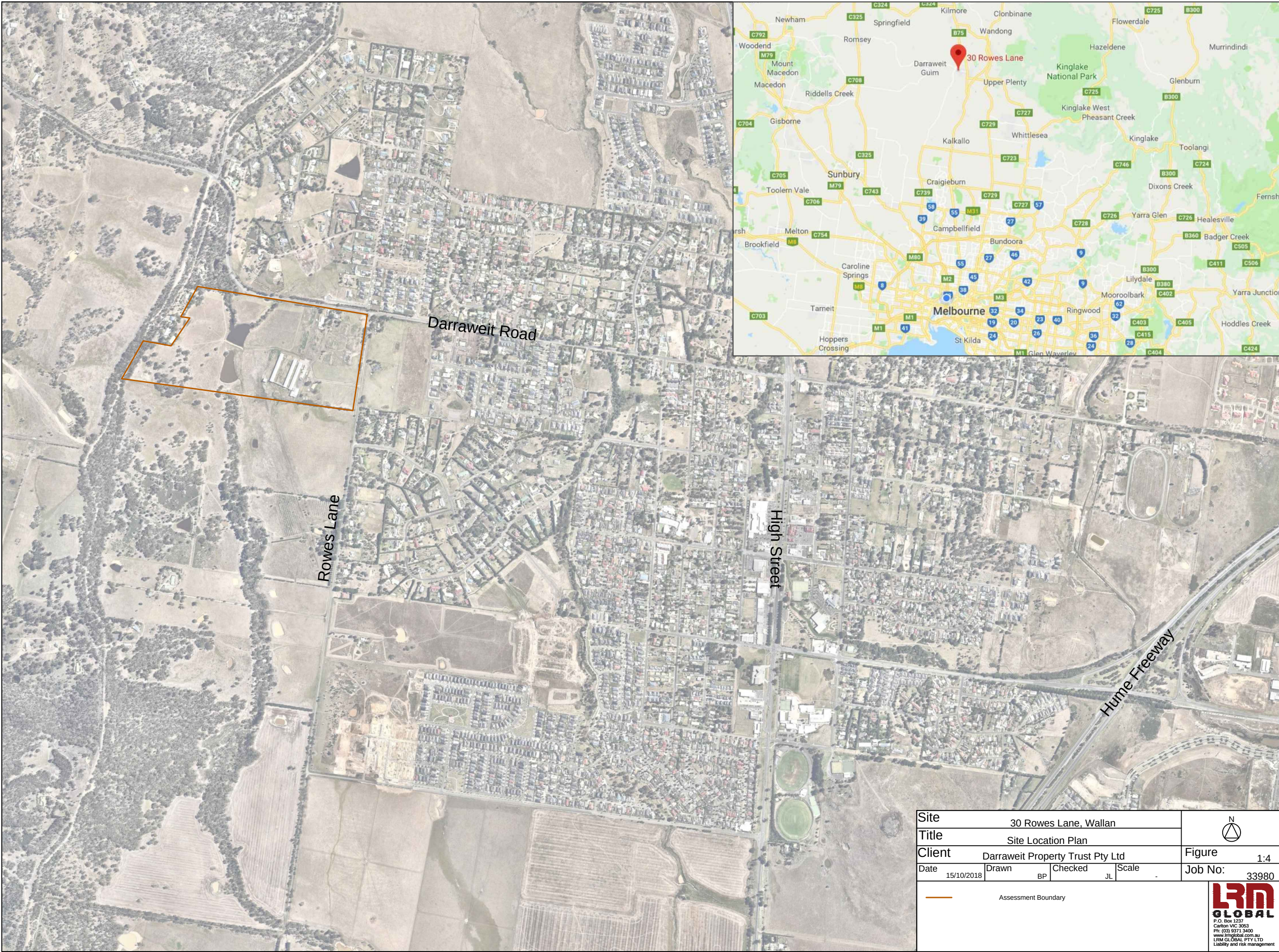


APPENDIX A

FIGURES

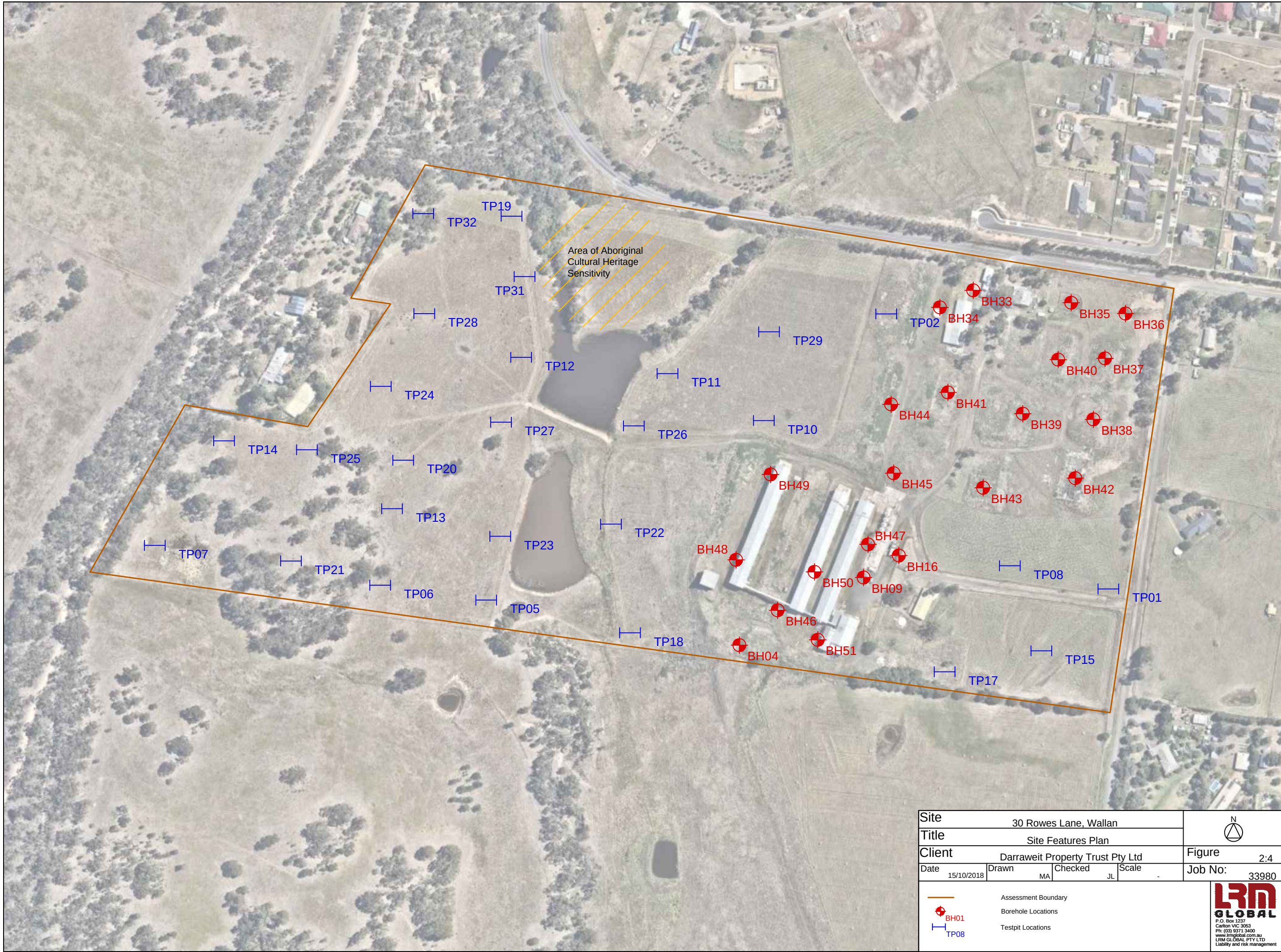


Site		30 Rows Lane, Wallan			
Title		Site Location Plan			
Client		Darraweit Property Trust Pty Ltd			Figure
Date	15/10/2018	Drawn	BP	Checked	JL
Scale	-				Job No:
					33980

