

Parafield stormwater harvesting water quality
data May – December 2009 summary report for
Adelaide and Mt Lofty Ranges Natural
Resources Management Board



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Water for a Healthy Country Flagship Report

March 2010

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Cover Photograph:

Description: In-stream Basin Inlet, Parafield stormwater harvesting facility, City of Salisbury, South Australia

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ACKNOWLEDGEMENTS

The Parafield stormwater quality monitoring project (May – December 2009) was funded by the Adelaide and Mount Lofty Natural Resource Management Board to allow water quality monitoring to continue between the end of the Aquifer Storage Transfer Recovery (ASTR) project and the proposed squeal project on managed aquifer recharge and urban stormwater use options. The City of Salisbury provided water quality data for the first wetland outlet sample and operated the Parafield stormwater harvesting system. The following CSIRO personnel assisted with the water quality sampling, Kerry Levett, Joanne Vanderzalm and volunteer student Dennis Gonzalas. Data were reviewed by Peter Dillon and Declan Page.

1. INTRODUCTION

The Aquifer Storage Transfer and Recovery (ASTR) project aimed to determine whether reedbed-treated stormwater that had been stored in an initially brackish aquifer could be recovered at a quality that met drinking water guidelines. It was shown that on a one off basis recovered water met the Australian Drinking Water Guidelines (Page *et al.* 2009) based on the water quality monitoring data between September 2006 and March 2009. A distinguishing feature of that report was that it followed the risk assessment process of the *Australian Guidelines for Water Recycling 2C: Managed Aquifer Recharge* (NRMMC–EPHC–NHMRC 2009) and also addresses the *Australian Guidelines for Water Recycling 2A: Augmentation of Drinking Water Supplies* (NRMMC–EPHC–NHMRCC 2008). However, the report identified that further assessment was necessary to ensure the risks to human health and the environment could be managed on a continuous basis. As such a sequel project ‘MAR and Urban Stormwater Use Options’ has been proposed that will address the remaining concerns about public health, environment, infrastructure and community engagement.

To bridge the data gap between the end of the ASTR project and the beginning of the proposed sequel project, an interim water quality monitoring program commenced in May 2009 for the winter stormwater capture period, funded by the Adelaide and Mt. Lofty Ranges Natural Resources Management Board (AMLR-NRMB). This data will allow a continuous record of water quality to facilitate improved risk assessment for the sequel project. It also gave focus to the quality of water entering the Parafield harvesting system during winter storm events, while continuing to monitor the quality of water leaving the cleansing reedbed before aquifer recharge. The previous monitoring of the ASTR system facilitated the selection of the current monitoring parameters. The highest costs were associated with analysis of micropollutants and pathogens such as viruses. These had been determined to be the hazards with the highest associated risks (Page *et al.* 2009).

2. MONITORING PROGRAM

The previous water quality monitoring program (Page *et al.*, 2009) involved collecting water samples at the inlet (WE01) and outlet (WE02) of the wetland at weekly intervals for a minimum period of one month, following an initial significant rain event (>10 mm in 24 hours), for parameters, which included the key potential hazards, pathogens, inorganic chemicals, salinity, nutrients, organic chemicals, turbidity and particulates.

In this present study, there were four rainfall triggered sampling events (>10 mm rainfall in 24 hour period) which were analysed for the same full suite of parameters at the in-stream basin (IS2). Following the event sampling at IS1, samples were then collected ~14 days after from the wetland outlet, WE02 (or 21 days at the ASTR injection bore, IW). This approximated the residence time of the water within the Parafield Stormwater Harvesting System. Sampling early in the week was required to allow time for pathogen and organic chemical samples to be delivered to appropriate laboratories for analysis. Monthly samples were also collected at the WE02 and IW locations for a reduced suite between event sampling. Figure 1 shows the sampling events corresponding to the daily rainfall measured at Parafield airport and Figure 2 shows the Parafield Stormwater Harvesting system and ASTR wellfield sampling locations.

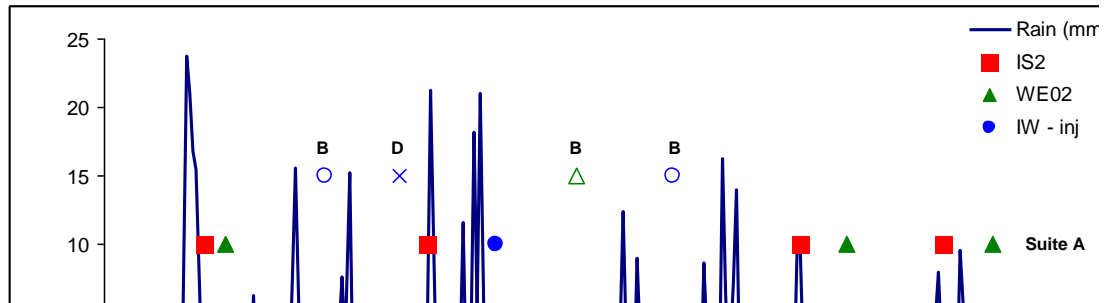


Figure 1 Daily rainfall recorded at Parafield airport (April to December 2009) and water quality sampling dates at IS2, WE02 and Injectant (at IW wells)

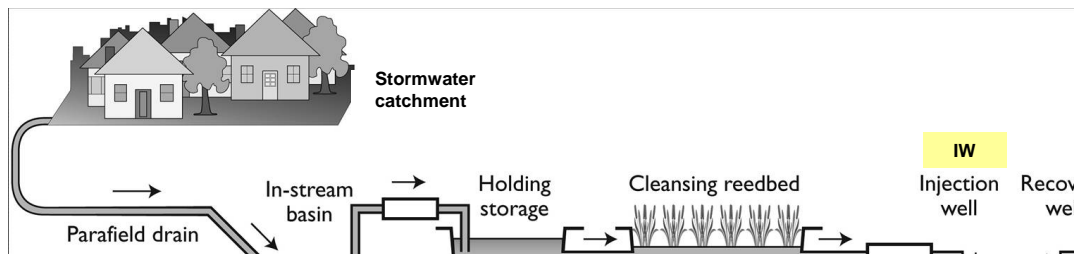


Figure 2 Conceptual diagram of the ASTR system, showing key sampling points IS2, WE01, WE02 and IW (injectant)

Sampling suites included;

- Event based - 4 Suite A samples linked to rain events (physical, nutrients, BDOC, major ions, bacteriological, pathogens recommended by MAR guidelines, total metals, soluble metals, THMFPs, PSD, MFI, faecal sterols, pharmaceuticals & NDMA, herbicide scan, full organic chemicals suite).
- Monthly (between event) - 3 Suite B sampled irrespective of rain events (physical, nutrients, major ions, bacteriological, total metals, soluble metals, THMFP, PSD) + 1 Suite D (chloride, sulphate, sodium, colour, total iron). Appendix A lists all individual parameters.

3. RESULTS AND DISCUSSION

Table 1 summarises the water quality data for the IS2 and WE02/IW locations, Tables 2 and 3 show only those parameters which were detected in the trace organics and pharmaceutical scans carried out at the National Measurement Institute (NMI) and Queensland Health and Scientific Services (QHSS) laboratories (highlighted in red). Several of the trace organic/pharmaceutical species significantly exceeded the level of detection (LOR) at the IS2 location, with levels decreasing on all but one occasion (dicamba, Nov-Dec09) at the WE02 or IW location. In November 2009 a travel blank of Milli-Q water was also submitted with the samples and caffeine, paracetamol and dalapon were detected at trace levels (< 0.08 ug/L). Appendices B and C provide tables of all available data, which is also in digital form on the attached CD.

Comparison of the results with those reported in the risk assessment (Page *et al* 2009) show that sampling at the IS2 (in-stream basin outlet) location as compared to the WE01 (wetland inlet) captures larger quantities of particulates and consequently 3 times higher levels of total iron, with average levels of iron in IS2 of 1.5 mg/L compared with 0.54 mg/L at WE01. Whereas levels at WE02 are comparable at ~ 0.65 mg/L. The reedbed process actually increases the level of iron in the output water as iron is released from earlier deposited sediments.

Average levels of faecal indicator organisms in the untreated stormwater sampled at IS2 were on order of magnitude greater than those at WE01 in the risk assessment and present an unacceptable level of risk. While at the wetland outlet/injectant, faecal indicator organisms (thermotolerant coliforms; *E. coli*; Enterococci; Streptococci) were frequently detected in low numbers similar to those detected in previous monitoring, suggesting a potential risk of pathogenic hazards, though there were no detections of cryptosporidium or rotavirus.

