

Site 010 – Larool Creek, Thornleigh

Freshwater site

Berowra Creek Catchment

Monitoring Program Timelines

Program Name (site reference)	Sampling Period	Sampling Frequency
Long-term (010)	Oct 1994 – Jun 2016	Fortnightly
	Jul 2016 – Sept 2017	Monthly
Industrial (010)	Oct 2017 ongoing	Monthly

Key Findings and Recommendations

Condition	<p>Phys-chem: pH and EC are elevated and consistently exceed REHVs. DO is slightly suppressed and variable, complying with REHVs approximately 60% of the time.</p> <p>Clarity: Turbidity and TSS are slightly elevated but a long-term decreasing trend is evident. Turbidity and TSS exceed REHVs approximately 50% and 25% of the time, respectively.</p> <p>Nutrients: Nutrient levels are elevated and consistently exceed REHVs. Long-term trends of increase for N-based nutrients, particularly post-2012. TP has a long-term trend of decrease.</p> <p>Bacteria: Bacteria levels are elevated and consistently exceed REHVs. A weak long-term decreasing trend and a reduction in variability post-2012 is evident.</p>
Issues	<ul style="list-style-type: none"> – Strongly influenced by industrial development in the catchment – Impacts from wastewater infrastructure – Difficulty in meeting REHVs in highly modified catchments
Recommendations	<ul style="list-style-type: none"> – Investigate sources of nutrients and bacteria in the catchment – Identify further opportunities for WSUD in the catchment – Ongoing collaboration with Sydney Water to improve the management of wastewater – Collaboration with State Government agencies (i.e. EPA) to improve the management of industrial developments – Engage with industry to identify opportunities to reduce sources of pollutants – Review water quality values and objectives relevant to industrial sites and continue monitoring until objectives are achieved – Maintain high sediment and erosion control standards

Site Photos



Larool Creek looking downstream during high flow



Larool Creek looking upstream during low flow

Results of Data Analysis

Table 1 Results of non-conformance calculations and *Kendall Tau* ($p < 0.05$) trend analysis for Site 010

010	REHV	Long-term				2012-2017			
		n	Median	%NCs	Trend	n	Median	%NCs	Trend
Temp (°C)	NA	482	16.93	NA	↓	102	16.17	NA	NS
pH	4.8-7	478	7.50	94	↑	100	7.63	100	NS
DO (%sat)	75-118	443	76.50	48	NS	102	77.45	42	↓
EC (mS/cm)	0.32	481	0.70	89	NS	102	0.63	91	NS
Turbidity (NTU)	8	481	21.4	78	↓	102	8.3	51	NS
TSS (mg/L)	7	496	12	60	↓	102	4	25	NS
TP (mg/L)	0.01	496	0.083	98	↓	102	0.038	100	NS
TN (mg/L)	0.32	495	1.550	100	NS	101	1.640	100	↑
NH ₃ -N (mg/L)	0.02	496	0.130	87	↑	102	0.110	96	↑
NO _x -N (mg/L)	0.05	496	0.740	95	↑	102	1.135	100	↑
F.Cols (CFU/100ml)	150	496	1900	92	↓	102	775	92	NS

REHV – Regional Environmental Health Value

n - Number of sampling events

%NCs - percent non-conformance based on REHVs

NA - No associated REHV or benchmark value

NS - trend not significant based on Kendall Tau analysis at $p < 0.05$

↑ - significant increasing trend based on Kendall Tau at $p < 0.05$

↓ - significant decreasing trend based on Kendall Tau at $p < 0.05$

Median	%NCs
Within or below REHV	<25%
Equal to REHV	25% to 75%
Outside or above REHV	>75%
No associated REHV	Not Applicable

Table 2 Descriptive statistics for variables measured at Site 010 from January 1995 to September 2017

Variable	Valid n	Mean	Median	Minimum	Maximum	20 th Percentile	80 th Percentile	Std Dev
Temp (°C)	482	16.70	16.93	7.17	27.00	13.14	20.38	3.800
pH	478	7.59	7.50	6.00	12.00	7.27	7.73	0.600
DO (mg/L)	479	7.06	7.58	0.00	18.00	5.20	8.90	2.400
DO (%sat)	443	70.99	76.50	0.05	200.00	50.95	91.20	25.200
EC (mS/cm)	481	0.71	0.70	0.00	7.00	0.48	0.90	0.400
EC (µS/cm)	207	690.40	666.00	41.00	6272.00	433.00	847.00	482.900
Turbidity (NTU)	481	54.4	21.4	0.5	725.0	7.8	72.0	90.10
TSS (mg/L)	496	34	12	1	1390	3	38	97.0
TP (mg/L)	496	0.250	0.083	0.003	23.000	0.037	0.230	1.1000
TN (mg/L)	495	2.140	1.550	0.330	32.000	1.030	2.570	2.4000
NH ₃ -N (mg/L)	496	0.320	0.130	0.005	9.000	0.040	0.360	0.7000
NO _x -N (mg/L)	496	0.930	0.740	0.005	18.000	0.390	1.190	1.1000
F.Cols (CFU/100ml)	496	44416	1900	0	9300000	400	13000	443390.3
E.Coli (CFU/100ml)	25	2238	680	120	22000	240	1600	4623.4
Enterococci (CFU/100ml)	47	1098	510	38	5800	200	1200	1485.7

Boxplots showing annual variability for each variable measured