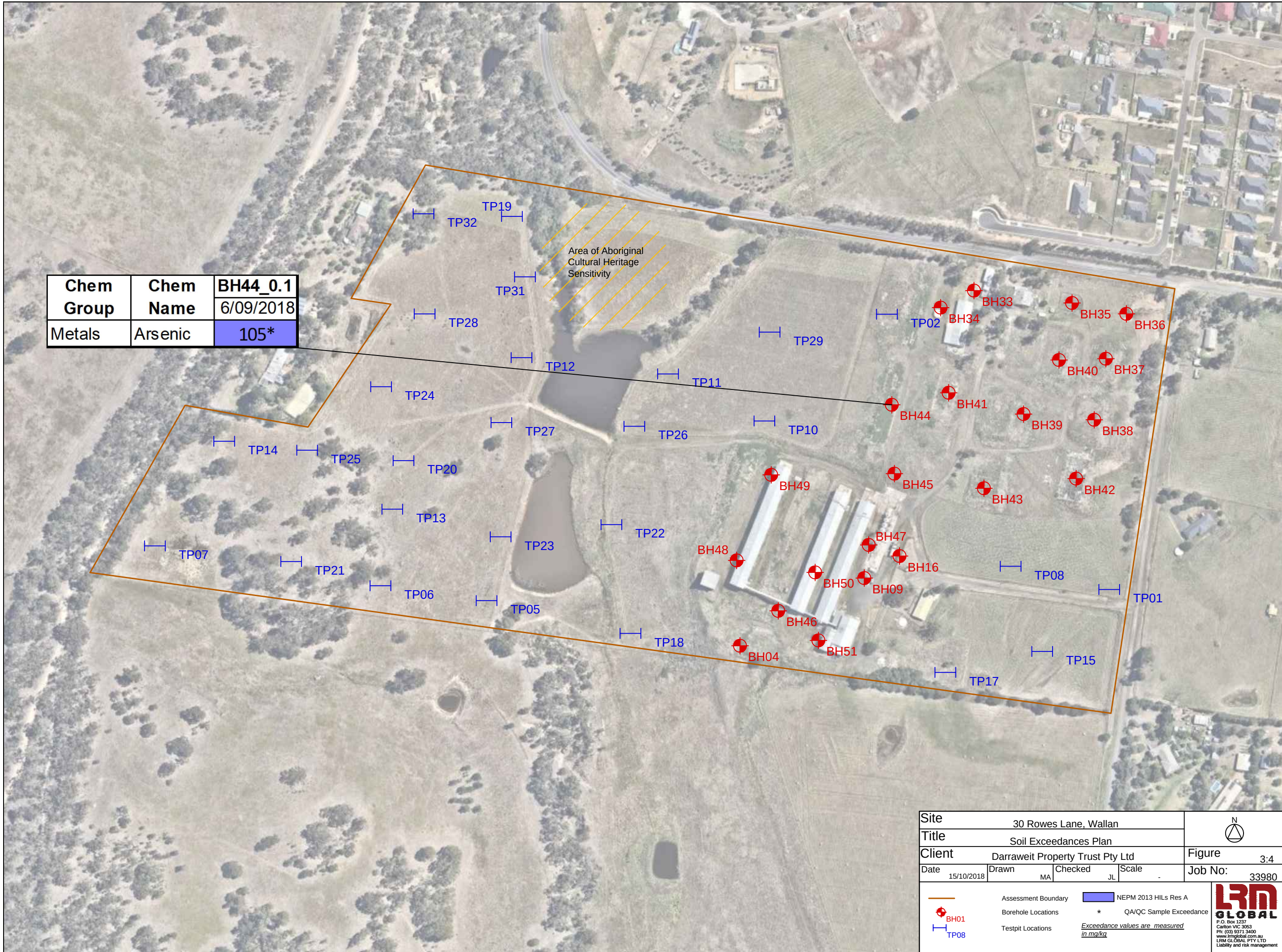
 Assessment Boundary

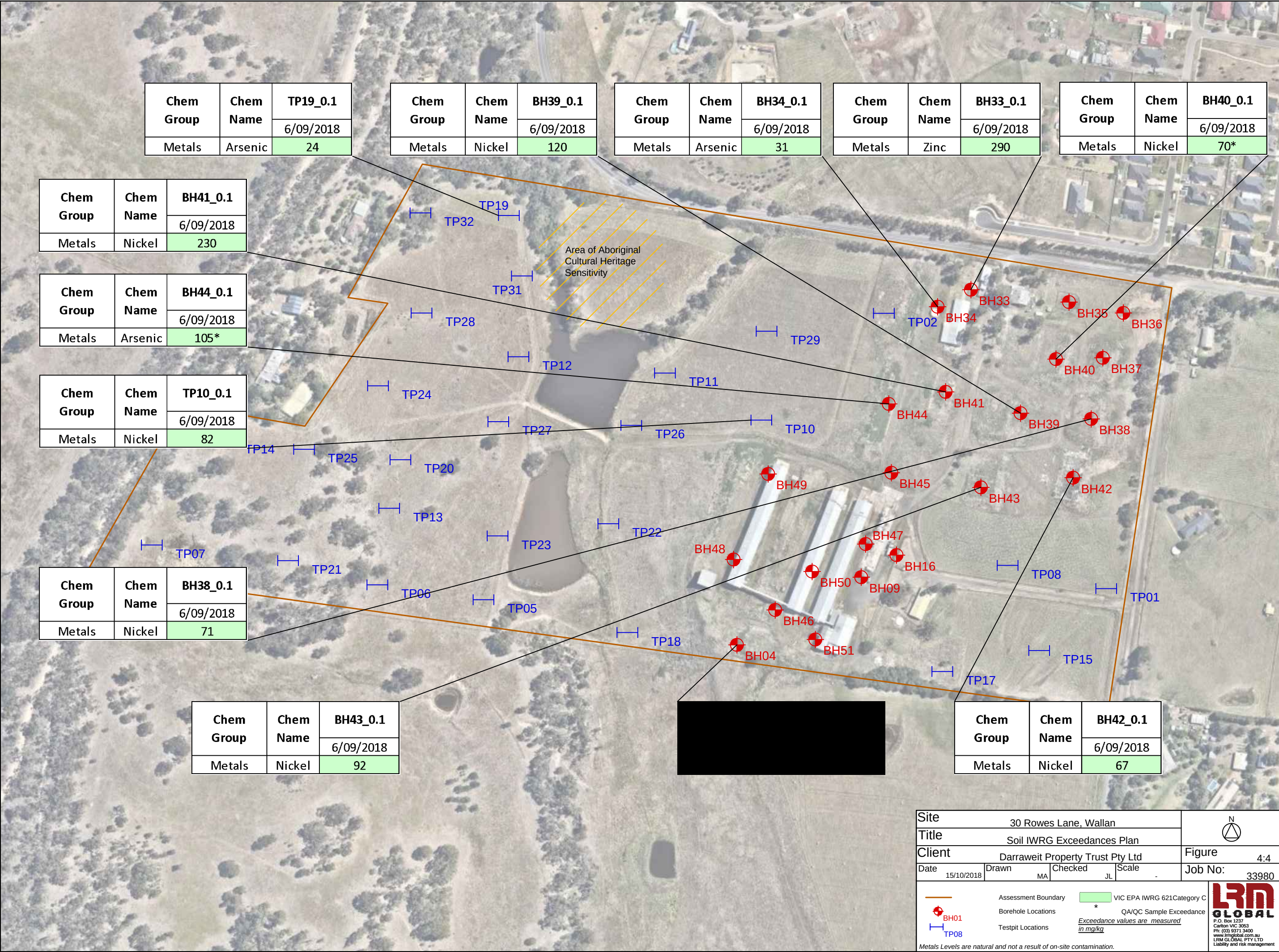


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www.lrmglobal.com.au
LRM GLOBAL PTY LTD
Liability and risk management



Chem Group	Chem Name	BH44_0.1
		6/09/2018
Metals	Arsenic	105*







APPENDIX B

SOIL SAMPLING PROCEDURES

Planning

Prior to soil sampling at a site, detailed planning is undertaken to review relevant site documentation, environmental standards, regulations and policies, as well as consultation with project stockholders directly interested or involved in the soil sampling works.

The planning phase of soil sampling works, details to the field scientist the proposed excavation method, the likely number and location of soil samples to be collected, the required analysis of the soil samples, the volume of soil samples to be collected and the appropriate sampling containers required.

Excavation is carried out with consideration to the following;

- Depth of assessment required;
- Likely encountered geology, including fill and natural material;
- Ease of access;
- Acceptable site disturbance; and
- Required analysis.

The volumes of soil samples collected and the sample containers used are determined, in consultation with the elected NATA accredited laboratory and vary based on the intended analysis required for soil samples at the project site.

Cleaning Procedures

All sampling equipment is thoroughly cleaned before use and between the collection of soil samples to minimise the risk of cross contamination. This included all hand augers, trowels, scoops etc. and any other applicable equipment that was used. The cleaning procedure for all sampling equipment involved:

- Removal of all soil adhering to the sampling equipment with the use of a brush and washing in tap water;
- Wash the sampling equipment in a bucket with DECON 90 solution (or similar phosphate-free laboratory detergent);
- Rinse the sampling equipment in a second bucket with tap water; and
- Rinse the sampling equipment in a third bucket with de-ionised water.

As part of quality assurance and control of the sampling process, a 'Rinsate Blank' sample is taken using de-ionised water off the sampling equipment after the cleaning procedure has been completed. This 'Rinsate Blank' sample is analysed and the results used to indicate the effectiveness and integrity of the cleaning procedure.

Sample Collection

The field scientist wore new, clean, nitrile gloves when handling all soil samples and cleaning soil sampling equipment. Soil samples were collected from consolidated material and placed into pre-washed glass jars with tight fitting screw top lids provided by the laboratory to prevent the loss of volatile contaminants.

Each sample jar was labelled with the following information:

- LRM Global Job Number;
- Project Name;
- Date of Sampling; and
- Sample Name/Number (including depth of sample), all samples were given a unique name/number.

As per Australian Standards AS 4482.2 1999, using the zero headspace procedures, care is taken to disturb the soil as little as possible before being placed into the single-use jars and the sample 'exactly fits,' giving zero headspace.

A duplicate of all soil samples is collected in a PID bag, where screening of the head space with the PID to detect volatile organic compounds in soil gases is undertaken. The PID is 'zeroed' and then calibrated using a 100 ppm standard gas solution of Isobutylene as field works initiate and annually as specified by the manufacturer calibrated and serviced by an appropriately qualified technician.

Sample Transportation and Documentation

Chain-of-custody documentation is completed for all soil samples collected at the project site. The COC includes the information listed above and the chemical analyses required for each sample.

All samples were cooled upon collection prior to analysis. This includes transportation and on-site storage. Samples were stored on-site and during transport in a laboratory chiller box with adequate ice bricks. Samples were transported by the field scientist who also completed the chain-of-custody documentation upon delivery to the receiving NATA accredited laboratories.

The COC, as per AS44821.1 2005, included the following information:

- Names and details of:
 - o Person transferring samples.
 - o Receiving Laboratory.
 - o Client.
- Time and date of;
 - o Samples being collected.
 - o Samples received by the laboratory.
- Analysis required and turn-around-time.
- Samples with expected high contaminant levels.