Table 1 Summary of average data for the in-stream basin outlet (IS2), Wetland outlet (WE02) / Injectant

	DWG ^a	In-Stream Basin outlet					Wetland outlet / Injectant				
		avg	stdev	n	max	min	avg	stdev	n	max	min
Field Readings											
DO (mg/L)	85%	4.75	2.70	3	7.18	1.85	2.94	1.69	5	4.61	0.62
EC (µS/cm)		237	110	3	360	147	243	86	5	346	128
pH (-)	6.5-8.5	7.85	0.24	3	8.08	7.6	7.51	1.25	5	8.76	6.04
Eh (mV)		81	51	3	128	27	109	102	4	235	-14
Eh adj (mV SHE)		312	56	3	372	261	338	12	4	346	329
Temperature (C)		18.0	4.1	3	22.8	15.6	14.28	2.75	5	19.1	12.4
CSIRO Data											
MFI (-)	-						83.63	41.56	3	131.5	56.7
PSD 10 (µm)				2	3.39	15.98	7.29	6.34	3	12.25	0.15
PSD 50 (µm)				2	11.51	62.48	20.04	16.43	3	30.18	1.08
PSD 90 (µm)				2	39.32	351.31	57.88	48.06	3	103.97	8.07
AWQC Data											
PHYSICAL CHARACTERISTICS (mg/L)											
Conductivity (µS/cm)	1000	236	91	4	358	144	268	80	6	343	147
Total Dissolved Solids (by EC)	500	130	51	4	200	79	149	45	6	190	81
Suspended Solids		32	22	4	56	13	3.8	1.9	6	7.0	2.0
Turbidity (NTU)	5	43.8	47.1	4	110	9.3	5.3	4.4	7	13	1.8
Colour - True (456nm) (HU)	15	62	35	4	99	28	21	7	7	35	16
pH (-)	6.5-8.5	7.20	0.22	4	7.5	7	7.0	0.2	6	7.2	6.8
MAJOR IONS (mg/L)											
Carbonate		0	0	4	0	0	0	0	6	0	0
Hydroxide		0	0	4	0	0	0	0	6	0	0
Alkalinity as Calcium Carbonate	200	50	21	4	81	35	73	21	6	101	46
Bicarbonate		61	26	4	99	42	88	25	6	123	56
Bromide		0.12	0.03	2	0.14	0.1	0.15	0.02	4	0.17	0.12
Sulphate	250	10.8	5.0	4	18	6.6	10.1	2.6	6	12.6	5.4
Chloride	250	37	18	4	53	16	35	14	7	50	14

Fluoride	1.5	0.17	0.08	3	0.26	0.1	0.18	0.05	6	0.26	0.11
Calcium		17.0	4.0	4	22.4	13.1	18.6	4.3	6	23.0	11.1
Magnesium		4.7	2.0	4	7.6	3.1	5.8	2.0	6	8.1	2.6
Potassium		3.7	1.1	4	5.3	2.9	2.8	0.4	6	3.14	2
Sodium	180	21.8	6.5	4	29.9	14.6	23.3	8.2	6	30.8	10.5
MICROBIOLOGICAL (cfu/100 mL)											
E.coli/F Coliforms - Presumptive		2.04×10^5	3.84×10^5	4	7.5×10^5	260	30	42	6	110	3
Faecal coliforms		2.04×10^5	3.84×10^5	4	7.5×10^5	260	30	42	6	110	3
E.coli	0	2.04×10^5	3.84×10^5	4	7.5×10^5	260	27	41	6	110	3
Ent/F.Strep - Presumptive		1.73×10^4	2.54×10^4	4	5.4×10^4	33	16	11	6	29	1
Enterococci	0	1.73×10^4	2.54×10^4	4	5.4×10^4	33	16	11	6	29	1
Faecal Streptococci	0	1.73×10^4	2.54×10^4	4	5.4×10^4	33	16	11	6	29	1
Sulphite reducing Clostridia		1.6×10^3	1.47×10^3	3	3.3×10^3	720	162	156	3	340	46
Clostridium - presumptive		1.6×10^3	1.47×10^3	3	3.3×10^3	720	162	156	3	340	46
Clostridium perfringens	0	1.2×10^3	1.58×10^3	3	3.3×10^3	140	10	14	2	20	0
Campylobacter	0	4	1	3	4	<4	14	10	3	23	4
Cryptosporidium - Presumptive (oocysts/10L)		14	12	3	22	<5	2		2	2	2
Cryptosporidium – Confirmed (oocysts/10L)	0	13		3	13	<5			2	0	0
Bacteriophage (/10 mL)		63		1	63	63	7	5	3	12	3
Rotavirus (PDU/L)	0			3	inhibition	absent			2	absent	absent
NUTRIENTS (mg/L)											
Nitrate + Nitrite as N	11.5	0.108	0.100	4	0.208	0.016	0.014	0.010	4	0.028	<0.005
Ammonia as N	0.5	0.276	0.233	4	0.44	0.111	0.011	0.004	6	0.017	0.006
TKN as Nitrogen		1.128	0.437	4	1.56	0.63	0.405	0.226	6	0.850	0.210
Nitrogen - Total		1.238	0.458	4	1.63	0.66	0.418	0.222	6	0.860	0.240
Phosphorus - Filterable Reactive as P		0.154	0.201	4	0.454	0.042	0.016	0.013	6	0.040	0.008
Phosphorus - Total		0.249	0.142	4	0.45	0.135	0.052	0.026	6	0.092	0.031
Biodegradable Dissolved Organic Carbon							2.3	2.1	3	4.7	0.7

Dissolved Organic Carbon	8.3	3.9	4	13.7	4.5	4.7	1.9	6	8.3	3
Total Organic Carbon	11.8	3.1	4	16.2	9.1	5.6	2.6	6	10.6	3.4
Silica	2.3	0.5	4	3	2	3.0	0.9	6	4	2
UV Absorbance - 254nm Filtered (cm-1)	0.368	0.129	4	0.525	0.212	0.163	0.072	6	0.296	0.096
UV Absorbance - 254 nm Unfiltered (cm-1)	0.351	0.146	4	0.461	0.136	0.173	0.046	6	0.260	0.130

METALS(mg/L)

Aluminium - Soluble		0.069	0.027	4	0.095	0.036	0.025	0.014	5	0.040	0.006
Aluminium - Total	0.2	1.222	1.315	4	3.126	0.214	0.567	0.762	7	2.089	0.089
Antimony - Total		0.001	0.001	4	0.002	<0.0005	0.001	0.000	3	0.001	<0.0005
Arsenic - Soluble		0.001	0.000	4	0.001	<0.001	0.001	0.000	3	0.001	<0.0003
Arsenic - Total	0.007	0.001	0.000	4	0.001	0.001	0.001	0.000	6	0.001	<0.001
Barium - Total	0.7	0.026	0.009	4	0.034	0.017	0.019	0.004	6	0.027	0.015
Beryllium - Total				4	<0.0005	<0.0003			3	<0.0005	<0.0003
Boron - Soluble		0.077	0.056	4	0.141	<0.4	0.062	0.024	4	0.093	0.039
Cadmium - Total				4	<0.0005	<0.0001			6	<0.0005	<0.0001
Chromium - Total		0.003	0.002	4	0.004	<0.003	0.001	0.000	3	0.001	0.000
Cobalt - Total		0.001	0.000	4	0.001	0.001	0.000	0.000	3	0.000	<0.0005
Copper - Total	1	0.007	0.004	4	0.013	0.004	0.001	0.001	4	0.002	<0.0001
Iron - Soluble		0.137	0.077	4	0.250	0.080	0.075	0.026	6	0.120	0.042
Iron - Total	0.3	1.568	1.551	4	3.835	0.531	0.711	0.634	7	2.067	0.267
Lead - Total	0.01	0.008	0.008	4	0.020	0.003	0.001	0.000	5	0.001	0.000
Lithium - Total		0.002	0.000	4	0.003	0.002	0.002	0.001	3	0.003	0.002
Manganese - Soluble		0.041	0.027	4	0.077	0.019	0.035	0.027	6	0.067	0.003
Manganese - Total	0.1	0.068	0.032	4	0.110	0.035	0.042	0.028	6	0.081	0.010
Mercury - Total	0.001			4	<0.0003	<0.0003	0.0004		3	0.0004	0.0004
Molybdenum - Total	0.05	0.001	0.000	4	0.002	0.001	0.001	0.0002	3	0.001	0.000
Nickel - Total	0.02	0.002	0.000	4	0.002	0.002	0.001	0.0001	5	0.001	0.001
Selenium - Total		0.000		4	0.0001	<0.0001	0.0001		3	0.0001	0.0001
Silver - Total				4	<0.0002	<0.0002			3	<0.0002	<0.0002
Thallium - Total				4	<0.0001	<0.0001			3	<0.0001	<0.0001
Vanadium - Total		0.003	0.001	4	0.004	0.002	0.001		3	0.001	<0.0001

