstream of concrete road bridge at Galston Gorge	Monthly	B	
2	Tunks Creek, Galston Gorge under wooden truss bridge	Monthly	B	
4	Berowra Creek, Westleigh 500m S along Great North Walk off end of Barkala Pl	Monthly	B	
5	Pyes Creek, Cherrybrook, end of Kristine Place	Monthly	B	
6	Georges Creek, Dural, off Fallon Drive on Sydney Water land	Monthly	B	
8	Devlins Creek, Sutherland Rd, Cheltenham, 200m downstream of M2	Monthly	LC	
10	Larool Creek, Sefton Rd, Thornleigh behind playground	Fortnightly	B	
12	Hornsby Creek, upstream of Leighton Pl road bridge, Hornsby	Fortnightly	C	
13	Sams Creek, Hamley Rd, Mt Kuring-gai 25m downstream of trash rack	Fortnightly	B	
23	Waitara Creek, at fire trail causeway 100m upstream from WHSTP outfall, Hornsby	Monthly	B	
36	Murray Anderson Creek, by boat off Smiths Creek (Reference)	Monthly	C	
37	Smugglers Creek, by boat/walk off Marramarra Creek (Reference)	Monthly	B	
39	Joe Crafts Creek, above confluence with Berowra Creek	Monthly	B	
42	Colah Creek, near of Wylds Road bridge, Glenorie	Monthly	B	
43	Calna Creek, above confluence with Berowra Creek. Walk in from Crosslands	Monthly	B	
45	Berowra Creek, at upper end Fishponds Waterhole, Hornsby at stepping stones	Monthly	B	
46	Unnamed tributary of Terrys Creek, track from eastern end Somerset St, Nth Epping	Monthly	LC	
49	Still Creek, end of Mansfield Road downstream tennis court	Monthly	B	
52	Calna Creek, down Pikes Road Hornsby, 300m upstream of HHSTP outfall	Monthly	B	
54	Laughtondale Creek, off Laughtondale Rd, Marramarra Nat Pk	Monthly	H	R
62	Cowan Township drainage, upper Kimmerikong CK, walk from Alberta Ave	Monthly	B	
63	Colah Creek, at end of fire trail off Ben Bullen Road Glenorie	Monthly	B	
64	Galston Village drainage, unnamed creek, tributary of Colah Ck near Sallaway Pl	Monthly	B	
77	Gleeson Creek, causeway crossing at end of Oxley Dr, Mt Colah	Monthly	B	
80	Glenorie Creek, Tekopa Ave, Glenorie. Pipe inlet upstream of GPT	Monthly	B	
85	Hornsby Quarry – pumped water (discharged from Quarry site into Old Mans Creek)	Monthly +	B	
114	Muogamarra Creek, at walking track crossing, flowing to Peats Bight	Bimonthly	B	R
115	Old Mans Creek, at fire trail crossing off Rosemead Rd	Monthly +	B	
122	Upper Calabash Ck below Arcadia Tip, Arcadia	Quarterly	B	
123	Creek draining Peats Crater in Muogamarra Nature Reserve	Bimonthly	B	R
146	Yatala Creek flowing into Jerusalem Bay, access by boat at high tide	Bimonthly	C	R
147	Unnamed creek in Lane Cove Nat Pk, flowing into Byles Ck	Bimonthly	LC	R
149	Unnamed creek end Duckpond Ridge Trail in Marramarra National Pk	Bimonthly	B	R
157	Unnamed creek flowing into Deep Bay Berowra Waters	Quarterly	B	R
160	Unnamed creek flowing from Joes Mt Saddle to Fishponds	Quarterly	B	R
161	Unnamed creek flowing from Canoelands into Marramarra Creek	Quarterly	B	R
164	Unnamed creek flowing into north arm of Joe Crafts Ck; at Djarra Crossing	Bimonthly	B	R

5.0 Water Quality Sites

Table 5.2 Land use classifications and associated freshwater creek sample sites

Land Use	Sample Sites
Undisturbed Land (Reference Sites)	36, 37, 54, 114, 123, 146, 147, 149, 157, 160, 161, 164
Urban area	4, 5, 6, 8, 39, 46
Discharge of Sewage Treatment Plants	1, 23, 52, 53, 45
Commercial / Industrial	10, 13, 12, 77
Rural	2, 40, 42, 49, 62,63, 64, 80
Estuary	38, 48, 55, 60,61, 100, 103, 104, 105, 106, 107, 108
Recreation - swimming	55, 100

Table 5.3 Location of estuarine water quality monitoring sites

Site	Location	Monitoring Status	Freq
38	Sandbrook Inlet, Brooklyn, Hawkesbury River	EH	M
48	Marramarra Creek in Marramarra NP near old orange orchard	EH	M
55	Hawkesbury River at Brooklyn Baths	REC	W
60	Berowra Creek, 50m downstream of Berowra Waters Ferry	EH	M
61	Berowra Creek, mid stream at Calabash Point	EH, Real-time Probe	M
100	Berowra Creek at Crosslands Reserve (north beach)	REC, EH	W, M
103	Mouth of Milsons Passage (Eastern end)	STP	M
104	Middle of Hawkesbury River off Peat island	STP	M
105	Under old Hawkesbury River Bridge; 2nd pylon Southern end	STP	M
106	Middle Sandbrook Inlet, off Fenwick's Marina	STP	M
107	Middle Hawkesbury River north off centre of Long Island	STP	M
108	Hawkesbury off Bradleys Beach Dangar Island	STP	M
150	Hawkesbury River off Gunyah Point	Real-time Probe	~M
151	Mouth of Marramarra Ck mouth, junction with Berowra Ck	Real-time Probe	~M
152	Hawkesbury River off Courangra Point	Real-time Probe	~M
153	Hawkesbury River, near Laughtondale	Real-time Probe	~M

Table 5.4 Location of CRR devices, leachate treatment devices and stormwater harvesting and reuse sites

Site	Location	Frequency	Catchment
18	Arcadia Tip Leachate Pond	Quarterly	Berowra
56	Wisemans Ferry Tip Leachate Pond	Quarterly	Hawkesbury
94	Arcadia Tip Treated Water Tank	Quarterly	Berowra
95	Foxglove Oval – collected landfill leachate	Monthly	Berowra
96A, 96A2	Foxglove Oval – bioreactor output water	Monthly	Berowra
96	Foxglove Oval – treated leachate, after wetland	Monthly	Berowra
132	Foxglove Oval - Treated Water – in storage tank for oval irrigation	Monthly	Berowra
98	Council Nursery – Treated stormwater - reuse water	Monthly	Lane Cove
112	Wisemans Ferry Tip, Riser 'C' below wall	Quarterly	Hawkesbury
120	Greenway Park Cherrybrook, raw harvested stormwater	Monthly	Berowra
121	Greenway Park Cherrybrook, treated harvested stormwater	Monthly	Berowra
128	Berowra Park Oval - Raw harvested stormwater in underground tank	Monthly	Berowra
129	Berowra Park Oval - Raw stormwater – input to UV treatment	Quarterly	Berowra
130	Berowra Park Oval – Treated stormwater – output from UV	Quarterly	Berowra
131	Berowra Park Oval – treated stormwater - in storage tank	Monthly	Berowra
134	Epping Oval – Raw stormwater in underground tanks	Monthly	Lane Cove
137	Epping Oval – Treated stormwater in above ground tank	Monthly	Lane Cove
138	North Epping Oval – Raw stormwater in underground tank	Monthly	Lane Cove
141	North Epping Oval – Treated stormwater in underground tank	Monthly	Lane Cove
142	Somerville Oval - Raw stormwater in underground tank	Monthly	Lane Cove
145	Somerville Oval - Treated stormwater in underground tank	Monthly	Lane Cove

6.0 Sampling and Testing Procedures

6.1 Routine Monitoring

The water quality monitoring program involves systematic sampling to a predetermined, usually monthly, regular schedule over the year.

Sampling and testing procedures have not varied over the past 12 months. Please see the Water Quality Monitoring Annual Report 2010-2011 (HSC, 2011) for detailed methodology employed in this water quality monitoring program.

Physical water quality parameters routinely measured in-situ include:

- temperature (°C)
- pH
- electrical conductivity (µS/cm, mS/cm)
- salinity (ppt)
- dissolved oxygen (%sat, mg/L)
- turbidity (NTU)

Chemical and bacterial parameters routinely sampled and analysed by the contracted laboratory include:

- faecal coliforms (CFU/100mL) and/or Enterococci (CFU/100mL))
- suspended solids
- chlorophyll-a
- trace metals
- major cations and anions
- bicarbonate/alkalinity

6.2 Quality Assurance / Quality Control

Quality assurance and quality control measures have not varied over the past 12 months. Please see the Water Quality Monitoring Annual Report 2010-2011 (HSC, 2011) for detailed information on quality assurance and quality control procedures.

7.0 Water Quality Monitoring Results

7.1 Presentation of Monitoring Data

Water quality monitoring has occurred at many sites at numerous times throughout the year for many parameters, generating a large database. Presentation of such large amounts of data is not the role of the Annual Report. Rather, the aim of this report is to provide summaries and trends. To do this the data is presented to show the averages and distribution of each parameter using basic statistical terms as described in Table 7.1 and Figure 7.1. This report does not include results from any additional specific targeted investigations undertaken during the 2011-12 period (e.g. sampling and investigation of a reported pollution incident).

Explanatory text and discussion on the influences on water quality through time should be sought from the Water Quality Report Card (HSC, 2012), the Companion Technical Report (HSC, 2012) and previous Water Quality Monitoring Annual Reports. This condensed annual report for 2011-12 will present summary graphs only.

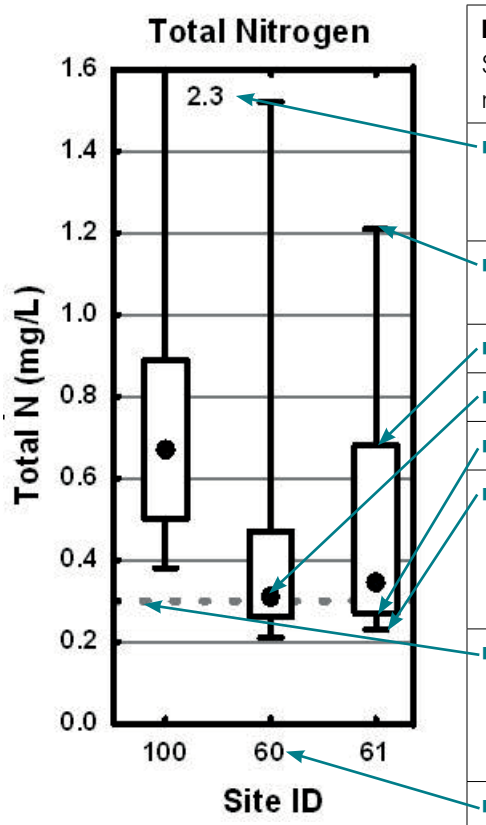
Table 7.1 Terminology for water quality data presentation

Term	Meaning
Parameter	A water quality variable or component which is subjected to analysis (e.g. Temperature, phosphorus, etc)
Valid N	The number of water samples taken or tests conducted at the site during the reporting period for each parameter
Mean	The numerical average of the values for the parameter for the samples taken or tested during the reporting period. The 'mean' value often appears high as it is easily biased high by one or two extreme values.
Median	The 'middle' value of the parameter at a site for all the samples taken or tested during the reporting period. When all the values are sorted into increasing magnitude from lowest to highest, the median is the magnitude of the middle number if there are an uneven number of values, or it is the average of the central two numbers when there is an even number of values.
Minimum	The lowest value of the parameter at a site for all the samples taken or tested during the reporting period. The numerical difference between the 'minimum' and 'maximum' value for the parameter is the 'range' of values for that parameter during the reporting period.
Maximum	The highest value of the parameter at a site for all the samples taken or tested during the reporting period
20th Percentile or 20th%ile	The statistically calculated value of the parameter above which 80% of all test results lie. Values below the 20th% might be considered significantly lower than the average.
80th Percentile or 80th%ile	The statistically calculated value of the parameter below which 80% of all tests lay. Values above the 80th% might be considered significantly higher than the average.
Std Dev.	The statistical standard deviation of the values for a parameter for the samples taken or tested during the reporting period. If the Std Dev is high relative to the mean (e.g. Turbidity, Faecal coliforms) it means the parameter varies a lot throughout the year. If the Std Dev is low relative to the mean (e.g. pH) it means there is low variability of that parameter over the year.

7.0 Water Quality Monitoring Results

Water quality data has been presented using 'whisker-box-plots' which enables ready comparison of water quality at various sites and, in particular, comparison with the reference sites. Figure 7.1 shows how to interpret the graphs used in this report. The graphs present the minimum, maximum, 20th%ile and 80th%ile data value for each parameter at a site. This gives a visual presentation of the magnitude, scatter and most usual range of a water quality parameter, and can also readily present the data in a form more easily compared with existing Guideline values or reference sites.

Figure 7.1 Interpretation of water quality data using Whisker-Box plots



Interpretation of the Whisker-Box Plots

Shows whisker-box plots for 3 sites for Total Nitrogen concentrations in milligrams per Litre

- Sometimes the maximum concentration value of some parameters is so high it is necessary to draw the whisker 'off scale'. In this case the value of the maximum concentration ('2.3') is typed here for this site.
- Maximum value of the test data at this site for the year is the top value of the 'whisker' line.
- 80th percentile value of test data for the year is the top of the 'box'
- Median value of test date for the year is the 'dot' inside the box
- 20th percentile value of test data for the year is the bottom of the box.
- Minimum value of test data for the year is the bottom value of the 'whisker' line (Note; often the reported minimum value is equal to half the laboratory detection limit)
- Dashed Line showing Guideline/REHV concentration. In this case the guideline for ecosystem protection of estuarine waters is 0.3 mg/L for this parameter. Concentrations above this value are considered to be undesirable in estuarine waters
- Sampling Site Number. The whisker-box symbol directly above the site number shows the distribution of data for the selected parameter for the year at that sample site.

7.0 Water Quality Monitoring Results

7.2 Influence of Rainfall 2011-12

Rainfall events have a major effect on water quality in waterways by increasing turbidity and suspended solids in stormwaters, washing rubbish and contaminants into streams and creeks and increasing the likelihood in developed areas of overflows of sewage systems into waterways. Large areas of impervious surfaces (e.g. roofs, roads, pavements), particularly when connected directly to creeks by stormwater pipes, result in larger, faster flows within the creeklines following rain. The magnitude of the contamination at a sampling site is related to the quantity and to the intensity of the rainfall, and to how recently a rainfall event occurred prior to sampling.

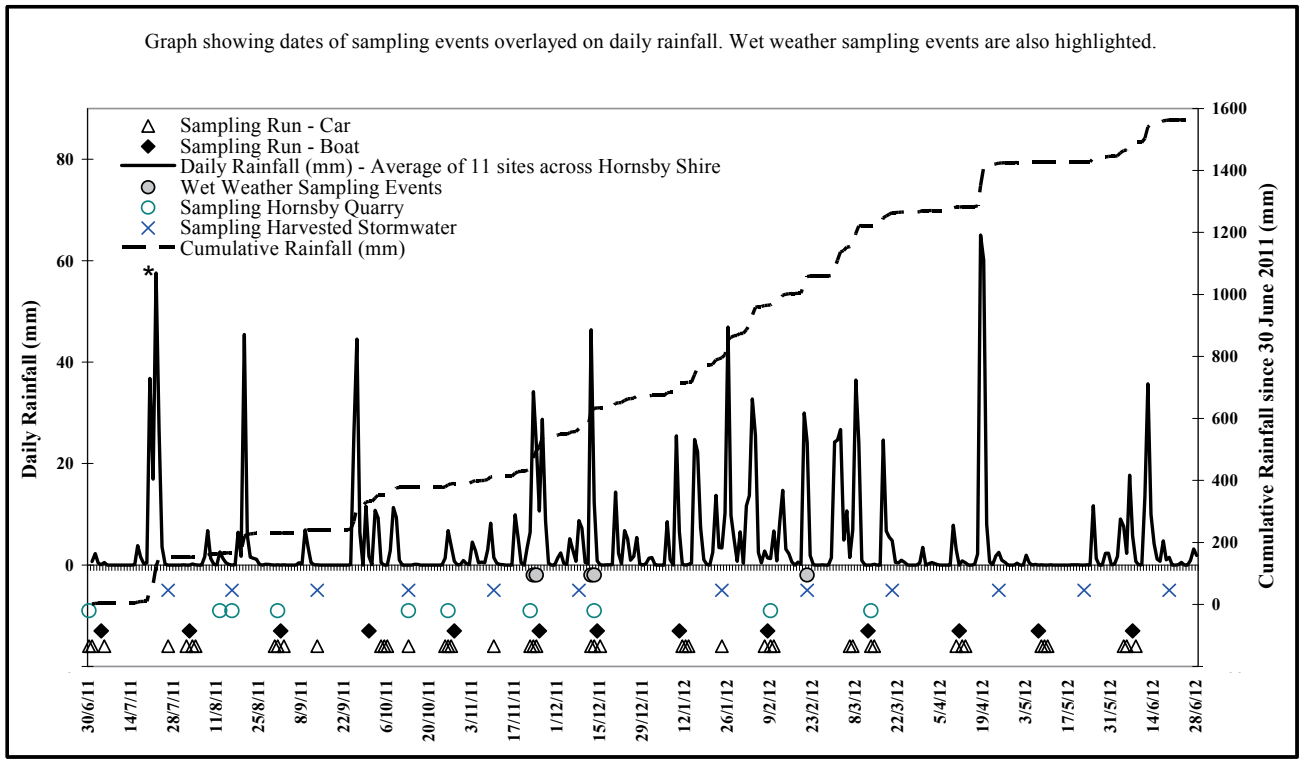
Council's water monitoring program involves systematic sampling to a set monthly schedule which over the year will by chance usually include representative dry and wet times. For the purposes of this program a "wet weather" sampling event is considered to be one for which a total of over 10mm of rain fell during the day prior to the sampling. It is recognised that stream flow rates at some sites are heavily affected by small rain events (e.g. sites close downstream of industrial and urban areas with high impervious surface areas), while others far downstream (e.g. estuarine sites) may hardly be affected except after heavy rainfall or extended wet periods.

Figure 7.2 shows the daily rainfall and cumulative rainfall for the 2011-2012 year obtained from the Bureau of Meteorology averaged over 14 gauging stations throughout the Shire. Along the bottom is given information on the annual sampling program for the year 2011-2012 showing the days when routine sampling by car or boat was undertaken and wet weather sampling days.

The wet weather sampling events are highlighted as grey dots along the bottom of Figure 7.2. During the reporting year there was a total of 77 sampling days which included 20 "wet weather" days. The total annual rainfall for 2011-12 was significantly higher (approx 500mm) to the previous 3 years.

During 2011-2012, there significantly more sampling days classified as "wet weather" compared to the previous year. This resulted in generally higher turbidity, suspended solids, nutrients and bacteria at sites in catchments with human developments during this reporting period.

Figure 7.2 Water sampling events and rainfall data for 2011-12

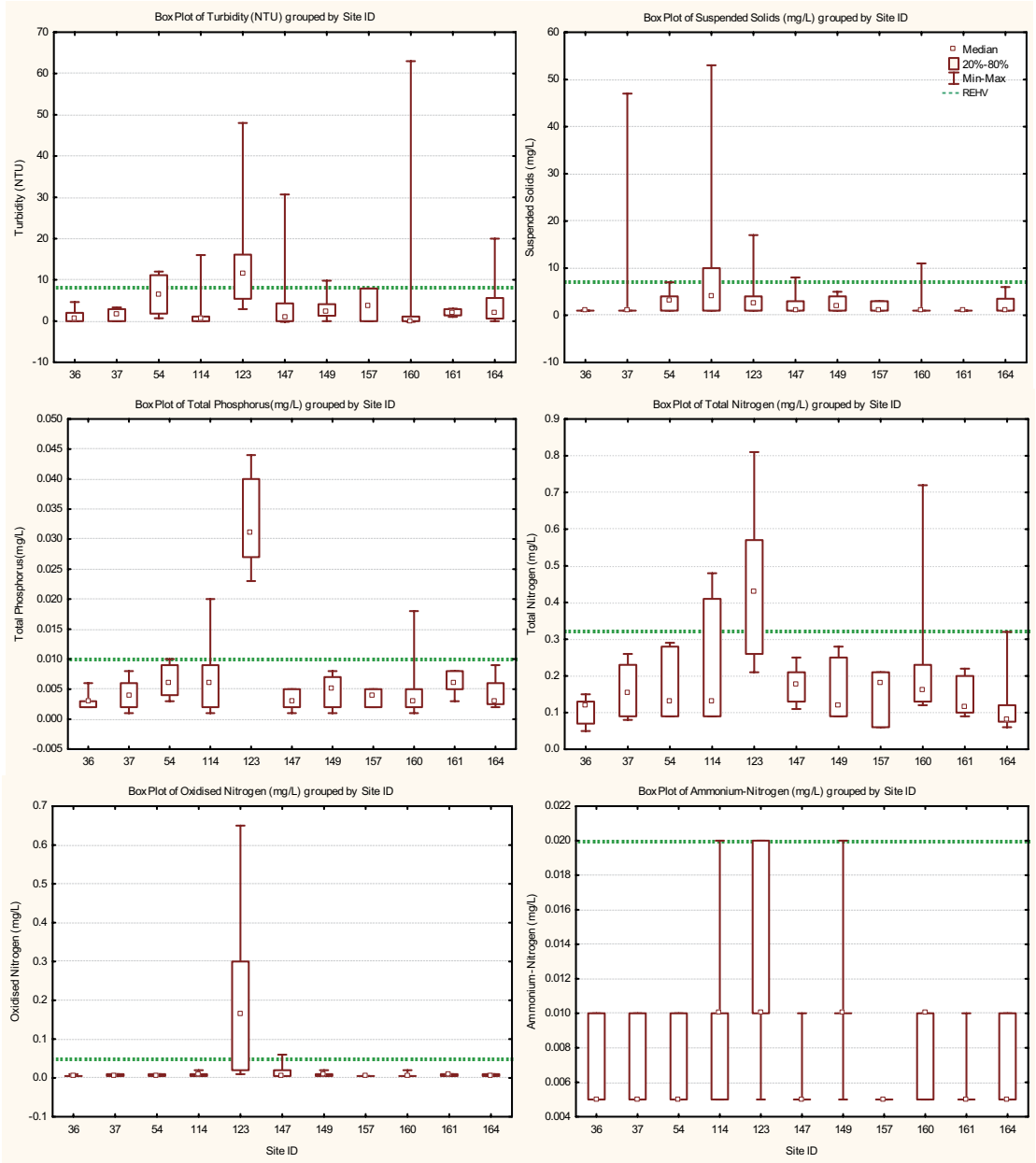


7.0 Water Quality Monitoring Results

7.3 Aquatic Ecosystem Health

7.3.1 Reference Sites

Figure 7.3 provides a graphical comparison of selected water quality parameters in 2011-12 at twelve sites considered to be reference locations. Detailed discussion on the selection of reference locations and detailed reference site descriptions are in the Water Quality Monitoring Annual Report 2010-11 (HSC, 2011). The green dotted line represents the associated REHVs for freshwater. A single line indicates a maximum trigger value; compliant values will fall below this line. Two lines indicate an upper and lower limit; compliant data will fall between these lines.



7.0 Water Quality Monitoring Results

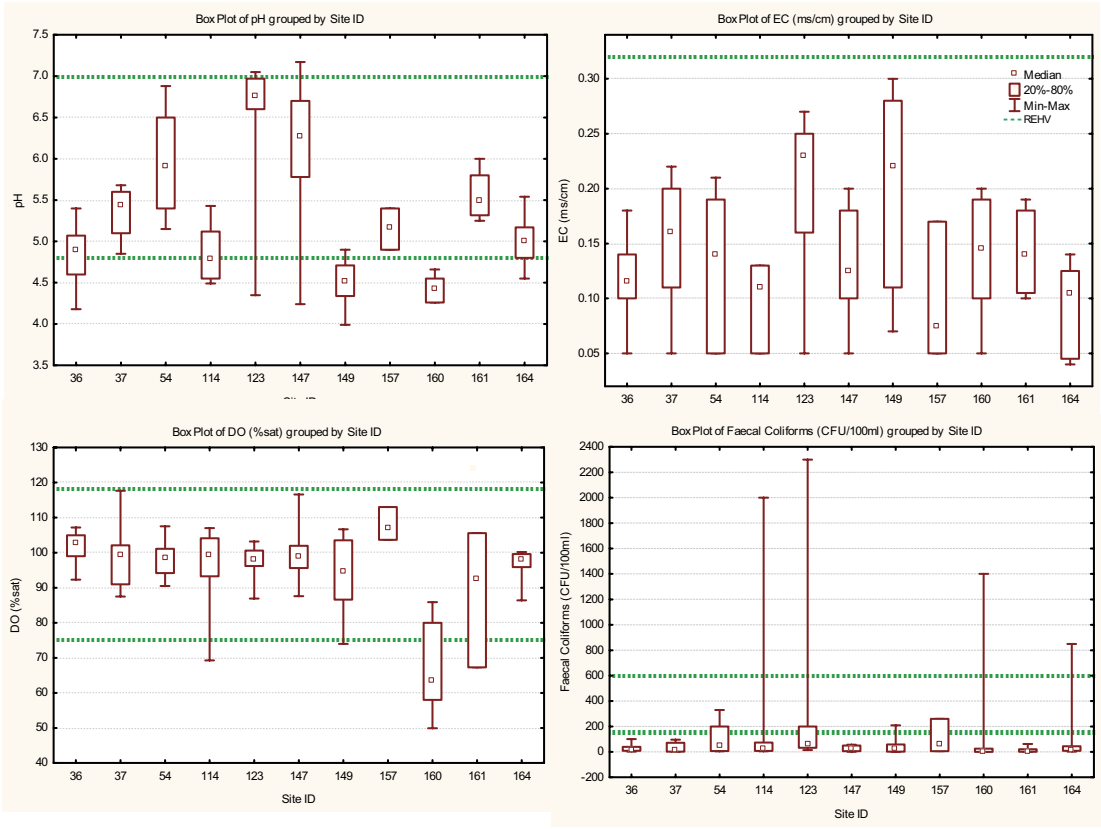
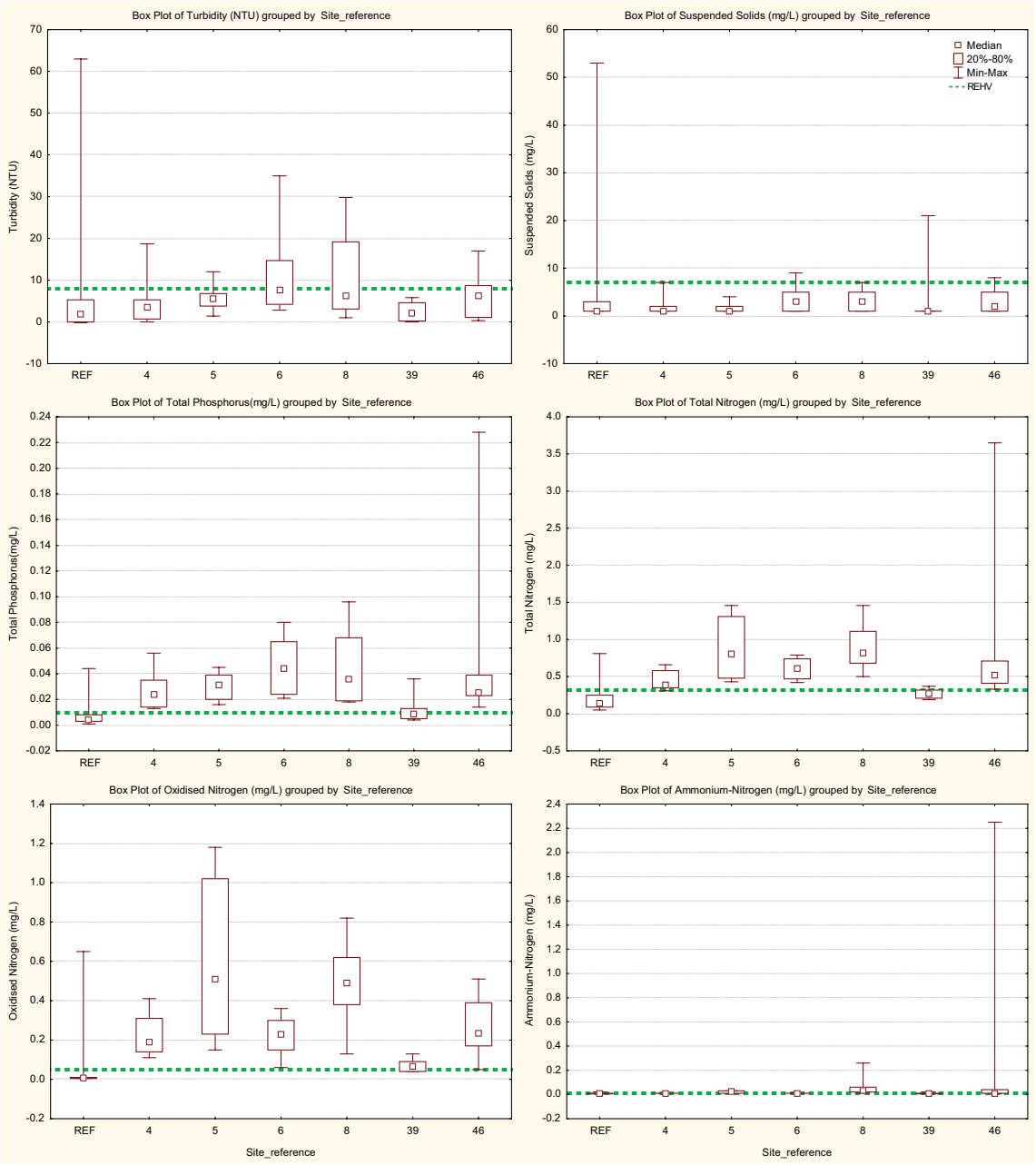


Figure 7.3 Water quality in reference creeks: annual distribution of selected parameters

7.0 Water Quality Monitoring Results

7.3.2 Urban Sites

Figure 7.4 provides a graphical comparison of selected water quality parameters in 2011-12 at six creeks receiving water from urban areas. The corresponding results at the reference sites are also included to enable comparison between the urban-affected and the unimpacted reference creeks. The green dotted line represents the associated REHVs for freshwater. A single line indicates a maximum trigger value; compliant values will fall below this line. Two lines indicate an upper and lower limit; compliant data will fall between these lines.



7.0 Water Quality Monitoring Results

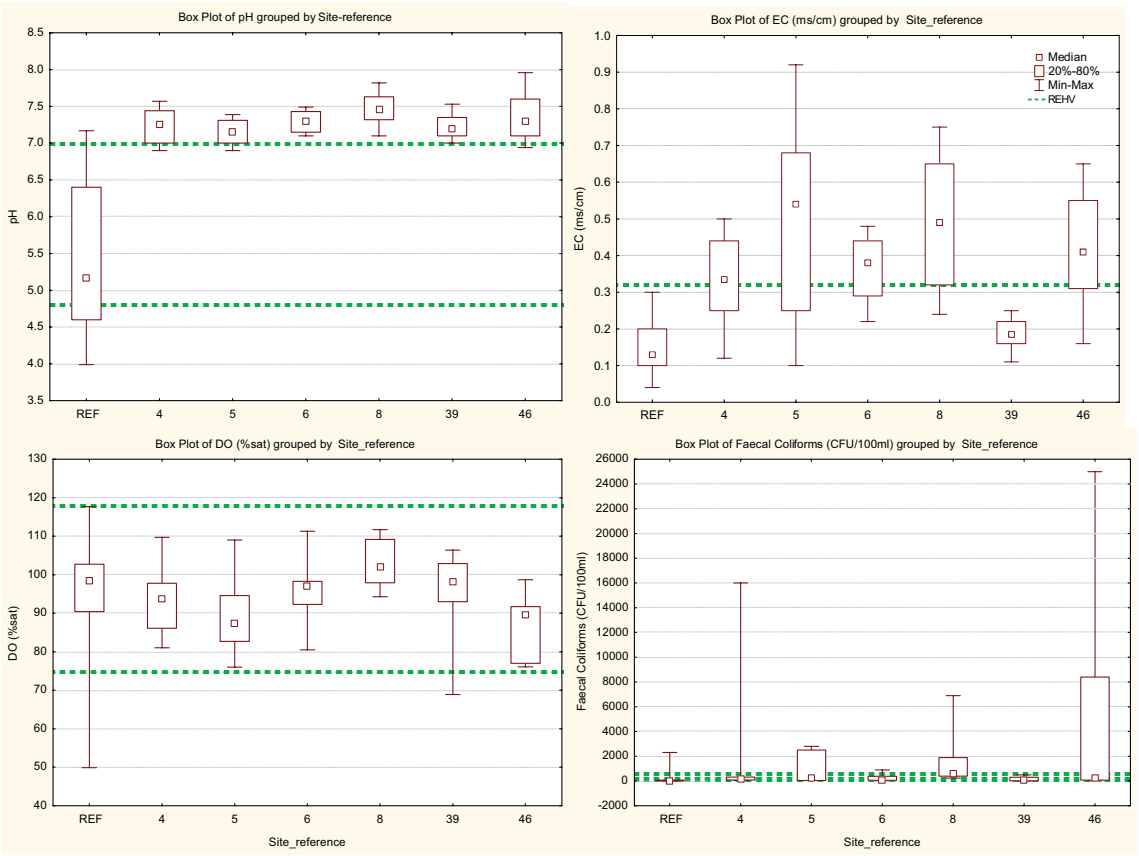
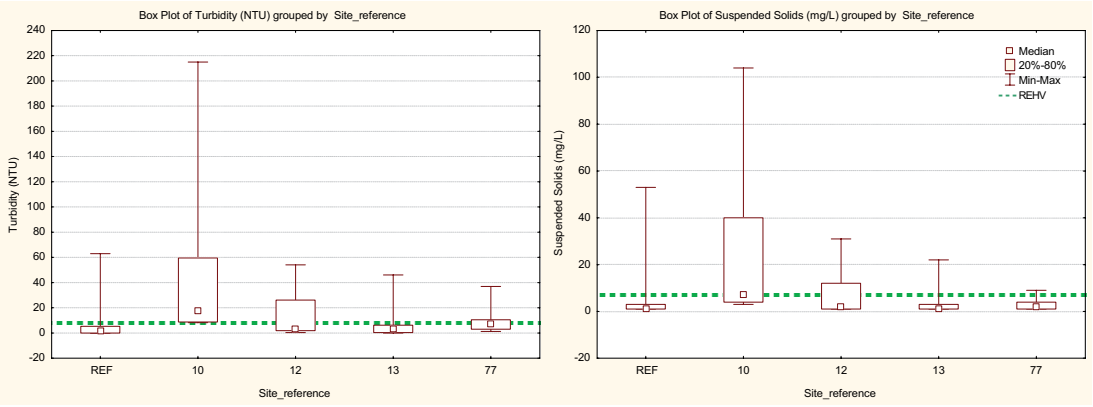


Figure 7.4 Water quality in urban creeks: 2011-12 annual distribution of selected parameters compared with reference sites and REHVs for freshwater

7.3.3 Industrial Sites

Figure 7.5 provides a graphical comparison of selected water quality parameters in 2011-12 at four creeks receiving water from industrial areas. The corresponding results at the reference sites are also included to enable comparison between the urban-affected and the unimpacted reference creeks. The green dotted line represents the associated REHVS for freshwater. A single line indicates a maximum trigger value; compliant values will fall below this line. Two lines indicate an upper and lower limit; compliant data will fall between these lines.