APPENDIX C

***ANALYTICAL RESULTS TABLES,
LABORATORY REPORTS, COCS***

				Field ID	BH04_0.1	BH09_0.1	BH16_0.1	BH33_0.1	BH34_0.1	BH35_0.1	BH36_0.1	BH37_0.1	BH38_0.1	BH39_0.1	BH40_0.1	Dup01	Split01	BH41_0.1	BH42_0.1	BH43_0.1	BH44_0.1	Dup02	Split02	BH45_0.1	BH46_0.1	BH47_0.1	Dup03	Split03	BH48_0.1	BH49_0.1	BH50_0.1	BH51_0.1	TP01_0.1			
				Sampled Date	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018			
				LocCode	BH04	BH09	BH16	BH33	BH34	BH35	BH36	BH37	BH38	BH39	BH40	BH40_0.1	Split01	BH41	BH42	BH43	BH44	BH44_0.1	Split02	BH45	BH46	BH47	BH47_0.1	Split03	BH48	BH49	BH50	BH51	TP01			
				NEPM 2013 Table 1A(1) HILs Res A Soil	NEPM 2013 Table 1A(3)				NEPM 2013 Table 1A(3)																											
				EQI	0-1m	1-2m	2-4m	>4m	0-1m	1-2m	2-4m	>4m																								
Chem_Group	ChemName	Units																																		
	Benzo(a)pyrene TEQ (LOR)	mg/kg																																		
	DCPA (Chlorthal) Diacid	mg/kg	0.5																																	
	Benzo(a)pyrene TEQ calc (Half)	mg/kg																																		
	Benzo(a)pyrene TEQ calc (Zero)	mg/kg																																		
		mg/kg																																		
Misc Inorg - soil NEPM	Organic Nitrogen as N	mg/kg	10																						2600	1600			1100	700	6100					
OCP	Organochlorine pesticides EPAVic	mg/kg																																		
	Other organochlorine pesticides EPAVic	mg/kg																																		
Phenols	Phenols (non-halogenated) EPAVic	mg/kg																																		
	Phenols(halogenated) EPAVic	mg/kg																																		
Phenoxy Acid Herbicides in Soil	2,6-D	mg/kg	0.5																																	
		mg/kg																																		
BTEX	Benzene	mg/kg	0.2		4	6	9	20	0.7	1	2	3																								
	Ethylbenzene	mg/kg	0.5		Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹						
	Toluene	mg/kg	0.5		Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹					
	Xylene (m & p)	mg/kg	1																																	
	Xylene (o)	mg/kg	0.5																																	
	Xylene Total	mg/kg	1																																	
		mg/kg			Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	110	310	310	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹					
		mg/kg	25		310 ⁴²	480 ⁴²	Nt ⁴¹	Nt ⁴¹	Nt ⁴¹	50 ⁴²	90 ⁴²	150 ⁴²	290 ⁴²																							
	Chlorinated Hydrocarbons	1,1,1,2-tetrachloroethane	mg/kg	0.5																																
		1,1,1-trichloroethane	mg/kg	0.5																																
1,1,2,2-tetrachloroethane		mg/kg	0.5																																	
1,1,2-trichloroethane		mg/kg	0.5																																	
1,1-dichloroethane		mg/kg	0.5																																	
1,1-dichloroethene		mg/kg	0.5																																	
1,1-dichloropropene		mg/kg	0.5																																	
1,2,3-trichloropropane		mg/kg	0.5																																	
1,2-dibromo-3-chloropropane		mg/kg	0.5																																	
1,2-dichloroethane		mg/kg	0.5																																	
1,2-dichloropropane		mg/kg	0.5																																	
1,3-dichloropropane		mg/kg	0.5																																	
2,2-dichloropropane		mg/kg	0.5																																	
Bromochloromethane		mg/kg	0.5																																	
Bromodichloromethane		mg/kg	0.5																																	
Bromoform		mg/kg	0.5																																	
Carbon tetrachloride		mg/kg	0.5																																	
Chlorodibromomethane		mg/kg	0.5																																	
Chloroethane		mg/kg	1																																	
Chloroform		mg/kg	0.5																																	
Chloromethane		mg/kg	1																																	
cis-1,2-dichloroethene		mg/kg	0.5																																	
cis-1,3-dichloropropene		mg/kg	0.5																																	
Dibromomethane		mg/kg	0.5																																	
Hexachlorobutadiene		mg/kg	0.5																																	
Trichloroethene		mg/kg	0.5																																	
Tetrachloroethene		mg/kg	0.5																																	
trans-1,2-dichloroethene		mg/kg	0.5																																	
trans-1,3-dichloropropene		mg/kg	0.5																																	
Vinyl chloride		mg/kg	1																																	
Chlorinated Hydrocarbons		Chlorinated hydrocarbons EPAVic	mg/kg																																	
		Other chlorinated hydrocarbons EPAVic	mg/kg																																	
			mg/kg																																	
Halogenated Benzenes		1,2,3-trichlorobenzene	mg/kg	0.5																																
		1,2,4-trichlorobenzene	mg/kg	0.5																																
		1,2-dichlorobenzene	mg/kg	0.5																																
		1,3-dichlorobenzene	mg/kg	0.5																																
		1,4-dichlorobenzene	mg/kg	0.5																																
		2-chlorotoluene	mg/kg	0.5																																
		4-chlorotoluene	mg/kg	0.5																																
	Bromobenzene	mg/kg	0.5																																	
	Chlorobenzene	mg/kg	0.5																																	
	Hexachlorobenzene	mg/kg	0.1	10																																
Halogenated Hydrocarbons	1,2-dibromoethane	mg/kg	0.5																																	
	Bromomethane	mg/kg	1																																	
	Dichlorodifluoromethane	mg/kg	1																																	
	Trichlorofluoromethane	mg/kg	1																																	
Halogenated Phenols	2,3,4,6-tetrachlorophenol	mg/kg	0.2																																	
	2,4,5-trichlorophenol	mg/kg	0.2						</																											

				Field ID	TP02_0.1	TP05_0.1	TP06_0.1	TP07_0.1	TP08_0.1	TP10_0.1	TP11_0.1	TP12_0.1	TP13_0.1	TP14_0.1	TP15_0.1	TP17_0.1	TP18_0.1	TP19_0.1	TP20_0.1	TP21_0.1	TP22_0.1	TP23_0.1	TP24_0.1	TP25_0.1	TP26_0.1	TP27_0.1	TP28_0.1	TP29_0.1	TP31_0.1	TP32_0.1	
				Sampled Date	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	
				LocCode	TP02	TP05	TP06	TP07	TP08	TP10	TP11	TP12	TP13	TP14	TP15	TP17	TP18	TP19	TP20	TP21	TP22	TP23	TP24	TP25	TP26	TP27	TP28	TP29	TP31	TP32	
				NEPM 2013 Table 1A(1) HILS Res A Soil	NEPM 2013 Table 1A(3)				NEPM 2013 Table 1A(3)				NEPM 2013 Table 1B(7) Management Limits in Res / Parkland. Fine Soil																		
				0-1m	1-2m	2-4m	>4m	0-1m	1-2m	2-4m	>4m																				
Chem Group	ChemName	Units	EQ																												
	Benzo(a)pyrene TEQ (LOR)	mg/kg																													
	DCCA (Chlorthal) Diacid	mg/kg	0.5																												
	Benzo(a)pyrene TEQ calc (Half)	mg/kg																													
	Benzo(a)pyrene TEQ calc (Zero)	mg/kg																													
Misc Inorg - soil NEPM	Organic Nitrogen as N	mg/kg	10																												
OCF	Organochlorine pesticides EPAVic	mg/kg																													
	Other organochlorine pesticides EPAVic	mg/kg																													
Phenols	Phenols (non-halogenated) EPAVic	mg/kg																													
	Phenols(halogenated) EPAVic	mg/kg																													
Phenoxy Acid Herbicides in Sol	2,6-D	mg/kg	0.5																												
BTEX	Benzene	mg/kg	0.2		4	6	9	20	0.7	1	2	3																			
	Ethylbenzene	mg/kg	0.5		NL ¹	NL ¹	NL ¹	NL ¹	NL ¹	NL ¹	NL ¹	NL ¹																			
	Toluene	mg/kg	0.5		NL ¹	NL ¹	NL ¹	NL ¹	480	NL ¹	NL ¹	NL ¹																			
	Xylene (m & p)	mg/kg	1																												
	Xylene (o)	mg/kg	0.5																												
	Xylene Total	mg/kg	1																												
					NL ¹	NL ¹	NL ¹	NL ¹	110	310	NL ¹	NL ¹	150 ¹²	290 ¹²																	
Chlorinated Hydrocarbons	C6-C10 less BTEX (F1)	mg/kg	25																												
	1,1,1,2-tetrachloroethane	mg/kg	0.5																												
	1,1,1-trichloroethane	mg/kg	0.5																												
	1,1,1,2,2-tetrachloroethane	mg/kg	0.5																												
	1,1,2-trichloroethane	mg/kg	0.5																												
	1,1-dichloroethane	mg/kg	0.5																												
	1,1-dichloroethene	mg/kg	0.5																												
	1,1-dichloropropene	mg/kg	0.5																												
	1,2,3-trichloropropane	mg/kg	0.5																												
	1,2-dibromo-3-chloropropane	mg/kg	0.5																												
	1,2-dichloroethane	mg/kg	0.5																												
	1,2-dichloropropane	mg/kg	0.5																												
	1,3-dichloropropane	mg/kg	0.5																												
	2,2-dichloropropane	mg/kg	0.5																												
	Bromochloromethane	mg/kg	0.5																												
	Bromodichloromethane	mg/kg	0.5																												
	Bromoform	mg/kg	0.5																												
	Carbon tetrachloride	mg/kg	0.5																												
	Chlorodibromomethane	mg/kg	0.5																												
	Chloroethane	mg/kg	1																												
	Chloroform	mg/kg	0.5																												
	Chloromethane	mg/kg	1																												
	cis-1,2-dichloroethene	mg/kg	0.5																												
	cis-1,3-dichloropropene	mg/kg	0.5																												
	Dibromomethane	mg/kg	0.5																												
	Hexachlorobutadiene	mg/kg	0.5																												
	Trichloroethene	mg/kg	0.5																												
	Tetrachloroethene	mg/kg	0.5																												
	trans-1,2-dichloroethene	mg/kg	0.5																												
	trans-1,3-dichloropropene	mg/kg	0.5																												
	Vinyl chloride	mg/kg	1																												
	Chlorinated hydrocarbons EPAVic	mg/kg																													
Other chlorinated hydrocarbons EPAVic	mg/kg																														

Env Stds Comments
 #1: Derived soil HSL exceeds soil saturation concentration
 #2: To obtain F1 subtract the sum of BTEX concentrations from the C6 - C10 fraction.
 #3: Lead: HILs A,B,C based on blood lead models (IEUBK & HIL D on adult lead model for where 50% bioavailability considered. Site-specific bioavailability should be

				Field ID		BH04_0.1	BH09_0.1	BH16_0.1	BH33_0.1	BH34_0.1	BH35_0.1	BH36_0.1	BH37_0.1	BH38_0.1	BH39_0.1	BH40_0.1	Dup01	Split01	BH41_0.1	BH42_0.1	BH43_0.1	BH44_0.1	Dup02	Split02	BH45_0.1	BH46_0.1	BH47_0.1	Dup03	Split03	BH48_0.1	BH49_0.1	BH50_0.1	BH51_0.1	TP01_0.1	TP02_0.1	TP05_0.1	TP06_0.1	TP07_0.1		
				Sampled Date	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	
				LocCode	BH04	BH09	BH16	BH33	BH34	BH35	BH36	BH37	BH38	BH39	BH40	BH40_0.1	Split01	BH41	BH42	BH43	BH44	BH44_0.1	Split02	BH45	BH46	BH47	BH47_0.1	Split03	BH48	BH49	BH50	BH51	TP01	TP02	TP05	TP06	TP07			
				Vic EPA IWRG 621 Category C																																				
Chem Group	ChemName	Units	EQL																																					
	Benzo(a)pyrene TEQ (LOR)	mg/kg																																						
	DCPA (Chlorthal) Diacid	mg/kg	0.5																																					
	Benzo(a)pyrene TEQ calc (Half)	mg/kg																																						
	Benzo(a)pyrene TEQ calc (Zero)	mg/kg																																						
Misc Inorg - soil NEPM	Organic Nitrogen as N	mg/kg	10																							2600	1600				1100	700	6100							
OCF	Organochlorine pesticides EPAVic	mg/kg		1																																				
	Other organochlorine pesticides EPAVic	mg/kg				10																																		
Phenols	Phenols (non-halogenated) EPAVic	mg/kg		60		560																																		
	Phenols(halogenated) EPAVic	mg/kg		1		10																																		
Phenoxy Acid Herbicides in Sol	2,6-D	mg/kg	0.5																																					
BTEX	Benzene	mg/kg	0.2	1		4			16																															
	Ethylbenzene	mg/kg	0.5																																					
	Toluene	mg/kg	0.5																																					
	Xylene (m & p)	mg/kg	1																																					
	Xylene (o)	mg/kg	0.5																																					
	Xylene Total	mg/kg	1																																					
Chlorinated Hydrocarbons	C6-C10 less BTEX (F1)	mg/kg	25																																					
	1,1,1,2-tetrachloroethane	mg/kg	0.5																																					
	1,1,1-trichloroethane	mg/kg	0.5																																					
	1,1,2,2-tetrachloroethane	mg/kg	0.5																																					
	1,1,2-trichloroethane	mg/kg	0.5																																					
	1,1-dichloroethane	mg/kg	0.5																																					
	1,1-dichloroethene	mg/kg	0.5																																					
	1,1-dichloropropene	mg/kg	0.5																																					
	1,2,3-trichloropropane	mg/kg	0.5																																					
	1,2-dibromo-3-chloropropane	mg/kg	0.5																																					
	1,2-dichloroethane	mg/kg	0.5																																					
	1,2-dichloropropane	mg/kg	0.5																																					
	1,3-dichloropropane	mg/kg	0.5																																					
	2,2-dichloropropane	mg/kg	0.5																																					
	Bromochloromethane	mg/kg	0.5																																					
	Bromodichloromethane	mg/kg	0.5																																					
	Bromoform	mg/kg	0.5																																					
	Carbon tetrachloride	mg/kg	0.5																																					
	Chlorodibromomethane	mg/kg	0.5																																					
	Chloroethane	mg/kg	1																																					
	Chloroform	mg/kg	0.5																																					
	Chloromethane	mg/kg	1																																					
	cis-1,2-dichloroethene	mg/kg	0.5																																					
	cis-1,3-dichloropropene	mg/kg	0.5																																					