Zinc - Total	3	0.103	0.071	4	0.207	0.052	0.014	0.010	5	0.026	0.004
STEROLS (ng/L)											
24-ethylcholestanol		1122	380	3	1390	<80	401	250	3	674	182
24-ethylcholesterol		9683	1567	3	11000	7950	2644	1994	3	4860	993
24-ethylcoprostanol		152		3	152	<80	164	86	3	259	90
24-ethylepicoprostanol		220		3	220	<80	203		3	203	203
Cholestanol		529		3	529	<80	142	53	3	198	92
Cholesterol	7000	12817	16355	3	31700	3170	1074	493	3	1600	622
Coprostanol	700	229	213	3	473	84	79	42	3	109	49
Epicholestanol		446		3	446	<80			3	<100	<40
Epicoprostanol		414		3	414	<80			3	<100	<40
TRIHALOMETHANES FORMATION POTENTIAL (µg/L)											
Bromoform Form Potential	100	<1		4	<1		4		5	4	<1
Chloroform Form Potential	200	246	76.2	4	324	156	118	80	5	254	47
Dibromochloroform Form Potential		4	1.73	4	6	3	12	17	5	42	1
Dichlorobromoform Form Potential		36	15.7	4	55	17	41	16	5	59	16
Trihalomethanes Form Potential - Total		284	78.9	4	382	200	173	80	5	307	99

Footnote: ^a Drinking Water Guideline

Table 2 Analytical 'Detects' (in bold) from samples submitted to the National Measurement Institute, Pymble NSW

		29.04.09 IS2	5.05.09 WE02 (awqc lab) ^b	1.07.09 IS2	20.07.09 Injectant	14.10.09 IS2	27.10.09 WE02	23.11.09 IS2	7.12.09 WE02
	LOR ^a								
Phenols (ug/L)									
3-& 4-Methylphenols	<0.2	<0.2		<0.2	<0.2	<0.2	<0.2	0.44	<0.2
Herbicides (ug/L)									
atrazine	<0.1		1						
Diuron	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	0.41	<0.1
Trihalomethanes NMI									
1120 Screen (ug/L)									
Chloroform	<1	<1		<1	<1	3.9	<1	<1	<1
Bromodichloromethane	<1	<1		<1	<1	2.5	<1	<1	<1
Dibromochloromethane	<1	<1		<1	<1	1.2	<1	<1	<1
Bromoform	<1	<1		<1	<1	<1	<1	<1	<1
Miscellaneous (mg/L)									
Detergent as MBAS	<0.05	0.25		0.09	0.05			0.24	0.1

Footnote: ^a minimum level of reporting, ^b Herbicide screen only, submitted to Australian Water Quality Centre

Table 3 Analytical 'Detects' (in bold) from samples submitted to the Queensland Health Clinical and Statewide Services, Coopers Plains QLD

			29.04.09	1.07.09	20.07.09	14.10.09	27.10.09	23.11.09	23.11.09	8.12.09
			IS2	IS2	Injectant IW2	IS2	WE02	IS2	Blank Milli Q H2O	WE02
	units	LOR ^a								
PHARMACEUTICALS										
Acesulfame	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.19	<0.01	0.14
Caffeine	µg/L	0.01	0.27	0.87	0.05	0.43	0.3	0.62	0.07	0.12
DEET	µg/L	0.01	0.06	0.05	0.03	0.06	0.03	0.33	<0.01	0.12
Erythromycin	µg/L	0.01	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Paracetamol	µg/L	0.01	0.06	0.08	<0.01	0.11	<0.01	0.31	0.02	<0.01
Salicylic acid	µg/L	0.01	<0.01	0.02	<0.01	0.04	<0.01	<0.01	<0.01	<0.01
Phenoxyacid Herbicides, LCMS										
Dicamba	µg/L	0.01	0.18	0.15	0.06	0.26	0.07	<0.01	<0.01	0.35
Mecoprop	µg/L	0.01	<0.01	<0.01	<0.01	0.04	0.02	0.02	<0.01	0.01
MCPA	µg/L	0.01	0.04	0.22	0.04	1.24	0.2	0.48	<0.01	0.14
2,4-D	µg/L	0.01	<0.01	<0.01	<0.01	0.05	0.01	0.03	<0.01	0.01
Triclopyr	µg/L	0.01	0.02	0.02	0.01	0.07	0.03	0.02	<0.01	<0.01
Herbicides by LCMS										
Dalapon	µg/L	0.01	0.03	0.03	<0.01	<0.01	<0.01	0.02	0.02	<0.01
Atrazine	µg/L	0.01	<0.01	<0.01	<0.01	0.43	0.19	0.13	<0.01	0.04
Desethyl Atrazine	µg/L	0.01	0.06	0.01	<0.01	0.05	0.02	0.04	<0.01	0.02
Desisopropyl Atrazine	µg/L	0.01	0.02	0.02	<0.01	0.02	0.02	0.05	<0.01	<0.01
Diuron	µg/L	0.01	0.12	0.17	0.1	0.25	0.21	0.39	<0.01	0.14
Metolachlor	µg/L	0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Simazine	µg/L	0.01	0.03	0.16	0.11	0.11	0.12	0.12	<0.01	0.03

Footnote: ^a minimum level of reporting

4. SUMMARY

Preliminary assessment of the water quality data obtained between May – December 2009 has provided vital information for determining future sampling regimes. Water quality results at the IS2 location support the importance of event based sampling capturing the potential ‘worse case scenario’ water. Future sampling regimes will need to incorporate sampling points going further upstream in the catchment to provide guidance on sources and potential for source control. These data will allow linkage of water quality records from the ASTR project to the sequel project, they inform on the hazard reduction in the holding storage and reedbed, they confirm the presence of hazards at unacceptable concentrations in source water. The information further reinforces the importance of tracking sources of hazards, notably of pathogens, organic chemicals and metals in the catchment to evaluate practical opportunities for catchment and source water protection as a key component in the multi barrier approach to minimise risks to human health and the environment.

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APPENDIX A - SUMMARY OF ALL PARAMETERS AND SAMPLING SUITES

PARAMETERS						
<u>Total physical</u>	<u>Major ions</u>	<u>Total metals</u>	<u>Soluble metals</u>	<u>THMFPs</u>	<u>Total bacto</u>	<u>QHSS Lab</u>
conductivity	calcium	aluminium	aluminium		E. coli & faecal coliforms	Pharmaceuticals
pH	magnesium	antimony	arsenic		& Faecal streptococci	& NDMA
suspended solids	potassium	arsenic	boron		Faecal streptococci	
turbidity	sodium	barium	iron	<u>Total sterols</u>	Sample prep	
Alkalinity	bicarbonate	beryllium	manganese	Faecal Sterols		
Colour	chloride	cadmium			<u>EXTRA Pathogens</u>	FULL trace organics suite
	fluoride	chromium			Bacteriophages - somatic	<u>NMI Total Micropollutants</u>
	sulphate	cobalt		<u>PSDs (CSIRO)</u>	Bacteriophages - F specific	Triazine herbicides
		copper			Campylobacter spp	Organophosphate
<u>Total nutrients</u>		iron		<u>Wetland only</u>	Clostridium Perfringens	Organochlorine
total organic carbon		lead			Sample prep	Propiconazole 1 and 2
dissolved organic carbon		lithium		<u>BDOC</u>	Cryptosporidium	Piperonyl butoxide
ammonia as N		manganese			Rotovirus - outsourced	Phenoxy acid herbicides
nitrate + nitrite as N		mercury		<u>MFI (CSIRO)</u>		Volatile hydrocarbons
total nitrogen as N		molybdenum				Semi-volatile hydrocarbons
total phosphorus as P		nickel				Phenols (speciated) low level
filterab P		selenium				PAHs lower level
UV absorbance		silver				Detergents (MBAS)
Silica		vanadium				
		zinc				

SAMPLING SUITES			
Suite A	Suite B	Suite C	Suite D
Physical	Physical	Major ions	Chloride
Nutrients	Nutrients	Colour	Sulphate
Major Ions	Major ions	Total & soluble metals	Sodium
Total bacto	Bacto	aluminium	Colour
Total Metals	Metals	arsenic	Total iron
Soluble Metals	Soluble Metals	iron	
THMFPs	THMFPs	manganese	
Sterols	PSDs (CSIRO)		
BDOC (WE02 only)			
MFI (WE02 only) CSIRO			
PSDs (CSIRO)			
Extra Pathogens			
Pharmaceuticals & NDMA (QHSS)			
FULL trace organics suite/Micropollutants (NMI)			