7.0 Water Quality Monitoring Results

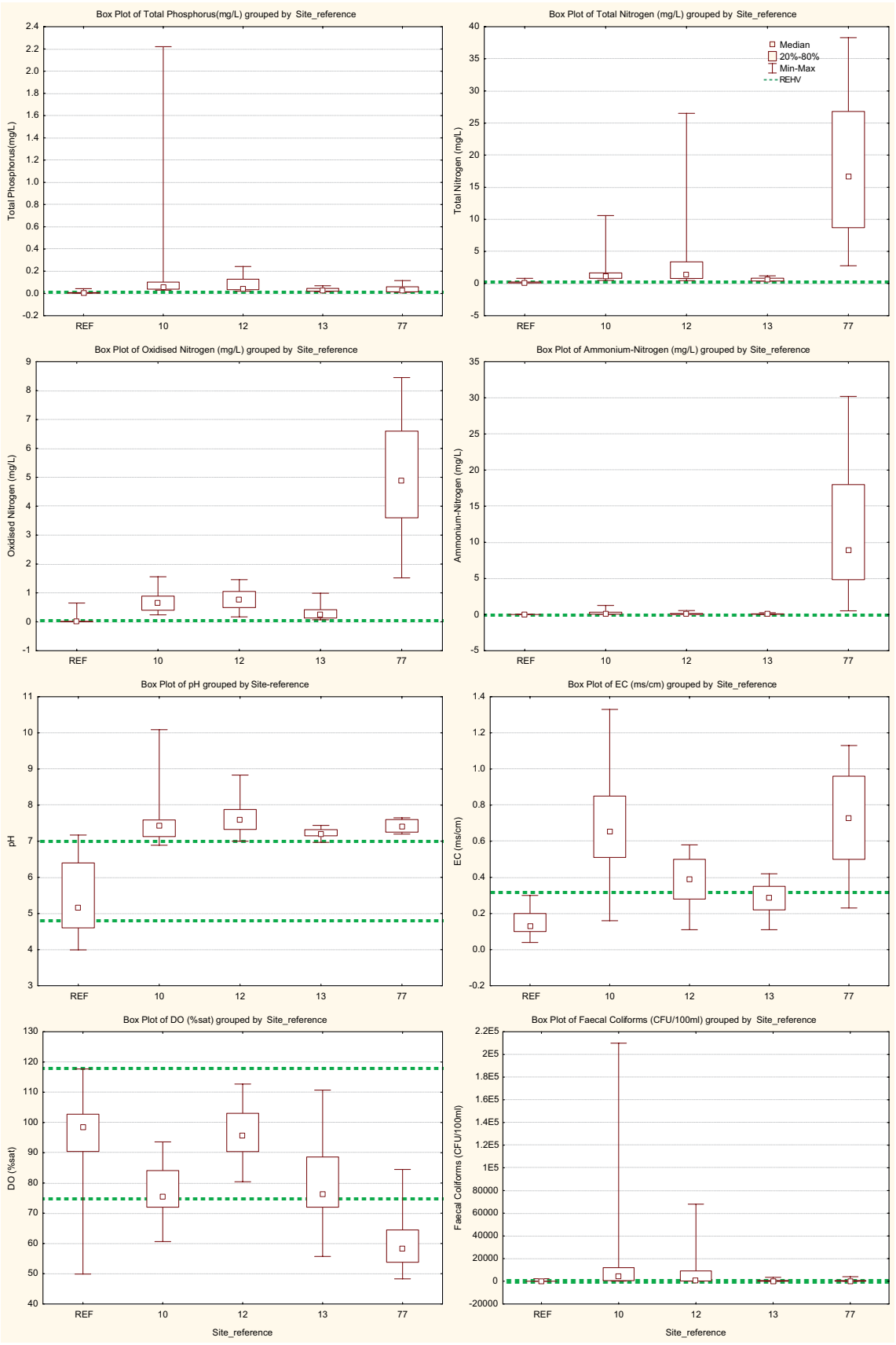


Figure 7.5 Water quality in creeks draining industrial/commercial areas: annual distribution of parameters compared with reference creeks and REHVs for freshwater

7.0 Water Quality Monitoring Results

7.3.4 Rural Sites

Figure 7.6 provides a graphical comparison of selected water quality parameters in 2011-12 at seven creeks receiving water from rural areas. The corresponding results at the reference sites are also included to enable comparison between the urban-affected and the unimpacted reference creeks. The green dotted line represents the associated REHVs for freshwater. A single line indicates a maximum trigger value; compliant values will fall below this line. Two lines indicate an upper and lower limit; compliant data will fall between these lines.

7.0 Water Quality Monitoring Results

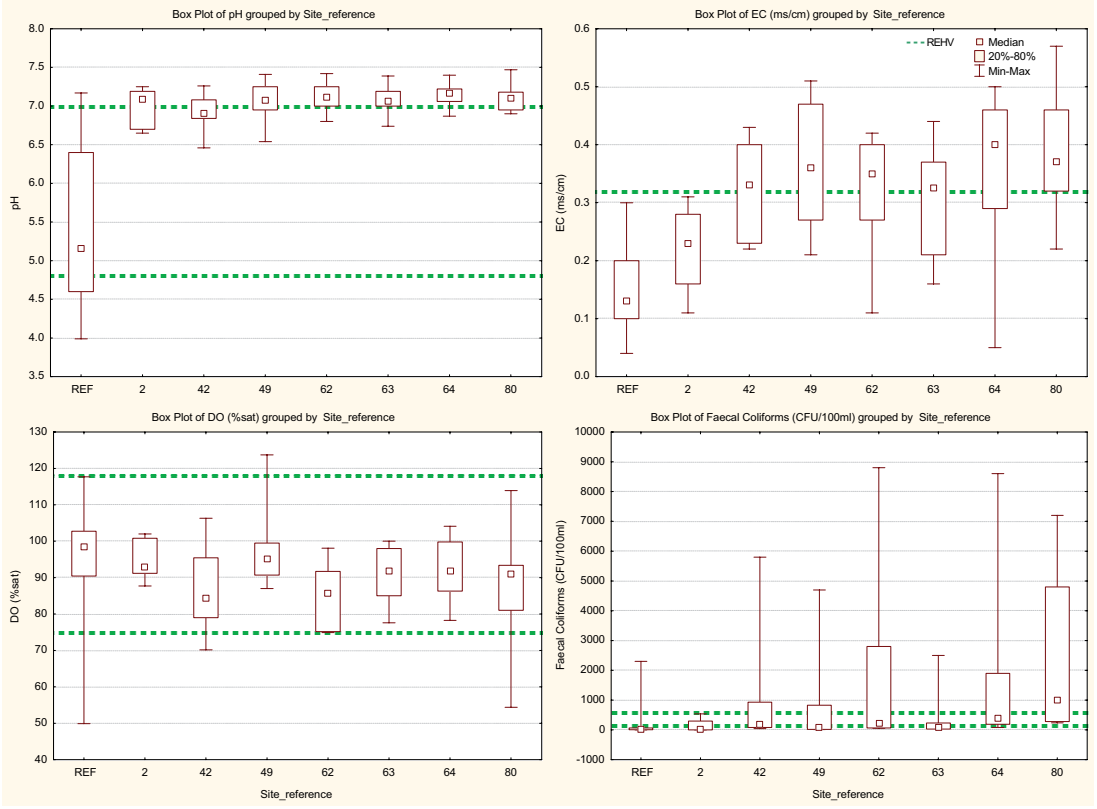
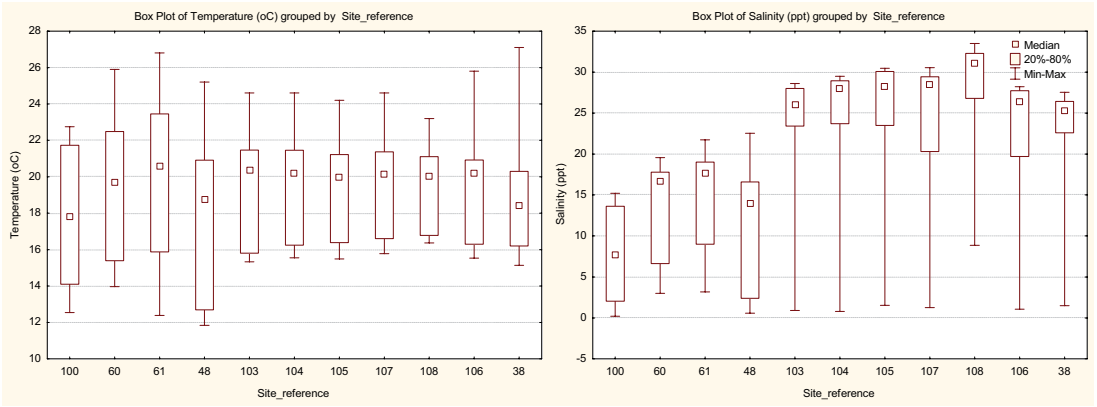


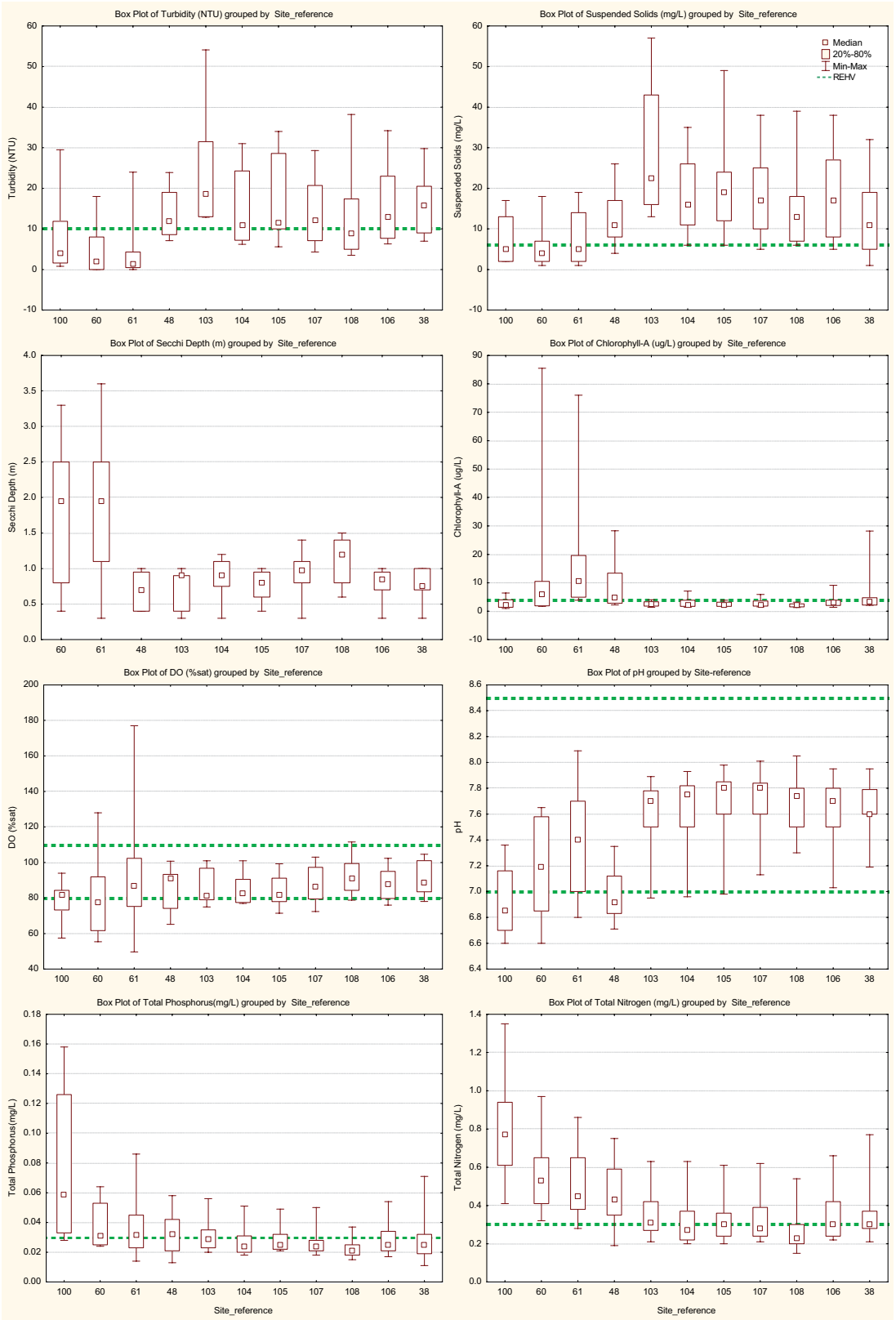
Figure 7.6 Water quality in creeks draining rural areas: annual distribution of selected parameters compared with reference creeks and REHVs for freshwater

7.3.5 Estuarine Sites

Figure 7.7 provides a graphical comparison of selected water quality parameters in 2011-12 at ten estuarine sites. Please note that sites 60, 61, 48 and 38 were monitored monthly as part of Council's routine long term water quality program. Sites 103, to 108 were monitored monthly as part of the Brooklyn Wastewater Treatment Plant impact assessment. The green dotted line represents the associated REHVs for estuarine water. A single line indicates a maximum trigger value; compliant values will fall below this line. Two lines indicate an upper and lower limit; compliant data will fall between these lines.



7.0 Water Quality Monitoring Results



7.0 Water Quality Monitoring Results

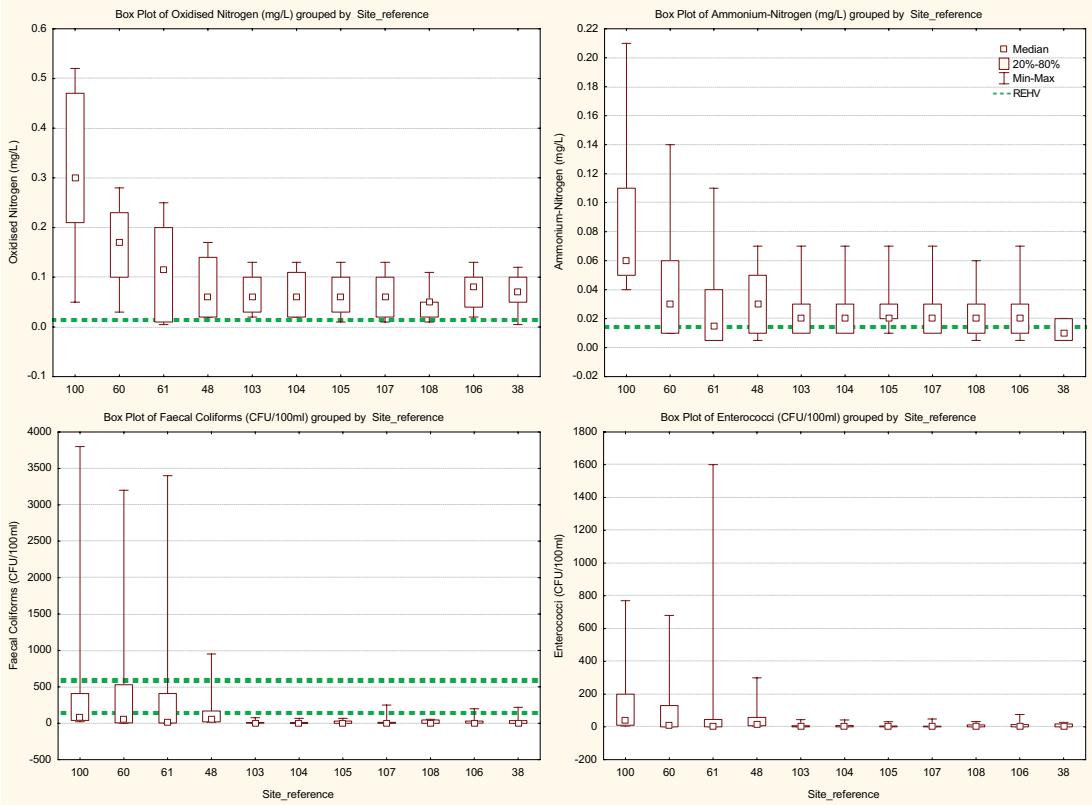


Figure 7.7 Water quality at estuarine sites: annual distribution of selected parameters compared to REHVs for estuarine waters

7.0 Water Quality Monitoring Results

Analysis of phytoplanktonic samples collected during 2011-2012 showed a diverse range of species. The dominant algal Classes collected in the Berowra Estuary at sites 60 and 61 are shown in Figure 7.8. Major phytoplankton types were similar at both sampling sites throughout the year, and generally similar to previous years.

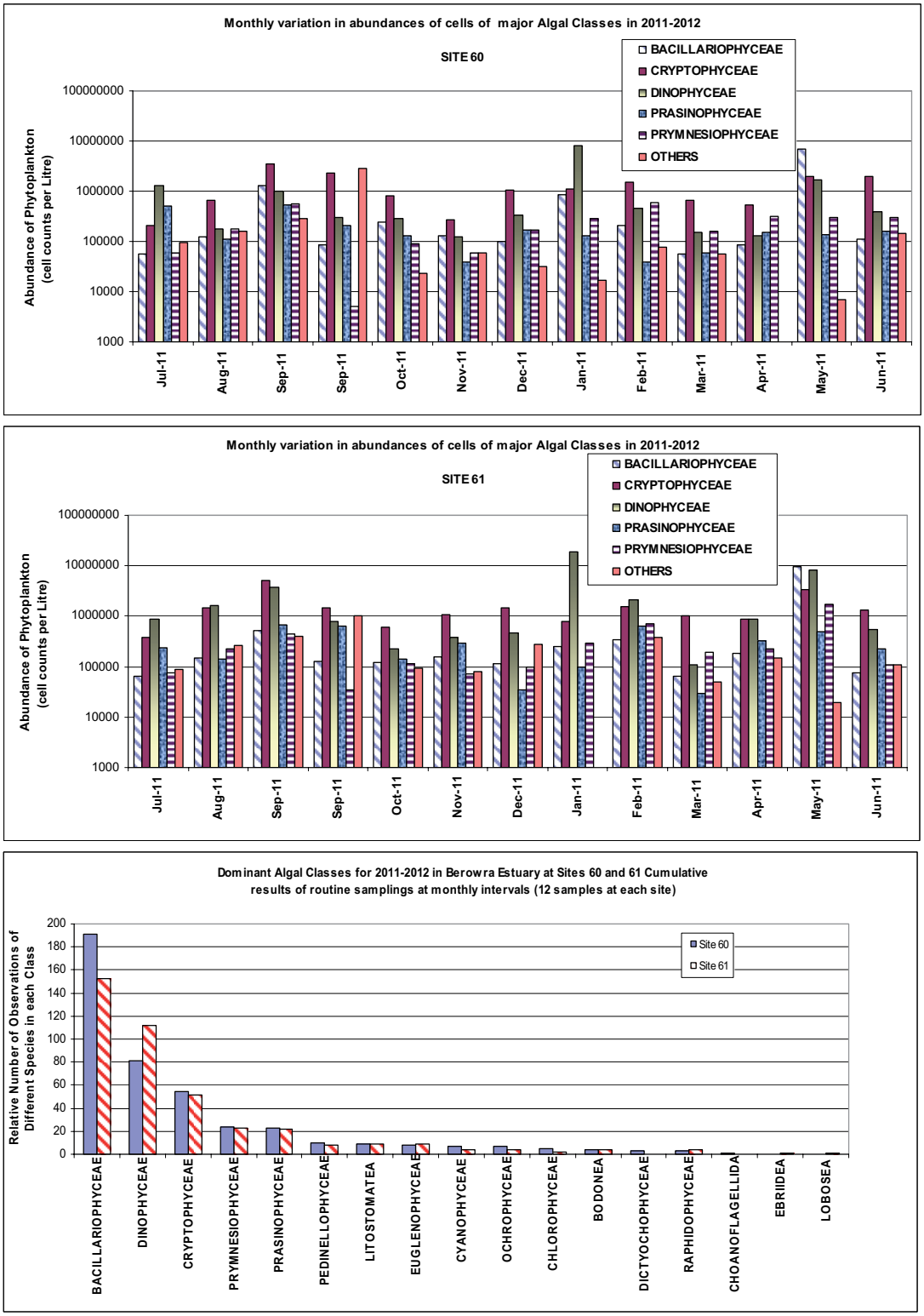
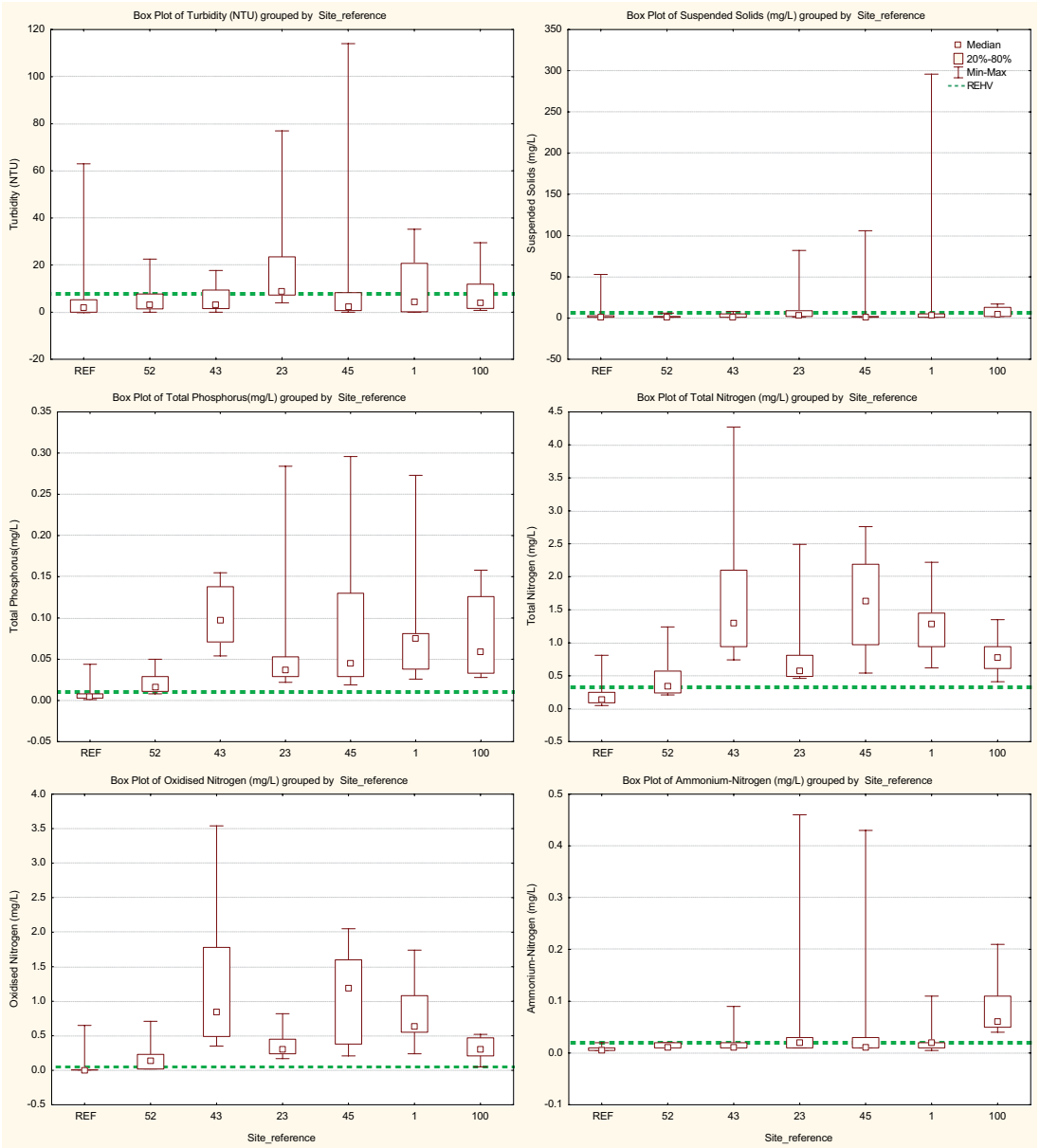


Figure 7.8 Dominant algal classes for 2011-2012 at sites 60 and 61 in Berowra Creek Estuary

7.0 Water Quality Monitoring Results

7.3.6 Sewage Treatment Plants (STP)

Figure 7.9 provides a graphical comparison of selected water quality parameters in 2011-12 at six sites near STPs in Hornsby Shire. The green dotted line represents the associated REHVs for freshwater. A single line indicates a maximum trigger value; compliant values will fall below this line. Two lines indicate an upper and lower limit; compliant data will fall between these lines.



7.0 Water Quality Monitoring Results

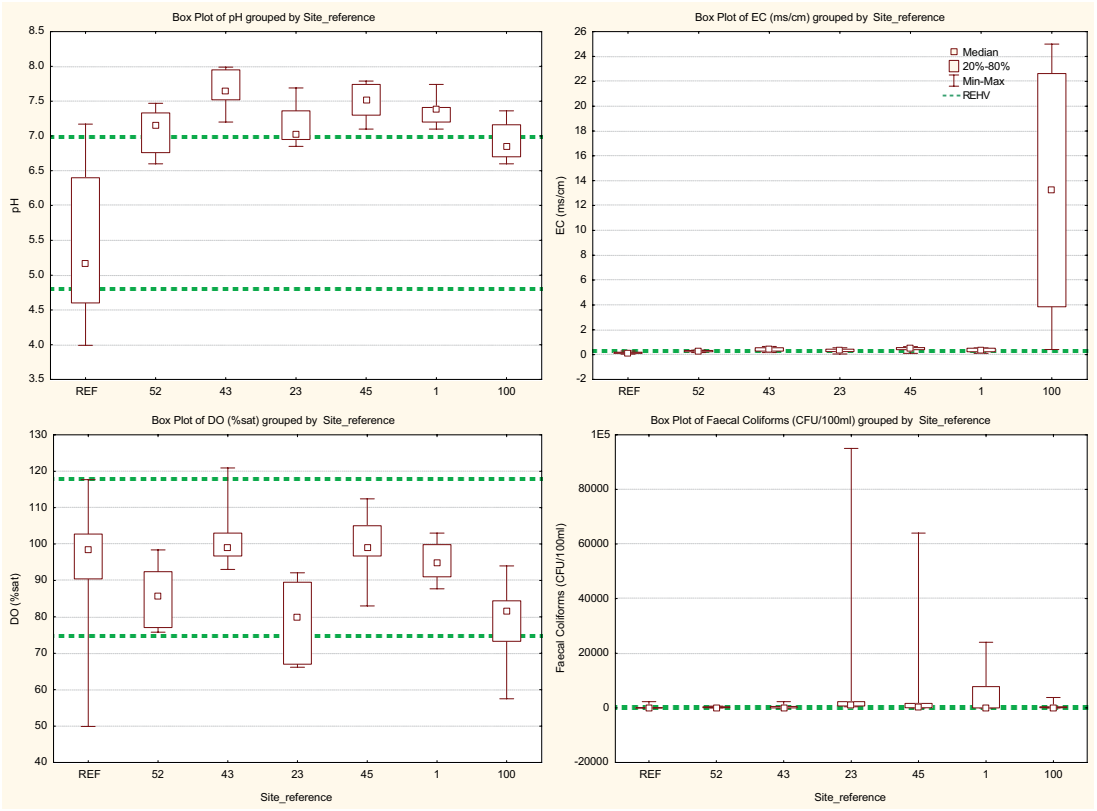


Figure 7.9 Water quality in creeks near STPS: annual distribution of selected parameters compared to REHVs for freshwater

7.0 Water Quality Monitoring Results

7.4 Catchment Remediation Rate Initiatives

7.4.1 Stormwater and Harvesting Reuse

Figure 7.10 provides a graphical comparison of selected water quality parameters in 2011-12 at seven stormwater harvesting and reuse projects in Hornsby Shire. Table 7.2 presents a summary of compliance with the interim guidelines (see section 4.2).

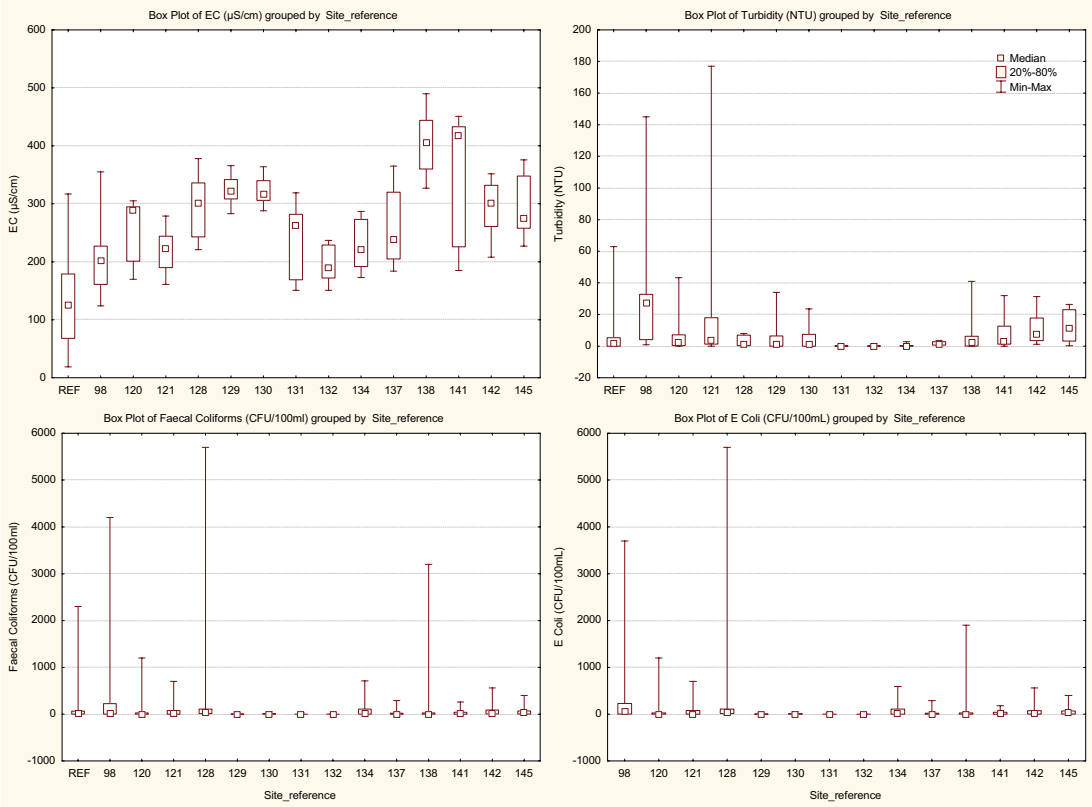


Figure 7.10 Water quality at stormwater harvesting and reuse projects: annual distribution of selected parameter

Test Parameter	Units	Trigger	Nursery 98	Greenway 121	Berowra 131	Foxglove 132	Epping\ 137	North Epping 141	Somerville 145
Fluoride (mg/L)	mg/L	>0.1	0.26	0.34	0.96	1.0	0.1	0.3	0.16
EC (uS/cm)	uS/cm	>2000	183	220	235	194	260	360	288
Sodicity (mg Na/L)	mg Na/L	>114	12	15	17	16	12	19	21
SAR *		>2	0.4	0.5	0.6	0.6	0.4	0.5	0.8
Cl (mg/L	mg/L	>175	16	24	33	32	21	32	34
Turbidity NTU	NTU	>10	7.2	21	0.2	0.2	1.6	7.2	12
Suspended Solids	mg/L	>50	1.7	2.3	1	1	1	2.3	1.8
Hardness	mg CaCO3/L	>350	*	75	(98)*	(56)*	(95)*	(72)*	(89)*
Total Fe	mg/L	>10	0.3	0.04	0.04	0.03	0.2	0.3	0.5
Total P	mg/L	>0.8	0.22	0.11	0.01	0.01	0.16	0.13	0.13
Bacteria	Faecal coliform cfu/100mL	>10	4	15	3	2	31	33	72
Bacteria	E. coli cfu/100mL	>10	5	1	3	2	34	28	72

Mean values given, except for Bacteria where median value is listed

* for EC<200 uS/cm

* = not tested or only 1 test

= Acceptable

= Potential Issue

= Problematic. Investigate further

Table 7.2 Stormwater harvesting and reuse projects 2011-12: summary of compliance with interim guidelines

7.0 Water Quality Monitoring Results

7.4.2 Landfill Sites Leachate Collection and Treatment

Figure 7.11 provides a graphical comparison of selected water quality parameters in 2011-12 at the Foxglove Oval and Arcadia landfill sites. Please note there are multiple sampling points at each landfill (before and after treatment).