				Field ID	BH04_0.1	BH09_0.1	BH16_0.1	BH33_0.1	BH34_0.1	BH35_0.1	BH36_0.1	BH37_0.1	BH38_0.1	BH39_0.1	BH40_0.1	Dup01	Split01	BH41_0.1	BH42_0.1	BH43_0.1	BH44_0.1	Dup02	Split02	BH45_0.1	BH46_0.1	BH47_0.1	Dup03	Split03	BH48_0.1	BH49_0.1	BH50_0.1	BH51_0.1	TP01_0.1	TP02_0.1	TP05_0.1	TP06_0.1	TP07_0.1		
				Sampled Date	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018		
				LocCode	BH04	BH09	BH16	BH33	BH34	BH35	BH36	BH37	BH38	BH39	BH40	BH40_0.1	Split01	BH41	BH42	BH43	BH44	BH44_0.1	Split02	BH45	BH46	BH47	BH47_0.1	Split03	BH48	BH49	BH50	BH51	TP01	TP02	TP05	TP06	TP07		
				Vic EPA IWRG 621 Category C																																			
Chem Group	ChemName	Units	EQL	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-		
	Cobalt	mg/kg	1	100	5000	20000	53	-	18	12	5	4	24	33	48	23	23	24	68	45	39	16	16	15	12	-	-	13	14	16	4	21	-	4	6	7	7	2	
	Copper	mg/kg	1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	43	-	-	-	-		
	Manganese	mg/kg	1				-	-	-	40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
	Mercury	mg/kg	0.1	1	75	300	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	<0.1	<0.1	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1		
	Nickel	mg/kg	1	60	3000	12000	74	-	19	10	5	4	57	71	120	53	52	70	230	67	92	23	21	27	18	-	-	10	15	22	4	26	-	5	5	5	5	4	
	Phosphorus	mg/kg	10				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4100	430	-	-	320	93	850	-	-	-	-	-	-		
	Selenium	mg/kg	2	10	50	200	-	-	-	<2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<2	-	-	-	-			
	Zinc	mg/kg	1	200	35000	140000	94	-	290	59	23	14	20	70	61	58	58	83	140	170	54	27	30	35	14	-	-	34	60	24	22	59	-	8	21	4	14	7	
Organochlorine Pesticides	4,4-DDE	mg/kg	0.1				-	-	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-		
	a-BHC	mg/kg	0.1				-	-	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-		
	Aldrin	mg/kg	0.1				-	-	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-		
	b-BHC	mg/kg	0.1				-	-	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-		
	Chlordane (cis)	mg/kg	0.1				-	-	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-		
	Chlordane (trans)	mg/kg	0.1				-	-	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-		
	d-BHC	mg/kg	0.1				-	-	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-		
	DDD	mg/kg	0.1				-	-	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-		
	DDT	mg/kg	0.1				-	-	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-		
	DDT+BDE+DDD	mg/kg	0.1			50	-	-	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-		
	Dieldrin	mg/kg	0.1				-	-	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-		
	Endosulfan I	mg/kg	0.1				-	-	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-		
	Endosulfan II	mg/kg	0.1				-	-	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-		
	Endosulfan sulphate	mg/kg	0.1				-	-	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-		
	Endrin	mg/kg	0.1				-	-	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-		
	Endrin aldehyde	mg/kg	0.1				-	-	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-		
	g-BHC (Lindane)	mg/kg	0.1				-	-	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-		
	Heptachlor	mg/kg	0.1			1.2	4.8	-	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-		
	Heptachlor epoxide	mg/kg	0.1					-	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-		
	Methoxychlor	mg/kg	0.1					-	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-		
	Toxaphene	mg/kg	2					-	-	<2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<2	-	-	-	-		
	Organophosphorous Pesticides	Chlorpyrifos	mg/kg	0.1				-	-	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-	-	
	Other	3,5-Dichlorobenzoic acid	mg/kg	0.5				-	-	-	<0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-		
		Acetyl (Ioxynil)	mg/kg	1				-	-	-	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-		
	PAH	Polycyclic aromatic hydrocarbons EPAVic	mg/kg	1	20			<1.35	<1	<1	<1.35	<1.35	<1.35	<1	<1.35	<1	<1.35	-	-	<1	<1.35	<1	<1.35	-	-	<1	<1.35	<1.35	<1	<1	<1.35	<1.35	<1	<1	<1.35	<1.35	<1	<1.35	<1
	PAH/Phenols	2,4-dimethylphenol	mg/kg	0.2				-	-	-	<0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.2	-	-	-	-	-	
		2,4-dinitrophenol	mg/kg	2				-	-	-	<2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<2	-	-	-	-	-	
		2-methylphenol	mg/kg	0.2				-	-	-	<0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.2	-	-	-	-	-	
		2-nitrophenol	mg/kg	0.2				-	-	-	<0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.2	-	-	-	-	-	
	4-chloro-3-methylphenol	mg/kg	2				-	-	-	<2	-	-	-	-	-</																								

				Field ID		TP08_0.1	TP10_0.1	TP11_0.1	TP12_0.1	TP13_0.1	TP14_0.1	TP15_0.1	TP17_0.1	TP18_0.1	TP19_0.1	TP20_0.1	TP21_0.1	TP22_0.1	TP23_0.1	TP24_0.1	TP25_0.1	TP26_0.1	TP27_0.1	TP28_0.1	TP29_0.1	TP31_0.1	TP32_0.1	
				Sampled Date		6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	
				LocCode		TP08	TP10	TP11	TP12	TP13	TP14	TP15	TP17	TP18	TP19	TP20	TP21	TP22	TP23	TP24	TP25	TP26	TP27	TP28	TP29	TP31	TP32	
				Vic EPA IWRG 621 Category C		Vic EPA IWRG 621 Category C		Vic EPA IWRG 621 Category C		Vic EPA IWRG 621 Category C		Vic EPA IWRG 621 Category C		Vic EPA IWRG 621 Category C		Vic EPA IWRG 621 Category C		Vic EPA IWRG 621 Category C		Vic EPA IWRG 621 Category C		Vic EPA IWRG 621 Category C		Vic EPA IWRG 621 Category C		Vic EPA IWRG 621 Category C		
Chem_Group	ChemName	Units	EQI																									
	Benzo(a)pyrene TEQ (LOR)	mg/kg				0.2	-	0.2	-	0.2	0.2	-	0.2	-	0.2	-	0.2	-	0.2	-	0.2	-	0.2	-	0.2	-	0.2	-
	DCPA (Chlorthal) Diacid	mg/kg	0.5			-	-	-	-	<0.5	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	-	<0.5	-	
	Benzo(a)pyrene TEQ calc (Half)	mg/kg				0.1	-	0.1	-	0.1	0.1	-	0.1	-	0.1	-	0.1	-	0.1	-	0.1	-	0.1	-	0.1	-	0.1	-
	Benzo(a)pyrene TEQ calc (Zero)	mg/kg				0	-	0	-	0	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-
Misc Inorg - soil NEPM	Organic Nitrogen as N	mg/kg	10			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
OCP	Organochlorine pesticides EPAVic	mg/kg		1		-	-	-	-	<1.8	-	-	-	-	-	-	<1.8	-	-	-	-	-	-	-	-	<1.8	-	
	Other organochlorine pesticides EPAVic	mg/kg				-	-	-	-	<1.3	-	-	-	-	-	-	<1.3	-	-	-	-	-	-	-	-	<1.3	-	
Phenols	Phenols (non-halogenated) EPAVic	mg/kg		60		-	-	-	-	<8.4	-	-	-	-	-	-	<8.4	-	-	-	-	-	-	-	-	<8.4	-	
	Phenols(halogenated) EPAVic	mg/kg		1		-	-	-	-	<4.2	-	-	-	-	-	-	<4.2	-	-	-	-	-	-	-	-	<4.2	-	
Phenoxy Acid Herbicides in Soil	2,6-D	mg/kg	0.5			-	-	-	-	<0.5	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	-	<0.5	-	
BTX	Benzene	mg/kg	0.2	1	4	16	-	<0.2	-	<0.2	-	<0.2	-	<0.2	-	<0.2	-	<0.2	-	<0.2	-	<0.2	-	<0.2	-	<0.2	-	
	Ethylbenzene	mg/kg	0.5				-	<1	-	<1	-	<1	-	<1	-	<1	-	<1	-	<1	-	<1	-	<1	-	<1	-	
	Toluene	mg/kg	0.5				-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	
	Xylene (m & p)	mg/kg	1				-	<2	-	<2	-	<2	-	<2	-	<2	-	<2	-	<2	-	<2	-	<2	-	<2	-	
	Xylene (o)	mg/kg	0.5				-	<1	-	<1	-	<0.5	-	<1	-	<1	-	<0.5	-	<1	-	<1	-	<1	-	<1	-	
	Xylene Total	mg/kg	1				-	<1	-	<1	-	<1	-	<1	-	<1	-	<1	-	<1	-	<1	-	<1	-	<1	-	
	C6-C10 less BTEX (F1)	mg/kg	25				-	<25	-	<25	-	<25	-	<25	-	<25	-	<25	-	<25	-	<25	-	<25	-	<25	-	
	1,1,1,2-tetrachloroethane	mg/kg	0.5				-	-	-	-	<0.5	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	<0.5	-	-	
	1,1,1-trichloroethane	mg/kg	0.5				-	-	-	-	<0.5	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	<0.5	-	-	
	1,1,2,2-tetrachloroethane	mg/kg	0.5				-	-	-	-	<0.5	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	<0.5	-	-	
	1,1,2-trichloroethane	mg/kg	0.5				-	-	-	-	<0.5	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	<0.5	-	-	
	1,1-dichloroethane	mg/kg	0.5				-	-	-	-	<0.5	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	<0.5	-	-	
	1,1-dichloroethene	mg/kg	0.5				-	-	-	-	<0.5	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	<0.5	-	-	
	1,1-dichloropropene	mg/kg	0.5				-	-	-	-	<0.5	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	<0.5	-	-	
	1,2,3-trichloropropane	mg/kg	0.5				-	-	-	-	<0.5	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	<0.5	-	-	
	1,2-dibromo-3-chloropropane	mg/kg	0.5				-	-	-	-	<0.5	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	<0.5	-	-	
	1,2-dichloroethane	mg/kg	0.5				-	-	-	-	<0.5	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	<0.5	-	-	
	1,2-dichloropropane	mg/kg	0.5				-	-	-	-	<0.5	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	<0.5	-	-	
	1,3-dichloropropane	mg/kg	0.5				-	-	-	-	<0.5	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	<0.5	-	-	
	2,2-dichloropropane	mg/kg	0.5				-	-	-	-	<0.5	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	<0.5	-	-	
	Bromochloromethane	mg/kg	0.5				-	-	-	-	<0.5	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	<0.5	-	-	
	Bromodichloromethane	mg/kg	0.5				-	-	-	-	<0.5	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	<0.5	-	-	
	Bromoform	mg/kg	0.5				-	-	-	-	<0.5	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	<0.5	-	-	
	Carbon tetrachloride	mg/kg	0.5				-	-	-	-	<0.5	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	<0.5	-	-	
	Chlorodibromomethane	mg/kg	0.5				-	-	-	-	<0.5	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	<0.5	-	-	
	Chloroethane	mg/kg	1				-	-	-	-	<1	-	-	-	-	-	<1	-	-	-	-	-	-	-	<1	-	-	
	Chloroform	mg/kg	0.5				-	-	-	-	<0.5	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	<0.5	-	-	
	Chloromethane	mg/kg	1				-	-	-	-	<1	-	-	-	-	-	<1	-	-	-	-	-	-	-	<1	-	-	
	cis-1,2-dichloroethene	mg/kg	0.5				-	-	-	-	<0.5	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	<0.5	-	-	
	cis-1,3-dichloropropene	mg/kg	0.5				-	-	-	-	<0.5	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	<0.5	-	-	
	Dibromomethane	mg/kg	0.5				-	-	-	-	<0.5	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	<0.5	-	-	
	Hexachlorobutadiene	mg/kg	0.5			2.8	11	-	-	-	<0.5	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	<0.5	-	-	
Trichloroethene	mg/kg	0.5					-	-	-	<0.5	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	<0.5	-	-		
Tetrachloroethene	mg/kg	0.5					-	-	-	<0.5	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	<0.5	-	-		
trans-1,2-dichloroethene	mg/kg	0.5					-	-	-	<0.5	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	<0.5	-	-		
trans-1,3-dichloropropene	mg/kg	0.5					-	-	-	<0.5	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	<0.5	-	-		
Vinyl chloride	mg/kg	1					-	-	-	<1	-	-	-	-	-	<1	-	-	-	-	-	-	-	<1	-	-		
Chlorinated hydrocarbons EPAVic	mg/kg		1				-	-	-	<8	-	-	-	-	-	<8	-	-	-	-	-	-	-	<8	-	-		
Other chlorinated hydrocarbons EPAVic	mg/kg				10	50	-	-	-	<6.5	-	-	-	-	-	<6.5	-	-	-	-	-	-	-	<6.5	-	-		
Halogenated Benzenes	1,2,3-trichlorobenzene	mg/kg	0.5				-	-	-	<0.5	-	-	-															