APPENDIX B – WATER QUALITY DATA FROM FIELD MEASUREMENTS, CSIRO AND AWQC LABORATORIES

Table B.1 Water Quality data for the In-stream basin outlet (IS2) from field measurements and CSIRO/AWQC Laboratories

Suite	29.04.09	1.07.09	14.10.09	23.11.09
	A	A	A	A
Field Readings				
DO (mg/L)	1.85		7.18	5.22
EC (uS/cm)	147		203.4	360
pH (-)	7.87		8.08	7.6
Eh (mV)	89		27	128
Eh adj (mV SHE)	304		261	372
Temperature (C)	15.7		15.6	22.8
CSIRO Lab				
PSD 10 (um)			3.39	15.98
PSD 50 (um)			11.51	62.48
PSD 90 (um)			39.32	351.31
AWQC Lab				
Physical characteristics (mg/L)				
Conductivity (uS/cm)	144	245	195	358
Total Dissolved Solids (by EC)	79	130	110	200
Suspended Solids	13	56	46	13
Turbidity (NTU)	11	110	45	9.3
Colour - True (456nm) (HU)	84	28	37	99
pH (lab) (-)	7	7.2	7.5	7.1
Major Ions (mg/L)				
Carbonate	0	0	0	0
Hydroxide	0	0	0	0
Alkalinity as Calcium Carbonate	41	35	42	81
Bicarbonate	50	42	51	99
Bromide	<0.1	<0.1	0.1	0.14
Sulphate	6.6	9.9	8.7	18
Chloride	16	53	29	51
Fluoride	0.1	<0.10	0.14	0.26
Calcium	15.2	17.3	13.1	22.4
Magnesium	4.4	3.8	3.07	7.61
Potassium	3.5	2.9	3.22	5.3
Sodium	19.2	23.6	14.6	29.9
Microbiological (cfu/100 mL)				
E.coli/F Coliforms - Presumptive	260	28000	7000	780000
Faecal coliforms	260	28000	7000	780000
E.coli	260	28000	7000	780000
Ent/F.Strep - Presumptive	250	54000	15000	33
Enterococci	250	54000	15000	33

Faecal	250	54000	15000	33
Streptococci				
Sulphite reducing		3300	790	720
Clostridia				
Clostridium -		3300	790	720
presumptive				
Clostridium perfringens		3000	400	140
Campylobacter (cfu/L)		3	4	<4
Cryptosporidium –		5	22	<5
Presumptive				
(oocytes/10L)				
Cryptosporidium –		<5	13	
Confirmed				
(oocytes/10L)				
Giardia – Presumptive		19	<5	<10
(cysts/10L)				
Giardia – Confirmed		6		
(cysts/10L)				
Bacteriophage (/10 mL)		63	NA	NA
Rotavirus (PDU/L)		Inhibition	Absent	Inhibition
Nutrients (mg/L)				
Nitrate + Nitrite as N	0.028	0.18	0.208	0.016
Ammonia as N	<0.005	0.111	0.44	<0.005
TKN as Nitrogen	0.63	0.9	1.42	1.56
Nitrogen - Total	0.66	1.08	1.63	1.58
Phosphorus - Filterable	0.071	0.048	0.454 ^a	0.042
Reactive as P				
Phosphorus - Total	0.135	0.164	0.45	0.245
Dissolved Organic	8.1	4.5	6.8	13.7
Carbon				
Total Organic Carbon	10.5	11.2	9.1	16.2
Silica	2	2	2	3
UV Absorbance -	0.349	0.525	0.212	0.386
254nm Filtered				
(cm-1)				
UV Absorbance -	0.388	0.136	0.461	0.418
254 nm Unfiltered				
(cm-1)				
Metals and metalloids (mg/L)				
Aluminium - Soluble	0.087	0.056	0.095	0.036
Aluminium - Total	0.508	3.126	1.041	0.214
Antimony - Total	0.002	0.001	0.0007	<0.0005
Arsenic - Soluble	0.001	<0.001	0.0007	0.0013
Arsenic - Total	0.001	0.001	0.0009	0.0014
Barium - Total	0.017	0.0327	0.0188	0.0336
Beryllium - Total	<0.0005	<0.0005	<0.0003	<0.0003
Boron - Soluble	0.041	<0.4	0.048	0.141
Cadmium - Total	<0.0005	<0.0005	<0.0001	<0.0001
Chromium - Total	<0.003	0.004	0.0026	0.001
Cobalt - Total	0.0005	0.0011	0.0006	0.0007
Copper - Total	0.0042	0.013	0.0053	0.0045
Iron - Soluble	0.099	0.08	0.1173	0.2503
Iron - Total	0.531	3.835	1.303	0.6036
Lead - Total	0.0026	0.0204	0.0047	0.0035
Lithium - Total	0.0016	0.0023	0.0021	0.0026
Manganese - Soluble	0.0457	0.0205	0.0194	0.0771
Manganese - Total	0.0689	0.0562	0.035	0.1103
Mercury - Total	<0.0003	<0.0003	<0.00003	<0.00003

Molybdenum - Total	0.0008	0.0009	0.0008	0.0015
Nickel - Total	0.0015	0.0024	0.0019	0.0016
Selenium - Total	<0.003	<0.003	0.0001	<0.0001
Silver - Total	<0.0002	<0.0002	<0.00003	<0.00003
Thallium - Total	<0.0005	<0.0005	<0.0001	<0.0001
Vanadium - Total	<0.003	0.004	0.0029	0.0016
Zinc - Total	0.068	0.207	0.0845	0.0519
Sterols (ng/L)				
24-ethylcholestanol		853	<80	1390
24-ethylcholesterol		7950	10100	11000
24-ethylcoprostanol		152	<80	<80
24-ethylepicoprostanol		<100	<80	220
Cholestanol		529	<80	<80
Cholesterol		3580	3170	31700
Coprostanol		473	129	84
Epicholestanol		446	<80	<80
Epicoprostanol		414	<80	<80
TRIHALOMETHANES FORMATION POTENTIAL				
Bromoform Form Potential	<1	<1	<1	<1
Chloroform Form Potential	291	156	211	324
Dibromochloroform Form Potential	<1	6	3	3
Dichlorobromoform Form Potential	17	38	32	55
Trihalomethanes Form Potential - Total	308	200	246	382

Footnote: ^a difference between filterab P and total P within experimental error of instrument

Table B.2 Water Quality data for the Wetland outlet (WE02) and Injectant (IW1 or IW2) from field measurements and CSIRO/AWQC Laboratories

	5/05/2009 WE02 ^a	2/06/2009 IW1 - Inj	23/06/2009 IW1 - Inj	20/07/2009 IW2 - Inj	12/08/2009 WE02	8/09/2009 IW1 - Inj	27/10/2009 WE02	7/12/2009 WE02
Suite	A	B	D	A	B	B	A	A
FIELD READINGS								
DO (mg/L)		0.62	NA	1.82	4.61	3.41	NA	4.25
EC (uS/cm)		196		128.2	305	241		346
pH (-)		6.04		6.3	8.1	8.34		8.76
Eh (mV)		235			114	-14		102
Eh adj (mV SHE)					329			346
Temperature (C)		13.3		12.4	12.8	13.8		19.1
CSIRO Lab								
MFI (-)				131.5	-	-	62.7	56.7
PSD10 (um)				-	12.25	-	0.15	9.46
PSD 50 (um)				-	30.18	-	1.08	28.51
PSD 90 (um)				-	61.58	-	8.07	103.97
AWQC Lab								
PHYSICAL CHARACTERISTICS (mg/L)								
Conductivity (uS/cm)	173	200		147	343	265	308	342
Total Dissolved Solids (by EC)	95	110		81	190	150	170	190
Suspended Solids	1	2		5	4	2	3	7
Turbidity (NTU)	2.5	2.3	9.8	13	2.3	1.8	3.5	4.2
Colour - True (456nm) (HU)	80	23	17	16	16	20	22	35
pH (lab) (-)	6.8	7.1		6.9	7	6.8	7.2	6.8
MAJOR IONS (mg/L)								
Carbonate	0.0	0		0	0	0	0	0
Hydroxide	0.0	0		0	0	0	0	0