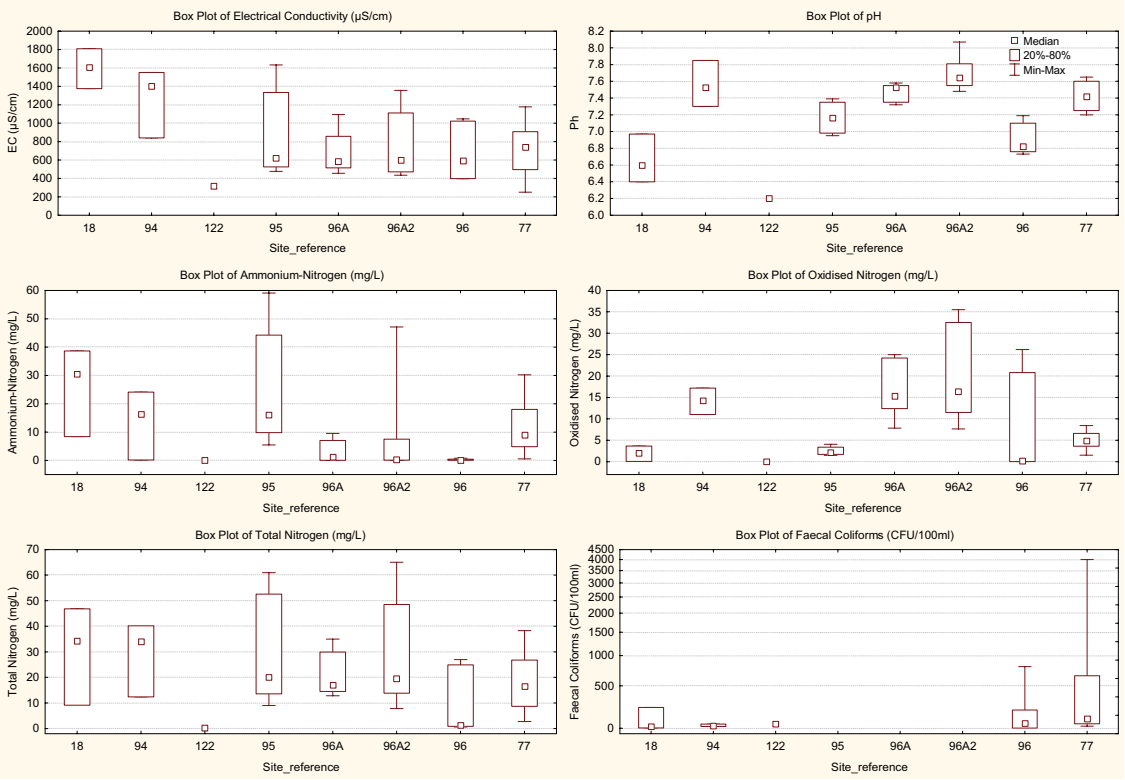


Figure 7.11 Arcadia and Foxglove Oval landfill leachate treatment facilities: annual distribution of selected water quality parameters

8.0 References

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9.0 Appendices

Appendix A. Water Quality Results

Table A.R1: Summary statistics for combined Freshwater Reference Sites for July 2011 to June 2012

Combined results of all Freshwater Reference Sites 2011-2012. (Sites 36, 37, 114, 123, 146, 147, 149, 157, 160, 161, 164)	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Flow Rate Estimate (L/min)	116	1119	200	1	30000	60	1000	3573
Temperature (oC)	117	15.4	15.9	9.0	21.3	12.1	18.7	3.3
EC (ms/cm)	117	0.14	0.13	0.04	0.30	0.10	0.20	0.06
EC (µS/cm)	117	128	126	19	317	68	179	65
Turbidity (NTU)	117	4.4	1.9	-0.2	63.0	0.0	5.3	8.4
DO (mg/L)	105	9.7	9.7	4.8	12.3	8.9	10.8	1.4
DO (%sat)	105	96	98	50	118	90	103	11
pH	112	5.4	5.2	4.0	7.2	4.6	6.4	0.8
Salinity (ppt)	117	0.1	0.1	0.0	0.6	0.1	0.1	0.1
Suspended Solids (mg/L)	115	3.1	1.0	1.0	53.0	1.0	3.0	7.0
Ammonium-Nitrogen (mg/L)	116	0.01	0.01	0.01	0.02	0.01	0.01	0.00
Oxidised Nitrogen (mg/L)	116	0.03	0.01	0.01	0.65	0.01	0.01	0.08
Total Nitrogen (mg/L)	116	0.2	0.1	0.1	0.8	0.1	0.3	0.1
Total Phosphorus(mg/L)	116	0.01	0.00	0.00	0.04	0.00	0.01	0.01
Faecal Coliforms (CFU/100ml)	116	96	23	1	2300	5	64	316
Bicarbonate Alkalinity (mg/CaCO3/L)	24	2	1	1	11	1	3	2
Chloride (mg/L)	25	33	29	14	56	25	45	12
Sulphate as SO42-(mg/L)	25	6.6	6.7	3.4	9.9	5.1	8.6	1.8
Fluoride (mg/L)	25	0.04	0.03	0.03	0.07	0.03	0.06	0.02
Sodium (mg/L)	27	18.2	17.1	9.6	29.2	13.5	23.9	5.5
Potassium (mg/L)	27	1.3	1.3	0.4	2.1	1.0	1.6	0.4
Magnesium (mg/L)	27	2.9	2.4	1.0	6.2	1.8	4.4	1.3
Calcium (mg/L)	27	1.3	1.1	0.2	4.9	0.5	2.1	1.0
Aluminium (ug/L)	26	677	386	81	2680	219	1070	663
Arsenic (ug/L)	26	0.5	0.5	0.5	0.5	0.5	0.5	0.0
Cadmium (ug/L)	26	0.5	0.5	0.5	0.5	0.5	0.5	0.0
Chromium (ug/L)	26	1.1	0.8	0.5	5.0	0.5	1.0	1.0
Copper (ug/L)	26	2.0	1.0	1.0	7.0	1.0	4.0	1.9
Lead (ug/L)	26	0.6	0.5	0.5	3.0	0.5	0.5	0.5
Manganese (ug/L)	26	22.2	16.5	2.0	92.0	7.0	35.0	20.3
Molybdenum (ug/L)	26	0.5	0.5	0.5	1.0	0.5	0.5	0.1
Nickel (ug/L)	26	1.1	0.5	0.5	4.0	0.5	2.0	1.1
Selenium (ug/L)	26	1.5	1.5	1.5	1.5	1.5	1.5	0.0
Silver (ug/L)	26	0.5	0.5	0.5	0.5	0.5	0.5	0.0
Uranium (ug/L)	26	0.5	0.5	0.5	1.0	0.5	0.5	0.1
Zinc (ug/L)	26	16.2	14.0	5.0	45.0	5.0	24.0	12.0
Boron (ug/L)	26	19.3	18.0	7.0	39.0	12.0	28.0	8.7
Iron (ug/L)	26	539	315	39	2460	146	850	565
Mercury (ug/L)	24	0.005	0.005	0.005	0.010	0.005	0.005	0.001
Total Organic Carbon(mg/L)	6	3	3	3	5	3	4	1

9.0 Appendices

Table A.1: Summary statistics Site 1 for July 2011 to June 2012

Site 1. Berowra Creek at Galston Gorge	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Temperature (oC)	13	15.8	17.4	10.7	20.8	11.9	19.9	3.6
EC (ms/cm)	13	0.36	0.33	0.11	0.54	0.23	0.52	0.14
EC (µS/cm)	13	354	315	119	552	213	508	143
Turbidity (NTU)	13	8.8	4.3	0.0	35.2	0.2	20.7	11.2
DO (mg/L)	13	9.5	9.3	8.2	11.5	8.4	10.7	1.1
DO (%sat)	13	95	95	88	103	91	100	5
pH	13	7.3	7.4	7.1	7.7	7.2	7.4	0.2
Salinity (ppt)	13	0.2	0.2	0.1	0.3	0.1	0.3	0.1
Suspended Solids (mg/L)	13	27.9	3.0	1.0	296.0	1.0	5.0	81.3
Ammonium-Nitrogen (mg/L)	13	0.02	0.02	0.01	0.11	0.01	0.02	0.03
Oxidised Nitrogen (mg/L)	13	0.80	0.63	0.24	1.74	0.55	1.08	0.41
Total Nitrogen (mg/L)	13	1.2	1.3	0.6	2.2	0.9	1.5	0.4
Total Phosphorus (mg/L)	13	0.08	0.08	0.03	0.27	0.04	0.08	0.06
Faecal Coliforms (CFU/100ml)	13	3313	49	22	24000	24	7800	7039
Bicarbonate Alkalinity (mg/CaCO3/L)	2	32		31	33			
Chloride (mg/L)	2	57		44	69			
Sulphate as $SO4^{2-}$(mg/L)	2	28.0		19.0	37.0			
Fluoride (mg/L)	2	0.17		0.09	0.25			
Sodium (mg/L)	2	36		29	43			
Potassium (mg/L)	2	4.8		3.1	6.5			
Magnesium (mg/L)	2	5.5		5.0	6.1			
Calcium (mg/L)	2	14		13	15			
Aluminium (ug/L)	2	988		306	1670			
Arsenic (ug/L)	2	0.5		0.5	0.5			
Cadmium (ug/L)	2	0.5		0.5	0.5			
Chromium (ug/L)	2	1.3		0.5	2.0			
Copper (ug/L)	2	5.5		5.0	6.0			
Lead (ug/L)	2	1.3		0.5	2.0			
Manganese (ug/L)	2	12.5		11.0	14.0			
Molybdenum (ug/L)	2	0.5		0.5	0.5			
Nickel (ug/L)	2	1.5		1.0	2.0			
Selenium (ug/L)	2	1.5		1.5	1.5			
Silver (ug/L)	2	0.5		0.5	0.5			
Uranium (ug/L)	2	0.5		0.5	0.5			
Zinc (ug/L)	2	15.0		5.0	25.0			
Boron (ug/L)	2	32.5		28.0	37.0			
Iron (ug/L)	2	1011		501	1520			
Mercury (ug/L)	2	0.005		0.005	0.005			
Total Organic Carbon (mg/L)	1	6						

Table A.2: Summary statistics Site 2 for July 2011 to June 2012

Site 2: Tunks Creek at Galston Gorge	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Flow Rate Estimate (L/min)	13	6615	2000	500	60000	900	4000	16119
Temperature (oC)	13	14.5	15.2	9.1	19.6	10.4	19.0	3.8
EC (ms/cm)	13	0.23	0.23	0.11	0.31	0.16	0.28	0.06
EC (µS/cm)	13	218	236	104	287	130	280	62
Turbidity (NTU)	13	5.5	2.9	0.0	16.1	1.1	11.0	5.4
DO (mg/L)	13	9.8	9.6	8.4	11.8	8.7	11.1	1.2
DO (%sat)	13	95	93	88	102	91	101	5
pH	13	7.0	7.1	6.7	7.3	6.7	7.2	0.2
Salinity (ppt)	13	0.1	0.1	0.1	0.2	0.1	0.1	0.0
Suspended Solids (mg/L)	13	2.3	1.0	1.0	10.0	1.0	4.0	2.6
Ammonium-Nitrogen (mg/L)	13	0.01	0.01	0.01	0.01	0.01	0.01	0.00
Oxidised Nitrogen (mg/L)	13	0.11	0.10	0.04	0.36	0.05	0.13	0.08
Total Nitrogen (mg/L)	13	0.4	0.4	0.3	0.7	0.3	0.5	0.1
Total Phosphorus (mg/L)	13	0.02	0.02	0.01	0.04	0.01	0.03	0.01
Faecal Coliforms (CFU/100ml)	13	105	17	1	540	2	300	171
Bicarbonate Alkalinity (mg/CaCO3/L)	2	12		9	15			
Chloride (mg/L)	2	44		32	56			
Sulphate as $SO4^{2-}$(mg/L)	2	15.0		12.0	18.0			
Fluoride (mg/L)	2	0.06		0.03	0.09			
Sodium (mg/L)	2	25		20	29			
Potassium (mg/L)	2	2.9		2.7	3.1			
Magnesium (mg/L)	2	4.5		3.3	5.6			
Calcium (mg/L)	2	5.6		4.3	6.8			
Aluminium (ug/L)	2	875		410	1340			
Arsenic (ug/L)	2	0.5		0.5	0.5			
Cadmium (ug/L)	2	0.5		0.5	0.5			
Chromium (ug/L)	2	1.3		0.5	2.0			
Copper (ug/L)	2	1.5		1.0	2.0			
Lead (ug/L)	2	0.5		0.5	0.5			
Manganese (ug/L)	2	9.5		8.0	11.0			
Molybdenum (ug/L)	2	0.5		0.5	0.5			
Nickel (ug/L)	2	1.0		1.0	1.0			
Selenium (ug/L)	2	1.5		1.5	1.5			
Silver (ug/L)	2	0.5		0.5	0.5			
Uranium (ug/L)	2	0.8		0.5	1.0			
Zinc (ug/L)	2	9.0		5.0	13.0			
Boron (ug/L)	2	19.0		10.0	28.0			
Iron (ug/L)	2	984		588	1380			
Mercury (ug/L)	2	0.008		0.005	0.010			
Total Organic Carbon (mg/L)	1	5						

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Table A.4: Summary statistics Site 4 for July 2011 to June 2012

Site 4: Berowra Creek near Westleigh	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Flow Rate Estimate (L/min)	11	1359	800	250	5000	500	2000	1379
Temperature (oC)	12	14.8	15.1	8.9	18.9	11.2	18.3	3.3
EC (ms/cm)	12	0.34	0.34	0.12	0.50	0.25	0.44	0.11
EC (µS/cm)	12	329	329	124	452	254	425	99
Turbidity (NTU)	12	4.3	3.5	0.0	18.7	0.7	5.3	4.9
DO (mg/L)	12	9.5	9.4	7.8	11.2	9.1	10.2	1.0
DO (%sat)	12	93	94	81	110	86	98	8
pH	12	7.2	7.3	6.9	7.6	7.0	7.4	0.2
Salinity (ppt)	12	0.2	0.2	0.1	0.3	0.1	0.2	0.1
Suspended Solids (mg/L)	12	1.9	1.0	1.0	7.0	1.0	2.0	1.8
Ammonium-Nitrogen (mg/L)	12	0.01	0.01	0.01	0.01	0.01	0.01	0.00
Oxidised Nitrogen (mg/L)	12	0.22	0.19	0.11	0.41	0.14	0.31	0.09
Total Nitrogen (mg/L)	12	0.4	0.4	0.3	0.7	0.4	0.6	0.1
Total Phosphorus (mg/L)	12	0.03	0.02	0.01	0.06	0.01	0.04	0.01
Faecal Coliforms (CFU/100ml)	12	1596	170	35	16000	78	320	4559
Bicarbonate Alkalinity (mg/CaCO3/L)	2	47		45	50			
Chloride (mg/L)	2	71		65	76			
Sulphate as $SO4^{2-}$(mg/L)	2	22.5		22.0	23.0			
Fluoride (mg/L)	2	0.11		0.08	0.13			
Sodium (mg/L)	2	42		40	45			
Potassium (mg/L)	2	2.4		2.3	2.4			
Magnesium (mg/L)	2	6.9		6.4	7.3			
Calcium (mg/L)	2	19		18	20			
Aluminium (ug/L)	2	238		111	365			
Arsenic (ug/L)	2	0.5		0.5	0.5			
Cadmium (ug/L)	2	0.5		0.5	0.5			
Chromium (ug/L)	2	0.5		0.5	0.5			
Copper (ug/L)	2	2.5		1.0	4.0			
Lead (ug/L)	2	0.5		0.5	0.5			
Manganese (ug/L)	2	9.5		9.0	10.0			
Molybdenum (ug/L)	2	0.5		0.5	0.5			
Nickel (ug/L)	2	1.0		1.0	1.0			
Selenium (ug/L)	2	1.5		1.5	1.5			
Silver (ug/L)	2	0.5		0.5	0.5			
Uranium (ug/L)	2	0.5		0.5	0.5			
Zinc (ug/L)	2	19.0		18.0	20.0			
Boron (ug/L)	2	33.0		19.0	47.0			
Iron (ug/L)	2	605		500	710			
Mercury (ug/L)	2	0.005		0.005	0.005			
Total Organic Carbon (mg/L)	1	8						

Table A.5: Summary statistics Site 5 for July 2011 to June 2012

Site 5: Pyes Creek Cherrybrook	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Flow Rate Estimate (L/min)	13	242	200	100	600	150	400	153
Temperature (oC)	13	15.1	15.1	9.5	19.3	12.0	18.8	3.2
EC (ms/cm)	13	0.51	0.54	0.10	0.92	0.25	0.68	0.24
EC (µS/cm)	13	510	562	123	902	270	707	235
Turbidity (NTU)	13	5.5	5.5	1.4	12.0	3.8	6.8	2.5
DO (mg/L)	13	8.9	8.8	6.6	12.1	7.9	10.0	1.4
DO (%sat)	13	89	88	76	109	83	95	8
pH	13	7.2	7.2	6.9	7.4	7.0	7.3	0.2
Salinity (ppt)	13	0.3	0.3	0.1	0.5	0.1	0.3	0.1
Suspended Solids (mg/L)	13	1.6	1.0	1.0	4.0	1.0	2.0	1.0
Ammonium-Nitrogen (mg/L)	13	0.02	0.02	0.01	0.03	0.01	0.03	0.01
Oxidised Nitrogen (mg/L)	13	0.57	0.51	0.15	1.18	0.23	1.02	0.33
Total Nitrogen (mg/L)	13	0.9	0.8	0.4	1.5	0.5	1.3	0.3
Total Phosphorus (mg/L)	13	0.03	0.03	0.02	0.05	0.02	0.04	0.01
Faecal Coliforms (CFU/100ml)	13	1000	270	43	2800	46	2500	1132
Bicarbonate Alkalinity (mg/CaCO3/L)	2	74		54	93			
Chloride (mg/L)	2	76		46	105			
Sulphate as $SO4^{2-}$(mg/L)	2	27.5		17.0	38.0			
Fluoride (mg/L)	2	0.12		0.11	0.13			
Sodium (mg/L)	2	46		30	61			
Potassium (mg/L)	2	3.0		2.3	3.8			
Magnesium (mg/L)	2	8.3		5.8	10.8			
Calcium (mg/L)	2	25		18	31			
Aluminium (ug/L)	2	173		143	202			
Arsenic (ug/L)	2	0.8		0.5	1.0			
Cadmium (ug/L)	2	0.5		0.5	0.5			
Chromium (ug/L)	2	1.3		0.5	2.0			
Copper (ug/L)	2	4.5		3.0	6.0			
Lead (ug/L)	2	0.5		0.5	0.5			
Manganese (ug/L)	2	27.0		16.0	38.0			
Molybdenum (ug/L)	2	0.8		0.5	1.0			
Nickel (ug/L)	2	7.5		1.0	14.0			
Selenium (ug/L)	2	1.5		1.5	1.5			
Silver (ug/L)	2	0.5		0.5	0.5			
Uranium (ug/L)	2	0.5		0.5	0.5			
Zinc (ug/L)	2	16.5		15.0	18.0			
Boron (ug/L)	2	33.5		21.0	46.0			
Iron (ug/L)	2	728		584	871			
Mercury (ug/L)	2	0.005		0.005	0.005			
Total Organic Carbon (mg/L)	1	5						

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Table A.6: Summary statistics Site 6 for July 2011 to June 2012

Site 6: Georges Creek Dural	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Flow Rate Estimate (L/min)	13	431	250	150	1500	150	600	404
Temperature (oC)	13	14.9	14.7	9.9	19.4	11.8	18.4	3.1
EC (ms/cm)	13	0.36	0.38	0.22	0.48	0.29	0.44	0.08
EC (µS/cm)	13	351	356	236	471	288	420	68
Turbidity (NTU)	13	10.8	7.7	2.8	35.0	4.2	14.7	9.0
DO (mg/L)	13	9.6	10.1	8.3	10.8	8.4	10.7	1.0
DO (%sat)	13	96	97	81	111	92	98	7
pH	13	7.3	7.3	7.1	7.5	7.2	7.4	0.1
Salinity (ppt)	13	0.2	0.2	0.1	0.2	0.1	0.2	0.0
Suspended Solids (mg/L)	13	3.1	3.0	1.0	9.0	1.0	5.0	2.6
Ammonium-Nitrogen (mg/L)	13	0.01	0.01	0.01	0.01	0.01	0.01	0.00
Oxidised Nitrogen (mg/L)	13	0.22	0.23	0.06	0.36	0.15	0.30	0.09
Total Nitrogen (mg/L)	13	0.6	0.6	0.4	0.8	0.5	0.7	0.1
Total Phosphorus (mg/L)	13	0.05	0.04	0.02	0.08	0.02	0.07	0.02
Faecal Coliforms (CFU/100ml)	13	265	91	12	900	52	380	289
Bicarbonate Alkalinity (mg/CaCO3/L)	2	47		44	51			
Chloride (mg/L)	2	66		61	70			
Sulphate as $SO4^{2-}$(mg/L)	2	22.0		21.0	23.0			
Fluoride (mg/L)	2	0.11		0.10	0.12			
Sodium (mg/L)	2	37		36	39			
Potassium (mg/L)	2	3.9		3.5	4.2			
Magnesium (mg/L)	2	6.7		6.5	7.0			
Calcium (mg/L)	2	17		16	17			
Aluminium (ug/L)	2	908		345	1470			
Arsenic (ug/L)	2	0.8		0.5	1.0			
Cadmium (ug/L)	2	0.5		0.5	0.5			
Chromium (ug/L)	2	1.3		0.5	2.0			
Copper (ug/L)	2	3.0		1.0	5.0			
Lead (ug/L)	2	0.8		0.5	1.0			
Manganese (ug/L)	2	13.5		10.0	17.0			
Molybdenum (ug/L)	2	0.5		0.5	0.5			
Nickel (ug/L)	2	0.8		0.5	1.0			
Selenium (ug/L)	2	1.5		1.5	1.5			
Silver (ug/L)	2	0.5		0.5	0.5			
Uranium (ug/L)	2	0.5		0.5	0.5			
Zinc (ug/L)	2	9.5		5.0	14.0			
Boron (ug/L)	2	28.5		15.0	42.0			
Iron (ug/L)	2	1429		887	1970			
Mercury (ug/L)	2	0.005		0.005	0.005			
Total Organic Carbon (mg/L)	1	8						

Table A.8: Summary statistics Site 8 for July 2011 to June 2012

Site 8: Devlins Ck Epping	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Flow Rate Estimate (L/min)	11	1991	1200	400	5000	1000	3000	1652
Temperature (oC)	13	16.1	16.2	10.5	20.4	13.2	19.8	3.2
EC (ms/cm)	13	0.49	0.49	0.24	0.75	0.32	0.65	0.16
EC (µS/cm)	13	481	493	240	702	324	635	149
Turbidity (NTU)	13	9.8	6.3	1.0	29.8	3.1	19.2	8.9
DO (mg/L)	13	10.0	9.9	9.0	11.4	9.2	11.1	0.8
DO (%sat)	13	102	102	94	112	98	109	6
pH	12	7.5	7.5	7.1	7.8	7.3	7.6	0.2
Salinity (ppt)	13	0.2	0.2	0.1	0.4	0.2	0.3	0.1
Suspended Solids (mg/L)	13	3.1	3.0	1.0	7.0	1.0	5.0	2.1
Ammonium-Nitrogen (mg/L)	13	0.05	0.03	0.01	0.26	0.02	0.06	0.07
Oxidised Nitrogen (mg/L)	13	0.50	0.49	0.13	0.82	0.38	0.62	0.20
Total Nitrogen (mg/L)	13	0.9	0.8	0.5	1.5	0.7	1.1	0.3
Total Phosphorus (mg/L)	13	0.05	0.04	0.02	0.10	0.02	0.07	0.03
Faecal Coliforms (CFU/100ml)	13	1636	600	240	6900	400	1900	2035
Bicarbonate Alkalinity (mg/CaCO3/L)	2	65		65	65			
Chloride (mg/L)	2	104		98	109			
Sulphate as $SO4^{2-}$(mg/L)	2	37.0		35.0	39.0			
Fluoride (mg/L)	2	0.13		0.11	0.15			
Sodium (mg/L)	2	53		48	59			
Potassium (mg/L)	2	3.8		3.5	4.0			
Magnesium (mg/L)	2	8.5		7.7	9.2			
Calcium (mg/L)	2	27		25	28			
Aluminium (ug/L)	2	222		122	322			
Arsenic (ug/L)	2	0.5		0.5	0.5			
Cadmium (ug/L)	2	0.5		0.5	0.5			
Chromium (ug/L)	2	0.5		0.5	0.5			
Copper (ug/L)	2	3.5		3.0	4.0			
Lead (ug/L)	2	0.8		0.5	1.0			
Manganese (ug/L)	2	20.0		20.0	20.0			
Molybdenum (ug/L)	2	0.5		0.5	0.5			
Nickel (ug/L)	2	1.0		1.0	1.0			
Selenium (ug/L)	2	1.5		1.5	1.5			
Silver (ug/L)	2	0.5		0.5	0.5			
Uranium (ug/L)	2	0.5		0.5	0.5			
Zinc (ug/L)	2	16.5		5.0	28.0			
Boron (ug/L)	2	35.5		22.0	49.0			
Iron (ug/L)	2	1044		988	1100			
Mercury (ug/L)	2	0.005		0.005	0.005			
Total Organic Carbon (mg/L)	1	12						

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Table A.10: Summary statistics Site 10 for July 2011 to June 2012

Site 10: Larool Ck Thornleigh	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Flow Rate Estimate (L/min)	18	116	30	3	600	10	240	179
Temperature (oC)	18	15.2	14.6	10.6	20.8	12.0	19.5	3.4
EC (ms/cm)	18	0.65	0.66	0.16	1.33	0.51	0.85	0.28
EC (µS/cm)	18	651	681	142	1351	499	840	284
Turbidity (NTU)	18	38.3	17.8	8.2	214.9	8.8	59.6	49.9
DO (mg/L)	18	7.7	7.7	6.0	9.7	7.0	8.4	0.9
DO (%sat)	18	78	76	61	94	72	84	9
pH	18	7.5	7.4	6.9	10.1	7.1	7.6	0.7
Salinity (ppt)	18	0.3	0.3	0.1	0.7	0.3	0.4	0.1
Suspended Solids (mg/L)	18	20.8	7.0	3.0	104.0	4.0	40.0	26.7
Ammonium-Nitrogen (mg/L)	18	0.21	0.11	0.04	1.28	0.06	0.33	0.29
Oxidised Nitrogen (mg/L)	18	0.71	0.66	0.24	1.56	0.40	0.89	0.35
Total Nitrogen (mg/L)	18	1.7	1.2	0.5	10.6	0.8	1.7	2.3
Total Phosphorus (mg/L)	18	0.19	0.06	0.03	2.22	0.04	0.10	0.51
Faecal Coliforms (CFU/100ml)	18	19631	4000	180	210000	620	12000	50024
Bicarbonate Alkalinity (mg/CaCO3/L)	2	245		120	369			
Chloride (mg/L)	1	150						
Sulphate as $SO4^{2-}$(mg/L)	1	31.0						
Fluoride (mg/L)	1	0.6						
Sodium (mg/L)	2	173		116	229			
Potassium (mg/L)	2	21		7	35			
Magnesium (mg/L)	2	14		10	18			
Calcium (mg/L)	2	38		27	48			
Aluminium (ug/L)	2	407		351	462			
Arsenic (ug/L)	2	1.3		0.5	2.0			
Cadmium (ug/L)	2	0.5		0.5	0.5			
Chromium (ug/L)	2	21.8		0.5	43.0			
Copper (ug/L)	2	17.5		2.0	33.0			
Lead (ug/L)	2	0.8		0.5	1.0			
Manganese (ug/L)	2	195.0		194.0	196.0			
Molybdenum (ug/L)	2	3.5		2.0	5.0			
Nickel (ug/L)	2	107.5		2.0	213.0			
Selenium (ug/L)	2	1.5		1.5	1.5			
Silver (ug/L)	2	0.5		0.5	0.5			
Uranium (ug/L)	2	0.5		0.5	0.5			
Zinc (ug/L)	2	133.0		49.0	217.0			
Boron (ug/L)	2	50.5		32.0	69.0			
Iron (ug/L)	2	2450		2410	2490			
Mercury (ug/L)	2	0.005		0.005	0.005			
BOD5/CBOD5 (mg/L)	1	1						
Chemical Oxygen Demand (mg/L)	1	7						
Total Organic Carbon (mg/L)	1	8						

Table A.12: Summary statistics Site 12 for July 2011 to June 2012

Site 12: Hornsby Creek Hornsby	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Flow Rate Estimate (L/min)	19	13492	200	30	250000	100	500	57275
Temperature (oC)	19	15.5	14.8	10.7	20.8	11.4	19.4	3.6
EC (ms/cm)	19	0.38	0.39	0.11	0.58	0.28	0.50	0.12
EC (µS/cm)	19	370	377	77	554	282	464	120
Turbidity (NTU)	19	10.0	3.5	0.3	54.0	1.9	26.2	14.5
DO (mg/L)	18	9.6	9.7	7.3	11.3	9.1	10.4	0.9
DO (%sat)	18	96	96	80	113	90	103	8
pH	19	7.6	7.6	7.0	8.8	7.3	7.9	0.4
Salinity (ppt)	19	0.2	0.2	0.1	0.3	0.1	0.3	0.1
Suspended Solids (mg/L)	19	5.8	2.0	1.0	31.0	1.0	12.0	7.6
Ammonium-Nitrogen (mg/L)	19	0.12	0.06	0.01	0.56	0.02	0.15	0.15
Oxidised Nitrogen (mg/L)	19	0.77	0.77	0.17	1.46	0.49	1.05	0.33
Total Nitrogen (mg/L)	19	3.3	1.3	0.5	26.5	0.8	3.4	5.9
Total Phosphorus (mg/L)	19	0.08	0.04	0.02	0.24	0.03	0.13	0.06
Faecal Coliforms (CFU/100ml)	19	9862	540	190	68000	280	9100	20718
Bicarbonate Alkalinity (mg/CaCO3/L)	3	54	65	29	67	29	67	21
Chloride (mg/L)	2	27		10	43			
Sulphate as $SO4^{2-}$(mg/L)	2	18.0		9.0	27.0			
Fluoride (mg/L)	2	0.10		0.06	0.14			
Sodium (mg/L)	3	28	26	8	49	8	49	20
Potassium (mg/L)	3	2.7	2.6	2.2	3.3	2.2	3.3	0.6
Magnesium (mg/L)	3	6.0	6.1	2.2	9.7	2.2	9.7	3.8
Calcium (mg/L)	3	22	22	11	32	11	32	11
Aluminium (ug/L)	3	715	166	58	1920	58	1920	1045
Arsenic (ug/L)	3	1.3	0.5	0.5	3.0	0.5	3.0	1.4
Cadmium (ug/L)	3	0.5	0.5	0.5	0.5	0.5	0.5	0.0
Chromium (ug/L)	3	3.5	3.0	0.5	7.0	0.5	7.0	3.3
Copper (ug/L)	3	8.7	6.0	1.0	19.0	1.0	19.0	9.3
Lead (ug/L)	3	3.0	0.5	0.5	8.0	0.5	8.0	4.3
Manganese (ug/L)	3	15.0	14.0	10.0	21.0	10.0	21.0	5.6
Molybdenum (ug/L)	3	1.0	0.5	0.5	2.0	0.5	2.0	0.9
Nickel (ug/L)	3	1.7	2.0	1.0	2.0	1.0	2.0	0.6
Selenium (ug/L)	3	1.5	1.5	1.5	1.5	1.5	1.5	0.0
Silver (ug/L)	3	0.5	0.5	0.5	0.5	0.5	0.5	0.0
Uranium (ug/L)	3	0.5	0.5	0.5	0.5	0.5	0.5	0.0
Zinc (ug/L)	3	62.7	70.0	48.0	70.0	48.0	70.0	12.7
Boron (ug/L)	3	34.3	27.0	27.0	49.0	27.0	49.0	12.7
Iron (ug/L)	3	979	724	592	1620	592	1620	559
Mercury (ug/L)	3	0.007	0.005	0.005	0.010	0.005	0.010	0.003
BOD5/CBOD5 (mg/L)	1	1						
Chemical Oxygen Demand (mg/L)	1	4						
Total Organic Carbon (mg/L)	1	31						