				Field ID	TP08 0.1	TP10 0.1	TP11 0.1	TP12 0.1	TP13 0.1	TP14 0.1	TP15 0.1	TP17 0.1	TP18 0.1	TP19 0.1	TP20 0.1	TP21 0.1	TP22 0.1	TP23 0.1	TP24 0.1	TP25 0.1	TP26 0.1	TP27 0.1	TP28 0.1	TP29 0.1	TP31 0.1	TP32 0.1		
				Sampled Date	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018	6/09/2018		
				LocCode	TP08	TP10	TP11	TP12	TP13	TP14	TP15	TP17	TP18	TP19	TP20	TP21	TP22	TP23	TP24	TP25	TP26	TP27	TP28	TP29	TP31	TP32		
				Vic EPA IWRG 621 Category C					Vic EPA IWRG 621 Category C																			
Chem_Group	ChemName	Units	EQI																									
Organochlorine Pesticides	Cobalt	mg/kg	1		-	-	-	-	2	-	-	-	-	-	-	2	-	-	-	-	-	-	-	8	-	-		
	Copper	mg/kg	1	100	5000	20000	22	31	26	6	1	4	27	5	4	1	4	5	12	3	3	4	6	2	2	5	3	4
	Manganese	mg/kg	1				-	-	-	42	-	-	-	-	-	-	71	-	-	-	-	-	-	-	77	-	-	
	Mercury	mg/kg	0.1	1	75	300	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
	Nickel	mg/kg	1	60	3000	12000	26	82	51	7	3	10	42	6	7	3	5	5	11	4	3	9	7	3	3	6	5	5
	Phosphorus	mg/kg	10				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	Selenium	mg/kg	2	10	50	200	-	-	-	<2	-	-	-	-	-	-	<2	-	-	-	-	-	-	-	<2	-	-	
	Zinc	mg/kg	1	200	35000	140000	27	38	26	10	4	19	28	9	8	3	12	17	13	4	4	20	12	3	6	19	8	14
	4,4-DDE	mg/kg	0.1				-	-	-	<0.1	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	<0.1	-	-	
	a-BHC	mg/kg	0.1				-	-	-	<0.1	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	<0.1	-	-	
	Aldrin	mg/kg	0.1				-	-	-	<0.1	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	<0.1	-	-	
	b-BHC	mg/kg	0.1				-	-	-	<0.1	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	<0.1	-	-	
	Chlordane (cis)	mg/kg	0.1				-	-	-	<0.1	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	<0.1	-	-	
	Chlordane (trans)	mg/kg	0.1				-	-	-	<0.1	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	<0.1	-	-	
	d-BHC	mg/kg	0.1				-	-	-	<0.1	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	<0.1	-	-	
	DDD	mg/kg	0.1				-	-	-	<0.1	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	<0.1	-	-	
	DDT	mg/kg	0.1				-	-	-	<0.1	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	<0.1	-	-	
	DDT+DDE+DDD	mg/kg	0.1			50	50	-	-	<0.1	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	<0.1	-	-	
	Dieldrin	mg/kg	0.1				-	-	-	<0.1	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	<0.1	-	-	
	Endosulfan I	mg/kg	0.1				-	-	-	<0.1	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	<0.1	-	-	
	Endosulfan II	mg/kg	0.1				-	-	-	<0.1	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	<0.1	-	-	
	Endosulfan sulphate	mg/kg	0.1				-	-	-	<0.1	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	<0.1	-	-	
	Endrin	mg/kg	0.1				-	-	-	<0.1	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	<0.1	-	-	
	Endrin aldehyde	mg/kg	0.1				-	-	-	<0.1	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	<0.1	-	-	
	g-BHC (Lindane)	mg/kg	0.1				-	-	-	<0.1	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	<0.1	-	-	
	Heptachlor	mg/kg	0.1			1.2	4.8	-	-	<0.1	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	<0.1	-	-	
	Heptachlor epoxide	mg/kg	0.1				-	-	-	<0.1	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	<0.1	-	-	
Methoxychlor	mg/kg	0.1				-	-	-	<0.1	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	<0.1	-	-		
Toxaphene	mg/kg	2				-	-	-	<2	-	-	-	-	-	-	<2	-	-	-	-	-	-	-	<2	-	-		
Organophosphorous Pesticides	Chlorpyrifos	mg/kg	0.1				-	-	<0.1	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	<0.1	-	-		
Other	3,5-Dichlorobenzoic acid	mg/kg	0.5				-	-	<0.5	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	<0.5	-	-		
	Actril (Isosynil)	mg/kg	1				-	-	<1	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	<1	-	-		
PAH	Polycyclic aromatic hydrocarbons EPAVic	mg/kg	1	20			<1.35	<1	<1.35	<1	<1.35	<1.35	<1	<1.35	<1	<1.35	<1	<1.35	<1	<1.35	<1	<1.35	<1	<1.35	<1	<1.35	<1	
PAH/Phenols	2,4-dimethylphenol	mg/kg	0.2				-	-	<0.2	-	-	-	-	-	-	<0.2	-	-	-	-	-	-	-	<0.2	-	-		
	2,4-dinitrophenol	mg/kg	2				-	-	<2	-	-	-	-	-	-	<2	-	-	-	-	-	-	-	<2	-	-		
	2-methylphenol	mg/kg	0.2				-	-	<0.2	-	-	-	-	-	-	<0.2	-	-	-	-	-	-	-	<0.2	-	-		
	2-nitrophenol	mg/kg	0.2				-	-	<0.2	-	-	-	-	-	-	<0.2	-	-	-	-	-	-	-	<0.2	-	-		
	4-chloro-3-methylphenol	mg/kg	2				-	-	<2	-	-	-	-	-	-	<2	-	-	-	-	-	-	-	<2	-	-		
	4-methylphenol	mg/kg	0.4				-	-	<0.4	-	-	-	-	-	-	<0.4	-	-	-	-	-	-	-	<0.4	-	-		
	4-nitrophenol	mg/kg	4				-	-	<4	-	-	-	-	-	-	<4	-	-	-	-	-	-	-	<4	-	-		
	Acenaphthene	mg/kg	0.1				<0.1	-	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
	Acenaphthylene	mg/kg	0.1				<0.1	-	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
	Anthracene	mg/kg	0.1				<0.1	-	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
	Benz(a)anthracene	mg/kg	0.1				<0.1	-	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
	Benzo(a) pyrene	mg/kg	0.05	1	5	20	<0.05	-	<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		
	Benzo(b+k)fluoranthene	mg/kg	0.2				<0.2	-	<0.2	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2		
	Benzo(g,h,i)perylene	mg/kg	0.1				<0.1	-	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
	Chrysene	mg/kg	0.1				<0.1	-	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
	Cresol Total	mg/kg	0.2				-	-	<0.2	-	-	-	-	-	-	<0.2	-	-	-	-	-	-	-	<0.2	-	-		
	Dibenz(a,h)anthracene	mg/kg	0.1				<0.1	-	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
	Fluoranthene	mg/kg	0.1				<0.1	-	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
	Fluorene	mg/kg	0.1				<0.1	-	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
	Indeno(1,2,3-c,d)pyrene	mg/kg	0.1				<0.1	-	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
	Naphthalene	mg/kg	0.1				<0.1	<1	<0.1	<1	<0.1	<0.1	<1	<0.1	<1	<0.1	<1	<0.1	<1	<0.1	<1	<0.1	<1	<0.1	<0			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.19/10/2018 3:04:35 PM		
From File	WorkSheet.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Nickel			
General Statistics			
Total Number of Observations	50	Number of Distinct Observations	29
		Number of Missing Observations	0
Minimum	3	Mean	28.34
Maximum	230	Median	10
SD	40.62	Std. Error of Mean	5.745
Coefficient of Variation	1.433	Skewness	2.984
Normal GOF Test			
Shapiro Wilk Test Statistic	0.654	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.947	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.266	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.125	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	37.97	95% Adjusted-CLT UCL (Chen-1995)	40.38
		95% Modified-t UCL (Johnson-1978)	38.38
Gamma GOF Test			
A-D Test Statistic	2.462	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.791	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.193	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.13	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	0.795	k star (bias corrected MLE)	0.761
Theta hat (MLE)	35.63	Theta star (bias corrected MLE)	37.24
nu hat (MLE)	79.55	nu star (bias corrected)	76.11
MLE Mean (bias corrected)	28.34	MLE Sd (bias corrected)	32.49
		Approximate Chi Square Value (0.05)	57.01
Adjusted Level of Significance	0.0452	Adjusted Chi Square Value	56.52
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	37.83	95% Adjusted Gamma UCL (use when n<50)	38.16
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.901	Shapiro Wilk Lognormal GOF Test	
5% Shapiro Wilk Critical Value	0.947	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.166	Lilliefors Lognormal GOF Test	
5% Lilliefors Critical Value	0.125	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	1.099	Mean of logged Data	2.598
Maximum of Logged Data	5.438	SD of logged Data	1.203
Assuming Lognormal Distribution			
95% H-UCL	43.12	90% Chebyshev (MVUE) UCL	44.14
95% Chebyshev (MVUE) UCL	51.88	97.5% Chebyshev (MVUE) UCL	62.62
99% Chebyshev (MVUE) UCL	83.72		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	37.79	95% Jackknife UCL	37.97
95% Standard Bootstrap UCL	37.84	95% Bootstrap-t UCL	42.28
95% Hall's Bootstrap UCL	45.94	95% Percentile Bootstrap UCL	38.38
95% BCA Bootstrap UCL	40.98		
90% Chebyshev(Mean, Sd) UCL	45.58	95% Chebyshev(Mean, Sd) UCL	53.38
97.5% Chebyshev(Mean, Sd) UCL	64.22	99% Chebyshev(Mean, Sd) UCL	85.5
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	53.38		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Zinc			
General Statistics			
Total Number of Observations	50	Number of Distinct Observations	35
		Number of Missing Observations	0
Minimum	3	Mean	37.14
Maximum	290	Median	20.5
SD	49.78	Std. Error of Mean	7.041
Coefficient of Variation	1.34	Skewness	3.35
Normal GOF Test			
Shapiro Wilk Test Statistic	0.635	Shapiro Wilk GOF Test	