Alkalinity as Calcium Carbonate	46.0	61	46	93	64	71	101
Bicarbonate	56.0	74	56	113	78	86	123
Bromide		<0.1	<0.1	0.15	0.12	0.16	0.17
Sulphate	8.7	11.7	5.4	11.7	9.9	12.6	9
Chloride	21.0	20	14	50	41	46	45
Fluoride	0.1	0.15	0.11	0.19	0.15	0.2	0.26
Calcium	14.9	17.8	11.1	22.5	17.8	19.2	23
Magnesium	3.2	4.6	2.6	7.11	5.45	6.87	8.1
Potassium	3.9	2.9	2	2.96	3.04	3.14	2.79
Sodium	13.8	15.8	10.5	28.4	25.4	28.8	30.8
MICROBIOLOGICAL							
(cfu/100 mL)							
E.coli/F Coliforms - Presumptive	8	3	3	12	43	9	110
Faecal coliforms		3	3	12	43	9	110
E.coli	8	3	3	12	26	9	110
Ent/F.Strep - Presumptive	6	1	15	4	24	22	29
Enterococci	6	1	15	4	24	22	29
Faecal Streptococci		1	15	4	24	22	29
Sulphite reducing Clostridia			340			46	100
Clostridium - presumptive			340			46	100
Clostridium perfringens			<10			0	20
Campylobacter (cfu/L)			23			4	15
Cryptosporidium – Presumptive (oocytes/10L)						<2	2
Cryptosporidium – Confirmed (oocytes/10L)			<3				<2
Giardia – Presumptive (cysts/10L)			<3			<2	<2
Giardia – Confirmed (cysts/10L)							
Bacteriophage (/10 mL)			7			12	3

Rotavirus (PDU/L)						Absent	Absent	
NUTRIENTS (mg/L)								
Nitrate + Nitrite as N	<0.005	0.008		0.028	<0.005	<0.005	0.014	0.005
Ammonia as N		0.017		0.015	0.01	0.009	0.008	0.006
TKN as Nitrogen	0.38	0.35		0.21	0.3	0.34	0.38	0.85
Nitrogen - Total	0.39	0.36		0.24	0.31	0.35	0.39	0.86
Phosphorus - Filterable Reactive as P		0.008		0.019	0.009	0.011	0.04	0.008 ^b
Phosphorus - Total	0.066	0.034		0.039	0.031	0.038	0.092	0.079
Biodegradable Dissolved Organic Carbon				0.7			1.4	4.7
Dissolved Organic Carbon		4		3	3.8	4.2	4.6	8.3
Total Organic Carbon	8.8	4.5		3.4	4.5	5.2	5.1	10.6
Silica		4		2	3	2	3	4
UV Absorbance - 254nm Filtered (cm-1)		0.135		0.096	0.117	0.143	0.191	0.296
UV Absorbance - 254 nm Unfiltered (cm-1)		0.163		0.184	0.13	0.161	0.142	0.26
METALS (mg/L)								
Aluminium - Soluble	0.025	0.026		0.04	<0.01	0.017	0.036	0.006
Aluminium - Total		0.199	2.089	1.116	0.12	0.089	0.222	0.135
Antimony - Total	<0.0005			0.0006			<0.0005	0.0008
Arsenic - Soluble		<0.001		<0.001	0.0004	<0.0003	0.0006	0.0005
Arsenic - Total	<0.001	<0.001	0.001	0.001	0.0004	0.0004	0.0009	0.0006
Barium - Total	0.0122	0.0199		0.0161	0.0273	0.0195	0.0151	0.0184
Beryllium - Total	<0.0005			<0.0005			<0.0003	<0.0003
Boron - Soluble	0.049	<0.040		<0.040	0.066	0.049	0.039	0.093
Cadmium - Total	<0.0005	<0.0005		<0.0005	<0.0001	<0.0001	<0.0001	<0.0001
Chromium - Total	14.9				0.0003		0.0008	0.0005
Cobalt - Total	<0.0005			<0.0005			0.0002	0.0002
Copper - Total	0.0014	<0.0010		0.002	<0.0001	0.0006	0.0007	0.0004
Iron - Soluble		0.065		0.07	0.042	0.0714	0.0837	0.1199
Iron - Total	0.353	0.288	2.067	0.743	0.267	0.3551	0.4638	0.7934

Lead - Total	0.0008	0.001	0.0012	<0.0001	0.0003	0.0003	0.0002
Lithium - Total	0.0014		0.0018			0.0021	0.0028
Manganese - Soluble		0.0029	0.0047	0.0448b	0.0316	0.06	0.0672
Manganese - Total	0.016	0.0181	0.0101	0.0406	0.0365	0.0677	0.0809
Mercury - Total	0.0007		<0.0003			<0.00003	0.00004
Molybdenum - Total	0.0007		0.0007			0.0006	0.0004
Nickel - Total	<0.003	0.0006	0.0007	<0.0001	0.0005	0.0007	0.0005
Selenium - Total	<0.0002		<0.003			0.0001	<0.0001
Silver - Total	<0.0005		<0.0002			<0.00003	<0.00003
Thallium - Total	<0.003		<0.0005			<0.0001	<0.0001
Vanadium - Total	0.025		<0.003			0.0014	<0.0001
Zinc - Total		0.019	0.026	<0.0003	0.0188	0.0048	0.0036
STEROLS (ng/L)							
24-ethylcholestanol			182			347	674
24-ethylcholesterol			993			2080	4860
24-ethylcoprostanol			90			143	259
24-ethylepicoprostanol			<40			<80	203
Cholestanol			92			135	198
Cholesterol			622			1000	1600
Coprostanol			49			<80	109
Epicholestanol			<40			<80	<100
Epicoprostanol			<40			<80	<100
TRIHALOMETHANE FORMATION POTENTIALS (mg/L)							
Bromoform Form Potential			<1	<1	4	<1	<1
Chloroform Form Potential			82	87	47	122	254
Dibromochloroform Form Potential			1	7	42	7	4
Dichlorobromoform Form Potential			16	39	59	43	49
Trihalomethanes Form Potential - Total			99	133	152	172	307

Footnote: ^a sample collected as part of City of Salisbury sampling regime (1st sample for season); ^b difference within experimental error of instrument

APPENDIX C – ALL TRACE ORGANIC AND PHARMACEUTICAL DATA AVAILABLE DATA FROM NMI, QHSS AND AWQC LABS

Table C.1 All data for the In-stream basin outlet (IS2), Wetland outlet (WE02) and Injectant (IW2) from the National Measurement Institute Laboratories, Pymble NSW (detects in bold).

	29.04.09 IS2	1.07.09 IS2	20.07.09 Injectant (IW2)	14.10.09 IS2	27.10.09 WE02	23.11.09 IS2	7.12.09 WE02
Poly Aromatic Hydrocarbons (ug/L)							
Naphthalene	<0.1	<0.1	<0.1	<0.01	<0.01	<0.01	<0.01
Acenaphthylene	<0.1	<0.1	<0.1	<0.01	<0.01	<0.01	<0.01
Acenaphthene	<0.1	<0.1	<0.1	<0.01	<0.01	<0.01	<0.01
Fluorene	<0.1	<0.1	<0.1	<0.01	<0.01	<0.01	<0.01
Phenanthrene	<0.1	<0.1	<0.1	<0.01	<0.01	<0.01	<0.01
Anthracene	<0.1	<0.1	<0.1	<0.01	<0.01	<0.01	<0.01
Fluoranthene	<0.1	<0.1	<0.1	<0.01	<0.01	<0.01	<0.01
Pyrene	<0.1	<0.1	<0.1	<0.01	<0.01	<0.01	<0.01
Benz(a)anthracene	<0.1	<0.1	<0.1	<0.01	<0.01	<0.01	<0.01
Chrysene	<0.1	<0.1	<0.1	<0.01	<0.01	<0.01	<0.01
Benzo(b)&(k)fluoranthene	<0.2	<0.2	<0.2	<0.02	<0.02	<0.02	<0.02
Benzo(a)pyrene	<0.1	<0.1	<0.1	<0.01	<0.01	<0.01	<0.01
Indeno(1,2,3-cd)pyrene	<0.1	<0.1	<0.1	<0.01	<0.01	<0.01	<0.01
Dibenz(ah)anthracene	<0.1	<0.1	<0.1	<0.01	<0.01	<0.01	<0.01
Benzo(ghi)perylene	<0.1	<0.1	<0.1	<0.01	<0.01	<0.01	<0.01
Organochlorine (OC) Pesticides (ug/L)							
HCB	<0.1	<0.1	<0.1	<0.01	<0.01	<0.01	<0.01
Heptachlor	<0.1	<0.1	<0.1	<0.01	<0.01	<0.01	<0.01
Heptachlor epoxide	<0.1	<0.1	<0.1	<0.01	<0.01	<0.01	<0.01
Aldrin	<0.1	<0.1	<0.1	<0.01	<0.01	<0.01	<0.01
gamma-BHC(Lindane)	<0.1	<0.1	<0.1	<0.01	<0.01	<0.01	<0.01
alpha-BHC	<0.1	<0.1	<0.1	<0.01	<0.01	<0.01	<0.01