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Table A.13: Summary statistics Site 13 for July 2011 to June 2012

Site 13: Sams Ck Mt Kuring-gai	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Flow Rate Estimate (L/min)	18	290	25	5	4000	10	100	936
Temperature (oC)	18	15.7	15.3	10.6	21.2	12.0	19.3	3.4
EC (ms/cm)	18	0.28	0.29	0.11	0.42	0.22	0.35	0.08
EC (µS/cm)	18	279	293	83	436	188	357	91
Turbidity (NTU)	18	7.4	3.0	0.0	46.1	0.4	6.2	13.3
DO (mg/L)	16	7.8	7.9	5.2	10.5	7.8	8.2	1.2
DO (%sat)	16	78	76	56	111	72	89	13
pH	17	7.2	7.2	7.0	7.4	7.2	7.3	0.1
Salinity (ppt)	18	0.1	0.2	0.1	0.2	0.1	0.2	0.0
Suspended Solids (mg/L)	18	3.4	1.0	1.0	22.0	1.0	3.0	5.5
Ammonium-Nitrogen (mg/L)	18	0.09	0.09	0.01	0.25	0.05	0.11	0.06
Oxidised Nitrogen (mg/L)	18	0.32	0.25	0.07	0.99	0.13	0.42	0.22
Total Nitrogen (mg/L)	18	0.6	0.6	0.4	1.2	0.4	0.8	0.3
Total Phosphorus (mg/L)	18	0.03	0.02	0.02	0.07	0.02	0.05	0.02
Faecal Coliforms (CFU/100ml)	18	618	275	15	3500	38	690	1051
Bicarbonate Alkalinity (mg/CaCO3/L)	3	61	61	50	71	50	71	11
Chloride (mg/L)	2	25		20	30			
Sulphate as $SO4^{2-}$(mg/L)	2	19.0		19.0	19.0			
Fluoride (mg/L)	2	0.08		0.06	0.09			
Sodium (mg/L)	3	23	21	16	32	16	32	8
Potassium (mg/L)	3	2.9	3.0	2.8	3.0	2.8	3.0	0.1
Magnesium (mg/L)	3	6.4	5.7	5.3	8.0	5.3	8.0	1.5
Calcium (mg/L)	3	26	24	19	34	19	34	8
Aluminium (ug/L)	3	899	137	11	2550	11	2550	1431
Arsenic (ug/L)	3	0.7	0.5	0.5	1.0	0.5	1.0	0.3
Cadmium (ug/L)	3	0.5	0.5	0.5	0.5	0.5	0.5	0.0
Chromium (ug/L)	3	1.3	0.5	0.5	3.0	0.5	3.0	1.4
Copper (ug/L)	3	4.3	1.0	1.0	11.0	1.0	11.0	5.8
Lead (ug/L)	3	1.7	0.5	0.5	4.0	0.5	4.0	2.0
Manganese (ug/L)	3	36.0	34.0	16.0	58.0	16.0	58.0	21.1
Molybdenum (ug/L)	3	1.2	1.0	0.5	2.0	0.5	2.0	0.8
Nickel (ug/L)	3	1.0	0.5	0.5	2.0	0.5	2.0	0.9
Selenium (ug/L)	3	1.5	1.5	1.5	1.5	1.5	1.5	0.0
Silver (ug/L)	3	0.5	0.5	0.5	0.5	0.5	0.5	0.0
Uranium (ug/L)	3	0.5	0.5	0.5	0.5	0.5	0.5	0.0
Zinc (ug/L)	3	44.3	41.0	25.0	67.0	25.0	67.0	21.2
Boron (ug/L)	3	37.0	35.0	32.0	44.0	32.0	44.0	6.2
Iron (ug/L)	3	1178	838	747	1950	747	1950	670
Mercury (ug/L)	3	0.005	0.005	0.005	0.005	0.005	0.005	0.000
BOD5/CBOD5 (mg/L)	1	1	1	1	1	1	1	

Table A.18: Summary statistics Site 18 for July 2011 to June 2012

Site 18: Arcadia Tip - Raw Leachate	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
FLOW RATE	0					0	0	
Secchi Depth (m)	0					0	0	
Temperature (oC)	4	17.7	18.1	14.6	19.8	14.6	19.8	2.4
EC (ms/cm)	4	1.58	1.60	1.33	1.77	1.33	1.77	0.19
EC (µS/cm)	4	1600	1608	1375	1808	1375	1808	194
Turbidity (NTU)	4	17.0	15.4	11.4	25.7	11.4	25.7	6.3
DO (mg/L)	4	2.2	1.7	0.1	5.3	0.1	5.3	2.5
DO (%sat)	4	24	17	2	61	2	61	28
pH	4	6.6	6.6	6.4	7.0	6.4	7.0	0.2
Salinity (ppt)	4	0.8	0.8	0.7	0.9	0.7	0.9	0.1
Suspended Solids (mg/L)	3	15.3	5.0	4.0	37.0	4.0	37.0	18.8
Ammonium-Nitrogen (mg/L)	4	27.05	30.60	8.40	38.60	8.40	38.60	13.19
Oxidised Nitrogen (mg/L)	4	1.96	2.06	0.06	3.67	0.06	3.67	1.53
Total Nitrogen (mg/L)	4	31.1	34.2	9.2	46.8	9.2	46.8	16.0
Total Phosphorus(mg/L)	3	0.03	0.03	0.01	0.04	0.01	0.04	0.01
Soluble Reactive Phosphorus (mg/L)	0					0.00	0.00	
Chlorophyll-A (ug/L)	0					0.0	0.0	
Faecal Coliforms (CFU/100ml)	3	80	16	3	220	3	220	122
Enterococci (CFU/100ml)	0					0	0	

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Table A.23: Summary statistics Site 23 for July 2011 to June 2012

Site 23: Waitara Ck Hornsby	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Flow Rate Estimate (L/min)	12	27033	750	300	300000	400	3000	86060
Temperature (oC)	13	15.0	15.7	10.0	19.4	12.6	17.8	2.9
EC (ms/cm)	13	0.33	0.35	0.05	0.55	0.24	0.44	0.14
EC (µS/cm)	13	319	343	57	512	194	441	138
Turbidity (NTU)	13	18.6	9.0	4.0	77.0	7.3	23.5	21.3
DO (mg/L)	11	8.0	8.2	5.6	9.9	7.1	9.2	1.3
DO (%sat)	11	80	80	66	92	67	90	10
pH	12	7.1	7.0	6.9	7.7	7.0	7.4	0.3
Salinity (ppt)	13	0.2	0.2	0.0	0.3	0.1	0.2	0.1
Suspended Solids (mg/L)	13	11.6	3.0	1.0	82.0	2.0	9.0	22.4
Ammonium-Nitrogen (mg/L)	13	0.05	0.02	0.01	0.46	0.01	0.03	0.12
Oxidised Nitrogen (mg/L)	13	0.36	0.30	0.17	0.82	0.24	0.45	0.18
Total Nitrogen (mg/L)	13	0.8	0.6	0.5	2.5	0.5	0.8	0.5
Total Phosphorus (mg/L)	13	0.06	0.04	0.02	0.28	0.03	0.05	0.07
Faecal Coliforms (CFU/100ml)	13	8608	1200	390	95000	710	2300	25973
Bicarbonate Alkalinity (mg/CaCO3/L)	2	43		27	58			
Chloride (mg/L)	2	50		27	73			
Sulphate as $SO4^{2-}$(mg/L)	2	18.0		10.0	26.0			
Fluoride (mg/L)	2	0.11		0.07	0.15			
Sodium (mg/L)	2	33		19	48			
Potassium (mg/L)	2	2.9		2.8	2.9			
Magnesium (mg/L)	2	5.6		2.9	8.2			
Calcium (mg/L)	2	18		12	24			
Aluminium (ug/L)	2	1855		339	3370			
Arsenic (ug/L)	2	1.8		0.5	3.0			
Cadmium (ug/L)	2	0.5		0.5	0.5			
Chromium (ug/L)	2	3.3		0.5	6.0			
Copper (ug/L)	2	15.0		14.0	16.0			
Lead (ug/L)	2	5.5		1.0	10.0			
Manganese (ug/L)	2	33.0		24.0	42.0			
Molybdenum (ug/L)	2	0.5		0.5	0.5			
Nickel (ug/L)	2	1.5		1.0	2.0			
Selenium (ug/L)	2	1.5		1.5	1.5			
Silver (ug/L)	2	0.5		0.5	0.5			
Uranium (ug/L)	2	1.3		0.5	2.0			
Zinc (ug/L)	2	38.0		17.0	59.0			
Boron (ug/L)	2	32.5		31.0	34.0			
Iron (ug/L)	2	2195		1000	3390			
Mercury (ug/L)	2	0.013		0.005	0.020			
Total Organic Carbon (mg/L)	1	9						

Table A.36: Summary statistics Site 36 for July 2011 to June 2012

Site 36: Murray Anderson Creek. Reference Freshwater Creek	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Flow Rate Estimate (L/min)	12	1051	1100	60	3000	200	1500	899
Temperature (oC)	12	15.5	16.0	10.0	19.8	12.4	19.1	3.2
EC (ms/cm)	12	0.12	0.12	0.05	0.18	0.10	0.14	0.04
EC (µS/cm)	12	99	105	55	140	68	130	30
Turbidity (NTU)	12	1.0	0.5	0.0	4.6	0.0	2.0	1.4
DO (mg/L)	11	10.3	10.1	9.1	11.5	9.7	11.1	0.8
DO (%sat)	11	101	103	92	107	99	105	4
pH	12	4.8	4.9	4.2	5.4	4.6	5.1	0.3
Salinity (ppt)	12	0.1	0.1	0.0	0.1	0.1	0.1	0.0
Suspended Solids (mg/L)	12	1.0	1.0	1.0	1.0	1.0	1.0	0.0
Ammonium-Nitrogen (mg/L)	12	0.01	0.01	0.01	0.01	0.01	0.01	0.00
Oxidised Nitrogen (mg/L)	12	0.01	0.01	0.01	0.01	0.01	0.01	0.00
Total Nitrogen (mg/L)	12	0.1	0.1	0.1	0.2	0.1	0.1	0.0
Total Phosphorus (mg/L)	12	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Faecal Coliforms (CFU/100ml)	12	26	16	2	100	9	39	27
Bicarbonate Alkalinity (mg/CaCO3/L)	1	1						
Chloride (mg/L)	1	29						
Sulphate as $SO4^{2-}$(mg/L)	1	5.6						
Fluoride (mg/L)	1	0.03						
Sodium (mg/L)	1	14						
Potassium (mg/L)	1	0.4						
Magnesium (mg/L)	1	1.8						
Calcium (mg/L)	1	0.5						
Aluminium (ug/L)	1	258						
Arsenic (ug/L)	1	0.5						
Cadmium (ug/L)	1	0.5						
Chromium (ug/L)	1	0.5						
Copper (ug/L)	1	5.0						
Lead (ug/L)	1	0.5						
Manganese (ug/L)	1	20.0						
Molybdenum (ug/L)	1	0.5						
Nickel (ug/L)	1	0.5						
Selenium (ug/L)	1	1.5						
Silver (ug/L)	1	0.5						
Uranium (ug/L)	1	0.5						
Zinc (ug/L)	1	20.0						
Boron (ug/L)	1	13.0						
Iron (ug/L)	1	257						
Mercury (ug/L)	1	0.005						

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Table A.37: Summary statistics Site 37 for July 2011 to June 2012

Site 37: Smugglers Ck in Marramarra NP. Reference freshwater creek	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Flow Rate Estimate (L/min)	12	850	225	120	4000	150	1500	1130
Temperature (oC)	13	15.0	16.1	9.2	20.1	10.9	18.3	3.6
EC (ms/cm)	13	0.14	0.16	0.05	0.22	0.11	0.20	0.06
EC (µS/cm)	13	127	135	56	199	65	166	45
Turbidity (NTU)	13	1.6	1.6	0.0	3.3	0.0	2.9	1.2
DO (mg/L)	13	10.2	9.7	8.8	12.2	9.0	11.4	1.2
DO (%sat)	13	99	99	88	118	91	102	8
pH	13	5.4	5.4	4.9	5.7	5.1	5.6	0.3
Salinity (ppt)	13	0.1	0.1	0.0	0.1	0.1	0.1	0.0
Suspended Solids (mg/L)	13	4.6	1.0	1.0	47.0	1.0	1.0	12.7
Ammonium-Nitrogen (mg/L)	13	0.01	0.01	0.01	0.01	0.01	0.01	0.00
Oxidised Nitrogen (mg/L)	13	0.01	0.01	0.01	0.01	0.01	0.01	0.00
Total Nitrogen (mg/L)	13	0.2	0.2	0.1	0.3	0.1	0.2	0.1
Total Phosphorus (mg/L)	13	0.00	0.00	0.00	0.01	0.00	0.01	0.00
Faecal Coliforms (CFU/100ml)	13	34	21	1	96	3	72	34
Bicarbonate Alkalinity (mg/CaCO3/L)	1	1						
Chloride (mg/L)	1	30						
Sulphate as $SO4^{2-}$(mg/L)	1	5.4						
Fluoride (mg/L)	1	0.03						
Sodium (mg/L)	1	15.5						
Potassium (mg/L)	1	1.1						
Magnesium (mg/L)	1	1.9						
Calcium (mg/L)	1	0.8						
Aluminium (ug/L)	1	565						
Arsenic (ug/L)	1	0.5						
Cadmium (ug/L)	1	0.5						
Chromium (ug/L)	1	1.0						
Copper (ug/L)	1	1.0						
Lead (ug/L)	1	0.5						
Manganese (ug/L)	1	37.0						
Molybdenum (ug/L)	1	0.5						
Nickel (ug/L)	1	1.0						
Selenium (ug/L)	1	1.5						
Silver (ug/L)	1	0.5						
Uranium (ug/L)	1	0.5						
Zinc (ug/L)	1	5.0						
Boron (ug/L)	1	29.0						
Iron (ug/L)	1	533						
Mercury (ug/L)	1	0						

Table A.38: Summary statistics Site 38 for July 2011 to June 2012

Site 38: Upper Sandbrook Inlet, Brooklyn	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Secchi Depth (m)	11	0.8	0.8	0.3	1.0	0.7	1.0	0.2
Temperature (oC)	11	18.8	18.4	15.1	27.1	16.2	20.3	3.5
EC (ms/cm)	11	36.32	39.66	2.86	42.91	35.90	41.23	11.32
EC (µS/cm)	1	2925*						
Turbidity (NTU)	11	15.8	15.8	7.0	29.8	9.0	20.5	7.6
DO (mg/L)	10	7.4	7.5	6.0	8.5	7.0	8.1	0.7
DO (%sat)	10	91	89	78	105	84	101	9
pH	11	7.6	7.6	7.2	8.0	7.6	7.8	0.2
Salinity (ppt)	11	23.1	25.3	1.5	27.5	22.6	26.4	7.3
Suspended Solids (mg/L)	11	14.2	11.0	1.0	32.0	5.0	19.0	10.1
Ammonium-Nitrogen (mg/L)	11	0.01	0.01	0.01	0.02	0.01	0.02	0.01
Oxidised Nitrogen (mg/L)	11	0.07	0.07	0.01	0.12	0.05	0.10	0.04
Total Nitrogen (mg/L)	11	0.3	0.3	0.2	0.8	0.3	0.4	0.1
Total Phosphorus (mg/L)	11	0.03	0.03	0.01	0.07	0.02	0.03	0.02
Chlorophyll-A (ug/L)	10	5.8	3.4	2.1	28.2	2.2	4.8	8.0
Faecal Coliforms (CFU/100ml)	11	32	5	1	220	1	38	65
Enterococci (CFU/100ml)	10	9	5	1	28	1	19	10

* After heavy rain 12 March 2012

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Table A.39: Summary statistics Site 39 for July 2011 to June 2012

Site 39: Joe Crafts Creek	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Flow Rate Estimate (L/min)	12	3017	1000	300	20000	400	3000	5517
Temperature (oC)	12	15.3	15.6	9.3	20.4	12.1	19.0	3.4
EC (ms/cm)	12	0.18	0.19	0.11	0.25	0.16	0.22	0.04
EC (µS/cm)	12	160	143	105	227	129	213	43
Turbidity (NTU)	12	2.5	2.1	0.0	5.8	0.2	4.6	2.1
DO (mg/L)	11	9.8	9.8	6.9	12.2	9.2	10.6	1.3
DO (%sat)	11	96	98	69	106	93	103	11
pH	12	7.2	7.2	7.0	7.5	7.1	7.4	0.2
Salinity (ppt)	12	0.1	0.1	0.1	0.1	0.1	0.1	0.0
Suspended Solids (mg/L)	12	2.7	1.0	1.0	21.0	1.0	1.0	5.8
Ammonium-Nitrogen (mg/L)	12	0.01	0.01	0.01	0.02	0.01	0.01	0.00
Oxidised Nitrogen (mg/L)	12	0.07	0.07	0.04	0.13	0.04	0.09	0.03
Total Nitrogen (mg/L)	12	0.3	0.3	0.2	0.4	0.2	0.3	0.1
Total Phosphorus(mg/L)	12	0.01	0.01	0.00	0.04	0.01	0.01	0.01
Chlorophyll-A (ug/L)	1	3.2	3.2	3.2	3.2	3.2	3.2	
Faecal Coliforms (CFU/100ml)	12	132	37	9	500	24	300	183
Enterococci (CFU/100ml)	1	34	34	34	34	34	34	
Bicarbonate Alkalinity (mg/CaCO3/L)	1	15	15	15	15	15	15	
Chloride (mg/L)	1	32	32	32	32	32	32	
Sulphate as SO42-(mg/L)	1	13.0	13.0	13.0	13.0	13.0	13.0	
Fluoride (mg/L)	1	0.03	0.03	0.03	0.03	0.03	0.03	
Sodium (mg/L)	1	16.7	16.7	16.7	16.7	16.7	16.7	
Potassium (mg/L)	1	1.1	1.1	1.1	1.1	1.1	1.1	
Magnesium (mg/L)	1	2.8	2.8	2.8	2.8	2.8	2.8	
Calcium (mg/L)	1	5.5	5.5	5.5	5.5	5.5	5.5	
Aluminium (ug/L)	1	499	499	499	499	499	499	
Arsenic (ug/L)	1	0.5	0.5	0.5	0.5	0.5	0.5	
Cadmium (ug/L)	1	0.5	0.5	0.5	0.5	0.5	0.5	
Chromium (ug/L)	1	1.0	1.0	1.0	1.0	1.0	1.0	
Copper (ug/L)	1	5.0	5.0	5.0	5.0	5.0	5.0	
Lead (ug/L)	1	0.5	0.5	0.5	0.5	0.5	0.5	
Manganese (ug/L)	1	5.0	5.0	5.0	5.0	5.0	5.0	
Molybdenum (ug/L)	1	0.5	0.5	0.5	0.5	0.5	0.5	
Nickel (ug/L)	1	0.5	0.5	0.5	0.5	0.5	0.5	
Selenium (ug/L)	1	1.5	1.5	1.5	1.5	1.5	1.5	
Silver (ug/L)	1	0.5	0.5	0.5	0.5	0.5	0.5	
Uranium (ug/L)	1	0.5	0.5	0.5	0.5	0.5	0.5	
Zinc (ug/L)	1	5.0	5.0	5.0	5.0	5.0	5.0	
Boron (ug/L)	1	20.0	20.0	20.0	20.0	20.0	20.0	
Iron (ug/L)	1	483	483	483	483	483	483	
Mercury (ug/L)	1	0.005	0.005	0.005	0.005	0.005	0.005	

Table A.42: Summary statistics Site 42 for July 2011 to June 2012

Site 42: Colah Creek, Wylds Rd, Glenorie	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Flow Rate Estimate (L/min)	12	8183	1250	300	80000	500	3000	22672
Temperature (oC)	13	15.1	16.1	9.8	21.0	10.5	19.4	4.0
EC (ms/cm)	13	0.32	0.33	0.22	0.43	0.23	0.40	0.07
EC (µS/cm)	13	312	322	218	440	242	380	70
Turbidity (NTU)	13	16.4	12.2	5.7	49.6	8.8	22.9	11.6
DO (mg/L)	13	8.9	8.9	6.5	12.2	7.6	10.0	1.6
DO (%sat)	13	86	84	70	106	79	95	10
pH	13	6.9	6.9	6.5	7.3	6.8	7.1	0.2
Salinity (ppt)	13	0.2	0.2	0.1	0.2	0.1	0.2	0.0
Suspended Solids (mg/L)	13	8.2	7.0	3.0	29.0	5.0	9.0	6.6
Ammonium-Nitrogen (mg/L)	13	0.02	0.02	0.01	0.04	0.01	0.03	0.01
Oxidised Nitrogen (mg/L)	13	0.43	0.39	0.10	0.82	0.26	0.59	0.21
Total Nitrogen (mg/L)	13	0.9	0.9	0.5	1.5	0.6	1.1	0.3
Total Phosphorus (mg/L)	13	0.06	0.06	0.03	0.12	0.04	0.09	0.03
Faecal Coliforms (CFU/100ml)	13	806	170	41	5800	81	930	1624
Bicarbonate Alkalinity (mg/CaCO3/L)	2	32		30	33			
Chloride (mg/L)	2	56		45	66			
Sulphate as $SO4^{2-}$(mg/L)	2	23.5		21.0	26.0			
Fluoride (mg/L)	2	0.08		0.07	0.09			
Sodium (mg/L)	2	33		29	37			
Potassium (mg/L)	2	5.3		5.0	5.6			
Magnesium (mg/L)	2	6.7		5.9	7.5			
Calcium (mg/L)	2	12		12	13			
Aluminium (ug/L)	2	1520		829	2210			
Arsenic (ug/L)	2	0.5		0.5	0.5			
Cadmium (ug/L)	2	0.5		0.5	0.5			
Chromium (ug/L)	2	1.5		1.0	2.0			
Copper (ug/L)	2	3.5		1.0	6.0			
Lead (ug/L)	2	1.5		1.0	2.0			
Manganese (ug/L)	2	34.0		28.0	40.0			
Molybdenum (ug/L)	2	0.5		0.5	0.5			
Nickel (ug/L)	2	1.0		1.0	1.0			
Selenium (ug/L)	2	1.5		1.5	1.5			
Silver (ug/L)	2	0.5		0.5	0.5			
Uranium (ug/L)	2	0.5		0.5	0.5			
Zinc (ug/L)	2	22.0		5.0	39.0			
Boron (ug/L)	2	30.5		24.0	37.0			
Iron (ug/L)	2	1930		1680	2180			
Mercury (ug/L)	2	0.005		0.005	0.005			
Total Organic Carbon (mg/L)	1	7						

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Table A.43: Summary statistics Site 43 for July 2011 to June 2012

Site 43: Calna Creek below STP near Berowra Ck	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Flow Rate Estimate (L/min)	13	41862	2700	1200	500000	2000	4000	137699
Temperature (oC)	13	15.7	16.0	11.3	20.1	12.9	18.5	3.0
EC (ms/cm)	13	0.43	0.45	0.17	0.66	0.29	0.55	0.14
EC (µS/cm)	13	424	450	176	621	261	564	137
Turbidity (NTU)	13	4.7	3.0	0.0	17.7	1.5	9.4	5.2
DO (mg/L)	12	10.1	10.2	8.5	11.5	9.1	10.8	1.0
DO (%sat)	12	102	99	93	121	97	103	8
pH	12	7.6	7.6	7.2	8.0	7.5	8.0	0.3
Salinity (ppt)	13	0.2	0.2	0.1	0.3	0.1	0.3	0.1
Suspended Solids (mg/L)	13	2.4	1.0	1.0	8.0	1.0	5.0	2.3
Ammonium-Nitrogen (mg/L)	13	0.02	0.01	0.01	0.09	0.01	0.02	0.02
Oxidised Nitrogen (mg/L)	13	1.10	0.84	0.35	3.54	0.49	1.78	0.91
Total Nitrogen (mg/L)	13	1.6	1.3	0.7	4.3	0.9	2.1	1.0
Total Phosphorus (mg/L)	13	0.10	0.10	0.05	0.16	0.07	0.14	0.03
Faecal Coliforms (CFU/100ml)	13	321	39	6	2300	16	530	650
Bicarbonate Alkalinity (mg/CaCO3/L)	2	44		32	57			
Chloride (mg/L)	2	49		36	61			
Sulphate as $SO4^{2-}$(mg/L)	2	26.5		16.0	37.0			
Fluoride (mg/L)	2	0.19		0.10	0.27			
Sodium (mg/L)	2	35		24	47			
Potassium (mg/L)	2	4.4		2.6	6.2			
Magnesium (mg/L)	2	4.9		3.6	6.2			
Calcium (mg/L)	2	18		13	24			
Aluminium (ug/L)	2	912		194	1630			
Arsenic (ug/L)	2	0.5		0.5	0.5			
Cadmium (ug/L)	2	0.5		0.5	0.5			
Chromium (ug/L)	2	1.3		0.5	2.0			
Copper (ug/L)	2	3.0		1.0	5.0			
Lead (ug/L)	2	1.3		0.5	2.0			
Manganese (ug/L)	2	9.5		7.0	12.0			
Molybdenum (ug/L)	2	0.5		0.5	0.5			
Nickel (ug/L)	2	1.0		1.0	1.0			
Selenium (ug/L)	2	1.5		1.5	1.5			
Silver (ug/L)	2	0.5		0.5	0.5			
Uranium (ug/L)	2	0.5		0.5	0.5			
Zinc (ug/L)	2	17.0		12.0	22.0			
Boron (ug/L)	2	31.0		30.0	32.0			
Iron (ug/L)	2	900		360	1440			
Mercury (ug/L)	2	0.005		0.005	0.005			
Total Organic Carbon (mg/L)	1	6						

Table A.45: Summary statistics Site 45 for July 2011 to June 2012

Site 45: Berowra Ck at Fishponds Waterholes	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Flow Rate Estimate (L/min)	11	177436	5000	1800	1800000	5000	15000	538896
Temperature (oC)	13	17.3	17.1	12.2	21.4	15.8	19.4	2.6
EC (ms/cm)	13	0.46	0.51	0.11	0.65	0.39	0.60	0.17
EC (µS/cm)	13	454	531	83	623	404	570	174
Turbidity (NTU)	13	16.9	1.8	0.0	114.0	0.6	8.8	36.3
DO (mg/L)	11	9.5	9.6	7.8	10.7	8.9	10.3	0.8
DO (%sat)	11	101	99	93	112	97	102	6
pH	12	7.5	7.5	7.1	7.8	7.5	7.7	0.2
Salinity (ppt)	13	0.2	0.3	0.1	0.3	0.2	0.3	0.1
Suspended Solids (mg/L)	13	13.3	1.0	1.0	106.0	1.0	2.0	31.4
Ammonium-Nitrogen (mg/L)	13	0.06	0.01	0.01	0.43	0.01	0.03	0.12
Oxidised Nitrogen (mg/L)	13	1.03	1.19	0.21	1.68	0.45	1.58	0.54
Total Nitrogen (mg/L)	13	1.6	1.6	0.6	2.3	1.2	2.2	0.5
Total Phosphorus (mg/L)	13	0.09	0.05	0.03	0.30	0.03	0.13	0.09
Chlorophyll-A (ug/L)	11	3.8	0.5	0.1	32.3	0.2	1.3	9.6
Faecal Coliforms (CFU/100ml)	13	5694	240	20	64000	82	2400	17580
Enterococci (CFU/100ml)	9	231	39	26	990	31	790	377
Bicarbonate Alkalinity (mg/CaCO3/L)	2	32		22	41			
Chloride (mg/L)	2	54		24	83			
Sulphate as $SO4^{2-}$(mg/L)	2	31.9		9.7	54.0			
Fluoride (mg/L)	2	0.21		0.07	0.34			
Sodium (mg/L)	2	39		17	62			
Potassium (mg/L)	2	6.7		3.1	10.3			
Magnesium (mg/L)	2	5.2		2.8	7.6			
Calcium (mg/L)	2	15		9	21			
Aluminium (ug/L)	2	1927		274	3580			
Arsenic (ug/L)	2	1.8		0.5	3.0			
Cadmium (ug/L)	2	0.5		0.5	0.5			
Chromium (ug/L)	2	3.3		0.5	6.0			
Copper (ug/L)	2	8.5		1.0	16.0			
Lead (ug/L)	2	4.8		0.5	9.0			
Manganese (ug/L)	2	47.5		20.0	75.0			
Molybdenum (ug/L)	2	0.5		0.5	0.5			
Nickel (ug/L)	2	2.5		2.0	3.0			
Selenium (ug/L)	2	1.5		1.5	1.5			
Silver (ug/L)	2	0.5		0.5	0.5			
Uranium (ug/L)	2	0.5		0.5	0.5			
Zinc (ug/L)	2	40.0		17.0	63.0			
Boron (ug/L)	2	36.0		29.0	43.0			
Iron (ug/L)	2	2496		382	4610			
Mercury (ug/L)	2	0.008		0.005	0.010			
Total Organic Carbon (mg/L)	1	6						

Table A.45A: Summary statistics Site 45A for July 2011 to June 2012

Site 45A: Berowra Ck below Fishponds	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Flow Rate Estimate (L/min)	2	2510		20	5000			
Temperature (oC)	2	16.5		12.1	20.9			
EC (ms/cm)	2	0.45		0.41	0.49			
EC (µS/cm)	2	457		388	525			
Turbidity (NTU)	2	6.3		4.7	7.8			
DO (mg/L)	2	8.5		8.2	8.9			
DO (%sat)	2	94		83	105			
pH	1	7.3						
Salinity (ppt)	2	0.2		0.2	0.2			
Suspended Solids (mg/L)	2	1.5		1.0	2.0			
Ammonium-Nitrogen (mg/L)	2	0.02		0.01	0.02			
Oxidised Nitrogen (mg/L)	2	1.18		0.31	2.05			
Total Nitrogen (mg/L)	2	1.7		0.5	2.8			
Total Phosphorus (mg/L)	2	0.07		0.02	0.13			
Chlorophyll-A (ug/L)	1	0.3						
Faecal Coliforms (CFU/100ml)	2	135		69	200			
Enterococci (CFU/100ml)	1	46						

Table A.46A: Summary statistics Site 46A for July 2011 to June 2012

Site 46A: unnamed tributary of Terrys Creek	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev
Flow rate estimate (L/min)	12	89	60	5	400	10	100	107
Temperature (oC)	12	15.8	15.7	10.7	20.0	12.5	18.5	2.8
EC (ms/cm)	12	0.42	0.41	0.16	0.65	0.27	0.55	0.14
EC (µS/cm)	12	388	399	129	625	250	440	124
Turbidity (NTU)	12	6.5	6.3	0.3	17.0	0.3	8.7	4.8
DO (mg/L)	12	8.6	8.7	6.9	10.1	7.8	9.5	0.9
DO (%sat)	12	87	90	76	99	77	92	7
Ph	12	7.4	7.3	6.9	8.0	7.1	7.6	0.3
Salinity (ppt)	12	0.2	0.2	0.1	0.3	0.1	0.2	0.1
Suspended Solids (mg/L)	12	2.9	2.0	1.0	8.0	1.0	5.0	2.5
Ammonium-Nitrogen (mg/L)	12	0.20	0.01	0.01	2.25	0.01	0.04	0.64
Oxidised Nitrogen (mg/L)	12	0.27	0.24	0.05	0.51	0.09	0.39	0.14
Total Nitrogen (mg/L)	12	0.8	0.5	0.3	3.7	0.4	0.7	0.9
Total Phosphorus(mg/L)	12	0.04	0.03	0.01	0.23	0.02	0.04	0.06
Faecal Coliforms (CFU/100ml)	12	3971	270	12	25000	32	8400	7696
Bicarbonate Alkalinity (mg/CaCO3/L)	2	70		64	75			
Chloride (mg/L)	2	60		57	62			
Sulphate as SO42-(mg/L)	2	34.5		29.0	40.0			
Fluoride (mg/L)	2	0.09		0.08	0.09			
Sodium (mg/L)	2	30.7		29.1	32.2			
Potassium (mg/L)	2	3.2		3.1	3.3			
Magnesium (mg/L)	2	5.8		5.6	6.0			
Calcium (mg/L)	2	29.7		25.2	34.2			
Aluminium (ug/L)	2	296		178	414			
Arsenic (ug/L)	2	0.5		0.5	0.5			
Cadmium (ug/L)	2	0.5		0.5	0.5			
Chromium (ug/L)	2	0.8		0.5	1.0			
Copper (ug/L)	2	3.5		3.0	4.0			
Lead (ug/L)	2	0.8		0.5	1.0			
Manganese (ug/L)	2	8.5		5.0	12.0			
Molybdenum (ug/L)	2	0.5		0.5	0.5			
Nickel (ug/L)	2	1.0		1.0	1.0			
Selenium (ug/L)	2	1.5		1.5	1.5			
Silver (ug/L)	2	0.5		0.5	0.5			
Uranium (ug/L)	2	0.5		0.5	0.5			
Zinc (ug/L)	2	12.5		5.0	20.0			
Boron (ug/L)	2	30.0		17.0	43.0			
Iron (ug/L)	2	697		601	792			
Mercury (ug/L)	2	0.005		0.005	0.005			
Total Organic Carbon(mg/L)	1	9						