5% Shapiro Wilk Critical Value	0.947	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.246	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.125	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	48.94	95% Adjusted-CLT UCL (Chen-1995)	52.28
		95% Modified-t UCL (Johnson-1978)	49.5
Gamma GOF Test			
A-D Test Statistic	0.98	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.78	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.132	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.129	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	1.01	k star (bias corrected MLE)	0.963
Theta hat (MLE)	36.76	Theta star (bias corrected MLE)	38.57
nu hat (MLE)	101	nu star (bias corrected)	96.3
MLE Mean (bias corrected)	37.14	MLE Sd (bias corrected)	37.85
		Approximate Chi Square Value (0.05)	74.67
Adjusted Level of Significance	0.0452	Adjusted Chi Square Value	74.1
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	47.9	95% Adjusted Gamma UCL (use when n<50)	48.27
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.975	Shapiro Wilk Lognormal GOF Test	
5% Shapiro Wilk Critical Value	0.947	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0716	Lilliefors Lognormal GOF Test	
5% Lilliefors Critical Value	0.125	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	1.099	Mean of logged Data	3.044
Maximum of Logged Data	5.67	SD of logged Data	1.069
Assuming Lognormal Distribution			
95% H-UCL	53.81	90% Chebyshev (MVUE) UCL	56.38
95% Chebyshev (MVUE) UCL	65.36	97.5% Chebyshev (MVUE) UCL	77.83
99% Chebyshev (MVUE) UCL	102.3		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	48.72	95% Jackknife UCL	48.94
95% Standard Bootstrap UCL	48.93	95% Bootstrap-t UCL	56.96
95% Hall's Bootstrap UCL	68.51	95% Percentile Bootstrap UCL	49.32
95% BCA Bootstrap UCL	52.32		
90% Chebyshev(Mean, Sd) UCL	58.26	95% Chebyshev(Mean, Sd) UCL	67.83
97.5% Chebyshev(Mean, Sd) UCL	81.11	99% Chebyshev(Mean, Sd) UCL	107.2
Suggested UCL to Use			
95% H-UCL	53.81		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

ProUCL computes and outputs H-statistic based UCLs for historical reasons only.

H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.

It is therefore recommended to avoid the use of H-statistic based 95% UCLs.

Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.

Arsenic			
General Statistics			
Total Number of Observations	24	Number of Distinct Observations	14
		Number of Missing Observations	26
Minimum	4	Mean	19.58
Maximum	105	Median	8
SD	25.91	Std. Error of Mean	5.289
Coefficient of Variation	1.323	Skewness	2.486
Normal GOF Test			
Shapiro Wilk Test Statistic	0.609	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.916	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.301	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.177	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	28.65	95% Adjusted-CLT UCL (Chen-1995)	31.15
		95% Modified-t UCL (Johnson-1978)	29.1
Gamma GOF Test			
A-D Test Statistic	1.921	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.769	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.225	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.183	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	1.126	k star (bias corrected MLE)	1.013
Theta hat (MLE)	17.39	Theta star (bias corrected MLE)	19.33
nu hat (MLE)	54.04	nu star (bias corrected)	48.62
MLE Mean (bias corrected)	19.58	MLE Sd (bias corrected)	19.46
		Approximate Chi Square Value (0.05)	33.61
Adjusted Level of Significance	0.0392	Adjusted Chi Square Value	32.73

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	28.33	95% Adjusted Gamma UCL (use when n<50)	29.09

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.871	Shapiro Wilk Lognormal GOF Test	
5% Shapiro Wilk Critical Value	0.916	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.216	Lilliefors Lognormal GOF Test	
5% Lilliefors Critical Value	0.177	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			

Lognormal Statistics			
Minimum of Logged Data	1.386	Mean of logged Data	2.469
Maximum of Logged Data	4.654	SD of logged Data	0.918

Assuming Lognormal Distribution			
95% H-UCL	28.69	90% Chebyshev (MVUE) UCL	28.6
95% Chebyshev (MVUE) UCL	33.6	97.5% Chebyshev (MVUE) UCL	40.54
99% Chebyshev (MVUE) UCL	54.16		

Nonparametric Distribution Free UCL Statistics	
Data do not follow a Discernible Distribution (0.05)	

Nonparametric Distribution Free UCLs			
95% CLT UCL	28.28	95% Jackknife UCL	28.65
95% Standard Bootstrap UCL	28.45	95% Bootstrap-t UCL	37.25
95% Hall's Bootstrap UCL	36.65	95% Percentile Bootstrap UCL	28.42
95% BCA Bootstrap UCL	31.54		
90% Chebyshev(Mean, Sd) UCL	35.45	95% Chebyshev(Mean, Sd) UCL	42.64
97.5% Chebyshev(Mean, Sd) UCL	52.61	99% Chebyshev(Mean, Sd) UCL	72.21

Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	42.64		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Field Duplicates (SOIL)
Filter: Lab_Report_Nu

Lab Report Number	14823	14823		14823	14823		14823	14823	
Field ID	BH40_0.1	Dup01	RPD	BH44_0.1	Dup02	RPD	BH48_0.1	Dup03	RPD
Sampled Date/Time	6/09/2018	6/09/2018		6/09/2018	6/09/2018		6/09/2018	6/09/2018	

Chem_Grd	ChemNam	Units	EQL									
Lead	Lead	mg/kg	1 (Primary): 5 (Interlab)	14.0	15.0	7	16.0	12.0	29	7.0	5.0	33
Metals	Arsenic	mg/kg	4 (Primary): 5 (Interlab)	<4.0	<4.0	0	54.0	85.0	45	7.0	7.0	0
	Cadmium	mg/kg	0.4 (Primary): 1 (Interlab)	<0.4	<0.4	0	<0.4	0.4	0	<0.4	<0.4	0
	Chromium	mg/kg	1 (Primary): 2 (Interlab)	130.0	140.0	7	42.0	45.0	7	51.0	20.0	87
	Copper	mg/kg	1 (Primary): 5 (Interlab)	23.0	23.0	0	16.0	16.0	0	16.0	13.0	21
	Mercury	mg/kg	0.1	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0
	Nickel	mg/kg	1 (Primary): 2 (Interlab)	53.0	52.0	2	23.0	21.0	9	22.0	10.0	75
	Zinc	mg/kg	1 (Primary): 5 (Interlab)	58.0	58.0	0	27.0	30.0	11	24.0	34.0	34

Field Duplicates (SOIL)
Filter: Lab_Report_Number in

Lab Report Number	14823	EM1814545		14823	EM1814545		14823	EM1814545	
Field ID	BH40_0.1	Split01	RPD	BH44_0.1	Split02	RPD	BH48_0.1	Split03	RPD
Sampled Date/Time	6/09/2018	6/09/2018		6/09/2018	6/09/2018		6/09/2018	6/09/2018	

Chem_Grd	ChemNam	Units	EQL									
Lead	Lead	mg/kg	1 (Primary): 5 (Interlab)	14.0	18.0	25	16.0	12.0	29	7.0	7.0	0
Metals	Arsenic	mg/kg	4 (Primary): 5 (Interlab)	<4.0	<5.0	0	54.0	105.0	64	7.0	6.0	15
	Cadmium	mg/kg	0.4 (Primary): 1 (Interlab)	<0.4	<1.0	0	<0.4	<1.0	0	<0.4	<1.0	0
	Chromium	mg/kg	1 (Primary): 2 (Interlab)	130.0	170.0	27	42.0	69.0	49	51.0	24.0	72
	Copper	mg/kg	1 (Primary): 5 (Interlab)	23.0	24.0	4	16.0	15.0	6	16.0	14.0	13
	Mercury	mg/kg	0.1	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0
	Nickel	mg/kg	1 (Primary): 2 (Interlab)	53.0	70.0	28	23.0	27.0	16	22.0	15.0	38
	Zinc	mg/kg	1 (Primary): 5 (Interlab)	58.0	83.0	35	27.0	35.0	26	24.0	60.0	86

*RPDs have only been considered where a concentration is greater than 1 times the EQL.