beta-BHC	<0.1	<0.1	<0.1	<0.01	<0.01	<0.01	<0.01
delta-BHC	<0.1	<0.1	<0.1	<0.01	<0.01	<0.01	<0.01
trans-Chlordane	<0.1	<0.1	<0.1	<0.01	<0.01	<0.01	<0.01
cis-Chlordane	<0.1	<0.1	<0.1	<0.01	<0.01	<0.01	<0.01
Oxychlordane	<0.1	<0.1	<0.1	<0.01	<0.01	<0.01	<0.01
Dieldrin	<0.1	<0.1	<0.1	<0.01	<0.01	<0.01	<0.01
p,p-DDE	<0.1	<0.1	<0.1	<0.01	<0.01	<0.01	<0.01
p,p-DDD	<0.1	<0.1	<0.1	<0.01	<0.01	<0.01	<0.01
p,p-DDT	<0.1	<0.1	<0.1	<0.01	<0.01	<0.01	<0.01
Endrin	<0.1	<0.1	<0.1	<0.01	<0.01	<0.01	<0.01
Endrin aldehyde	<0.1	<0.1	<0.1	<0.01	<0.01	<0.01	<0.01
Endrin Ketone	<0.1	<0.1	<0.1	<0.01	<0.01	<0.01	<0.01
alpha-Endosulfan	<0.1	<0.1	<0.1	<0.01	<0.01	<0.01	<0.01
beta-Endosulfan	<0.1	<0.1	<0.1	<0.01	<0.01	<0.01	<0.01
Endosulfan sulfate	<0.1	<0.1	<0.1	<0.01	<0.01	<0.01	<0.01
Methoxychlor	<0.1	<0.1	<0.1	<0.01	<0.01	<0.01	<0.01
Dicofol	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenols (ug/L)							
Phenol	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2-Chlorophenol	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2-Methylphenol	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2,4-Dichlorophenol	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
3- & 4-Methylphenols	<0.2	<0.2	<0.2	<0.2	<0.2	0.44	<0.2
2,4-Dimethylphenol	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2,6-Dichlorophenol	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2-Nitrophenol	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4-Chloro-3-methylphenol	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
2,4,6-Trichlorophenol	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
4-Nitrophenol	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2,4,5-Trichlorophenol	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
2,3,4,6-Tetrachlorophenol	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Pentachlorophenol	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2

Phenoxy acid herbicides (ug/L)							
Dicamba	<1	<1	<1	<1	<1	<1	<1
MCPA	<1	<1	<1	<1	<1	<1	<1
Dichlorprop	<1	<1	<1	<1	<1	<1	<1
2, 4-D	<1	<1	<1	<1	<1	<1	<1
2, 4, 5-T	<1	<1	<1	<1	<1	<1	<1
2, 4, 5 - TP	<1	<1	<1	<1	<1	<1	<1
2, 4 - DB	<1	<1	<1	<1	<1	<1	<1
MCPP	<1	<1	<1	<1	<1	<1	<1
Triclopyr	<1	<1	<1	<1	<1	<1	<1
Organophosphate (OP) Pesticides							
Demeton-S-methyl	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dichlorvos	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyrifos	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyrifos methyl	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fenthion	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorfenvinphos (E)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorfenvinphos (Z)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion (ethyl)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion methyl	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pirimiphos methyl	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pirimiphos ethyl	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Azinphos methyl	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Azinphos ethyl	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos ethyl	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Carbophenothion	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Coumaphos	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

Dioxathion	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fenamiphos	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fenchlorphos	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Formothion	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Methacrifos	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Methidathion	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Mevinphos	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phorate	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phosalone	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Profenophos	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Prothiofos	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Thiometon	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Triazophos	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
<hr/>							
Fungicides (ug/L)							
Bupirimate	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorothalonil	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cyprodinil	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dichlofluanid	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dicloran	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Difenoconazole	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethomorph	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Diphenylamine	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fenarimol	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Flusilazole	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Hexaconazole	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Imazalil	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Iprodione	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Metalaxyl	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Penconazole	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Prochloraz	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Procymidone	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Propiconazole I	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

Propiconazole II	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrimethanil	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tebuconazole	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Vinclozolin	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
o-Phenylphenol	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Herbicides (ug/L)							
Atrazine	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Diuron	<0.1	<0.1	<0.1	<0.1	<0.1	0.41	<0.1
Hexazinone	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Linuron	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Metolachlor	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Molinate	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Oxyfluorfen	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pendimethalin	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Simazine	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Trifluralin	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Miscellaneous (ug/L)							
Buprofezin	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Methoprene	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Piperonyl Butoxide	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Propargite	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tebufenpyrad	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tetradifon	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Monocyclic Aromatic Hydrocarbons NMI 1120 Screen (ug/L)							
Benzene	<1	<1	<1	<1	<1	<1	<1
Toluene	<1	<1	<1	<1	<1	<1	<1
Ethylbenzene	<1	<1	<1	<1	<1	<1	<1
m & p-Xylenes	<2	<2	<2	<2	<2	<2	<2
o-Xylene	<1	<1	<1	<1	<1	<1	<1
Styrene	<1	<1	<1	<1	<1	<1	<1
Isopropylbenzene	<1	<1	<1	<1	<1	<1	<1
n-Propylbenzene	<1	<1	<1	<1	<1	<1	<1

1,3,5-Trimethylbenzene	<1	<1	<1	<1	<1	<1	<1
tert-Butylbenzene	<1	<1	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene	<1	<1	<1	<1	<1	<1	<1
sec-Butylbenzene	<1	<1	<1	<1	<1	<1	<1
4-Isopropyltoluene	<1	<1	<1	<1	<1	<1	<1
n-Butylbenzene	<1	<1	<1	<1	<1	<1	<1
Halogenated Aliphatics Hydrocarbons NMI 1120 Screen (ug/L)							
Chloromethane	<5	<5	<5	<5	<1	<5	<5
Vinyl chloride	<2	<2	<2	<2	<1	<2	<2
Bromomethane	<5	<5	<5	<5	<1	<5	<5
Chloroethane	<5	<5	<5	<5	<1	<5	<5
Trichlorofluoromethane	<5	<5	<5	<5	<1	<5	<5
1,1-Dichloroethane	<1	<1	<1	<1	<1	<1	<1
Dichloromethane	<1	<1	<1	<1	<1	<1	<1
trans-1,2-Dichloroethene	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethene	<1	<1	<1	<1	<1	<1	<1
2,2-Dichloropropane	<1	<1	<1	<1	<1	<1	<1
cis-1,2-Dichloroethene	<1	<1	<1	<1	<1	<1	<1
Bromochloromethane	<1	<1	<1	<1	<1	<1	<1
1,1,1-Trichloroethane	<1	<1	<1	<1	<1	<1	<1
Carbon tetrachloride	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloropropene	<1	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	<1	<1	<1	<1	<1	<1	<1
Trichloroethene	<1	<1	<1	<1	<1	<1	<1
1,2-Dichloropropane	<1	<1	<1	<1	<1	<1	<1
Dibromomethane	<1	<1	<1	<1	<1	<1	<1
cis-1,3-Dichloropropene	<1	<1	<1	<1	<1	<1	<1
trans-1,3-Dichloropropene	<1	<1	<1	<1	<1	<1	<1
1,1,2-Trichloroethane	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene	<1	<1	<1	<1	<1	<1	<1
1,3-Dichloropropane	<1	<1	<1	<1	<1	<1	<1
1,2-Dibromoethane	<1	<1	<1	<1	<1	<1	<1

1,1,1,2-Tetrachloroethane	<1	<1	<1	<1	<1	<1	<1
1,1,2,2-Tetrachloroethane	<1	<1	<1	<1	<1	<1	<1
1,2,3-Trichloropropane	<1	<1	<1	<1	<1	<1	<1
1,2-Dibromo-3-chloropropane	<1	<1	<1	<1	<1	<1	<1
Hexachlorobutadiene	<1	<1	<1	<1	<1	<1	<1
Halogenated Aromatics Hydrocarbons NMI 1120 Screen (ug/l)							
Chlorobenzene	<1	<1	<1	<1	<1	<1	<1
Bromobenzene	<1	<1	<1	<1	<1	<1	<1
2-Chlorotoluene	<1	<1	<1	<1	<1	<1	<1
4-Chlorotoluene	<1	<1	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	<1	<1	<1	<1	<1	<1	<1
1,4-Dichlorobenzene	<1	<1	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	<1	<1	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	<1	<1	<1	<1	<1	<1	<1
1,2,3-Trichlorobenzene	<1	<1	<1	<1	<1	<1	<1
Trihalomethanes NMI 1120 Screen (ug/L)							
Chloroform	<1	<1	<1	3.9	<1	<1	<1
Bromodichloromethane	<1	<1	<1	2.5	<1	<1	<1
Dibromochloromethane	<1	<1	<1	1.2	<1	<1	<1
Bromoform	<1	<1	<1	<1	<1	<1	<1
Polycyclic Aromatic Hydrocarbons(volatile) NMI 1120 Screen (ug/L)							
Naphthalene	<1	<1	<1	<1	<1	<1	<1
Poly Aromatic Hydrocarbons NMI 1122 Screen (ug/L)							
Acenaphthylene	<10	<10	<10	<10	<10	<10	<10
Naphthalene	<10	<10	<10	<10	<10	<10	<10
Acenaphthene	<10	<10	<10	<10	<10	<10	<10
Fluorene	<10	<10	<10	<10	<10	<10	<10
Phenanthrene	<10	<10	<10	<10	<10	<10	<10
Anthracene	<10	<10	<10	<10	<10	<10	<10
Fluoranthene	<10	<10	<10	<10	<10	<10	<10
Pyrene	<10	<10	<10	<10	<10	<10	<10
Benz(a)anthracene	<10	<10	<10	<10	<10	<10	<10