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Table A.48: Summary statistics Site 48 for July 2011 to June 2012

Site 48: Marramarra Creek at Orange Orchid	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Secchi Depth (m)	8	0.7	0.7	0.4	1.0	0.4	1.0	0.2
Temperature (oC)	13	17.4	18.7	11.8	25.2	12.7	20.9	4.1
EC (ms/cm)	13	18.38	23.18	1.13	35.70	4.49	27.10	11.42
EC (µS/cm) *	3	2510	1890	1166	4473	1166	4473	1738
Turbidity (NTU)	13	13.9	12.0	7.1	23.9	8.6	19.0	5.2
DO (mg/L)	12	8.0	8.4	5.4	10.6	5.5	9.5	1.8
DO (%sat)	12	88	91	65	101	74	93	11
pH	13	7.0	6.9	6.7	7.4	6.8	7.1	0.2
Salinity (ppt)	13	11.1	14.0	0.6	22.5	2.4	16.6	7.2
Suspended Solids (mg/L)	13	12.5	11.0	4.0	26.0	8.0	17.0	6.5
Ammonium-Nitrogen (mg/L)	13	0.03	0.03	0.01	0.07	0.01	0.05	0.02
Oxidised Nitrogen (mg/L)	13	0.07	0.06	0.02	0.17	0.02	0.14	0.06
Total Nitrogen (mg/L)	13	0.5	0.4	0.2	0.8	0.4	0.6	0.1
Total Phosphorus (mg/L)	13	0.03	0.03	0.01	0.06	0.02	0.04	0.01
Soluble Reactive Phosphorus (mg/L)	2	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Chlorophyll-A (ug/L)	12	8.2	4.9	2.2	28.3	2.8	13.4	7.9
Faecal Coliforms (CFU/100ml)	13	177	48	11	950	18	170	312
Enterococci (CFU/100ml)	12	48	14	3	300	7	58	83

* After times of heavy rain only

Table A.52: Summary statistics Site 52 for July 2011 to June 2012

Site 52: Calna Ck, upstream of STP	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Flow Rate Estimate (L/min)	13	789	300	60	5000	150	800	1364
Temperature (oC)	13	14.8	15.2	10.5	19.6	11.6	17.4	3.3
EC (ms/cm)	13	0.27	0.26	0.17	0.36	0.23	0.33	0.05
EC (µS/cm)	13	264	273	160	336	229	299	49
Turbidity (NTU)	13	5.5	3.0	0.0	22.5	1.4	7.7	6.7
DO (mg/L)	12	8.6	8.6	7.3	10.3	7.8	9.5	1.0
DO (%sat)	12	85	86	76	98	77	92	7
pH	12	7.1	7.2	6.6	7.5	6.8	7.3	0.3
Salinity (ppt)	13	0.1	0.1	0.1	0.2	0.1	0.2	0.0
Suspended Solids (mg/L)	13	1.7	1.0	1.0	6.0	1.0	2.0	1.4
Ammonium-Nitrogen (mg/L)	13	0.01	0.01	0.01	0.02	0.01	0.02	0.00
Oxidised Nitrogen (mg/L)	13	0.18	0.14	0.02	0.71	0.02	0.23	0.20
Total Nitrogen (mg/L)	13	0.4	0.3	0.2	1.2	0.2	0.6	0.3
Total Phosphorus (mg/L)	13	0.02	0.02	0.01	0.05	0.01	0.03	0.01
Faecal Coliforms (CFU/100ml)	13	184	88	25	640	47	400	197
Bicarbonate Alkalinity (mg/CaCO3/L)	2	50		49	51			
Chloride (mg/L)	2	41		33	49			
Sulphate as $SO4^{2-}$(mg/L)	2	20.5		19.0	22.0			
Fluoride (mg/L)	2	0.09		0.06	0.11			
Sodium (mg/L)	2	28		23	32			
Potassium (mg/L)	2	2.2		1.9	2.5			
Magnesium (mg/L)	2	6.7		6.0	7.5			
Calcium (mg/L)	2	20		20	20			
Aluminium (ug/L)	2	1244		197	2290			
Arsenic (ug/L)	2	0.8		0.5	1.0			
Cadmium (ug/L)	2	0.5		0.5	0.5			
Chromium (ug/L)	2	1.3		0.5	2.0			
Copper (ug/L)	2	4.5		1.0	8.0			
Lead (ug/L)	2	1.8		0.5	3.0			
Manganese (ug/L)	2	21.5		16.0	27.0			
Molybdenum (ug/L)	2	0.5		0.5	0.5			
Nickel (ug/L)	2	1.0		1.0	1.0			
Selenium (ug/L)	2	1.5		1.5	1.5			
Silver (ug/L)	2	0.5		0.5	0.5			
Uranium (ug/L)	2	0.5		0.5	0.5			
Zinc (ug/L)	2	14.5		5.0	24.0			
Boron (ug/L)	2	36.5		36.0	37.0			
Iron (ug/L)	2	1520		960	2080			
Mercury (ug/L)	2	0.005		0.005	0.005			
Total Organic Carbon (mg/L)	1	4						

Table A.54: Summary statistics Site 54 for July 2011 to June 2012

Site 54: Laughtondale Ck. Freshwater reference creek	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Flow Rate Estimate (L/min)	9	290	200	60	700	100	500	226
Temperature (oC)	9	15.4	15.5	10.4	20.7	10.4	19.3	3.9
EC (ms/cm)	9	0.13	0.14	0.05	0.21	0.05	0.19	0.07
EC (µS/cm)	9	128	149	50	201	54	185	59
Turbidity (NTU)	9	6.2	6.4	0.7	12.0	1.8	11.1	4.5
DO (mg/L)	9	10.1	10.2	8.5	11.9	9.1	11.4	1.2
DO (%sat)	9	98	98	91	108	94	101	5
pH	9	6.0	5.9	5.2	6.9	5.4	6.5	0.6
Salinity (ppt)	9	0.1	0.1	0.0	0.1	0.0	0.1	0.0
Suspended Solids (mg/L)	9	2.9	3.0	1.0	7.0	1.0	4.0	1.9
Ammonium-Nitrogen (mg/L)	9	0.01	0.01	0.01	0.01	0.01	0.01	0.00
Oxidised Nitrogen (mg/L)	9	0.01	0.01	0.01	0.01	0.01	0.01	0.00
Total Nitrogen (mg/L)	9	0.2	0.1	0.1	0.3	0.1	0.3	0.1
Total Phosphorus (mg/L)	9	0.01	0.01	0.00	0.01	0.00	0.01	0.00
Faecal Coliforms (CFU/100ml)	9	82	43	5	330	7	200	111
Bicarbonate Alkalinity (mg/CaCO3/L)	1	2						
Chloride (mg/L)	1	28						
Sulphate as $SO4^{2-}$(mg/L)	1	3.4						
Fluoride (mg/L)	1	0.03						
Sodium (mg/L)	1	15.0						
Potassium (mg/L)	1	1.4						
Magnesium (mg/L)	1	2.1						
Calcium (mg/L)	1	1.1						
Aluminium (ug/L)	1	968						
Arsenic (ug/L)	1	0.5						
Cadmium (ug/L)	1	0.5						
Chromium (ug/L)	1	1.0						
Copper (ug/L)	1	1.0						
Lead (ug/L)	1	0.5						
Manganese (ug/L)	1	15.0						
Molybdenum (ug/L)	1	0.5						
Nickel (ug/L)	1	0.5						
Selenium (ug/L)	1	1.5						
Silver (ug/L)	1	0.5						
Uranium (ug/L)	1	0.5						
Zinc (ug/L)	1	5.0						
Boron (ug/L)	1	18.0						
Iron (ug/L)	1	850						
Mercury (ug/L)	1	0.005						
Total Organic Carbon (mg/L)	1	4						

Table A.56: Summary statistics Site 56 for July 2011 to June 2012

Site 56: Wisemans Ferry Tip Leachate Pond	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Temperature (oC)	4	17.9	18.3	12.1	23.0	12.1	23.0	5.7
EC (ms/cm)	4	0.54	0.48	0.42	0.77	0.42	0.77	0.16
EC (µS/cm)	4	523	454	404	779	404	779	173
Turbidity (NTU)	4	12.2	9.7	0.4	29.1	0.4	29.1	13.6
DO (mg/L)	4	7.3	7.5	5.6	8.6	5.6	8.6	1.3
DO (%sat)	4	74	75	65	81	65	81	7
pH	4	7.6	7.5	7.3	7.8	7.3	7.8	0.2
Salinity (ppt)	4	0.3	0.2	0.2	0.4	0.2	0.4	0.1
Suspended Solids (mg/L)	4	5.0	3.0	1.0	13.0	1.0	13.0	5.7
Ammonium-Nitrogen (mg/L)	4	0.02	0.01	0.01	0.04	0.01	0.04	0.02
Oxidised Nitrogen (mg/L)	4	0.21	0.21	0.01	0.41	0.01	0.41	0.21
Total Nitrogen (mg/L)	4	0.8	0.8	0.7	1.1	0.7	1.1	0.2
Total Phosphorus(mg/L)	4	0.02	0.01	0.01	0.02	0.01	0.02	0.01
Faecal Coliforms (CFU/100ml)	4	20	3	1	72	1	72	35

Table A.60: Summary statistics Site 60 for July 2011 to June 2012

Site 60: Berowra Creek near Berowra Waters car ferry	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Secchi Depth (m)	12	1.8	2.0	0.4	3.3	0.8	2.5	0.9
Temperature (oC)	13	19.5	19.7	14.0	25.9	15.4	22.5	3.7
EC (ms/cm)	13	23.14	27.19	5.52	31.45	11.93	28.53	8.37
Turbidity (NTU)	13	3.6	1.9	0.0	18.0	0.0	8.0	5.1
DO (mg/L)	12	6.9	6.6	4.8	10.1	5.0	8.4	1.8
DO (%sat)	12	81	77	55	128	62	92	22
pH	13	7.2	7.2	6.6	7.7	6.9	7.6	0.3
Salinity (ppt)	13	14.1	16.6	3.0	19.6	6.6	17.8	5.4
Suspended Solids (mg/L)	13	5.0	4.0	1.0	18.0	2.0	7.0	4.6
Ammonium-Nitrogen (mg/L)	13	0.04	0.03	0.01	0.14	0.01	0.06	0.04
Oxidised Nitrogen (mg/L)	13	0.17	0.17	0.03	0.28	0.10	0.23	0.08
Total Nitrogen (mg/L)	13	0.6	0.5	0.3	1.0	0.4	0.7	0.2
Total Phosphorus (mg/L)	13	0.04	0.03	0.02	0.06	0.03	0.05	0.01
Soluble Reactive Phosphorus (mg/L)	9	0.01	0.01	0.00	0.02	0.01	0.02	0.01
Chlorophyll-A (ug/L)	13	14.8	6.1	1.7	85.5	1.9	10.5	24.9
Faecal Coliforms (CFU/100ml)	13	451	48	1	3200	7	530	936
Enterococci (CFU/100ml)	13	85	9	1	680	1	130	187
E Coli (CFU/100mL)	1	1						

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Table A.61: Summary statistics Site 61 for July 2011 to June 2012

Site 61: Berowra Ck at Calabash Point	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Secchi Depth (m)	27	1.9	2.0	0.3	3.6	1.1	2.5	0.8
Temperature (oC)	30	19.7	20.6	12.4	26.8	15.9	23.5	4.0
EC (ms/cm)	30	24.21	28.52	5.86	34.61	15.49	30.61	8.69
Turbidity (NTU)	29	3.3	1.4	0.0	24.0	0.5	4.3	5.0
DO (mg/L)	28	7.7	7.5	4.0	13.0	6.4	9.1	1.8
DO (%sat)	28	92	87	50	177	75	102	25
pH	29	7.4	7.4	6.8	8.1	7.0	7.7	0.4
Salinity (ppt)	30	14.8	17.6	3.2	21.7	9.0	19.0	5.7
Suspended Solids (mg/L)	14	6.3	5.0	1.0	19.0	2.0	14.0	5.6
Ammonium-Nitrogen (mg/L)	16	0.03	0.02	0.01	0.11	0.01	0.04	0.03
Oxidised Nitrogen (mg/L)	16	0.12	0.12	0.01	0.25	0.01	0.20	0.09
Total Nitrogen (mg/L)	16	0.5	0.5	0.3	0.9	0.4	0.7	0.2
Total Phosphorus (mg/L)	16	0.04	0.03	0.01	0.09	0.02	0.05	0.02
Soluble Reactive Phosphorus (mg/L)	9	0.01	0.01	0.01	0.02	0.01	0.02	0.00
Chlorophyll-A (ug/L)	14	15.5	10.6	3.9	76.0	4.9	19.6	18.4
Faecal Coliforms (CFU/100ml)	14	354	13	1	3400	3	410	900
Enterococci (CFU/100ml)	14	129	5	1	1600	1	46	425
E Coli (CFU/100mL)	1	3						

Table A.62: Summary statistics Site 62 for July 2011 to June 2012

Site 62: Upper Kimmerakong Ck, Cowan Village	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Flow Rate Estimate (L/min)	13	109	20	2	600	5	100	200
Temperature (oC)	13	15.8	15.9	12.6	19.8	13.2	17.8	2.6
EC (ms/cm)	13	0.32	0.35	0.11	0.42	0.27	0.40	0.10
EC (µS/cm)	13	301	341	129	377	251	363	79
Turbidity (NTU)	13	7.3	4.3	1.3	40.0	1.7	8.0	10.3
DO (mg/L)	11	8.4	8.3	7.2	9.8	7.5	9.3	0.9
DO (%sat)	11	85	86	75	98	75	92	8
pH	12	7.1	7.1	6.8	7.4	7.0	7.3	0.2
Salinity (ppt)	13	0.2	0.2	0.1	0.2	0.1	0.2	0.1
Suspended Solids (mg/L)	13	2.2	1.0	1.0	8.0	1.0	5.0	2.3
Ammonium-Nitrogen (mg/L)	13	0.05	0.03	0.01	0.22	0.02	0.06	0.06
Oxidised Nitrogen (mg/L)	13	0.91	0.67	0.20	1.81	0.30	1.57	0.58
Total Nitrogen (mg/L)	13	1.3	1.1	0.5	2.7	0.6	1.9	0.7
Total Phosphorus (mg/L)	13	0.05	0.04	0.02	0.16	0.02	0.07	0.04
Faecal Coliforms (CFU/100ml)	13	1420	230	56	8800	65	2800	2615
Bicarbonate Alkalinity (mg/CaCO3/L)	2	49		38	61			
Chloride (mg/L)	2	38		28	47			
Sulphate as $SO4^{2}$(mg/L)	2	21.5		16.0	27.0			
Fluoride (mg/L)	2	0.05		0.03	0.07			
Sodium (mg/L)	2	32		24	41			
Potassium (mg/L)	2	3.4		3.4	3.5			
Magnesium (mg/L)	2	6.2		4.5	7.9			
Calcium (mg/L)	2	15		12	19			
Aluminium (ug/L)	2	2096		471	3720			
Arsenic (ug/L)	2	1.3		0.5	2.0			
Cadmium (ug/L)	2	0.5		0.5	0.5			
Chromium (ug/L)	2	2.5		1.0	4.0			
Copper (ug/L)	2	4.5		1.0	8.0			
Lead (ug/L)	2	1.8		0.5	3.0			
Manganese (ug/L)	2	19.5		15.0	24.0			
Molybdenum (ug/L)	2	0.5		0.5	0.5			
Nickel (ug/L)	2	1.0		1.0	1.0			
Selenium (ug/L)	2	1.5		1.5	1.5			
Silver (ug/L)	2	0.5		0.5	0.5			
Uranium (ug/L)	2	0.5		0.5	0.5			
Zinc (ug/L)	2	24.5		14.0	35.0			
Boron (ug/L)	2	48.5		45.0	52.0			
Iron (ug/L)	2	1710		819	2600			
Mercury (ug/L)	2	0.008		0.005	0.010			
Total Organic Carbon (mg/L)	1	7						

Table A.63: Summary statistics Site 63 for July 2011 to June 2012

Site 63: Colah Creek end Ben Bullen Rd	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Flow Rate Estimate (L/min)	11	21418	2000	1000	200000	1600	6000	59367
Temperature (oC)	12	14.2	13.4	9.1	20.1	10.3	19.3	4.1
EC (ms/cm)	12	0.30	0.33	0.16	0.44	0.21	0.37	0.09
EC (µS/cm)	12	296	310	170	440	193	370	87
Turbidity (NTU)	12	9.9	5.5	1.3	40.8	3.2	11.7	11.0
DO (mg/L)	12	9.6	9.2	7.9	11.6	8.3	11.2	1.4
DO (%sat)	12	91	92	78	100	85	98	7
pH	12	7.1	7.1	6.7	7.4	7.0	7.2	0.2
Salinity (ppt)	12	0.1	0.2	0.1	0.2	0.1	0.2	0.0
Suspended Solids (mg/L)	12	2.5	1.5	1.0	7.0	1.0	4.0	2.0
Ammonium-Nitrogen (mg/L)	12	0.01	0.01	0.01	0.01	0.01	0.01	0.00
Oxidised Nitrogen (mg/L)	12	0.24	0.22	0.09	0.43	0.13	0.37	0.12
Total Nitrogen (mg/L)	12	0.7	0.6	0.4	1.2	0.5	0.8	0.2
Total Phosphorus (mg/L)	12	0.04	0.03	0.01	0.09	0.02	0.07	0.02
Faecal Coliforms (CFU/100ml)	12	322	72	20	2500	26	230	708
Bicarbonate Alkalinity (mg/CaCO3/L)	2	24		22	25			
Chloride (mg/L)	2	57		44	70			
Sulphate as $SO4^{2-}$(mg/L)	2	20.5		17.0	24.0			
Fluoride (mg/L)	2	0.08		0.06	0.09			
Sodium (mg/L)	2	31		27	36			
Potassium (mg/L)	2	5.0		4.7	5.2			
Magnesium (mg/L)	2	6.4		5.3	7.4			
Calcium (mg/L)	2	9.3		8.5	10.1			
Aluminium (ug/L)	2	1221		492	1950			
Arsenic (ug/L)	2	0.5		0.5	0.5			
Cadmium (ug/L)	2	0.5		0.5	0.5			
Chromium (ug/L)	2	1.3		0.5	2.0			
Copper (ug/L)	2	11.0		4.0	18.0			
Lead (ug/L)	2	1.3		0.5	2.0			
Manganese (ug/L)	2	14.5		13.0	16.0			
Molybdenum (ug/L)	2	0.5		0.5	0.5			
Nickel (ug/L)	2	1.0		1.0	1.0			
Selenium (ug/L)	2	1.5		1.5	1.5			
Silver (ug/L)	2	0.5		0.5	0.5			
Uranium (ug/L)	2	0.5		0.5	0.5			
Zinc (ug/L)	2	13.5		5.0	22.0			
Boron (ug/L)	2	25.0		17.0	33.0			
Iron (ug/L)	2	1394		977	1810			
Mercury (ug/L)	2	0.005		0.005	0.005			
Total Organic Carbon (mg/L)	1	7						

Table A.64: Summary statistics Site 64 for July 2011 to June 2012

Site 64: Creek draining Galston Village	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Flow Rate Estimate (L/min)	13	829	200	80	5000	100	600	1474
Temperature (oC)	13	15.2	15.5	10.7	20.8	11.5	18.9	3.4
EC (ms/cm)	13	0.37	0.40	0.05	0.50	0.29	0.46	0.13
EC (µS/cm)	13	379	421	71	529	312	484	127
Turbidity (NTU)	13	15.0	8.8	2.7	69.0	4.7	23.3	18.2
DO (mg/L)	13	9.3	9.3	7.9	11.6	8.3	10.3	1.1
DO (%sat)	13	92	92	78	104	86	100	7
pH	13	7.1	7.2	6.9	7.4	7.1	7.2	0.1
Salinity (ppt)	13	0.2	0.2	0.0	0.3	0.1	0.2	0.1
Suspended Solids (mg/L)	13	6.7	3.0	1.0	47.0	2.0	6.0	12.3
Ammonium-Nitrogen (mg/L)	13	0.05	0.03	0.01	0.26	0.02	0.05	0.07
Oxidised Nitrogen (mg/L)	13	1.06	1.13	0.35	1.99	0.59	1.40	0.51
Total Nitrogen (mg/L)	13	1.5	1.4	0.7	2.5	1.0	2.0	0.6
Total Phosphorus (mg/L)	13	0.11	0.10	0.03	0.30	0.05	0.13	0.07
Faecal Coliforms (CFU/100ml)	13	1354	380	81	8600	190	1900	2407
Bicarbonate Alkalinity (mg/CaCO3/L)	2	49		44	54			
Chloride (mg/L)	2	70		61	78			
Sulphate as $SO4^{2-}$(mg/L)	2	28.5		25.0	32.0			
Fluoride (mg/L)	2	0.12		0.09	0.14			
Sodium (mg/L)	2	44		40	48			
Potassium (mg/L)	2	4.8		4.6	5.0			
Magnesium (mg/L)	2	7.5		6.4	8.5			
Calcium (mg/L)	2	18		16	19			
Aluminium (ug/L)	2	1690		630	2750			
Arsenic (ug/L)	2	0.8		0.5	1.0			
Cadmium (ug/L)	2	0.5		0.5	0.5			
Chromium (ug/L)	2	2.5		2.0	3.0			
Copper (ug/L)	2	5.5		5.0	6.0			
Lead (ug/L)	2	1.3		0.5	2.0			
Manganese (ug/L)	2	22.0		21.0	23.0			
Molybdenum (ug/L)	2	0.5		0.5	0.5			
Nickel (ug/L)	2	1.5		1.0	2.0			
Selenium (ug/L)	2	1.5		1.5	1.5			
Silver (ug/L)	2	0.5		0.5	0.5			
Uranium (ug/L)	2	0.5		0.5	0.5			
Zinc (ug/L)	2	20.0		19.0	21.0			
Boron (ug/L)	2	36.5		31.0	42.0			
Iron (ug/L)	2	1910		1220	2600			
Mercury (ug/L)	2	0.005		0.005	0.005			
Total Organic Carbon (mg/L)	1	7						

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Table A.77: Summary statistics Site 77 for July 2011 to June 2012

Site 77: Gleeson Creek below Foxglove Oval	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Flow Rate Estimate (L/min)	13	518	100	20	3000	60	600	851
Temperature (oC)	13	15.8	15.9	12.5	20.2	13.0	18.3	2.7
EC (ms/cm)	13	0.72	0.73	0.23	1.13	0.50	0.96	0.27
EC (µS/cm)	13	723	742	250	1177	496	907	269
Turbidity (NTU)	13	8.7	7.1	1.2	37.0	3.0	10.5	9.1
DO (mg/L)	11	6.0	5.9	4.8	8.1	5.1	6.5	0.9
DO (%sat)	11	60	58	48	85	54	65	10
pH	12	7.4	7.4	7.2	7.7	7.3	7.6	0.2
Salinity (ppt)	13	0.4	0.4	0.1	0.6	0.3	0.5	0.1
Suspended Solids (mg/L)	13	2.6	2.0	1.0	9.0	1.0	4.0	2.4
Ammonium-Nitrogen (mg/L)	13	11.47	8.90	0.52	30.20	4.83	18.00	8.17
Oxidised Nitrogen (mg/L)	13	5.01	4.88	1.52	8.45	3.60	6.60	2.08
Total Nitrogen (mg/L)	13	17.6	16.6	2.8	38.3	8.7	26.8	10.0
Total Phosphorus (mg/L)	13	0.03	0.03	0.01	0.12	0.02	0.06	0.03
Faecal Coliforms (CFU/100ml)	13	645	94	20	4000	44	650	1225
Bicarbonate Alkalinity (mg/CaCO3/L)	2	105		58	152			
Chloride (mg/L)	2	60		34	85			
Sulphate as $SO4^{2-}$(mg/L)	2	24.5		20.0	29.0			
Fluoride (mg/L)	2	0.10		0.07	0.12			
Sodium (mg/L)	2	41		25	57			
Potassium (mg/L)	2	10.3		5.1	15.4			
Magnesium (mg/L)	2	9.1		5.7	12.5			
Calcium (mg/L)	2	35		24	45			
Aluminium (ug/L)	2	1546		232	2860			
Arsenic (ug/L)	2	1.8		0.5	3.0			
Cadmium (ug/L)	2	0.5		0.5	0.5			
Chromium (ug/L)	2	1.8		0.5	3.0			
Copper (ug/L)	2	7.5		3.0	12.0			
Lead (ug/L)	2	2.3		0.5	4.0			
Manganese (ug/L)	2	24.0		15.0	33.0			
Molybdenum (ug/L)	2	0.5		0.5	0.5			
Nickel (ug/L)	2	1.5		1.0	2.0			
Selenium (ug/L)	2	1.5		1.5	1.5			
Silver (ug/L)	2	0.5		0.5	0.5			
Uranium (ug/L)	2	0.5		0.5	0.5			
Zinc (ug/L)	2	17.5		5.0	30.0			
Boron (ug/L)	2	85.5		59.0	112.0			
Iron (ug/L)	2	1416		801	2030			
Mercury (ug/L)	2	0.005		0.005	0.005			
Total Organic Carbon (mg/L)	1	23						

Table A.80: Summary statistics Site 80 for July 2011 to June 2012

Site 80: Glenorie Creek, Glenorie	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Flow Rate Estimate (L/min)	13	875	300	80	4000	200	1000	1323
Temperature (oC)	13	15.8	15.7	10.7	21.3	11.4	20.3	3.8
EC (ms/cm)	13	0.39	0.37	0.22	0.57	0.32	0.46	0.09
EC (µS/cm)	13	377	366	232	565	291	462	90
Turbidity (NTU)	13	17.3	10.0	1.4	49.7	6.4	30.1	15.3
DO (mg/L)	13	9.0	8.6	5.4	12.5	8.0	10.3	1.7
DO (%sat)	13	89	91	54	114	81	93	13
pH	13	7.1	7.1	6.9	7.5	7.0	7.2	0.2
Salinity (ppt)	13	0.2	0.2	0.1	0.3	0.2	0.2	0.0
Suspended Solids (mg/L)	13	7.5	5.0	1.0	26.0	2.0	16.0	7.4
Ammonium-Nitrogen (mg/L)	13	0.13	0.14	0.06	0.22	0.08	0.17	0.05
Oxidised Nitrogen (mg/L)	13	1.29	1.31	0.36	2.25	0.75	1.74	0.59
Total Nitrogen (mg/L)	13	2.1	2.2	0.9	3.8	1.6	2.8	0.8
Total Phosphorus (mg/L)	13	0.24	0.19	0.13	0.52	0.13	0.32	0.12
Faecal Coliforms (CFU/100ml)	13	2228	1000	240	7200	280	4800	2503
Bicarbonate Alkalinity (mg/CaCO3/L)	2	50		46	53			
Chloride (mg/L)	2	69		58	80			
Sulphate as $SO4^{2-}$(mg/L)	2	41.5		34.0	49.0			
Fluoride (mg/L)	2	0.13		0.10	0.16			
Sodium (mg/L)	2	41		37	44			
Potassium (mg/L)	2	12		11	13			
Magnesium (mg/L)	2	10		10	11			
Calcium (mg/L)	2	20		19	20			
Aluminium (ug/L)	2	1472		213	2730			
Arsenic (ug/L)	2	1.3		0.5	2.0			
Cadmium (ug/L)	2	0.5		0.5	0.5			
Chromium (ug/L)	2	1.3		0.5	2.0			
Copper (ug/L)	2	7.0		1.0	13.0			
Lead (ug/L)	2	1.8		0.5	3.0			
Manganese (ug/L)	2	29.0		24.0	34.0			
Molybdenum (ug/L)	2	0.5		0.5	0.5			
Nickel (ug/L)	2	1.0		1.0	1.0			
Selenium (ug/L)	2	1.5		1.5	1.5			
Silver (ug/L)	2	0.5		0.5	0.5			
Uranium (ug/L)	2	0.5		0.5	0.5			
Zinc (ug/L)	2	20.5		5.0	36.0			
Boron (ug/L)	2	37.0		27.0	47.0			
Iron (ug/L)	2	2005		1120	2890			
Mercury (ug/L)	2	0.005		0.005	0.005			
Total Organic Carbon (mg/L)	1	9						

Table A.85: Summary statistics Site 85 for July 2011 to June 2012

Site 85: Hornsby Quarry discharge water	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Flow Rate Estimate (L/min)	8	3600	(Calculated at weir)					
Temperature (oC)	10	18.9	18.9	13.0	24.6	13.6	24.0	4.9
EC (ms/cm)	10	0.82	0.85	0.72	0.89	0.75	0.88	0.06
EC (µS/cm)	10	836	841	762	892	785	880	46
Turbidity (NTU)	10	0.1	0.0	0.0	0.5	0.0	0.2	0.2
DO (mg/L)	10	9.8	9.6	6.1	13.0	8.6	11.4	2.0
DO (%sat)	10	106	110	59	129	95	123	20
pH	9	8.2	8.3	7.4	8.4	8.1	8.4	0.3
Salinity (ppt)	10	0.4	0.4	0.4	0.5	0.4	0.4	0.0
Suspended Solids (mg/L)	9	1.3	1.0	1.0	3.0	1.0	2.0	0.7
Ammonium-Nitrogen (mg/L)	10	0.01	0.01	0.01	0.02	0.01	0.01	0.00
Oxidised Nitrogen (mg/L)	10	0.01	0.01	0.01	0.04	0.01	0.03	0.01
Total Nitrogen (mg/L)	10	0.2	0.2	0.2	0.3	0.2	0.2	0.0
Total Phosphorus (mg/L)	10	0.01	0.01	0.00	0.01	0.00	0.01	0.00
Chlorophyll-A (ug/L)	10	3.1	2.8	0.3	6.9	0.7	5.8	2.5
Faecal Coliforms (CFU/100ml)	10	8	3	1	34	1	15	11
Enterococci (CFU/100ml)	9	4	2	1	15	1	5	5

Table A.94: Summary statistics Site 94 for July 2011 to June 2012

Site 94: Ardadia Tip treated seepage water	Valid N	Mean	Median	Minimum	Maximum	Percentile	Percentile	Std.Dev.
Temperature (oC)	4	16.9	16.7	13.3	21.1	13.3	21.1	3.7
EC (ms/cm)	4	1.28	1.40	0.83	1.49	0.83	1.49	0.31
EC (µS/cm)	4	1298	1400	839	1552	839	1552	324
Turbidity (NTU)	4	3.3	1.8	0.8	8.6	0.8	8.6	3.6
DO (mg/L)	4	5.6	5.8	0.9	9.8	0.9	9.8	3.8
DO (%sat)	4	56	55	10	104	10	104	39
pH	4	7.6	7.5	7.3	7.9	7.3	7.9	0.2
Salinity (ppt)	4	0.7	0.7	0.4	0.8	0.4	0.8	0.2
Suspended Solids (mg/L)	3	2.7	1.0	1.0	6.0	1.0	6.0	2.9
Ammonium-Nitrogen (mg/L)	4	14.26	16.40	0.14	24.10	0.14	24.10	10.28
Oxidised Nitrogen (mg/L)	4	14.20	14.30	11.00	17.20	11.00	17.20	2.66
Total Nitrogen (mg/L)	4	30.2	34.1	12.4	40.2	12.4	40.2	13.2
Total Phosphorus(mg/L)	3	0.01	0.02	0.01	0.02	0.01	0.02	0.00
Faecal Coliforms (CFU/100ml)	3	28	25	17	41	17	41	12