**High RPDs are in bold (Acceptable RPDs for each EQL multiplier range are: 80 (1-10 x EQL); 50 (10-30 x EQL); 30 (> 30 x EQL))

***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those

SDG	ENVIROLAB 2018-09-10T00:00:00	ENVIROLAB 2018-09-10T00:00:00
Field ID	Rinsate	Trip
Sampled Date	6/09/2018	6/09/2018
Sample Type	Rinsate	Trip Blank

Chemical Group	Chemical Name	Units	EQL		
BTEX	Benzene	µg/L	1	<1	<1
	Ethylbenzene	µg/L	1	<1	<1
	Toluene	µg/L	1	<1	<1
	Xylene (m & p)	µg/L	2	<2	<2
	Xylene (o)	µg/L	1	<1	<1
	C6-C10 less BTEX (F1)	mg/l	0.01	<0.01	<0.01
PAH/Phenols	Naphthalene	µg/L	1	<1	<1
TPH	C10-C16	mg/l	0.05	<0.05	
	C16-C34	mg/l	0.1	<0.1	
	C34-C40	mg/l	0.1	<0.1	
	F2-NAPHTHALENE	mg/l	0.05	<0.05	
	C6 - C9	µg/L	10	<10	<10
	C10 - C14	µg/L	50	<50	
	C15 - C28	µg/L	100	<100	
	C29-C36	µg/L	100	<100	
	C6-C10	mg/l	0.01	<0.01	<0.01



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CHAIN OF CUSTODY

Job Number 33980

ATTENTION

EnviroLab

Sheet 1 of 7

CLIENT

Crystal Group Pty Ltd

LOCATION

30 - 70 Rows Lane Wallan

Sample Number	Sample Date	Sample Type	Analysis Required	No. of Containers	Turn-around Time Required
TP01_0.1	6.09.2018	Soil	NEPM HIL Full Suit	1	Standard
TP02_0.1	6.09.2018	Soil	Metals 8, PAHs, pH	1	Standard
TP05_0.1	6.09.2018	Soil	Metals 8, TRH/BTEX, pH	1	Standard
TP05_0.3	6.09.2018	Soil	Hold	1	Standard
TP06_0.1	6.09.2018	Soil	Metals 8, PAHs, pH	1	Standard
TP06_0.3	6.09.2018	Soil	Hold	1	Standard
TP07_0.1	6.09.2018	Soil	Metals 8, TRH/BTEX, pH	1	Standard
TP07_0.3	6.09.2018	Soil	Hold	1	Standard
TP08_0.1	6.09.2018	Soil	Metals 8, PAHs	1	Standard
TP10_0.1	6.09.2018	Soil	Metals 8, TRH/BTEX, pH	1	Standard
TP10_0.3	6.09.2018	Soil	Hold	1	Standard
TP11_0.1	6.09.2018	Soil	Metals 8, PAHs, pH	1	Standard
TP11_0.3	6.09.2018	Soil	Hold	1	Standard
TP12_0.1	6.09.2018	Soil	Metals 8, TRH/BTEX, pH	1	Standard

Job No: 1182-3
Date Received: 10/9/18
Time Received: 16:30
Received by: [Signature]
Temp: Cool/Ambient
Packaging: Ice/Icepack
Security: Intact/Broken

Additional information::**Email Results To****Tick**

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bpaule@lrnglobal.com.au	☒

Chain of custody must be signed and dated by LRM, courier, and laboratory.

Total number of containers

14

Sampled by: BP, JL

Checked by: BP, JL

Additional Comments

RELINQUISHED BY (Signature)	ORGANISATION	DATE / TIME	RECEIVED BY (Signature)	ORGANISATION	DATE / TIME
Brendan Paule	LRM Global	06/09/2018	[Signature]	ELS	7/9/18
RELINQUISHED BY (Signature)	ORGANISATION	DATE / TIME	RECEIVED BY (Signature)	RECEIVED FOR LABORATORY BY (Sig)	



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CHAIN OF CUSTODY

Job Number 33980

ATTENTION

Envirolab

Sheet 2 of 7

CLIENT

Crystal Group Pty Ltd

LOCATION

30 - 70 Rowes Lane Wallan

Sample Number	Sample Date	Sample Type	Analysis Required	No. of Containers	Turn-around Time Required
TP12_0.3	6.09.2018	Soil	Hold	1	Standard
TP13_0.1	6.09.2018	Soil	NEPM HIL Full Suit	1	Standard
TP13_0.3	6.09.2018	Soil	Hold	1	Standard
TP14_0.1	6.09.2018	Soil	Metals 8, PAHs, pH	1	Standard
TP14_0.3	6.09.2018	Soil	Hold	1	Standard
TP15_0.1	6.09.2018	Soil	Metals 8, TRH/BTEX, pH	1	Standard
TP17_0.1	6.09.2018	Soil	Metals 8, PAHs, pH	1	Standard
TP17_0.3	6.09.2018	Soil	Hold	1	Standard
TP18_0.1	6.09.2018	Soil	Metals 8, TRH/BTEX, pH	1	Standard
TP18_0.3	6.09.2018	Soil	Hold	1	Standard
TP19_0.1	6.09.2018	Soil	Metals 8, PAHs, pH	1	Standard
TP19_0.3	6.09.2018	Soil	Hold	1	Standard
TP20_0.1	6.09.2018	Soil	Metals 8, TRH/BTEX, pH	1	Standard
TP20_0.3	6.09.2018	Soil	Hold	1	Standard

Additional information::**Email Results To****Tick**

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acampbell@lrnglobal.com.au	☐
bpaule@lrnglobal.com.au	☒

Chain of custody must be signed and dated by LRM, courier, and laboratory.

Total number of containers

14

Sampled by: BP, JL

Checked by: BP, JL

Additional Comments

RELINQUISHED BY (Signature)	ORGANISATION	DATE / TIME	RECEIVED BY (Signature)	ORGANISATION	DATE / TIME
Brendan Paule	LRM Global	06/09/2018			
RELINQUISHED BY (Signature)	ORGANISATION	DATE / TIME	RECEIVED BY (Signature)	RECEIVED FOR LABORATORY BY (Sig)	



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CHAIN OF CUSTODY

Job Number 33980

ATTENTION Envirolab

CLIENT Crystal Group Pty Ltd

LOCATION 30 - 70 Rowes Lane Wallan

Sheet 3 of 7

Sample Number	Sample Date	Sample Type	Analysis Required	No. of Containers	Turn-around Time Required
TP21_0.1	6.09.2018	Soil	NEPM HIL Full Suit	1	Standard
TP21_0.3	6.09.2018	Soil	Hold	1	Standard
TP22_0.1	6.09.2018	Soil	Metals 8, TRH/BTEX, pH	1	Standard
TP22_0.3	6.09.2018	Soil	Hold	1	Standard
TP23_0.1	6.09.2018	Soil	Metals 8, PAHs, pH	1	Standard
TP23_0.3	6.09.2018	Soil	Hold	1	Standard
TP24_0.1	6.09.2018	Soil	Metals 8, TRH/BTEX, pH	1	Standard
TP25_0.1	6.09.2018	Soil	Metals 8, PAHs, pH	1	Standard
TP25_0.3	6.09.2018	Soil	Hold	1	Standard
TP26_0.1	6.09.2018	Soil	Metals 8, TRH/BTEX, pH	1	Standard
TP26_0.3	6.09.2018	Soil	Hold	1	Standard
TP27_0.1	6.09.2018	Soil	Metals 8, PAHs, pH	1	Standard
TP27_0.3	6.09.2018	Soil	Hold	1	Standard
TP28_0.1	6.09.2018	Soil	Metals 8, TRH/BTEX, pH	1	Standard

Additional information::

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bpaule@lrmglobal.com.au	☒

Chain of custody must be signed and dated by LRM, courier, and laboratory.

Total number of containers

14

Sampled by: BP, JL

Checked by: BP, JL

Additional Comments

RELINQUISHED BY (Signature)	ORGANISATION	DATE / TIME	RECEIVED BY (Signature)	ORGANISATION	DATE / TIME
Brendan Paule	LRM Global	06/09/2018			
RELINQUISHED BY (Signature)	ORGANISATION	DATE / TIME	RECEIVED BY (Signature)	RECEIVED FOR LABORATORY BY (Sig)	



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CHAIN OF CUSTODY

Job Number 33980

ATTENTION Envirolab

CLIENT Crystal Group Pty Ltd

LOCATION 30 - 70 Rowes Lane Wallan

Sheet 4 of 7

Sample Number	Sample Date	Sample Type	Analysis Required	No. of Containers	Turn-around Time Required
43 TP28_0.3	6.09.2018	Soil	Hold	1	Standard
44 TP29_0.1	6.09.2018	Soil	NEPM HIL Full Suit	1	Standard
45 TP29_0.3	6.09.2018	Soil	Hold	1	Standard
46 TP31_0.1	6.09.2018	Soil	Metals 8, PAHs, pH	1	Standard
47 TP31_0.3	6.09.2018	Soil	Hold	1	Standard
48 TP32_0.1	6.09.2018	Soil	Metals 8, TRH/BTEX, pH	1	Standard
49 TP32_0.3	6.09.2018	Soil	Hold	1	Standard
50 BH04_0.1	6.09.2018	Soil	Metals 8, PAHs, pH	1	Standard
51 BH04_0.3	6.09.2018	Soil	Hold	1	Standard
52 BH09_0.1	6.09.2018	Soil	TRH	1	Standard
53 BH16_0.1	6.09.2018	Soil	PCBs	1	Standard
54 BH33_0.1	6.09.2018	Soil	Metals 8, TRH/BTEX, pH	1	Standard
55 BH33_0.3	6.09.2018	Soil	Hold	1	Standard
56 BH34_0.1	6.09.2018	Soil	Metals 8, PAHs, pH	1	Standard

Additional information::

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Chain of custody must be signed and dated by LRM, courier, and laboratory.