Chrysene	<10	<10	<10	<10	<10	<10	<10
Benzo(b,k)fluoranthene	<20	<20	<20	<20	<20	<20	<20
Benzo(a)pyrene	<10	<10	<10	<10	<10	<10	<10
Indeno(1,2,3-cd)pyrene	<10	<10	<10	<10	<10	<10	<10
Dibenz(a,h)anthracene	<10	<10	<10	<10	<10	<10	<10
Benzo(g,h,i)perylene	<10	<10	<10	<10	<10	<10	<10
Phenols NMI 1122 Screen (ug/L)							
Phenol	<10	<10	<10	<10	<10	<10	<10
2-Chlorophenol	<10	<10	<10	<10	<10	<10	<10
2-Methylphenol	<10	<10	<10	<10	<10	<10	<10
3&4-Methylphenol	<20	<20	<20	<20	<20	<20	<20
2-Nitrophenol	<10	<10	<10	<10	<10	<10	<10
2,4-Dimethylphenol	<10	<10	<10	<10	<10	<10	<10
2,4-Dichlorophenol	<10	<10	<10	<10	<10	<10	<10
2,6-Dichlorophenol	<10	<10	<10	<10	<10	<10	<10
4-Chloro-3-methylphenol	<20	<20	<20	<20	<20	<20	<20
2,4,5-Trichlorophenol	<20	<20	<20	<20	<20	<20	<20
2,4,6-Trichlorophenol	<20	<20	<20	<20	<20	<20	<20
2,3,4,6-Tetrachlorophenol	<20	<20	<20	<20	<20	<20	<20
Pentachlorophenol	<20	<20	<20	<20	<20	<20	<20
Oxygenated Compounds NMI 1120 Screen (ug/L)							
Acetone	<10	<10	<10	<10	<10	<10	<10
Vinylacetate	<10	<10	<10	<10	<10	<10	<10
2-Butanone (MEK)	<10	<10	<10	<10	<10	<10	<10
4-Methyl-2-pentanone (MIBK)	<10	<10	<10	<10	<10	<10	<10
2-Hexanone (MBK)	<10	<10	<10	<10	<10	<10	<10
Methyl tert-Butyl Ether (MTBE)	<10	<10	<10	<10	<10	<10	<10
Sulfonated Compounds NMI 1120 Screen (ug/L)							
Carbon disulfide	<10	<10	<10	<10	<10	<10	<10
Phthalates NMI 1122 Screen (ug/L)							
Dimethyl phthalate	<10	<10	<10	<10	<10	<10	<10
Diethyl phthalate	<10	<10	<10	<10	<10	<10	<10

Di-n-butyl phthalate	<10	<10	<10	<10	<10	<10	<10
Butyl benzyl phthalate	<10	<10	<10	<10	<10	<10	<10
Bis(2-ethylhexyl) phthalate	<20	<20	<20	<20	<20	<20	<20
Di-n-octyl phthalate	<10	<10	<10	<10	<10	<10	<10
Chlorinated Hydrocarbons NMI 1122 Screen (ug/L)							
2-Chloronaphthalene	<20	<20	<20	<20	<20	<20	<20
1,4-Dichlorobenzene	<20	<20	<20	<20	<20	<20	<20
1,2-Dichlorobenzene	<20	<20	<20	<20	<20	<20	<20
1,3-Dichlorobenzene	<20	<20	<20	<20	<20	<20	<20
Hexachlorobenzene	<20	<20	<20	<20	<20	<20	<20
1,2,4-Trichlorobenzene	<20	<20	<20	<20	<20	<20	<20
Hexachloroethane	<20	<20	<20	<20	<20	<20	<20
Hexachlorocyclopentadiene	<20	<20	<20	<20	<20	<20	<20
Hexachloro-1,3-butadiene	<20	<20	<20	<20	<20	<20	<20
Ethers NMI 1122 Screen (ug/l)							
4-Bromophenyl phenyl ether	<20	<20	<20	<20	<20	<20	<20
4-Chlorophenyl phenyl ether	<20	<20	<20	<20	<20	<20	<20
Bis(2-chloroethyl)ether	<20	<20	<20	<20	<20	<20	<20
Bis(2-chloroethoxy)methane	<20	<20	<20	<20	<20	<20	<20
Bis(2-chloroisopropyl)ether	<20	<20	<20	<20	<20	<20	<20
Amines Nitroaromatics & Nitrosamines NMI 1122 Screen (ug/L)							
Azobenzene	<20	<20	<20	<20	<20	<20	<20
2,4-Dinitrotoluene	<20	<20	<20	<20	<20	<20	<20
2,6-Dinitrotoluene	<20	<20	<20	<20	<20	<20	<20
Nitrobenzene	<20	<20	<20	<20	<20	<20	<20
N-Nitrosodimethylamine	<20	<20	<20	<20	<20	<20	<20
N-Nitrosodiphenylamine	<20	<20	<20	<20	<20	<20	<20
N-Nitrosodi-n-propylamine	<20	<20	<20	<20	<20	<20	<20
Aniline	<20	<20	<20	<20	<20	<20	<20
4-Chloroaniline	<20	<20	<20	<20	<20	<20	<20
2-Nitroaniline	<20	<20	<20	<20	<20	<20	<20
3-Nitroaniline	<20	<20	<20	<20	<20	<20	<20

4-Nitroaniline	<20	<20	<20	<20	<20	<20	<20
Organochlorine Pesticides NMI 1122 Screen (ug/L)							
Aldrin	<20	<20	<20	<20	<20	<20	<20
a-BHC	<20	<20	<20	<20	<20	<20	<20
b-BHC	<20	<20	<20	<20	<20	<20	<20
g-BHC (Lindane)	<20	<20	<20	<20	<20	<20	<20
d-BHC	<20	<20	<20	<20	<20	<20	<20
4,4,'-DDD	<20	<20	<20	<20	<20	<20	<20
4,4,'-DDE	<20	<20	<20	<20	<20	<20	<20
4,4,'-DDT	<20	<20	<20	<20	<20	<20	<20
Dieldrin	<20	<20	<20	<20	<20	<20	<20
Endosulphan I	<20	<20	<20	<20	<20	<20	<20
Endosulphan II	<20	<20	<20	<20	<20	<20	<20
Endosulfan sulphate	<20	<20	<20	<20	<20	<20	<20
Endrin	<20	<20	<20	<20	<20	<20	<20
Endrin Aldehyde	<20	<20	<20	<20	<20	<20	<20
Heptachlor	<20	<20	<20	<20	<20	<20	<20
Heptachlorepoxyde	<20	<20	<20	<20	<20	<20	<20
Organophosphate Pesticides NMI 1122 Screen (ug/L)							
Dimethoate	<20	<20	<20	<20	<20	<20	<20
Diazinon	<20	<20	<20	<20	<20	<20	<20
Fenitrothion	<20	<20	<20	<20	<20	<20	<20
Malathion	<20	<20	<20	<20	<20	<20	<20
Chlorpyrifos	<20	<20	<20	<20	<20	<20	<20
Ethion	<20	<20	<20	<20	<20	<20	<20
Surrogate							
Surrogate semivolatile Rec. (%)	117	80	80	116	83	53	72
Surrogate volatile Rec (%)	96	112	112	111	85	118	89
Others							
Dichlorobenzidine	<20	<20	<20	<20	<20	<20	<20
2-Methylnaphthalene	<20	<10	<10	<10	<10	<10	<10
Isophorone	<20	<20	<20	<20	<20	<20	<20

Benzyl alcohol	<20	<20	<20	<20	<20	<20	<20
Carbazole	<20	<20	<20	<20	<20	<20	<20
Dibenzofuran	<20	<20	<20	<20	<20	<20	<20
Miscellaneous							
Detergent as MBAS (mg/L)	0.25	0.09	0.05			0.24	0.1

Table C.2 All data for the In-stream basin outlet (IS2), Wetland outlet (WE02) and Injectant (IW2) from the Queensland Health Scientific Services Laboratories, Coopers Plains, QLD (detects in bold).