Table A.95: Summary statistics Site 95 for July 2011 to June 2012

Site 95: Foxglove Oval- collected landfill leachate	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Temperature (oC)	9	17.0	18.6	11.9	21.1	13.2	20.1	3.4
EC (ms/cm)	9	0.81	0.62	0.48	1.59	0.51	1.37	0.41
EC (µS/cm)	9	809	623	476	1632	525	1333	411
Turbidity (NTU)	9	69.9	13.0	5.6	490.0	10.0	60.1	158.4
DO (mg/L)	9	4.0	4.0	2.5	5.8	3.1	5.7	1.1
DO (%sat)	9	41	39	27	56	34	53	9
pH	8	7.2	7.2	7.0	7.4	7.0	7.4	0.2
Salinity (ppt)	9	0.4	0.3	0.2	0.8	0.3	0.7	0.2
Ammonium-Nitrogen (mg/L)	9	23.34	16.00	5.45	59.10	9.80	44.20	18.05
Oxidised Nitrogen (mg/L)	9	2.54	2.20	1.46	4.06	1.69	3.40	0.87
Total Nitrogen (mg/L)	9	27.1	20.0	9.0	61.0	13.6	52.6	18.5

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Table A.96: Summary statistics Site 96 for July 2011 to June 2012

Site 96: treated landfill leachate-after wetland	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Flow Rate Estimate (L/min)	6	3	2	1	6	1	6	3
Temperature (oC)	9	16.5	18.2	10.9	20.3	12.1	19.0	3.5
EC (ms/cm)	9	0.69	0.60	0.38	1.07	0.40	1.02	0.25
EC (µS/cm)	9	686	589	397	1046	399	1023	243
Turbidity (NTU)	9	2.2	0.9	0.0	13.0	0.0	3.5	4.2
DO (mg/L)	9	1.9	2.0	0.2	4.4	0.6	2.8	1.3
DO (%sat)	9	19	19	3	47	7	25	13
pH	9	6.9	6.8	6.7	7.2	6.8	7.1	0.2
Salinity (ppt)	9	0.3	0.3	0.2	0.5	0.2	0.5	0.1
Suspended Solids (mg/L)	1	2.0						
Ammonium-Nitrogen (mg/L)	9	0.16	0.03	0.02	0.75	0.02	0.43	0.26
Oxidised Nitrogen (mg/L)	9	5.33	0.21	0.01	26.20	0.01	20.80	10.39
Total Nitrogen (mg/L)	9	6.7	1.2	0.6	27.0	0.9	24.9	11.0
Total Phosphorus (mg/L)	1	0.10	0.10	0.10	0.10	0.10	0.10	
Faecal Coliforms (CFU/100ml)	7	164	46	1	800	2	190	289
E Coli (CFU/100mL)	7	164	46	1	800	2	190	289
Bicarbonate Alkalinity (mg/CaCO3/L)	1	264						
Chloride (mg/L)	1	74						
Sulphate as $SO4^{2-}$(mg/L)	1	3.3						
Fluoride (mg/L)	2	0.10		0.09	0.11			
Sodium (mg/L)	1	53.4						
Potassium (mg/L)	1	20.8						
Magnesium (mg/L)	1	15.6						
Calcium (mg/L)	1	54.4						
Aluminium (ug/L)	1	35						
Arsenic (ug/L)	1	1.0						
Cadmium (ug/L)	1	0.5						
Chromium (ug/L)	1	0.5						
Copper (ug/L)	1	2.0						
Lead (ug/L)	1	0.5						
Manganese (ug/L)	1	173.0						
Molybdenum (ug/L)	1	0.5						
Nickel (ug/L)	1	4.0						
Selenium (ug/L)	1	1.5						
Silver (ug/L)	1	0.5						
Uranium (ug/L)	1	0.5						
Zinc (ug/L)	1	25.0						
Boron (ug/L)	1	134.0						
Iron (ug/L)	1	927						
Mercury (ug/L)	1	0.005						

Table A.96A: Summary statistics Site 96A for July 2011 to June 2012

Site 96A: Foxglove Oval - treated leachate - bioreactor 1 output	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Temperature (oC)	7	17.0	19.5	11.2	21.1	11.2	20.9	4.4
EC (ms/cm)	7	0.71	0.56	0.49	1.13	0.49	0.86	0.24
EC (µS/cm)	7	701	582	456	1094	456	858	233
Turbidity (NTU)	7	218.1	216.0	7.9	400.0	7.9	322.0	133.2
DO (mg/L)	7	3.4	2.9	1.6	6.6	1.6	4.8	1.8
DO (%sat)	7	34	27	17	60	17	52	17
pH	6	7.5	7.5	7.3	7.6	7.3	7.6	0.1
Salinity (ppt)	7	0.4	0.3	0.3	0.6	0.3	0.4	0.1
Ammonium-Nitrogen (mg/L)	7	3.35	1.13	0.01	9.50	0.01	7.00	3.99
Oxidised Nitrogen (mg/L)	7	17.35	15.40	7.84	25.00	7.84	24.20	6.60
Total Nitrogen (mg/L)	7	22.2	17.1	12.8	35.0	12.8	29.9	8.9

Table A.96A2: Summary statistics Site 96A2 for July 2011 to June 2012

Site 96A2: Foxglove Oval - treated leachate - bioreactor 2 output	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Temperature (oC)	9	17.9	19.3	12.6	22.3	12.6	21.6	3.7
EC (ms/cm)	9	0.75	0.62	0.44	1.38	0.44	1.14	0.32
EC (µS/cm)	9	741	601	435	1357	435	1111	318
Turbidity (NTU)	9	12.7	8.0	1.1	36.6	1.1	32.2	13.3
DO (mg/L)	9	7.1	7.3	5.3	8.7	5.3	8.5	1.3
DO (%sat)	9	74	79	59	91	59	83	12
pH	8	7.7	7.6	7.5	8.1	7.5	7.8	0.2
Salinity (ppt)	9	0.4	0.3	0.2	0.7	0.2	0.6	0.2
Ammonium-Nitrogen (mg/L)	9	6.37	0.40	0.04	47.10	0.04	7.47	15.46
Oxidised Nitrogen (mg/L)	9	20.40	16.40	7.64	35.50	7.64	32.50	10.25
Total Nitrogen (mg/L)	9	28.9	19.6	7.8	65.0	7.8	48.5	18.7

Table A.98: Summary statistics Site 98 for July 2011 to June 2012

Site 98: Council Nursery treatred stormwater - reuse water	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Temperature (oC)	12	18.1	18.5	12.0	24.3	13.5	22.3	4.2
EC (ms/cm)	12	0.20	0.20	0.14	0.27	0.15	0.25	0.05
EC (µS/cm)	12	183	182	124	230	150	227	35
Turbidity (NTU)	12	7.2	5.7	0.9	27.0	1.3	10.0	7.5
DO (mg/L)	12	5.2	5.2	1.8	8.0	3.2	7.4	2.3
DO (%sat)	12	52	53	21	85	37	72	20
pH	12	7.0	6.9	6.8	7.6	6.9	7.2	0.2
Salinity (ppt)	12	0.1	0.1	0.1	0.1	0.1	0.1	0.0
Suspended Solids (mg/L)	7	1.7	1.0	1.0	5.0	1.0	2.0	1.5
Ammonium-Nitrogen (mg/L)	7	0.01	0.01	0.01	0.03	0.01	0.01	0.01
Oxidised Nitrogen (mg/L)	7	0.46	0.40	0.33	0.79	0.39	0.49	0.15
Total Nitrogen (mg/L)	8	0.7	0.6	0.6	1.1	0.6	0.7	0.2
Total Phosphorus (mg/L)	8	0.22	0.21	0.10	0.50	0.10	0.29	0.14
Faecal Coliforms (CFU/100ml)	12	33	4	1	230	1	50	68
E Coli (CFU/100mL)	9	43	5	1	230	1	88	77
Bicarbonate Alkalinity (mg/CaCO3/L)	2	75		70	81			
Chloride (mg/L)	3	16	15	7	26	7	26	10
Sulphate as $SO4^{2-}$(mg/L)	2	8.3		7.4	9.1			
Fluoride (mg/L)	4	0.26	0.27	0.17	0.32	0.17	0.32	0.07
Sodium (mg/L)	3	11.8	13.5	7.3	14.6	7.3	14.6	4.0
Potassium (mg/L)	3	7.9	7.6	3.5	12.7	3.5	12.7	4.6
Magnesium (mg/L)	3	5.0	4.8	4.3	5.9	4.3	5.9	0.8
Calcium (mg/L)	3	19.2	20.2	16.7	20.6	16.7	20.6	2.1
Aluminium (ug/L)	2	170		84	255			
Arsenic (ug/L)	2	5.0		4.0	6.0			
Cadmium (ug/L)	2	0.5		0.5	0.5			
Chromium (ug/L)	2	0.5		0.5	0.5			
Copper (ug/L)	2	18.0		15.0	21.0			
Lead (ug/L)	2	2.5		2.0	3.0			
Manganese (ug/L)	2	22.0		4.0	40.0			
Molybdenum (ug/L)	2	5.5		3.0	8.0			
Nickel (ug/L)	2	2.5		2.0	3.0			
Selenium (ug/L)	2	1.5		1.5	1.5			
Silver (ug/L)	2	0.5		0.5	0.5			
Uranium (ug/L)	2	0.5		0.5	0.5			
Zinc (ug/L)	2	96.0		57.0	135.0			
Boron (ug/L)	2	24.5		20.0	29.0			
Iron (ug/L)	2	314		160	468			
Mercury (ug/L)	2	0.005		0.005	0.005			

Table A.100: Summary statistics Site 100 for July 2011 to June 2012

Site 100 Berowra Creek at Crosslands Reserve (north beach)	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Temperature (oC)	13	17.6	17.8	12.5	22.8	14.1	21.7	3.6
EC (ms/cm)	13	12.11	13.30	0.41	25.00	3.86	22.63	8.46
EC (µS/cm)	3	1659	665	407	3905	407	3905	1949
Turbidity (NTU)	13	7.6	4.1	0.8	29.5	1.6	11.9	9.1
DO (mg/L)	12	7.2	7.2	4.9	8.9	6.4	8.4	1.2
DO (%sat)	12	78	82	58	94	73	84	10
pH	12	6.9	6.9	6.6	7.4	6.7	7.2	0.2
Salinity (ppt)	13	7.1	7.6	0.2	15.2	2.1	13.6	5.2
Suspended Solids (mg/L)	13	7.3	5.0	2.0	17.0	2.0	13.0	5.3
Ammonium-Nitrogen (mg/L)	13	0.08	0.06	0.04	0.21	0.05	0.11	0.05
Oxidised Nitrogen (mg/L)	13	0.32	0.30	0.05	0.52	0.21	0.47	0.14
Total Nitrogen (mg/L)	13	0.8	0.8	0.4	1.4	0.6	0.9	0.3
Total Phosphorus (mg/L)	13	0.08	0.06	0.03	0.16	0.03	0.13	0.05
Soluble Reactive Phosphorus (mg/L)	1	0.03	0.03	0.03	0.03	0.03	0.03	
Chlorophyll-A (ug/L)	12	2.7	2.2	1.0	6.4	1.4	4.0	1.8
Faecal Coliforms (CFU/100ml)	13	642	81	22	3800	41	410	1223
Enterococci (CFU/100ml)	12	123	35	6	770	10	200	221

Table A.103: Summary statistics Site 103 for July 2011 to June 2012

Site 103: Hawkesbury River eastern end of Milsons Passage	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Secchi Depth (m)	13	0.7	0.9	0.3	1.0	0.4	0.9	0.3
Temperature (oC)	13	19.4	20.4	15.3	24.6	15.8	21.5	2.9
EC (ms/cm)	13	37.43	40.66	1.82	44.28	36.20	43.56	11.47
EC (µS/cm)*	1	1807						
Turbidity (NTU)	13	24.4	18.7	12.9	54.1	13.0	31.5	13.1
DO (mg/L)	12	6.9	7.0	5.7	7.8	6.1	7.4	0.7
DO (%sat)	12	85	81	75	101	79	97	9
pH	13	7.6	7.7	7.0	7.9	7.5	7.8	0.2
Salinity (ppt)	13	23.9	26.0	0.9	28.6	23.4	28.0	7.5
Suspended Solids (mg/L)	12	28.6	22.5	13.0	57.0	16.0	43.0	16.0
Ammonium-Nitrogen (mg/L)	13	0.02	0.02	0.01	0.07	0.01	0.03	0.02
Oxidised Nitrogen (mg/L)	13	0.07	0.06	0.02	0.13	0.03	0.10	0.04
Total Nitrogen (mg/L)	13	0.3	0.3	0.2	0.6	0.3	0.4	0.1
Total Phosphorus (mg/L)	13	0.03	0.03	0.02	0.06	0.02	0.04	0.01
Chlorophyll-A (ug/L)	12	2.6	2.6	1.4	4.0	1.8	3.3	0.8
Faecal Coliforms (CFU/100ml)	13	15	3	1	78	2	11	27
Enterococci (CFU/100ml)	13	9	2	1	44	1	7	15

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Table A.104: Summary statistics Site 104 for July 2011 to June 2012

Site 104: Hawkesbury River, off Peat Island	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Secchi Depth (m)	13	0.9	0.9	0.3	1.2	0.8	1.1	0.2
Temperature (oC)	13	19.5	20.2	15.6	24.6	16.3	21.5	2.8
EC (ms/cm)	13	37.98	43.40	1.60	45.57	37.30	44.76	12.41
EC (µS/cm)	1	1695						
Turbidity (NTU)	13	15.2	11.0	6.2	31.0	7.2	24.3	8.4
DO (mg/L)	12	6.8	6.9	5.8	7.5	6.4	7.2	0.5
DO (%sat)	12	85	83	77	101	78	91	8
pH	13	7.7	7.8	7.0	7.9	7.5	7.8	0.3
Salinity (ppt)	13	24.4	28.0	0.8	29.5	23.7	28.9	8.2
Suspended Solids (mg/L)	13	17.5	16.0	6.0	35.0	11.0	26.0	8.3
Ammonium-Nitrogen (mg/L)	13	0.02	0.02	0.01	0.07	0.01	0.03	0.02
Oxidised Nitrogen (mg/L)	13	0.07	0.06	0.02	0.13	0.02	0.11	0.04
Total Nitrogen (mg/L)	13	0.3	0.3	0.2	0.6	0.2	0.4	0.1
Total Phosphorus (mg/L)	13	0.03	0.02	0.02	0.05	0.02	0.03	0.01
Chlorophyll-A (ug/L)	13	2.9	2.2	1.4	7.1	1.7	3.9	1.6
Faecal Coliforms (CFU/100ml)	13	12	4	1	67	1	8	22
Enterococci (CFU/100ml)	13	8	2	1	43	1	8	15

Table A.105: Summary statistics Site 105 for July 2011 to June 2012

Site 105: Hawkesbury River under Hawlesbury River Bridge	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Secchi Depth (m)	13	0.8	0.8	0.4	1.0	0.6	1.0	0.2
Temperature (oC)	13	19.5	20.0	15.5	24.2	16.4	21.2	2.7
EC (ms/cm)	13	39.34	44.37	3.00	47.01	37.50	46.37	11.99
EC (µS/cm)*	1	3109						
Turbidity (NTU)	13	16.3	11.6	5.6	34.0	10.0	28.6	9.2
DO (mg/L)	12	6.8	6.6	5.9	7.8	6.4	7.2	0.6
DO (%sat)	12	84	82	72	99	78	91	8
pH	13	7.7	7.8	7.0	8.0	7.6	7.9	0.3
Salinity (ppt)	13	25.2	28.3	1.5	30.5	23.5	30.1	7.9
Suspended Solids (mg/L)	13	21.6	19.0	6.0	49.0	12.0	24.0	13.2
Ammonium-Nitrogen (mg/L)	13	0.03	0.02	0.01	0.07	0.02	0.03	0.02
Oxidised Nitrogen (mg/L)	13	0.06	0.06	0.01	0.13	0.03	0.10	0.04
Total Nitrogen (mg/L)	13	0.3	0.3	0.2	0.6	0.2	0.4	0.1
Total Phosphorus (mg/L)	13	0.03	0.03	0.02	0.05	0.02	0.03	0.01
Chlorophyll-A (ug/L)	13	2.5	2.1	1.6	3.9	1.7	3.2	0.8
Faecal Coliforms (CFU/100ml)	13	13	2	1	69	1	30	23
Enterococci (CFU/100ml)	13	6	2	1	32	1	6	10

* After heavy rain 12 March 2012

Table A.106: Summary statistics Site 106 for July 2011 to June 2012

Site 106: Middle Sandbrook Inlet Brooklyn, off Fenwicks Marina	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Secchi Depth (m)	12	0.8	0.9	0.3	1.0	0.7	1.0	0.2
Temperature (oC)	13	19.5	20.2	15.5	25.8	16.3	20.9	3.1
EC (ms/cm)	13	36.45	41.22	2.06	43.78	31.60	43.25	11.74
EC (µS/cm) *	1							
Turbidity (NTU)	13	15.8	12.9	6.3	34.2	7.7	23.0	8.8
DO (mg/L)	12	7.0	6.9	5.8	8.4	6.5	7.6	0.7
DO (%sat)	12	87	88	76	102	80	95	9
pH	13	7.6	7.7	7.0	8.0	7.5	7.8	0.2
Salinity (ppt)	13	23.2	26.4	1.1	28.2	19.7	27.7	7.7
Suspended Solids (mg/L)	13	17.3	17.0	5.0	38.0	8.0	27.0	9.6
Ammonium-Nitrogen (mg/L)	13	0.02	0.02	0.01	0.07	0.01	0.03	0.02
Oxidised Nitrogen (mg/L)	13	0.07	0.08	0.02	0.13	0.04	0.10	0.04
Total Nitrogen (mg/L)	13	0.3	0.3	0.2	0.7	0.2	0.4	0.1
Total Phosphorus (mg/L)	13	0.03	0.03	0.02	0.05	0.02	0.03	0.01
Chlorophyll-A (ug/L)	13	3.4	3.2	1.4	9.1	2.0	3.9	2.0
Faecal Coliforms (CFU/100ml)	13	27	6	1	200	2	32	55
Enterococci (CFU/100ml)	13	15	4	1	76	1	14	27

* After heavy rain 12 March 2012

Table A.107: Summary statistics Site 107 for July 2011 to June 2012

Site 107: Hawkesbury River off Long Island	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Secchi Depth (m)	12	0.9	1.0	0.3	1.4	0.8	1.1	0.3
Temperature (oC)	13	19.6	20.2	15.8	24.6	16.6	21.4	2.7
EC (ms/cm)	13	38.82	44.29	2.42	47.02	32.60	45.50	12.31
EC (µS/cm) *	1	2507						
Turbidity (NTU)	13	13.1	12.2	4.3	29.3	7.1	20.7	7.2
DO (mg/L)	12	7.0	7.0	5.4	8.3	6.5	7.5	0.7
DO (%sat)	12	88	86	72	103	80	97	9
pH	13	7.7	7.8	7.1	8.0	7.6	7.8	0.2
Salinity (ppt)	13	24.9	28.5	1.3	30.6	20.3	29.4	8.1
Suspended Solids (mg/L)	13	17.0	17.0	5.0	38.0	10.0	25.0	9.4
Ammonium-Nitrogen (mg/L)	13	0.02	0.02	0.01	0.07	0.01	0.03	0.02
Oxidised Nitrogen (mg/L)	13	0.06	0.06	0.01	0.13	0.02	0.10	0.04
Total Nitrogen (mg/L)	13	0.3	0.3	0.2	0.6	0.2	0.4	0.1
Total Phosphorus (mg/L)	13	0.03	0.02	0.02	0.05	0.02	0.03	0.01
Chlorophyll-A (ug/L)	13	2.7	2.3	1.5	5.9	1.8	3.6	1.2
Faecal Coliforms (CFU/100ml)	13	28	5	1	250	1	13	69
Enterococci (CFU/100ml)	13	9	3	1	48	1	4	16

* After heavy rain 12 March 2012

Table A.108: Summary statistics Site 108 for July 2011 to June 2012

Site 108: Hawkesbury River off Bradleys Beach Dangar Island	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Secchi Depth (m)	11	1.1	1.2	0.6	1.5	0.8	1.4	0.3
Temperature (oC)	13	19.3	20.0	16.4	23.2	16.8	21.1	2.3
EC (ms/cm)	13	44.67	47.77	15.50	51.05	41.89	49.36	9.43
Turbidity (NTU)	13	12.0	8.8	3.5	38.2	5.0	17.4	9.6
DO (mg/L)	12	7.1	7.0	5.9	8.5	6.7	7.6	0.7
DO (%sat)	12	92	91	79	112	84	99	9
pH	13	7.7	7.7	7.3	8.1	7.5	7.8	0.2
Salinity (ppt)	13	28.9	31.1	8.9	33.5	26.8	32.3	6.6
Suspended Solids (mg/L)	13	14.6	13.0	6.0	39.0	7.0	18.0	9.1
Ammonium-Nitrogen (mg/L)	13	0.02	0.02	0.01	0.06	0.01	0.03	0.01
Oxidised Nitrogen (mg/L)	13	0.04	0.05	0.01	0.11	0.02	0.05	0.03
Total Nitrogen (mg/L)	13	0.3	0.2	0.2	0.5	0.2	0.3	0.1
Total Phosphorus (mg/L)	13	0.02	0.02	0.02	0.04	0.02	0.03	0.01
Chlorophyll-A (ug/L)	13	2.2	2.2	1.3	3.2	1.5	2.6	0.6
Faecal Coliforms (CFU/100ml)	13	14	1	1	54	1	47	21
Enterococci (CFU/100ml)	13	7	1	1	33	1	12	12

Table A.110f (0.4): Summary statistics Site 110f for July 2011 to June 2012

Site 110f at 0.4m depth: The Lakes of Cherrybrook-lower lake at observation platform	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Temperature (oC)	9	16.9	19.3	10.0	22.0	10.3	21.4	4.7
EC (ms/cm)	9	0.36	0.38	0.20	0.56	0.21	0.51	0.12
EC (µS/cm)	9	367	390	183	528	211	514	119
Turbidity (NTU)	9	1.5	0.8	0.0	6.2	0.0	2.5	2.0
DO (mg/L)	9	7.2	6.9	1.4	11.2	4.2	11.1	3.5
DO (%sat)	9	72	78	18	100	47	99	30
pH	9	6.9	6.9	6.3	7.4	6.4	7.2	0.4
Salinity (ppt)	9	0.2	0.2	0.1	0.3	0.1	0.3	0.1

Table A.110f (1.4): Summary statistics Site 110f for July 2011 to June 2012

Site 110f- 1.4m depth: The Lakes of Cherrybrook-lower lake at observation platform	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Temperature (oC)	9	16.8	19.0	10.0	21.5	10.0	21.2	4.6
EC (ms/cm)	9	0.37	0.38	0.20	0.56	0.20	0.51	0.12
EC (µS/cm)	9	368	390	185	528	185	514	119
Turbidity (NTU)	9	1.4	0.8	0.0	5.7	0.0	2.7	1.9
DO (mg/L)	9	6.7	7.1	1.3	10.1	1.3	10.0	3.2
DO (%sat)	9	67	80	16	97	16	96	28
pH	9	7	7	6	7	6	7	0
Salinity (ppt)	9.0	0.2	0.2	0.1	0.3	0.1	0.3	0.1

Table A.112: Summary statistics Site 112 for July 2011 to June 2012

Site 112: Wisemans Ferry Tip: Riser "C"	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Temperature (oC)	4	18.6	19.1	15.1	21.1	15.1	21.1	2.8
EC (ms/cm)	4	2.50	2.44	2.26	2.85	2.26	2.85	0.27
EC (µS/cm)	4	2004	2421	225	2948	225	2948	1221
Turbidity (NTU)	4	2.4	2.6	0.8	3.6	0.8	3.6	1.2
DO (mg/L)	4	2.0	1.9	0.2	4.1	0.2	4.1	2.0
DO (%sat)	4	22	22	2	41	2	41	21
pH	4	6.5	6.4	6.3	6.7	6.3	6.7	0.2
Salinity (ppt)	4	1.3	1.3	1.2	1.5	1.2	1.5	0.1
Suspended Solids (mg/L)	4	5.3	3.0	1.0	14.0	1.0	14.0	6.0
Ammonium-Nitrogen (mg/L)	4	1.14	0.45	0.08	3.60	0.08	3.60	1.65
Oxidised Nitrogen (mg/L)	4	18.00	16.10	8.80	31.00	8.80	31.00	9.33
Total Nitrogen (mg/L)	4	20.5	17.4	15.0	32.3	15.0	32.3	7.9
Total Phosphorus(mg/L)	4	0.03	0.03	0.02	0.05	0.02	0.05	0.01
Faecal Coliforms (CFU/100ml)	4	69	17	1	240	1	240	115

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Table A.114: Summary statistics Site 114 for July 2011 to June 2012

Site 114. Muogamarra Ck. Reference freshwater creek	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Flow Rate Estimate (L/min)	13	2552	200	25	30000	50	500	8250
Temperature (oC)	13	15.6	16.7	11.2	20.2	11.6	18.8	3.2
EC (ms/cm)	13	0.10	0.11	0.05	0.13	0.05	0.13	0.03
EC (µS/cm)	13	86	95	19	133	43	112	33
Turbidity (NTU)	13	1.8	0.4	0.0	16.0	0.0	1.1	4.4
DO (mg/L)	11	9.6	9.9	6.5	10.9	8.5	10.8	1.3
DO (%sat)	11	96	100	69	107	89	104	10
pH	12	4.8	4.8	4.5	5.4	4.5	5.1	0.3
Salinity (ppt)	13	0.0	0.1	0.0	0.1	0.0	0.1	0.0
Suspended Solids (mg/L)	13	8.5	4.0	1.0	53.0	1.0	10.0	14.7
Ammonium-Nitrogen (mg/L)	13	0.01	0.01	0.01	0.02	0.01	0.01	0.01
Oxidised Nitrogen (mg/L)	13	0.01	0.01	0.01	0.02	0.01	0.01	0.00
Total Nitrogen (mg/L)	13	0.2	0.1	0.1	0.5	0.1	0.4	0.1
Total Phosphorus (mg/L)	13	0.01	0.01	0.00	0.02	0.00	0.01	0.01
Faecal Coliforms (CFU/100ml)	13	189	23	4	2000	5	73	547
Bicarbonate Alkalinity (mg/CaCO3/L)	2	1		1	1			
Chloride (mg/L)	2	21		14	28			
Sulphate as $SO4^{2-}$(mg/L)	2	4.7		3.7	5.6			
Fluoride (mg/L)	2	0.03		0.03	0.03			
Sodium (mg/L)	3	15.2	17.1	9.6	19.0	9.6	19.0	5.0
Potassium (mg/L)	3	0.9	1.0	0.7	1.1	0.7	1.1	0.2
Magnesium (mg/L)	3	1.9	2.2	1.0	2.4	1.0	2.4	0.8
Calcium (mg/L)	3	0.6	0.6	0.4	1.0	0.4	1.0	0.3
Aluminium (ug/L)	3	661	243	219	1520	219	1520	744
Arsenic (ug/L)	3	0.5	0.5	0.5	0.5	0.5	0.5	0.0
Cadmium (ug/L)	3	0.5	0.5	0.5	0.5	0.5	0.5	0.0
Chromium (ug/L)	3	1.2	1.0	0.5	2.0	0.5	2.0	0.8
Copper (ug/L)	3	3.0	1.0	1.0	7.0	1.0	7.0	3.5
Lead (ug/L)	3	0.5	0.5	0.5	0.5	0.5	0.5	0.0
Manganese (ug/L)	3	15.0	13.0	12.0	20.0	12.0	20.0	4.4
Molybdenum (ug/L)	3	0.7	0.5	0.5	1.0	0.5	1.0	0.3
Nickel (ug/L)	3	1.0	0.5	0.5	2.0	0.5	2.0	0.9
Selenium (ug/L)	3	1.5	1.5	1.5	1.5	1.5	1.5	0.0
Silver (ug/L)	3	0.5	0.5	0.5	0.5	0.5	0.5	0.0
Uranium (ug/L)	3	0.7	0.5	0.5	1.0	0.5	1.0	0.3
Zinc (ug/L)	3	24.7	23.0	10.0	41.0	10.0	41.0	15.6
Boron (ug/L)	3	19.7	19.0	18.0	22.0	18.0	22.0	2.1
Iron (ug/L)	3	442	242	146	938	146	938	432
Mercury (ug/L)	2	0.005		0.005	0.005			
Total Organic Carbon (mg/L)	1	3						

Table A.115: Summary statistics Site 115 for July 2011 to June 2012

Site 115: Old Mans Ck at firetrail crossing	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Flow Rate Estimate (L/min)	9	3492	3600	30	6000	3000	4000	1544
Temperature (oC)	9	17.7	18.0	10.5	23.1	13.1	22.9	4.4
EC (ms/cm)	9	0.65	0.69	0.17	0.90	0.35	0.87	0.24
EC (µS/cm)	9	654	726	163	847	346	846	241
Turbidity (NTU)	9	12.1	1.0	0.0	80.0	0.2	22.4	26.4
DO (mg/L)	8	8.1	7.6	6.8	9.8	7.1	9.5	1.2
DO (%sat)	8	86	87	77	93	78	92	6
pH	9	7.6	7.7	6.1	8.0	7.4	8.0	0.6
Salinity (ppt)	9	0.3	0.3	0.1	0.5	0.2	0.4	0.1
Suspended Solids (mg/L)	9	7.3	2.0	1.0	43.0	1.0	12.0	13.8
Ammonium-Nitrogen (mg/L)	9	0.01	0.01	0.01	0.04	0.01	0.01	0.01
Oxidised Nitrogen (mg/L)	9	0.10	0.04	0.01	0.39	0.01	0.22	0.13
Total Nitrogen (mg/L)	9	0.4	0.2	0.2	1.2	0.2	0.6	0.3
Total Phosphorus (mg/L)	9	0.03	0.02	0.02	0.13	0.02	0.05	0.04
Faecal Coliforms (CFU/100ml)	9	1124	320	46	4800	67	3000	1655
Bicarbonate Alkalinity (mg/CaCO3/L)	1	55						
Chloride (mg/L)	1	18						
Sulphate as $SO4^{2-}$(mg/L)	1	17.0						
Fluoride (mg/L)	1	0.14						
Sodium (mg/L)	1	17						
Potassium (mg/L)	1	2.5						
Magnesium (mg/L)	1	8.8						
Calcium (mg/L)	1	12						
Aluminium (ug/L)	1	3570						
Arsenic (ug/L)	1	2.0						
Cadmium (ug/L)	1	0.5						
Chromium (ug/L)	1	7.0						
Copper (ug/L)	1	11.0						
Lead (ug/L)	1	7.0						
Manganese (ug/L)	1	56.0						
Molybdenum (ug/L)	1	2.0						
Nickel (ug/L)	1	5.0						
Selenium (ug/L)	1	1.5						
Silver (ug/L)	1	0.5						
Uranium (ug/L)	1	0.5						
Zinc (ug/L)	1	32.0						
Boron (ug/L)	1	29.0						
Iron (ug/L)	1	3420						
Mercury (ug/L)	1	0.020						

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Table A.120: Summary statistics Site 120 for July 2011 to June 2012

Site 120: Greenway Park Cherrybrook. Raw harvested stormwater	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Temperature (oC)	12	19.7	20.1	10.9	25.9	16.1	24.3	4.4
EC (ms/cm)	12	0.26	0.29	0.19	0.34	0.20	0.30	0.05
EC (µS/cm)	12	262	289	170	305	201	295	48
Turbidity (NTU)	12	6.4	2.4	0.0	43.3	0.4	7.2	12.1
DO (mg/L)	12	4.0	4.1	1.9	5.9	2.6	5.2	1.3
DO (%sat)	12	43	46	22	65	26	52	14
pH	12	6.9	6.9	6.8	7.2	6.8	7.0	0.1
Salinity (ppt)	12	0.1	0.1	0.1	0.2	0.1	0.2	0.0
Suspended Solids (mg/L)	1	4.0						
Ammonium-Nitrogen (mg/L)	1	0.02						
Oxidised Nitrogen (mg/L)	1	0.41						
Total Nitrogen (mg/L)	1	1.0						
Total Phosphorus (mg/L)	1	0.09						
Faecal Coliforms (CFU/100ml)	12	107	1	1	1200	1	27	344
E Coli (CFU/100mL)	12	107	1	1	1200	1	27	344
Bicarbonate Alkalinity (mg/CaCO3/L)	1	66						
Chloride (mg/L)	1	32						
Sulphate as $SO4^{2-}$(mg/L)	1	19.0						
Fluoride (mg/L)	3	0.14	0.14	0.12	0.16	0.12	0.16	0.02
Sodium (mg/L)	1	21.9						
Potassium (mg/L)	1	5.3						
Magnesium (mg/L)	1	4.8						
Calcium (mg/L)	1	23.4						
Aluminium (ug/L)	1	385						
Arsenic (ug/L)	1	0.5						
Cadmium (ug/L)	1	0.5						
Chromium (ug/L)	1	0.5						
Copper (ug/L)	1	18.0						
Lead (ug/L)	1	2.0						
Manganese (ug/L)	1	19.0						
Molybdenum (ug/L)	1	0.5						
Nickel (ug/L)	1	4.0						
Selenium (ug/L)	1	1.5						
Silver (ug/L)	1	0.5						
Uranium (ug/L)	1	0.5						
Zinc (ug/L)	1	67.0						
Boron (ug/L)	1	23.0						
Iron (ug/L)	1	900						
Mercury (ug/L)	1	0.005						

Table A.121: Summary statistics Site 121 for July 2011 to June 2012

Site 121: Greenway Park Cherrybrook. Treated harvested stormwater.	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Temperature (oC)	12	17.3	17.5	12.3	22.5	13.9	20.5	3.5
EC (ms/cm)	12	0.23	0.24	0.16	0.30	0.19	0.26	0.04
EC (µS/cm)	12	220	224	161	279	190	244	36
Turbidity (NTU)	12	21.1	3.5	0.0	177.0	1.3	18.0	49.6
DO (mg/L)	12	7.0	6.7	4.9	10.1	5.2	8.3	1.7
DO (%sat)	12	72	68	46	107	58	86	18
pH	12	7.6	7.2	7.0	9.2	7.2	8.1	0.8
Salinity (ppt)	12	0.1	0.1	0.1	0.2	0.1	0.1	0.0
Suspended Solids (mg/L)	4	2.3	1.0	1.0	6.0	1.0	6.0	2.5
Ammonium-Nitrogen (mg/L)	2	0.04	0.04	0.01	0.07	0.01	0.07	0.04
Oxidised Nitrogen (mg/L)	2	0.39	0.39	0.29	0.48	0.29	0.48	0.13
Total Nitrogen (mg/L)	4	0.9	0.9	0.7	1.3	0.7	1.3	0.3
Total Phosphorus (mg/L)	4	0.11	0.06	0.00	0.31	0.00	0.31	0.14
Faecal Coliforms (CFU/100ml)	12	85	15	1	700	1	79	197
E Coli (CFU/100mL)	11	86	1	1	700	1	79	206
Bicarbonate Alkalinity (mg/CaCO3/L)	2	84		66	102			
Chloride (mg/L)	4	24	25	13	33	13	33	8
Sulphate as $SO4^{2-}$(mg/L)	3	12.1	8.9	8.4	19.0	8.4	19.0	6.0
Fluoride (mg/L)	5	0.34	0.15	0.12	0.92	0.13	0.65	0.34
Sodium (mg/L)	4	14.6	13.1	10.3	22.0	10.3	22.0	5.2
Potassium (mg/L)	4	4.3	3.9	2.4	7.1	2.4	7.1	2.3
Magnesium (mg/L)	4	4.2	4.6	2.6	4.9	2.6	4.9	1.0
Calcium (mg/L)	4	24.6	25.0	16.6	31.8	16.6	31.8	6.5
Aluminium (ug/L)	2	422		38	806			
Arsenic (ug/L)	2	0.8		0.5	1.0			
Cadmium (ug/L)	2	0.5		0.5	0.5			
Chromium (ug/L)	2	0.8		0.5	1.0			
Copper (ug/L)	2	16.0		11.0	21.0			
Lead (ug/L)	2	0.5		0.5	0.5			
Manganese (ug/L)	2	35.0		7.0	63.0			
Molybdenum (ug/L)	2	0.5		0.5	0.5			
Nickel (ug/L)	2	4.0		3.0	5.0			
Selenium (ug/L)	2	1.5		1.5	1.5			
Silver (ug/L)	2	0.5		0.5	0.5			
Uranium (ug/L)	2	0.5		0.5	0.5			
Zinc (ug/L)	2	29.0		21.0	37.0			
Boron (ug/L)	2	21.5		20.0	23.0			
Iron (ug/L)	4	380		27	1230			
Mercury (ug/L)	2	0.005		0.005	0.005			
Hardness mg/L CaCO3	2	75		66	85			
BOD5/CBOD5 (mg/L)	1	4						

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Table A.122: Summary statistics Site 122 for July 2011 to June 2012

Site 122: Upper Calabash Ck below Arcadia Tip	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Flow Rate Estimate (L/min)	1	30						
Temperature (oC)	1	12.3						
EC (ms/cm)	1	0.34						
EC (µS/cm)	1	316						
Turbidity (NTU)	1	3.5						
DO (mg/L)	1	8.8						
DO (%sat)	1	82						
pH	1	6.2						
Salinity (ppt)	1	0.2						
Suspended Solids (mg/L)	1	3.0						
Ammonium-Nitrogen (mg/L)	1	0.01						
Oxidised Nitrogen (mg/L)	1	0.05						
Total Nitrogen (mg/L)	1	0.3						
Total Phosphorus (mg/L)	1	0.01						
Faecal Coliforms (CFU/100ml)	1	44						

Table A.123: Summary statistics Site 123 for July 2011 to June 2012

Site 123: Creek draining Peats Crater. Reference freshwater creek.	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Flow Rate Estimate (L/min)	13	1060	150	20	10000	60	800	2714
Temperature (oC)	13	15.4	16.2	11.6	19.4	12.2	17.8	2.8
EC (ms/cm)	13	0.20	0.23	0.05	0.27	0.16	0.25	0.06
EC (µS/cm)	13	196	220	38	257	153	236	61
Turbidity (NTU)	13	13.2	11.4	2.9	48.0	5.4	16.1	11.4
DO (mg/L)	11	9.7	9.5	8.3	10.6	9.3	10.3	0.7
DO (%sat)	11	97	98	87	103	96	101	5
pH	12	6.6	6.8	4.4	7.1	6.6	7.0	0.7
Salinity (ppt)	13	0.1	0.1	0.0	0.1	0.1	0.1	0.0
Suspended Solids (mg/L)	13	3.5	3.0	1.0	17.0	1.0	4.0	4.2
Ammonium-Nitrogen (mg/L)	13	0.01	0.01	0.01	0.02	0.01	0.02	0.00
Oxidised Nitrogen (mg/L)	13	0.19	0.16	0.01	0.65	0.02	0.30	0.18
Total Nitrogen (mg/L)	13	0.4	0.4	0.2	0.8	0.3	0.6	0.2
Total Phosphorus (mg/L)	13	0.03	0.03	0.02	0.04	0.03	0.04	0.01
Faecal Coliforms (CFU/100ml)	13	251	55	14	2300	32	200	619
Bicarbonate Alkalinity (mg/CaCO3/L)	2	6		1	11			
Chloride (mg/L)	2	32		20	44			
Sulphate as $SO4^{2-}$(mg/L)	2	5.9		4.9	6.9			
Fluoride (mg/L)	2	0.04		0.03	0.06			
Sodium (mg/L)	3	23.3	26.4	14.4	29.2	14.4	29.2	7.9
Potassium (mg/L)	3	1.9	1.9	1.6	2.1	1.6	2.1	0.3
Magnesium (mg/L)	3	4.4	4.9	2.2	6.2	2.2	6.2	2.0
Calcium (mg/L)	3	2.8	2.5	1.1	4.9	1.1	4.9	2.0
Aluminium (ug/L)	3	1406	1070	467	2680	467	2680	1144
Arsenic (ug/L)	3	0.5	0.5	0.5	0.5	0.5	0.5	0.0
Cadmium (ug/L)	3	0.5	0.5	0.5	0.5	0.5	0.5	0.0
Chromium (ug/L)	3	2.7	2.0	1.0	5.0	1.0	5.0	2.1
Copper (ug/L)	3	1.0	1.0	1.0	1.0	1.0	1.0	0.0
Lead (ug/L)	3	0.7	0.5	0.5	1.0	0.5	1.0	0.3
Manganese (ug/L)	3	31.0	31.0	26.0	36.0	26.0	36.0	5.0
Molybdenum (ug/L)	3	0.5	0.5	0.5	0.5	0.5	0.5	0.0
Nickel (ug/L)	3	3.7	4.0	3.0	4.0	3.0	4.0	0.6
Selenium (ug/L)	3	1.5	1.5	1.5	1.5	1.5	1.5	0.0
Silver (ug/L)	3	0.5	0.5	0.5	0.5	0.5	0.5	0.0
Uranium (ug/L)	3	0.5	0.5	0.5	0.5	0.5	0.5	0.0
Zinc (ug/L)	3	11.3	5.0	5.0	24.0	5.0	24.0	11.0
Boron (ug/L)	3	28.7	29.0	26.0	31.0	26.0	31.0	2.5
Iron (ug/L)	3	1338	820	735	2460	735	2460	972
Mercury (ug/L)	2	0.005		0.005	0.005			
Total Organic Carbon (mg/L)	1	5						

Table A.128: Summary statistics Site 128 for July 2011 to June 2012

Site 128: Berowra Park Oval. Raw harvested stormwater from underground tank.	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Flow Rate Estimate (L/min)	12	11	12	5	15	9	13	3
Temperature (oC)	12	17.2	17.1	13.0	21.4	14.1	20.5	3.1
EC (ms/cm)	12	0.30	0.31	0.21	0.40	0.27	0.33	0.05
EC (µS/cm)	12	298	302	221	378	243	336	50
Turbidity (NTU)	12	2.8	1.3	0.0	8.0	0.4	7.0	3.1
DO (mg/L)	12	8.1	8.4	7.2	8.9	7.4	8.8	0.7
DO (%sat)	12	84	82	80	92	81	87	4
pH	12	7.4	7.4	7.3	7.7	7.4	7.5	0.1
Salinity (ppt)	12	0.1	0.2	0.1	0.2	0.1	0.2	0.0
Suspended Solids (mg/L)	1	1.0						
Ammonium-Nitrogen (mg/L)	1	0.01						
Oxidised Nitrogen (mg/L)	1	0.52						
Total Nitrogen (mg/L)	1	0.7						
Total Phosphorus (mg/L)	1	0.02						
Faecal Coliforms (CFU/100ml)	12	530	43	1	5700	15	110	1630
E Coli (CFU/100mL)	12	524	43	1	5700	14	110	1631
Bicarbonate Alkalinity (mg/CaCO3/L)	1	50						
Chloride (mg/L)	1	33						
Sulphate as $SO4^{2-}$(mg/L)	1	25.0						
Fluoride (mg/L)	3	0.03	0.03	0.03	0.05	0.03	0.05	0.01
Sodium (mg/L)	1	19.2						
Potassium (mg/L)	1	1.8						
Magnesium (mg/L)	1	5.3						
Calcium (mg/L)	1	16.2						
Aluminium (ug/L)	1	139						
Arsenic (ug/L)	1	0.5						
Cadmium (ug/L)	1	0.5						
Chromium (ug/L)	1	0.5						
Copper (ug/L)	1	5.0						
Lead (ug/L)	1	0.5						
Manganese (ug/L)	1	4.0						
Molybdenum (ug/L)	1	0.5						
Nickel (ug/L)	1	1.0						
Selenium (ug/L)	1	1.5						
Silver (ug/L)	1	0.5						
Uranium (ug/L)	1	0.5						
Zinc (ug/L)	1	21.0						
Boron (ug/L)	1	31.0						
Iron (ug/L)	1	283						
Mercury (ug/L)	1	0.005						

Table A.129: Summary statistics Site 129 for July 2011 to June 2012

Site 129: Berowra Park Oval. Raw stormwater - input to UV treatment	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Temperature (oC)	10	18.0	17.3	13.4	23.1	14.6	21.3	3.5
EC (ms/cm)	10	0.31	0.32	0.20	0.37	0.30	0.35	0.05
EC (µS/cm)	10	323	321	283	366	309	342	23
Turbidity (NTU)	10	5.0	0.8	0.0	34.0	0.0	6.4	10.6
DO (mg/L)	10	4.0	4.1	1.0	7.8	1.3	6.1	2.3
DO (%sat)	10	41	42	11	76	14	61	23
pH	10	7.1	7.0	6.7	7.6	6.9	7.3	0.3
Salinity (ppt)	10	0.2	0.2	0.1	0.2	0.2	0.2	0.0
Faecal Coliforms (CFU/100ml)	10	4	1	1	27	1	3	8
E Coli (CFU/100mL)	10	4	1	1	27	1	3	8
Fluoride (mg/L)	3	0.03	0.03	0.03	0.05	0.03	0.05	0.01

Table A.130: Summary statistics Site 130 for July 2011 to June 2012

Site 130: Berowra Park Oval. Treated stormwater - output from UV.	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Temperature (oC)	10	17.9	17.0	14.1	23.3	14.9	21.4	3.2
EC (ms/cm)	10	0.32	0.32	0.28	0.36	0.30	0.34	0.03
EC (µS/cm)	10	321	316	288	364	306	340	23
Turbidity (NTU)	10	4.3	1.1	0.0	23.6	0.0	7.4	7.4
DO (mg/L)	10	4.5	4.4	1.0	8.5	1.8	7.2	2.7
DO (%sat)	10	46	45	9	83	21	74	27
pH	10	7.1	7.0	6.7	7.7	6.7	7.5	0.4
Salinity (ppt)	10	0.2	0.2	0.1	0.2	0.1	0.2	0.0
Faecal Coliforms (CFU/100ml)	10	9	1	1	52	1	15	16
E Coli (CFU/100mL)	10	9	1	1	52	1	15	16
Fluoride (mg/L)	3	0.04	0.05	0.03	0.05	0.03	0.05	0.01

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Table A.131: Summary statistics Site 131 for July 2011 to June 2012

Site 131: Berowra Park Oval. Treated stormwater - in storage tank	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Temperature (oC)	12	18.4	18.2	13.3	23.7	15.0	21.4	3.4
EC (ms/cm)	12	0.25	0.26	0.14	0.35	0.20	0.30	0.06
EC (µS/cm)	12	235	263	151	319	169	282	60
Turbidity (NTU)	12	0.2	0.0	0.0	0.7	0.0	0.3	0.2
DO (mg/L)	12	8.5	8.3	6.7	10.4	8.0	9.7	1.0
DO (%sat)	12	90	90	79	111	83	94	9
pH	12	8.2	8.2	7.5	8.8	7.7	8.7	0.4
Salinity (ppt)	12	0.1	0.1	0.1	0.2	0.1	0.2	0.0
Suspended Solids (mg/L)	4	1.0	1.0	1.0	1.0	1.0	1.0	0.0
Ammonium-Nitrogen (mg/L)	2	0.01		0.01	0.01			
Oxidised Nitrogen (mg/L)	2	0.28		0.19	0.37			
Total Nitrogen (mg/L)	4	0.5	0.5	0.4	0.5	0.4	0.5	0.1
Total Phosphorus (mg/L)	4	0.01	0.01	0.00	0.02	0.00	0.02	0.01
Faecal Coliforms (CFU/100ml)	12	3	1	1	27	1	1	8
E Coli (CFU/100mL)	11	3	1	1	27	1	1	8
Bicarbonate Alkalinity (mg/CaCO3/L)	2	46		36	56			
Chloride (mg/L)	4	33	33	32	33	32	33	1
Sulphate as $SO4^{2-}$(mg/L)	3	10.4	11.0	7.3	13.0	7.3	13.0	2.9
Fluoride (mg/L)	6	0.96	1.00	0.75	1.07	0.94	1.01	0.11
Sodium (mg/L)	4	16.6	17.0	13.1	19.1	13.1	19.1	2.6
Potassium (mg/L)	4	2.5	2.5	1.7	3.3	1.7	3.3	0.7
Magnesium (mg/L)	4	4.5	4.5	3.8	5.0	3.8	5.0	0.6
Calcium (mg/L)	4	24.1	25.3	11.6	34.2	11.6	34.2	9.9
Aluminium (ug/L)	2	64		39	88			
Arsenic (ug/L)	2	0.8		0.5	1.0			
Cadmium (ug/L)	2	0.5		0.5	0.5			
Chromium (ug/L)	2	0.5		0.5	0.5			
Copper (ug/L)	2	16.5		15.0	18.0			
Lead (ug/L)	2	0.5		0.5	0.5			
Manganese (ug/L)	2	0.5		0.5	0.5			
Molybdenum (ug/L)	2	0.5		0.5	0.5			
Nickel (ug/L)	2	0.5		0.5	0.5			
Selenium (ug/L)	2	1.5		1.5	1.5			
Silver (ug/L)	2	0.5		0.5	0.5			
Uranium (ug/L)	2	0.5		0.5	0.5			
Zinc (ug/L)	2	17.0		13.0	21.0			
Boron (ug/L)	2	12.0		8.0	16.0			
Iron (ug/L)	4	43	32	10	98	10	98	39
Mercury (ug/L)	2	0.005		0.005	0.005			
Hardness mg/L CaCO3	2	98		93	103			
BOD5/CBOD5 (mg/L)	1	1						

Table A.132: Summary statistics Site 132 for July 2011 to June 2012

Site 132: Foxglove Oval Irrigation Water Tank	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Temperature (oC)	13	16.6	15.8	10.7	21.9	12.5	21.4	3.9
EC (ms/cm)	13	0.21	0.21	0.15	0.27	0.19	0.24	0.04
EC (µS/cm)	13	194	189	151	237	172	229	27
Turbidity (NTU)	13	0.2	0.0	0.0	1.5	0.0	0.2	0.4
DO (mg/L)	13	9.1	9.2	8.3	10.4	8.5	9.4	0.6
DO (%sat)	13	92	94	83	97	89	96	4
pH	12	8.7	8.8	7.8	9.2	8.4	9.0	0.4
Salinity (ppt)	13	0.1	0.1	0.1	0.1	0.1	0.1	0.0
Suspended Solids (mg/L)	3	1.0	1.0	1.0	1.0	1.0	1.0	0.0
Ammonium-Nitrogen (mg/L)	2	0.01		0.01	0.01			
Oxidised Nitrogen (mg/L)	2	0.36		0.31	0.41			
Total Nitrogen (mg/L)	3	0.5	0.5	0.4	0.6	0.4	0.6	0.1
Total Phosphorus (mg/L)	3	0.01	0.01	0.00	0.01	0.00	0.01	0.00
Faecal Coliforms (CFU/100ml)	12	2		1	12			
E Coli (CFU/100mL)	11	2		1	12			
Bicarbonate Alkalinity (mg/CaCO3/L)	2	44		42	45			
Chloride (mg/L)	3	32	31	29	35	29	35	3
Sulphate as $SO4^{2-}$(mg/L)	2	7.7		7.2	8.1			
Fluoride (mg/L)	4	1.04	1.05	1.00	1.07	1.00	1.07	0.03
Sodium (mg/L)	3	15.5	15.1	14.5	16.8	14.5	16.8	1.2
Potassium (mg/L)	3	2.3	2.4	1.7	2.7	1.7	2.7	0.5
Magnesium (mg/L)	3	4.1	4.2	3.6	4.4	3.6	4.4	0.4
Calcium (mg/L)	3	17.1	17.8	15.4	18.1	15.4	18.1	1.5
Aluminium (ug/L)	2	39		33	44			
Arsenic (ug/L)	2	0.5		0.5	0.5			
Cadmium (ug/L)	2	0.5		0.5	0.5			
Chromium (ug/L)	2	0.5		0.5	0.5			
Copper (ug/L)	2	51.0		51.0	51.0			
Lead (ug/L)	2	0.5		0.5	0.5			
Manganese (ug/L)	2	6.5		1.0	12.0			
Molybdenum (ug/L)	2	0.5		0.5	0.5			
Nickel (ug/L)	2	0.5		0.5	0.5			
Selenium (ug/L)	2	1.5		1.5	1.5			
Silver (ug/L)	2	0.5		0.5	0.5			
Uranium (ug/L)	2	0.5		0.5	0.5			
Zinc (ug/L)	2	21.0		12.0	30.0			
Boron (ug/L)	2	14.5		14.0	15.0			
Iron (ug/L)	3	25		10	44			
Mercury (ug/L)	2	0.005		0.005	0.005			
Hardness mg/L CaCO3	1	56						
BOD5/CBOD5 (mg/L)	1	1						

Table A.134: Summary statistics Site 134 for July 2011 to June 2012

Site 134: Epping Oval. Raw harvested stormwater in underground tanks	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Temperature (oC)	12	18.1	18.0	13.0	23.5	14.4	22.7	3.8
EC (ms/cm)	12	0.24	0.25	0.16	0.30	0.20	0.26	0.04
EC (µS/cm)	12	226	221	173	287	192	273	39
Turbidity (NTU)	12	0.3	0.0	0.0	2.8	0.0	0.4	0.8
DO (mg/L)	12	5.1	5.0	0.9	9.7	2.8	7.2	2.6
DO (%sat)	12	52	51	10	92	31	71	24
pH	12	7.4	7.4	6.9	7.9	7.2	7.6	0.3
Salinity (ppt)	12	0.1	0.1	0.1	0.2	0.1	0.1	0.0
Suspended Solids (mg/L)	1	1.0						
Ammonium-Nitrogen (mg/L)	1	0.19						
Oxidised Nitrogen (mg/L)	1	0.14						
Total Nitrogen (mg/L)	1	0.7						
Total Phosphorus (mg/L)	1	0.20						
Faecal Coliforms (CFU/100ml)	12	90	5	1	710	1	110	205
E Coli (CFU/100mL)	12	80	5	1	590	1	110	173
Bicarbonate Alkalinity (mg/CaCO3/L)	1	68						
Chloride (mg/L)	1	16						
Sulphate as $SO4^{2-}$(mg/L)	1	11.0						
Fluoride (mg/L)	3	0.08	0.09	0.06	0.10	0.06	0.10	0.02
Sodium (mg/L)	1	13.7						
Potassium (mg/L)	1	4.8						
Magnesium (mg/L)	1	2.7						
Calcium (mg/L)	1	20.7						
Aluminium (ug/L)	1	66						
Arsenic (ug/L)	1	1.0						
Cadmium (ug/L)	1	0.5						
Chromium (ug/L)	1	1.0						
Copper (ug/L)	1	8.0						
Lead (ug/L)	1	2.0						
Manganese (ug/L)	1	38.0						
Molybdenum (ug/L)	1	1.0						
Nickel (ug/L)	1	10.0						
Selenium (ug/L)	1	1.5						
Silver (ug/L)	1	0.5						
Uranium (ug/L)	1	0.5						
Zinc (ug/L)	1	18.0						
Boron (ug/L)	1	24.0						
Iron (ug/L)	1	216						
Mercury (ug/L)	1	0.005						

Table A.137: Summary statistics Site 137 for July 2011 to June 2012

Site 137: Epping Oval. Treated harvested stormwater - above ground tank	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Temperature (oC)	12	17.0	17.5	11.0	22.3	13.0	20.8	4.0
EC (ms/cm)	12	0.27	0.26	0.16	0.37	0.24	0.33	0.06
EC (µS/cm)	12	261	241	184	365	205	320	58
Turbidity (NTU)	12	1.6	1.1	0.5	3.6	0.7	2.8	1.0
DO (mg/L)	12	8.1	7.8	6.1	10.8	6.8	9.3	1.5
DO (%sat)	12	83	83	68	100	76	89	8
pH	12	8.2	8.3	7.4	8.9	7.6	8.8	0.6
Salinity (ppt)	12	0.1	0.1	0.1	0.2	0.1	0.2	0.0
Suspended Solids (mg/L)	4	1.0	1.0	1.0	1.0	1.0	1.0	0.0
Ammonium-Nitrogen (mg/L)	2	0.08		0.01	0.15			
Oxidised Nitrogen (mg/L)	2	0.39		0.23	0.55			
Total Nitrogen (mg/L)	4	0.8	0.8	0.7	0.9	0.7	0.9	0.1
Total Phosphorus (mg/L)	4	0.16	0.16	0.13	0.19	0.13	0.19	0.03
Faecal Coliforms (CFU/100ml)	12	31	1	1	290	1	21	83
E Coli (CFU/100mL)	11	34	1	1	290	1	21	86
Bicarbonate Alkalinity (mg/CaCO3/L)	2	84		71	97			
Chloride (mg/L)	4	21	19	16	29	16	29	6
Sulphate as $SO4^{2-}$(mg/L)	3	16.0	15.0	12.0	21.0	12.0	21.0	4.6
Fluoride (mg/L)	5	0.10	0.08	0.07	0.15	0.08	0.14	0.03
Sodium (mg/L)	4	12.2	12.2	8.9	15.7	8.9	15.7	2.8
Potassium (mg/L)	4	4.5	4.3	4.1	5.5	4.1	5.5	0.7
Magnesium (mg/L)	4	3.8	3.3	3.1	5.6	3.1	5.6	1.2
Calcium (mg/L)	4	30.3	32.3	22.2	34.4	22.2	34.4	5.7
Aluminium (ug/L)	2	122		110	134			
Arsenic (ug/L)	2	2.0		1.0	3.0			
Cadmium (ug/L)	2	0.5		0.5	0.5			
Chromium (ug/L)	2	0.5		0.5	0.5			
Copper (ug/L)	2	59.5		54.0	65.0			
Lead (ug/L)	2	10.5		9.0	12.0			
Manganese (ug/L)	2	65.5		20.0	111.0			
Molybdenum (ug/L)	2	0.5		0.5	0.5			
Nickel (ug/L)	2	2.0		2.0	2.0			
Selenium (ug/L)	2	1.5		1.5	1.5			
Silver (ug/L)	2	0.5		0.5	0.5			
Uranium (ug/L)	2	0.5		0.5	0.5			
Zinc (ug/L)	2	26.5		25.0	28.0			
Boron (ug/L)	2	32.0		23.0	41.0			
Iron (ug/L)	4	239	257	124	320			
Mercury (ug/L)	2	0.005		0.005	0.005			
Hardness mg/L CaCO3	2	95		91	99			
BOD5/CBOD5 (mg/L)	1	1						

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Table A.138: Summary statistics Site 138 for July 2011 to June 2012

Site 138: North Epping Oval. Raw harvested stormwater in underground tank	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Temperature (oC)	12	19.1	19.6	14.2	24.7	15.0	22.8	3.7
EC (ms/cm)	12	0.42	0.42	0.32	0.51	0.36	0.47	0.06
EC (µS/cm)	12	407	406	327	490	360	444	51
Turbidity (NTU)	12	6.1	2.7	0.0	41.0	0.1	6.3	11.3
DO (mg/L)	12	6.4	6.3	4.7	8.4	5.8	7.3	1.1
DO (%sat)	12	69	68	47	86	61	82	12
pH	12	7.6	7.5	7.2	9.1	7.4	7.9	0.5
Salinity (ppt)	12	0.2	0.2	0.2	0.3	0.2	0.2	0.0
Suspended Solids (mg/L)	1	5.0						
Ammonium-Nitrogen (mg/L)	1	0.01						
Oxidised Nitrogen (mg/L)	1	1.58						
Total Nitrogen (mg/L)	1	2.4						
Total Phosphorus (mg/L)	1	0.14						
Faecal Coliforms (CFU/100ml)	12	291	2	1	3200	1	29	918
E Coli (CFU/100mL)	12	183	2	1	1900	1	29	544
Bicarbonate Alkalinity (mg/CaCO3/L)	1	71						
Chloride (mg/L)	1	40						
Sulphate as $SO4^{2-}$(mg/L)	1	31.0						
Fluoride (mg/L)	3	0.15	0.12	0.10	0.22	0.10	0.22	0.06
Sodium (mg/L)	1	23.9						
Potassium (mg/L)	1	12.5						
Magnesium (mg/L)	1	4.5						
Calcium (mg/L)	1	25.7						
Aluminium (ug/L)	1	396						
Arsenic (ug/L)	1	2.0						
Cadmium (ug/L)	1	0.5						
Chromium (ug/L)	1	2.0						
Copper (ug/L)	1	11.0						
Lead (ug/L)	1	1.0						
Manganese (ug/L)	1	10.0						
Molybdenum (ug/L)	1	2.0						
Nickel (ug/L)	1	2.0						
Selenium (ug/L)	1	1.5						
Silver (ug/L)	1	0.5						
Uranium (ug/L)	1	0.5						
Zinc (ug/L)	1	26.0						
Boron (ug/L)	1	70.0						
Iron (ug/L)	1	439						
Mercury (ug/L)	1	0.005						

Table A.141: Summary statistics Site 141 for July 2011 to June 2012

Site 141: North Epping Oval. Treated stormwater in underground tank	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Temperature (oC)	12	18.5	18.5	13.8	23.2	15.0	22.1	3.3
EC (ms/cm)	12	0.36	0.41	0.19	0.47	0.25	0.45	0.10
EC (µS/cm)	12	359	418	185	451	226	433	100
Turbidity (NTU)	12	7.2	3.1	0.0	32.0	1.3	12.6	9.5
DO (mg/L)	12	6.2	6.9	0.4	9.8	4.4	8.0	2.7
DO (%sat)	12	65	74	4	96	46	80	27
pH	12	7.8	7.6	7.1	9.3	7.3	8.6	0.7
Salinity (ppt)	12	0.2	0.2	0.1	0.2	0.1	0.2	0.1
Suspended Solids (mg/L)	4	2.3	1.5	1.0	5.0	1.0	5.0	1.9
Ammonium-Nitrogen (mg/L)	2	0.02		0.01	0.02			
Oxidised Nitrogen (mg/L)	2	1.12		0.63	1.61			
Total Nitrogen (mg/L)	4	1.4	1.2	0.7	2.4	0.7	2.4	0.8
Total Phosphorus (mg/L)	4	0.13	0.13	0.11	0.14	0.11	0.14	0.01
Faecal Coliforms (CFU/100ml)	12	33	8	1	260	1	41	73
E Coli (CFU/100mL)	11	28	7	1	180	1	41	53
Bicarbonate Alkalinity (mg/CaCO3/L)	2	102		92	112			
Chloride (mg/L)	4	32	31	21	45	21	45	11
Sulphate as $SO4^{2-}$(mg/L)	3	24.3	26.0	11.0	36.0	11.0	36.0	12.6
Fluoride (mg/L)	5	0.30	0.19	0.14	0.72	0.16	0.51	0.24
Sodium (mg/L)	4	18.7	18.7	12.5	25.0	12.5	25.0	6.4
Potassium (mg/L)	4	9.5	9.8	4.7	13.9	4.7	13.9	5.1
Magnesium (mg/L)	4	3.5	3.5	2.8	4.2	2.8	4.2	0.6
Calcium (mg/L)	4	29.0	30.9	19.0	35.3	19.0	35.3	7.4
Aluminium (ug/L)	2	156		150	162			
Arsenic (ug/L)	2	3.0		3.0	3.0			
Cadmium (ug/L)	2	0.5		0.5	0.5			
Chromium (ug/L)	2	1.0		1.0	1.0			
Copper (ug/L)	2	14.0		13.0	15.0			
Lead (ug/L)	2	0.8		0.5	1.0			
Manganese (ug/L)	2	7.5		3.0	12.0			
Molybdenum (ug/L)	2	2.0		2.0	2.0			
Nickel (ug/L)	2	2.0		2.0	2.0			
Selenium (ug/L)	2	1.5		1.5	1.5			
Silver (ug/L)	2	0.5		0.5	0.5			
Uranium (ug/L)	2	0.5		0.5	0.5			
Zinc (ug/L)	2	25.0		23.0	27.0			
Boron (ug/L)	2	75.5		67.0	84.0			
Iron (ug/L)	4	311		188	507			
Mercury (ug/L)	2	0.005		0.005	0.005			
Hardness mg/L CaCO3	2	72		63	80			
BOD5/CBOD5 (mg/L)	1	1						

Table A.142: Summary statistics Site 142 for July 2011 to June 2012

Site 142: Somerville Oval Epping. Raw harvested stormwater in underground tank.	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Temperature (oC)	12	18.4	18.4	15.3	22.1	15.7	21.0	2.4
EC (ms/cm)	12	0.29	0.31	0.22	0.39	0.26	0.31	0.05
EC (µS/cm)	12	292	300	208	352	261	332	44
Turbidity (NTU)	12	9.9	7.6	1.2	31.4	3.5	17.8	8.7
DO (mg/L)	12	3.9	3.8	0.4	8.5	1.5	6.3	2.7
DO (%sat)	12	42	40	4	90	16	71	30
pH	12	7.3	7.2	6.8	8.1	7.0	7.5	0.4
Salinity (ppt)	12	0.1	0.2	0.1	0.2	0.1	0.2	0.0
Suspended Solids (mg/L)	1	3.0						
Ammonium-Nitrogen (mg/L)	1	0.04						
Oxidised Nitrogen (mg/L)	1	0.72						
Total Nitrogen (mg/L)	1	1.0						
Total Phosphorus (mg/L)	1	0.08						
Faecal Coliforms (CFU/100ml)	12	107	7	1	560	3	90	198
E Coli (CFU/100mL)	12	106	7	1	560	3	75	198
Bicarbonate Alkalinity (mg/CaCO3/L)	1	39						
Chloride (mg/L)	1	43						
Sulphate as $SO4^{2-}$(mg/L)	1	21.0						
Fluoride (mg/L)	3	0.12	0.12	0.12	0.13	0.12	0.13	0.01
Sodium (mg/L)	1	27.1						
Potassium (mg/L)	1	3.3						
Magnesium (mg/L)	1	4.5						
Calcium (mg/L)	1	11.9						
Aluminium (ug/L)	1	898						
Arsenic (ug/L)	1	1.0						
Cadmium (ug/L)	1	0.5						
Chromium (ug/L)	1	1.0						
Copper (ug/L)	1	9.0						
Lead (ug/L)	1	2.0						
Manganese (ug/L)	1	10.0						
Molybdenum (ug/L)	1	0.5						
Nickel (ug/L)	1	1.0						
Selenium (ug/L)	1	1.5						
Silver (ug/L)	1	0.5						
Uranium (ug/L)	1	0.5						
Zinc (ug/L)	1	184.0						
Boron (ug/L)	1	82.0						
Iron (ug/L)	1	838						
Mercury (ug/L)	1	0.005						