	29.04.09	1.07.09	20.07.09	14.10.09	27.10.09	23.11.09	8.12.09	23.11.09	
	IS2	IS2	Injectant IW2	IS2	WE02	IS2	WE02	Blank Milli Q H2O	
LOR									
NITROSAMINES (ng/L)									
NDMA [‡]	5	<5	<5	<5	<5	<5	<5	<5	
NDEA	10	<10	<10	<10	<10	<10	<10	<10	
Nitroso-piperidine	20	<10	NA	NA	<10	<20	NA	<20	
Nitroso-pyrrolidine	10	<20	<10	<10	<20	NA	<20	<10	
NDBA	20	<20	<20	<20	<20	<20	<20	<20	
Nitroso-morpholine (NMOR)	10		<20	<20	<10	NA	NA	NA	
%surrogate recovery (Deuterated NDMA)		80	76	86	52	78	70 16	79.2 16	
PHARMACEUTICALS (µg/L)									
Acesulfame	0.01						0.19	0.14	<0.01
Acetylsalicylic acid	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Atenolol	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Atorvastatin	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Caffeine	0.01	0.27	0.87	0.05	0.43	0.3	0.62	0.12	0.07
Carbamazepine	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cephalexin	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chloramphenicol	0.1	<0.10	<0.10	<0.10	<0.1	<0.1	<0.1	<0.1	<0.1
Chlortetracycline	0.1	<0.10	<0.10	<0.10	<0.1	<0.1	<0.1	<0.1	<0.1
Ciprofloxacin	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Citalopram	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Codeine	0.1	<0.10	<0.10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

Cyclophosphamide	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dapsone	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
DEET	0.01	0.06	0.05	0.03	0.06	0.03	0.33	0.12	<0.01
Desmethyl Citalopram	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Desmethyl Diazepam	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Diazepam	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Diclofenac	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Doxylamine	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Enrofloxacin	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Erythromycin	0.01	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Erythromycin anhydrate	0.01				<0.01	<0.01	<0.01	<0.01	<0.01
Fluoxetine	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fluvastatin	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fruzemide	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Gabapentin	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Gemfibrozol	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Hydrochlorthiazide	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Ibuprofen	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Ifosfamide	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Indomethacin	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Iopromide	0.2	<0.20	<0.20	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Lincomycin	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Metoprolol	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Naproxen	0.1	<0.10	<0.10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Norfloxacin	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Oxazepam	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Oxycodone	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Oxytetracycline	0.1	<0.10	<0.10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Paracetamol	0.01	0.06	0.08	<0.01	0.11	<0.01	0.31	<0.01	0.02
Phenytoin	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Praziquantel	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Primidone	0.01				<0.01	<0.01	<0.01	<0.01	<0.01
Propranolol	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Ranitidine	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Roxithromycin	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Salicylic acid	0.01	<0.01	0.02	<0.01	0.04	<0.01	<0.01	<0.01	<0.01
Sertraline	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Simvastatin	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Sulfasalazine	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Sulphadiazine	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Sulphamethoxazole	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Sulphathiazole	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Temazepam	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Tetracycline	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Tramadol	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Triclosan	0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01
Trimethoprim	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Tylosin	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Phenoxyacid Herbicides (µg/L)									
Venlafaxine	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Warfarin	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dicamba	0.01	0.18	0.15	0.06	0.26	0.07	<0.01	0.35	<0.01
Mecoprop	0.01	<0.01	<0.01	<0.01	0.04	0.02	0.02	0.01	<0.01
MCPA	0.01	0.04	0.22	0.04	1.24	0.2	0.48	0.14	<0.01
2,4-DP	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
2,4-D	0.01	<0.01	<0.01	<0.01	0.05	0.01	0.03	0.01	0.01
Triclopyr	0.01	0.02	0.02	0.01	0.07	0.03	0.02	<0.01	<0.01
MCPB	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fluroxypyr	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
2,4-DB	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Herbicides (µg/L)									
Picloram	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dalapon	0.01	0.03	0.03	<0.01	<0.01	<0.01	0.02	<0.01	0.02
Ametryn	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Atrazine	0.01	<0.01	<0.01	<0.01	0.43	0.19	0.13	0.04	<0.01

Bromacil	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Carbaryl	0.01					<0.01	<0.01		
Desethyl Atrazine	0.01	0.06	0.01	<0.01	0.05	0.02	0.04	0.02	<0.01
Desisopropyl Atrazine	0.01	0.02	0.02	<0.01	0.02	0.02	0.05	<0.01	<0.01
Diazinon	0.02					<0.02	<0.02		
Diuron	0.01	0.12	0.17	0.1	0.25	0.21	0.39	0.14	<0.01
3,4 Dichloroaniline	0.01				<0.01	<0.01	<0.01	<0.01	<0.01
Fluometuron	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Hexazinone	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Metolachlor	0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Prometryn	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Propoxur	0.01					<0.01	<0.01		
Simazine	0.01	0.03	0.16	0.11	0.11	0.12	0.12	0.03	<0.01
Tebuthiuron	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Terbutryn	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01
Haloxfop (acid)	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Haloxfop-2-etotyl	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Haloxfop-methyl	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total Haloxfop	0.03		<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03

Table C.3 All data for the Wetland outlet (WE02) sample collected by the City of Salisbury 5/5/09 and submitted to the Australian Water Quality Centre, Adelaide SA (detects in bold).

		5/05/2009 WE02
Pesticides		
aldrin	ug/L	<0.01
atrazine	ug/L	1
azinphos-methyl	ug/L	<0.5
chlordane- a	ug/L	<0.01
chlordane -g	ug/L	<0.01
chlorpyrifos	ug/L	<0.05
Chlorsulfuron	ug/L	<0.5
chlorthalontil	ug/L	<0.05
Chlorthal-Dimethyl (Dacthal)	ug/L	<0.05
2,4-D	ug/L	<0.05
4,4-DDT	ug/L	<0.05
DDE	ug/L	<0.05
diazinon	ug/L	<0.05
Dicamba	ug/L	<0.05
dieldrin	ug/L	<0.01
Endrin	ug/L	
endosulfan 1	ug/L	<0.05
endosulfan 2	ug/L	<0.05
Endosulfan Sulphate	ug/L	<0.05
fenitrothion	ug/L	<0.05
heptachlor	ug/L	<0.05
heptachlor Epoxide	ug/L	<0.05
hexazinone	ug/L	<0.5
lindane	ug/L	<0.05
malathion	ug/L	<0.5
methoxychlor	ug/L	<0.05
parathion	ug/L	<0.5
parathion-methyl	ug/L	<0.3
prometryne	ug/L	<0.5
simazine	ug/L	<0.5
trifluralin	ug/L	<0.05
vinclozolin	ug/L	<0.05
Other		
Acenaphthene	ug/L	<0.5
Acenaphthylene	ug/L	<0.5
Anthracene	ug/L	<0.5
benzo (bk) fluoranthene	ug/L	<1
benzo (a) anthracene	ug/L	<0.5
benzo (a) pyrene	ug/L	<0.5
benzo (g-h-i) perylene	ug/L	<0.5
Chrysene	ug/L	<0.5
Dibenzo (a-h) anthracene	ug/L	<0.5
Fluoranthene	ug/L	<0.5
Fluorene	ug/L	<0.5
Indeno(123-cd) pyrene	ug/L	<0.5
naphthalene	ug/L	<0.5
phenanthrene	ug/L	<0.5
Pyrene	ug/L	<0.5

benzene	ug/L	<1
toluene	ug/L	<1
ethylbenzene	ug/L	<1
O-Xylene	ug/L	<1
M,P-Xylene	ug/L	<1
bromoform	ug/L	<1
bromodichloromethane	ug/L	
Dibromochloromethane	ug/L	<1
Dibromochloroform	ug/L	<1
xylene	ug/L	
chlorine	ug/L	
chloroform	ug/L	<1
Dicamba	ug/L	
phenol	ug/L	<0.01
polyaromatic hydrocarbons	ug/L	
trihalomethanes	ug/L	<4
total petroleum hydrocarbons	ug/L	
Hydrocarbons CO6-CO9	ug/L	<0.040
Hydrocarbons C10-C14	ug/L	<0.1
Hydrocarbons C15-C28	ug/L	<0.2
Hydrocarbons C29-C36	ug/L	<0.2
MCPA	ug/L	<0.5
Metsulfuron Methyl	ug/L	<0.5
Picloram	ug/L	<0.5
Silvex	ug/L	<0.5
Sulfometuron	ug/L	<0.5
Triclopyr	ug/L	<0.5



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