Table A.145: Summary statistics Site 145 for July 2011 to June 2012

Site 145. Somerville Oval Epping. Treated stormwater in underground tank.	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Temperature (oC)	12	18.2	18.3	14.9	22.1	15.5	20.7	2.6
EC (ms/cm)	12	0.30	0.29	0.22	0.41	0.25	0.37	0.06
EC (µS/cm)	12	288	275	227	376	258	348	49
Turbidity (NTU)	12	12.2	11.1	0.3	26.4	3.2	23.0	8.8
DO (mg/L)	12	7.0	6.8	4.8	11.6	5.1	7.7	1.9
DO (%sat)	12	73	67	51	122	59	86	20
pH	12	7.2	7.2	6.9	7.7	6.9	7.4	0.3
Salinity (ppt)	12	0.1	0.1	0.1	0.2	0.1	0.2	0.0
Suspended Solids (mg/L)	4	1.8	1.5	1.0	3.0	1.0	3.0	1.0
Ammonium-Nitrogen (mg/L)	2	0.01		0.01	0.02			
Oxidised Nitrogen (mg/L)	2	0.85		0.70	0.99			
Total Nitrogen (mg/L)	4	1.2	1.2	1.0	1.5	1.0	1.5	0.2
Total Phosphorus (mg/L)	4	0.13	0.13	0.11	0.14	0.11	0.14	0.01
Faecal Coliforms (CFU/100ml)	12	72	31	1	400	3	68	120
E Coli (CFU/100mL)	11	77	38	1	400	3	68	124
Bicarbonate Alkalinity (mg/CaCO3/L)	2	56		48	63			
Chloride (mg/L)	4	34	32	26	45	26	45	9
Sulphate as $SO4^{2-}$(mg/L)	3	21.7	21.0	19.0	25.0	19.0	25.0	3.1
Fluoride (mg/L)	5	0.16	0.13	0.13	0.26	0.13	0.20	0.06
Sodium (mg/L)	4	21.2	20.3	17.9	26.2	17.9	26.2	3.9
Potassium (mg/L)	4	5.3	5.4	4.2	6.4	4.2	6.4	1.0
Magnesium (mg/L)	4	3.9	3.9	3.7	4.1	3.7	4.1	0.2
Calcium (mg/L)	4	23.5	24.1	13.9	32.0	13.9	32.0	7.9
Aluminium (ug/L)	2	786		381	1190			
Arsenic (ug/L)	2	1.0		1.0	1.0			
Cadmium (ug/L)	2	0.5		0.5	0.5			
Chromium (ug/L)	2	0.8		0.5	1.0			
Copper (ug/L)	2	10.5		10.0	11.0			
Lead (ug/L)	2	1.5		1.0	2.0			
Manganese (ug/L)	2	5.0		4.0	6.0			
Molybdenum (ug/L)	2	0.8		0.5	1.0			
Nickel (ug/L)	2	2.0		2.0	2.0			
Selenium (ug/L)	2	1.5		1.5	1.5			
Silver (ug/L)	2	0.5		0.5	0.5			
Uranium (ug/L)	2	0.5		0.5	0.5			
Zinc (ug/L)	2	104.0		85.0	123.0			
Boron (ug/L)	2	35.5		33.0	38.0			
Iron (ug/L)	4	478	444	235	788	235	788	242
Mercury (ug/L)	2	0.005		0.005	0.005			
Hardness mg/L CaCO3	2	89		84	93			
BOD5/CBOD5 (mg/L)	1	1						

9.0 Appendices

Table A.146: Summary statistics Site 146 for July 2011 to June 2012

Site 146: Yatala Creek. Reference freshwater creek	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Flow Rate Estimate (L/min)	5	900	500	100	2500	150	1850	992
Temperature (oC)	5	16.2	16.7	12.0	19.1	13.4	18.8	2.9
EC (ms/cm)	5	0.10	0.10	0.05	0.13	0.08	0.13	0.03
EC (µS/cm)	5	92	76	53	137	61	132	37
Turbidity (NTU)	5	2.1	2.0	0.0	5.0	0.3	3.9	2.0
DO (mg/L)	4	9.5	9.4	8.9	10.5	8.9	10.5	0.7
DO (%sat)	4	96	99	88	101	88	101	6
pH	4	6.3	6.3	6.0	6.6	6.0	6.6	0.3
Salinity (ppt)	5	0.1	0.1	0.0	0.1	0.0	0.1	0.0
Suspended Solids (mg/L)	5	1.0	1.0	1.0	1.0	1.0	1.0	0.0
Ammonium-Nitrogen (mg/L)	5	0.01	0.01	0.01	0.01	0.01	0.01	0.00
Oxidised Nitrogen (mg/L)	5	0.01	0.01	0.01	0.02	0.01	0.02	0.00
Total Nitrogen (mg/L)	5	0.1	0.1	0.1	0.2	0.1	0.2	0.0
Total Phosphorus (mg/L)	5	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Faecal Coliforms (CFU/100ml)	5	33	23	5	64	11	60	26
Bicarbonate Alkalinity (mg/CaCO3/L)	3	5	4	3	7	3	7	2
Chloride (mg/L)	3	35	37	27	41	27	41	7
Sulphate as $SO4^{2-}$(mg/L)	3	7.4	7.8	6.5	7.9	6.5	7.9	0.8
Fluoride (mg/L)	3	0.04	0.05	0.03	0.05	0.03	0.05	0.01
Sodium (mg/L)	3	18.6	20.9	13.4	21.5	13.4	21.5	4.5
Potassium (mg/L)	3	1.0	1.2	0.6	1.3	0.6	1.3	0.4
Magnesium (mg/L)	3	2.8	3.2	1.8	3.5	1.8	3.5	0.9
Calcium (mg/L)	3	2.1	2.3	1.3	2.6	1.3	2.6	0.7
Aluminium (ug/L)	3	203	146	81	383	81	383	159
Arsenic (ug/L)	3	0.5	0.5	0.5	0.5	0.5	0.5	0.0
Cadmium (ug/L)	3	0.5	0.5	0.5	0.5	0.5	0.5	0.0
Chromium (ug/L)	3	0.7	0.5	0.5	1.0	0.5	1.0	0.3
Copper (ug/L)	3	2.0	1.0	1.0	4.0	1.0	4.0	1.7
Lead (ug/L)	3	0.5	0.5	0.5	0.5	0.5	0.5	0.0
Manganese (ug/L)	3	7.3	6.0	6.0	10.0	6.0	10.0	2.3
Molybdenum (ug/L)	3	0.5	0.5	0.5	0.5	0.5	0.5	0.0
Nickel (ug/L)	3	0.5	0.5	0.5	0.5	0.5	0.5	0.0
Selenium (ug/L)	3	1.5	1.5	1.5	1.5	1.5	1.5	0.0
Silver (ug/L)	3	0.5	0.5	0.5	0.5	0.5	0.5	0.0
Uranium (ug/L)	3	0.5	0.5	0.5	0.5	0.5	0.5	0.0
Zinc (ug/L)	3	18.0	18.0	5.0	31.0	5.0	31.0	13.0
Boron (ug/L)	3	14.7	14.0	13.0	17.0	13.0	17.0	2.1
Iron (ug/L)	3	309	284	224	420	224	420	100
Mercury (ug/L)	3	0.005	0.005	0.005	0.005	0.005	0.005	0.000

Table A.147: Summary statistics Site 147 for July 2011 to June 2012

Site 147: Unnamed creek in Lane Cove NP flowing from Pennant Hills Oval. Reference freshwater creek	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Flow Rate Estimate (L/min)	12	84	40	5	200	15	160	80
Temperature (oC)	12	14.6	14.1	10.3	19.1	12.1	16.9	2.7
EC (ms/cm)	12	0.13	0.13	0.05	0.20	0.10	0.18	0.05
EC (µS/cm)	12	128	133	63	179	68	177	45
Turbidity (NTU)	12	4.0	1.0	-0.2	30.7	0.0	4.3	8.6
DO (mg/L)	12	10.1	9.9	9.1	11.6	9.5	10.4	0.8
DO (%sat)	12	99	99	88	117	96	102	7
pH	12	6.2	6.3	4.2	7.2	5.8	6.7	0.8
Salinity (ppt)	12	0.1	0.1	0.0	0.1	0.1	0.1	0.0
Suspended Solids (mg/L)	12	2.0	1.0	1.0	8.0	1.0	3.0	2.0
Ammonium-Nitrogen (mg/L)	12	0.01	0.01	0.01	0.01	0.01	0.01	0.00
Oxidised Nitrogen (mg/L)	12	0.01	0.01	0.01	0.06	0.01	0.02	0.02
Total Nitrogen (mg/L)	12	0.2	0.2	0.1	0.3	0.1	0.2	0.0
Total Phosphorus (mg/L)	12	0.00	0.00	0.00	0.01	0.00	0.01	0.00
Faecal Coliforms (CFU/100ml)	12	28	29	1	57	6	50	21
Bicarbonate Alkalinity (mg/CaCO3/L)	3	3	3	2	5	2	5	2
Chloride (mg/L)	3	39	41	27	50	27	50	12
Sulphate as $SO4^{2-}$(mg/L)	3	8.4	8.7	7.4	9.2	7.4	9.2	0.9
Fluoride (mg/L)	3	0.05	0.06	0.03	0.06	0.03	0.06	0.02
Sodium (mg/L)	3	18.7	18.8	13.5	23.9	13.5	23.9	5.2
Potassium (mg/L)	3	1.4	1.4	1.3	1.4	1.3	1.4	0.1
Magnesium (mg/L)	3	3.9	4.0	2.5	5.2	2.5	5.2	1.4
Calcium (mg/L)	3	2.2	2.1	1.9	2.7	1.9	2.7	0.4
Aluminium (ug/L)	3	413	244	153	842	153	842	374
Arsenic (ug/L)	3	0.5	0.5	0.5	0.5	0.5	0.5	0.0
Cadmium (ug/L)	3	0.5	0.5	0.5	0.5	0.5	0.5	0.0
Chromium (ug/L)	3	0.7	0.5	0.5	1.0	0.5	1.0	0.3
Copper (ug/L)	3	1.3	1.0	1.0	2.0	1.0	2.0	0.6
Lead (ug/L)	3	0.5	0.5	0.5	0.5	0.5	0.5	0.0
Manganese (ug/L)	3	3.0	3.0	2.0	4.0	2.0	4.0	1.0
Molybdenum (ug/L)	3	0.5	0.5	0.5	0.5	0.5	0.5	0.0
Nickel (ug/L)	3	0.5	0.5	0.5	0.5	0.5	0.5	0.0
Selenium (ug/L)	3	1.5	1.5	1.5	1.5	1.5	1.5	0.0
Silver (ug/L)	3	0.5	0.5	0.5	0.5	0.5	0.5	0.0
Uranium (ug/L)	3	0.5	0.5	0.5	0.5	0.5	0.5	0.0
Zinc (ug/L)	3	11.0	13.0	5.0	15.0	5.0	15.0	5.3
Boron (ug/L)	3	10.3	12.0	7.0	12.0	7.0	12.0	2.9
Iron (ug/L)	3	170	104	39	368	39	368	174
Mercury (ug/L)	3	0.005	0.005	0.005	0.005	0.005	0.005	0.000
Total Organic Carbon (mg/L)	1	4	4	4	4	4	4	

Table A.149: Summary statistics Site 149 for July 2011 to June 2012

Site 149: Unnamed creek end of Duckpond Ridge trailin Marramarra NP. Reference freshwater creek.	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Flow Rate Estimate (L/min)	13	2164	400	50	20000	100	2000	5431
Temperature (oC)	13	14.3	14.8	9.0	19.4	10.1	18.6	3.9
EC (ms/cm)	13	0.21	0.22	0.07	0.30	0.11	0.28	0.08
EC (µS/cm)	13	202	230	66	317	85	270	83
Turbidity (NTU)	13	3.0	2.2	0.0	9.8	1.3	4.1	2.5
DO (mg/L)	13	9.8	10.2	7.0	12.0	8.7	11.7	1.6
DO (%sat)	13	93	95	74	107	87	104	9
pH	13	4.5	4.5	4.0	4.9	4.3	4.7	0.3
Salinity (ppt)	13	0.1	0.1	0.1	0.2	0.1	0.1	0.0
Suspended Solids (mg/L)	13	2.5	2.0	1.0	5.0	1.0	4.0	1.5
Ammonium-Nitrogen (mg/L)	13	0.01	0.01	0.01	0.02	0.01	0.01	0.00
Oxidised Nitrogen (mg/L)	13	0.01	0.01	0.01	0.02	0.01	0.01	0.00
Total Nitrogen (mg/L)	13	0.2	0.1	0.1	0.3	0.1	0.3	0.1
Total Phosphorus (mg/L)	13	0.00	0.01	0.00	0.01	0.00	0.01	0.00
Faecal Coliforms (CFU/100ml)	13	39	19	1	210	2	59	57
Bicarbonate Alkalinity (mg/CaCO3/L)	2	1		1	1			
Chloride (mg/L)	2	41		29	53			
Sulphate as $SO4^{2-}$(mg/L)	2	9.0		8.6	9.3			
Fluoride (mg/L)	2	0.04		0.03	0.06			
Sodium (mg/L)	2	20.7		16.1	25.2			
Potassium (mg/L)	2	1.6		1.6	1.6			
Magnesium (mg/L)	2	3.4		2.4	4.4			
Calcium (mg/L)	2	1.2		1.1	1.4			
Aluminium (ug/L)	2	860		319	1400			
Arsenic (ug/L)	2	0.5		0.5	0.5			
Cadmium (ug/L)	2	0.5		0.5	0.5			
Chromium (ug/L)	2	0.8		0.5	1.0			
Copper (ug/L)	2	1.0		1.0	1.0			
Lead (ug/L)	2	0.5		0.5	0.5			
Manganese (ug/L)	2	63.5		35.0	92.0			
Molybdenum (ug/L)	2	0.5		0.5	0.5			
Nickel (ug/L)	2	1.5		1.0	2.0			
Selenium (ug/L)	2	1.5		1.5	1.5			
Silver (ug/L)	2	0.5		0.5	0.5			
Uranium (ug/L)	2	0.5		0.5	0.5			
Zinc (ug/L)	2	40.5		36.0	45.0			
Boron (ug/L)	2	15.0		8.0	22.0			
Iron (ug/L)	2	668		286	1050			
Mercury (ug/L)	2	0.005		0.005	0.005			
Total Organic Carbon (mg/L)	1	3						

Table A.157: Summary statistics Site 157 for July 2011 to June 2012

Site 157: Unnamed creek flowing into Deep Bay Berowra Creek. Reference freshwater creek	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Flow Rate Estimate (L/min)	4	400	175	50	1200	50	1200	540
Temperature (oC)	4	18.6	18.6	16.4	20.8	16.4	20.8	2.1
EC (ms/cm)	4	0.09	0.08	0.05	0.17	0.05	0.17	0.06
EC (µS/cm)	4	75	64	39	134	39	134	43
Turbidity (NTU)	4	3.7	3.5	0.0	7.9	0.0	7.9	3.6
DO (mg/L)	3	10.1	9.7	9.4	11.1	9.4	11.1	0.9
DO (%sat)	3	108	107	104	113	104	113	5
pH	4	5.2	5.2	4.9	5.4	4.9	5.4	0.2
Salinity (ppt)	4	0.0	0.0	0.0	0.1	0.0	0.1	0.0
Suspended Solids (mg/L)	4	1.5	1.0	1.0	3.0	1.0	3.0	1.0
Ammonium-Nitrogen (mg/L)	4	0.01	0.01	0.01	0.01	0.01	0.01	0.00
Oxidised Nitrogen (mg/L)	4	0.01	0.01	0.01	0.01	0.01	0.01	0.00
Total Nitrogen (mg/L)	4	0.2	0.2	0.1	0.2	0.1	0.2	0.1
Total Phosphorus (mg/L)	4	0.00	0.00	0.00	0.01	0.00	0.01	0.00
Faecal Coliforms (CFU/100ml)	4	98	63	6	260	6	260	112
Bicarbonate Alkalinity (mg/CaCO3/L)	2	1		1	1			
Chloride (mg/L)	2	34		23	45			
Sulphate as $SO4^{2-}$(mg/L)	2	5.4		5.2	5.5			
Fluoride (mg/L)	2	0.05		0.03	0.07			
Sodium (mg/L)	2	16.5		11.8	21.2			
Potassium (mg/L)	2	0.9		0.8	1.1			
Magnesium (mg/L)	2	2.3		1.4	3.2			
Calcium (mg/L)	2	0.5		0.4	0.7			
Aluminium (ug/L)	2	480		158	802			
Arsenic (ug/L)	2	0.5		0.5	0.5			
Cadmium (ug/L)	2	0.5		0.5	0.5			
Chromium (ug/L)	2	0.8		0.5	1.0			
Copper (ug/L)	2	3.5		1.0	6.0			
Lead (ug/L)	2	0.5		0.5	0.5			
Manganese (ug/L)	2	26.5		11.0	42.0			
Molybdenum (ug/L)	2	0.5		0.5	0.5			
Nickel (ug/L)	2	0.8		0.5	1.0			
Selenium (ug/L)	2	1.5		1.5	1.5			
Silver (ug/L)	2	0.5		0.5	0.5			
Uranium (ug/L)	2	0.5		0.5	0.5			
Zinc (ug/L)	2	12.0		5.0	19.0			
Boron (ug/L)	2	13.0		13.0	13.0			
Iron (ug/L)	2	282		106	457			
Mercury (ug/L)	2	0.005		0.005	0.005			

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Table A.160: Summary statistics Site 160 for July 2011 to June 2012

Site 160: Unnamed Creek flowing to Fishponds from saddle near Joes Mt	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Flow Rate Estimate (L/min)	8	635	8	1	5000	2	30	1764
Temperature (oC)	8	14.9	14.2	11.1	19.0	12.2	18.4	3.0
EC (ms/cm)	8	0.14	0.15	0.05	0.20	0.10	0.19	0.05
EC (µS/cm)	8	133	141	20	188	81	182	58
Turbidity (NTU)	8	8.1	0.0	-0.2	63.0	0.0	1.1	22.2
DO (mg/L)	6	6.7	6.9	4.8	8.3	5.0	8.0	1.5
DO (%sat)	6	67	63	50	86	58	80	14
pH	7	4.4	4.4	4.3	4.7	4.3	4.6	0.2
Salinity (ppt)	8	0.1	0.1	0.0	0.1	0.1	0.1	0.0
Suspended Solids (mg/L)	6	2.7	1.0	1.0	11.0	1.0	1.0	4.1
Ammonium-Nitrogen (mg/L)	7	0.01	0.01	0.01	0.01	0.01	0.01	0.00
Oxidised Nitrogen (mg/L)	7	0.01	0.01	0.01	0.02	0.01	0.01	0.01
Total Nitrogen (mg/L)	7	0.2	0.2	0.1	0.7	0.1	0.2	0.2
Total Phosphorus(mg/L)	7	0.00	0.00	0.00	0.02	0.00	0.01	0.01
Faecal Coliforms (CFU/100ml)	7	205	4	1	1400	1	25	527
Bicarbonate Alkalinity (mg/CaCO3/L)	3	1	1	1	1	1	1	0
Chloride (mg/L)	3	35	41	14	50	14	50	19
Sulphate as $SO4^{2-}$(mg/L)	3	6.0	6.7	4.3	6.9	4.3	6.9	1.4
Fluoride (mg/L)	3	0.05	0.06	0.03	0.07	0.03	0.07	0.02
Sodium (mg/L)	3	19.8	22.9	10.4	26.0	10.4	26.0	8.3
Potassium (mg/L)	3	1.5	1.5	1.2	1.7	1.2	1.7	0.2
Magnesium (mg/L)	3	3.1	3.4	1.5	4.5	1.5	4.5	1.5
Calcium (mg/L)	3	0.9	0.9	0.8	1.1	0.8	1.1	0.2
Aluminium (ug/L)	3	906	418	389	1910	389	1910	870
Arsenic (ug/L)	3	0.5	0.5	0.5	0.5	0.5	0.5	0.0
Cadmium (ug/L)	3	0.5	0.5	0.5	0.5	0.5	0.5	0.0
Chromium (ug/L)	3	1.3	0.5	0.5	3.0	0.5	3.0	1.4
Copper (ug/L)	3	1.0	1.0	1.0	1.0	1.0	1.0	0.0
Lead (ug/L)	3	1.3	0.5	0.5	3.0	0.5	3.0	1.4
Manganese (ug/L)	3	17.0	18.0	15.0	18.0	15.0	18.0	1.7
Molybdenum (ug/L)	3	0.5	0.5	0.5	0.5	0.5	0.5	0.0
Nickel (ug/L)	3	0.8	1.0	0.5	1.0	0.5	1.0	0.3
Selenium (ug/L)	3	1.5	1.5	1.5	1.5	1.5	1.5	0.0
Silver (ug/L)	3	0.5	0.5	0.5	0.5	0.5	0.5	0.0
Uranium (ug/L)	3	0.5	0.5	0.5	0.5	0.5	0.5	0.0
Zinc (ug/L)	3	12.3	13.0	5.0	19.0	5.0	19.0	7.0
Boron (ug/L)	3	29.0	28.0	20.0	39.0	20.0	39.0	9.5
Iron (ug/L)	3	669	123	93	1790	93	1790	971
Mercury (ug/L)	3	0.007	0.005	0.005	0.010	0.005	0.010	0.003

Table A.161: Summary statistics Site 161 for July 2011 to June 2012

Site 161: Canoelands Creek upstream of tidal Marramarra Creek. Reference freshwater creek.	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Flow Rate Estimate (L/min)	5	1080	200	100	3000	100	2500	1344
Temperature (oC)	5	15.4	16.8	9.5	19.1	11.8	18.4	3.8
EC (ms/cm)	5	0.14	0.14	0.10	0.19	0.11	0.18	0.04
EC (µS/cm)	5	130	161	72	175	73	172	52
Turbidity (NTU)	5	2.1	1.8	1.0	3.0	1.4	2.9	0.8
DO (mg/L)	4	9.1	8.7	6.9	12.3	6.9	12.3	2.3
DO (%sat)	4	89	92	67	106	67	106	17
pH	5	5.5	5.5	5.3	6.0	5.3	5.8	0.3
Salinity (ppt)	5	0.1	0.1	0.1	0.1	0.1	0.1	0.0
Suspended Solids (mg/L)	5	1.0	1.0	1.0	1.0	1.0	1.0	0.0
Ammonium-Nitrogen (mg/L)	5	0.01	0.01	0.01	0.01	0.01	0.01	0.00
Oxidised Nitrogen (mg/L)	5	0.01	0.01	0.01	0.01	0.01	0.01	0.00
Total Nitrogen (mg/L)	5	0.1	0.1	0.1	0.2	0.1	0.2	0.1
Total Phosphorus (mg/L)	5	0.01	0.01	0.00	0.01	0.00	0.01	0.00
Faecal Coliforms (CFU/100ml)	5	17	1	1	62	1	42	27
Bicarbonate Alkalinity (mg/CaCO3/L)	2	1		1	1			
Chloride (mg/L)	2	44		31	56			
Sulphate as $SO4^{2-}$(mg/L)	2	9.2		8.5	9.9			
Fluoride (mg/L)	2	0.04		0.03	0.06			
Sodium (mg/L)	2	19.2		14.1	24.3			
Potassium (mg/L)	2	1.6		1.5	1.8			
Magnesium (mg/L)	2	3.3		2.3	4.4			
Calcium (mg/L)	2	1.5		1.1	2.0			
Aluminium (ug/L)	2	198		84	312			
Arsenic (ug/L)	2	0.5		0.5	0.5			
Cadmium (ug/L)	2	0.5		0.5	0.5			
Chromium (ug/L)	2	0.5		0.5	0.5			
Copper (ug/L)	2	3.5		1.0	6.0			
Lead (ug/L)	2	0.5		0.5	0.5			
Manganese (ug/L)	2	45.0		27.0	63.0			
Molybdenum (ug/L)	2	0.5		0.5	0.5			
Nickel (ug/L)	2	1.3		0.5	2.0			
Selenium (ug/L)	2	1.5		1.5	1.5			
Silver (ug/L)	2	0.5		0.5	0.5			
Uranium (ug/L)	2	0.5		0.5	0.5			
Zinc (ug/L)	2	15.5		5.0	26.0			
Boron (ug/L)	2	11.0		10.0	12.0			
Iron (ug/L)	2	276		207	344			
Mercury (ug/L)	2	0.005		0.005	0.005			

Table A.164: Summary statistics Site 164 for July 2011 to June 2012

Site 164: Unnamed creek flowing into Joe Crafts Creek. Djara Crossing. Reference freshwater creek	Valid N	Mean	Median	Minimum	Maximum	20th%ile	80th%ile	Std.Dev.
Flow Rate Estimate (L/min)	10	1175	110	10	10000	20	550	3109
Temperature (oC)	10	16.3	16.5	10.3	21.3	12.7	20.6	4.0
EC (ms/cm)	10	0.09	0.11	0.04	0.14	0.05	0.13	0.04
EC (µS/cm)	10	73	71	19	121	40	107	34
Turbidity (NTU)	10	4.0	2.0	0.0	20.0	0.6	5.6	6.1
DO (mg/L)	8	9.5	9.2	8.6	10.8	8.7	10.6	0.9
DO (%sat)	8	97	98	86	100	96	100	4
pH	9	5.0	5.0	4.6	5.5	4.8	5.2	0.3
Salinity (ppt)	10	0.1	0.1	0.0	0.6	0.0	0.1	0.2
Suspended Solids (mg/L)	10	2.0	1.0	1.0	6.0	1.0	3.5	1.8
Ammonium-Nitrogen (mg/L)	10	0.01	0.01	0.01	0.01	0.01	0.01	0.00
Oxidised Nitrogen (mg/L)	10	0.01	0.01	0.01	0.01	0.01	0.01	0.00
Total Nitrogen (mg/L)	10	0.1	0.1	0.1	0.3	0.1	0.1	0.1
Total Phosphorus (mg/L)	10	0.00	0.00	0.00	0.01	0.00	0.01	0.00
Faecal Coliforms (CFU/100ml)	10	102	14	2	850	9	45	263
Bicarbonate Alkalinity (mg/CaCO3/L)	2	1		1	1			
Chloride (mg/L)	3	24	27	15	29	15	29	8
Sulphate as $SO4^{2-}$(mg/L)	3	5.9	6.0	4.3	7.4	4.3	7.4	1.6
Fluoride (mg/L)	3	0.03	0.03	0.03	0.05	0.03	0.05	0.01
Sodium (mg/L)	3	15.3	16.5	10.0	19.4	10.0	19.4	4.8
Potassium (mg/L)	3	1.0	1.1	0.8	1.2	0.8	1.2	0.2
Magnesium (mg/L)	3	2.2	2.4	1.2	3.0	1.2	3.0	0.9
Calcium (mg/L)	3	0.4	0.4	0.2	0.5	0.2	0.5	0.2
Aluminium (ug/L)	2	983		316	1650			
Arsenic (ug/L)	2	0.5		0.5	0.5			
Cadmium (ug/L)	2	0.5		0.5	0.5			
Chromium (ug/L)	2	1.3		0.5	2.0			
Copper (ug/L)	2	2.5		1.0	4.0			
Lead (ug/L)	2	0.8		0.5	1.0			
Manganese (ug/L)	2	7.5		7.0	8.0			
Molybdenum (ug/L)	2	0.5		0.5	0.5			
Nickel (ug/L)	2	0.5		0.5	0.5			
Selenium (ug/L)	2	1.5		1.5	1.5			
Silver (ug/L)	2	0.5		0.5	0.5			
Uranium (ug/L)	2	0.5		0.5	0.5			
Zinc (ug/L)	2	12.0		5.0	19.0			
Boron (ug/L)	2	28.5		20.0	37.0			
Iron (ug/L)	2	567		154	979			
Mercury (ug/L)	2	0.005		0.005	0.005			
Total Organic Carbon (mg/L)	1	3						

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Appendix B. Summary for SOE Report 2011-2012

Health ratings of 35 sites in creeks and estuaries.

Prepared for use in Council's State of Environment Report 2011-2012

SOE REPORTING 2011-2012 YEAR. HEALTH RATINGS OF 35 SITES IN CREEKS AND ESTUARY.

ANZECC GUIDELINE PARAMETERS **Freshwater:** **RANKING:** Three key water parameters were used to rank the water quality at a site: At freshwater sites - suspended

SUMMARY Ranking	2011-2012 Number	Percent	Criteria	SUMMARY Ranking	2010-2011 Number	Percent
good	6	17	Satisfy 3 key parameters simult over 50% of time	good	13	36
fair	5	14	Satisfy 3 key parameters simult over 25to 50% of time	fair	3	8
poor	24	69	Satisfy 3 key parameters simult. less than 25% of time	poor	20	56
total sites	35				36	

site	2011-2012 Rank	2011-2012 % of time the 3 key guidelines passed simultaneously	2011-2012 Problem?	Site (Creek -where)	Last year: 2010-2011 Site Identification	Rank	% of time the 3 key guidelines passed simultaneously
FRESHWATER CREEKS					**FRESHWATER CREEKS**		
36	good	100	-	**Murray Anderson - Reference**	36	good	100
37	good	92	-	**Smugglers - Reference**	37	good	100
1	poor	0	V Hi TN; V Hi TP	**Berowra - Gorge**	1	poor	0
2	fair	46	Hi TN	**Tunks - Gorge**	2	good	50
4	poor	17	Hi TN, TP	**Berowra - Westleigh**	4	poor	8
5	poor	0	V Hi TN, Hi TP	**Pyes - Cherrybrook**	5	poor	0
6	poor	0	V Hi TN, Hi TP	**Georges - Cherrybrook**	6	poor	0
8	poor	0	V Hi TN, Hi TP	**Devlins - Epping**	8	poor	0
10	poor	0	Hi SS, V Hi TN, V Hi TP	**Larool - Thornleigh**	10	poor	0
12	poor	0	V Hi TN, V Hi TP	**Hornsby - Hornsby**	12	poor	0
13	poor	0	V Hi TN, Hi TP	**Sams - Mt Kuring-gai**	13	poor	0
23	poor	0	V Hi TN, V Hi TP	**Waitara - U/S STP**	23	poor	0
39	good	83	-	**Joe Crafts - Berowra Hts**	39	good	58
42	poor	0	V Hi TN,V Hi TP	**Colah - Glenorie**	42	poor	0
43	poor	0	V Hi TN,V Hi TP	**Calna - D/S STP**	43	poor	0
45	poor	0	V Hi TN,V Hi TP	**Berowra - Fishponds**	45	poor	0
46A	poor	8	V Hi TN, Hi TP	**Trib of Terrys - Epping**	46	fair	25
49	poor	0	V Hi TN, Hi TP	**Still - Galston**	49	fair	25
52	good	62	TN, TP	**Calna - U/S STP**	52	good	50
62	poor	0	V Hi TN, Hi TP	**Kimmerikong - Cowan**	62	poor	0
63	poor	0	V Hi TN, Hi TP	**Colah - Ben Bullen**	63	poor	18
64	poor	0	V Hi TN, V Hi TP	**Sallaway - Galston**	64	poor	0
77	poor	0	V Hi TN, Hi TP	**Gleeson - Mt Colah**	77	poor	0
80	poor	0	SS, V Hi TN, V Hi TP	**Glenorie - Glenorie**	80	poor	0
ESTUARY SITES					**ESTUARY SITES**		
38	fair	36	Chloro, TN, TP	**Sandbrook Inlet - Brooklyn**	38	good	58
48	poor	8	Hi Chloro, V Hi TN, TP	**Marramarra - Orchard**	48	fair	33
					55	good	67
60	poor	0	Hi Chloro, V Hi TN, TP	**Berowra - Car ferry**	60	poor	25
61	poor	7	Hi Chloro, V Hi TN, TP	**Berowra - Calabash**	61	poor	7
100	poor	0	V Hi TN, V Hi TP	**Berowra - Crosslands**	100	poor	0
103	poor	23	Hi TN, TP	**Hawkesbury - Milsons Passage**	103	good	75
104	fair	46	Chloro, TN, TP	**Hawkesbury - Peat Island**	104	good	75
105	fair	38	Hi TN	**Hawkesbury - at STP outlet**	105	good	83
106	fair	31	Chloro, TN, TP	**Hawkesbury - entrance Sandbrook**	106	good	66
107	good	46	Hi TN	**Hawkesbury - off Long Isl**	107	good	58
108	good	92	-	**Hawkesbury - Dangar Isl**	108	good	92
total =	**35**	**% of sites**			**total =**	**36**	**% of sites**
Good=	6	17			Good=	13	36
Fair	5	14			Fair	3	8
Poor	24	67			Poor	20	56

Why ranking is different in 2011-2012 than in 2010-2011

- Total rain higher and more wet sampling days than 2010-2011;
- All esturaine sites affected by higher nutrients than in 2010-2011. More failures at all Hawkesbury R sites in 2012.
- Freshwate sites: more failures for TN and TP at most sites. Sites 2, 46A and 49 ranked lower this year

	2011-2012		2010-2011		2009-2010	
Ranking	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
good	6	17	13	36	14	39
fair	5	14	3	8	5	14
poor	24	69	20	56	17	47