Total number of containers

14

Sampled by: BP, JL

Checked by: BP, JL

Additional Comments

RELINQUISHED BY (Signature)	ORGANISATION	DATE / TIME	RECEIVED BY (Signature)	ORGANISATION	DATE / TIME
Brendan Paule	LRM Global	06/09/2018			
RELINQUISHED BY (Signature)	ORGANISATION	DATE / TIME	RECEIVED BY (Signature)	RECEIVED FOR LABORATORY BY (Sig)	



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CHAIN OF CUSTODY

Job Number 33980

ATTENTION Envirolab

CLIENT Crystal Group Pty Ltd

LOCATION 30 - 70 Rowes Lane Wallan

Sheet 5 of 7

Sample Number	Sample Date	Sample Type	Analysis Required	No. of Containers	Turn-around Time Required
BH34_0.3	6.09.2018	Soil	Hold	1	Standard
BH35_0.1	6.09.2018	Soil	NEPM HIL Full Suit	1	Standard
BH35_0.3	6.09.2018	Soil	Hold	1	Standard
BH36_0.1	6.09.2018	Soil	Metals 8, PAHs, pH	1	Standard
BH36_0.3	6.09.2018	Soil	Hold	1	Standard
BH37_0.1	6.09.2018	Soil	Metals 8, TRH/BTEX, pH	1	Standard
BH37_0.3	6.09.2018	Soil	Hold	1	Standard
BH38_0.1	6.09.2018	Soil	Metals 8, PAHs, pH	1	Standard
BH38_0.3	6.09.2018	Soil	Hold	1	Standard
BH39_0.1	6.09.2018	Soil	Metals 8, TRH/BTEX, pH	1	Standard
BH39_0.3	6.09.2018	Soil	Hold	1	Standard
BH40_0.1	6.09.2018	Soil	Metals 8, PAHs, pH	1	Standard
BH40_0.3	6.09.2018	Soil	Hold	1	Standard
BH41_0.1	6.09.2018	Soil	Metals 8, TRH/BTEX, pH	1	Standard

Additional information::

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Chain of custody must be signed and dated by LRM, courier, and laboratory.

Total number of containers

14

Sampled by: BP, JL

Checked by: BP, JL

Additional Comments

RELINQUISHED BY (Signature)	ORGANISATION	DATE / TIME	RECEIVED BY (Signature)	ORGANISATION	DATE / TIME
Brendan Paule	LRM Global	06/09/2018			
RELINQUISHED BY (Signature)	ORGANISATION	DATE / TIME	RECEIVED BY (Signature)	RECEIVED FOR LABORATORY BY (Sig)	



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CHAIN OF CUSTODY

Job Number 33980

ATTENTION Envirolab

CLIENT Crystal Group Pty Ltd

LOCATION 30 - 70 Rowes Lane Wallan

Sheet 6 of 7

Sample Number	Sample Date	Sample Type	Analysis Required	No. of Containers	Turn-around Time Required
BH41_0.3	6.09.2018	Soil	Hold	1	Standard
BH42_0.1	6.09.2018	Soil	Metals 8, PAHs, pH	1	Standard
BH42_0.3	6.09.2018	Soil	Hold	1	Standard
BH43_0.1	6.09.2018	Soil	Metals 8, TRH/BTEX, pH	1	Standard
BH43_0.3	6.09.2018	Soil	Hold	1	Standard
BH44_0.1	6.09.2018	Soil	Metals 8, PAHs, pH	1	Standard
BH44_0.3	6.09.2018	Soil	Hold	1	Standard
BH45_0.1	6.09.2018	Soil	Metals 8, TRH/BTEX, pH	1	Standard
BH45_0.3	6.09.2018	Soil	Hold	1	Standard
BH46_0.1	6.09.2018	Soil	Nutrient suite (TKN, NO2, NO3, Org N, NH3,Tot P, PO4_P), pH	1	Standard
BH46_0.3	6.09.2018	Soil	Hold	1	Standard
BH47_0.1	6.09.2018	Soil	Nutrient suite (TKN, NO2, NO3, Org N, NH3,Tot P, PO4_P), pH	1	Standard
BH47_0.3	6.09.2018	Soil	Hold	1	Standard
BH48_0.1	6.09.2018	Soil	Metals 8, PAHs, Nutrient suite (TKN, NO2, NO3, Org N, NH3,Tot P, PO4_P), pH	1	Standard

Additional information::

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bpaule@lrnglobal.com.au	✓

Chain of custody must be signed and dated by LRM, courier, and laboratory.

Total number of containers

14

Sampled by: BP, JL

Checked by: BP, JL

Additional Comments

RELINQUISHED BY (Signature)	ORGANISATION	DATE / TIME	RECEIVED BY (Signature)	ORGANISATION	DATE / TIME
Brendan Paule	LRM Global	06/09/2018			
RELINQUISHED BY (Signature)	ORGANISATION	DATE / TIME	RECEIVED BY (Signature)	RECEIVED FOR LABORATORY BY (Sig)	



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CHAIN OF CUSTODY**Job Number**

33980

ATTENTION

Envirolab

Sheet 7 of 7

CLIENT

Crystal Group Pty Ltd

LOCATION

30 - 70 Rowes Lane Wallan

Sample Number	Sample Date	Sample Type	Analysis Required	No. of Containers	Turn-around Time Required
BH48_0.3	6.09.2018	Soil	Hold	1	Standard
BH49_0.1	6.09.2018	Soil	Metals 8, PAHs, Nutrient suite (TKN, NO2, NO3, Org N, NH3,Tot P, PO4_P), pH	1	Standard
BH49_0.3	6.09.2018	Soil	Hold	1	Standard
BH50_0.1	6.09.2018	Soil	Metals 8, TRH/BTEX, Nutrient suite (TKN, NO2, NO3, Org N, NH3,Tot P, PO4_P), pH	1	Standard
BH50_0.3	6.09.2018	Soil	Hold	1	Standard
BH51_0.1	6.09.2018	Soil	TRH	1	Standard
BH51_0.3	6.09.2018	Soil	Hold	1	Standard
Dup01	6.09.2018	Soil	Metals 8	1	Standard
Dup02	6.09.2018	Soil	Metals 8	1	Standard
Dup03	6.09.2018	Soil	Metals 8	1	Standard
Trip	6.09.2018	Water	TRH	2	Standard
Rinsate	6.09.2018	Water	TRH/BTEX	3	Standard

Additional information::**Email Results To****Tick**

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bpaule@lrnglobal.com.au	☒

Chain of custody must be signed and dated by LRM, courier, and laboratory.

Total number of containers

15

Sampled by: BP, JL

Checked by: BP, JL

Additional Comments

RELINQUISHED BY (Signature)	ORGANISATION	DATE / TIME	RECEIVED BY (Signature)	ORGANISATION	DATE / TIME
Brendan Paule	LRM Global	06/09/2018			
RELINQUISHED BY (Signature)	ORGANISATION	DATE / TIME	RECEIVED BY (Signature)	RECEIVED FOR LABORATORY BY (Sig)	

CERTIFICATE OF ANALYSIS 14823

Client Details

Client	LRM Global
Attention	Brendan Paule
Address	65 Stubbs Street, Kensington, VIC, 3031

Sample Details

Your Reference	<u>33980 - 30-70 Rows Lane Wallan</u>
Number of Samples	94 Soil, 2 Water
Date samples received	07/09/2018
Date completed instructions received	10/09/2018

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
 Samples were analysed as received from the client. Results relate specifically to the samples as received.
 Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

Report Details

Date results requested by	18/09/2018
Date of Issue	18/09/2018
NATA Accreditation Number 2901. This document shall not be reproduced except in full.	
Accredited for compliance with ISO/IEC 17025 - Testing. Tests not covered by NATA are denoted with *	

Results Approved By

Chris De Luca, Senior Chemist

Authorised By

P. Adams.

Pamela Adams, Laboratory Manager

VOCs in soil						
Our Reference		14823-1	14823-16	14823-29	14823-44	14823-58
Your Reference	UNITS	TP01_0.1	TP13_0.1	TP21_0.1	TP29_0.1	BH35_0.1
Date Sampled		06/09/2018	06/09/2018	06/09/2018	06/09/2018	06/09/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	12/09/2018	12/09/2018	12/09/2018	12/09/2018	12/09/2018
Date analysed	-	12/09/2018	12/09/2018	12/09/2018	13/09/2018	14/09/2018
Dichlorodifluoromethane	mg/kg	<1	<1	<1	<1	<1
Chloromethane	mg/kg	<1	<1	<1	<1	<1
Vinyl Chloride	mg/kg	<1	<1	<1	<1	<1
Bromomethane	mg/kg	<1	<1	<1	<1	<1
Chloroethane	mg/kg	<1	<1	<1	<1	<1
Trichlorofluoromethane	mg/kg	<1	<1	<1	<1	<1
1,1-Dichloroethene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
trans-1,2-dichloroethene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
1,1-dichloroethane	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
cis-1,2-dichloroethene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
bromochloromethane	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
chloroform	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2,2-dichloropropane	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-dichloroethane	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,1-trichloroethane	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
1,1-dichloropropene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Cyclohexane	mg/kg	<1	<1	<1	<1	<1
carbon tetrachloride	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
dibromomethane	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-dichloropropane	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
trichloroethene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
bromodichloromethane	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
trans-1,3-dichloropropene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
cis-1,3-dichloropropene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,2-trichloroethane	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
1,3-dichloropropane	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
dibromochloromethane	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-dibromoethane	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Tetrachloroethene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,1,2-tetrachloroethane	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
chlorobenzene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
bromoform	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5

VOCs in soil						
Our Reference		14823-1	14823-16	14823-29	14823-44	14823-58
Your Reference	UNITS	TP01_0.1	TP13_0.1	TP21_0.1	TP29_0.1	BH35_0.1
Date Sampled		06/09/2018	06/09/2018	06/09/2018	06/09/2018	06/09/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
m+p-xylene	mg/kg	<1	<1	<1	<1	<1
styrene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,2,2-tetrachloroethane	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
o-Xylene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
1,2,3-trichloropropane	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
isopropylbenzene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
bromobenzene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
n-propyl benzene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2-chlorotoluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
4-chlorotoluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
1,3,5-trimethyl benzene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
tert-butyl benzene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
1,2,4-trimethyl benzene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
1,3-dichlorobenzene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
sec-butyl benzene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
1,4-dichlorobenzene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
4-isopropyl toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-dichlorobenzene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
n-butyl benzene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-dibromo-3-chloropropane	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
1,2,4-trichlorobenzene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
hexachlorobutadiene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
1,2,3-trichlorobenzene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate Dibromofluoromethane	%	100	99	99	98	97
Surrogate aaa-Trifluorotoluene	%	85	96	103	93	101
Surrogate Toluene-d ₈	%	98	97	98	98	99
Surrogate 4-Bromofluorobenzene	%	87	86	87	85	93

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		14823-1	14823-3	14823-7	14823-10	14823-14
Your Reference	UNITS	TP01_0.1	TP05_0.1	TP07_0.1	TP10_0.1	TP12_0.1
Date Sampled		06/09/2018	06/09/2018	06/09/2018	06/09/2018	06/09/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	12/09/2018	12/09/2018	12/09/2018	12/09/2018	12/09/2018
Date analysed	-	12/09/2018	12/09/2018	12/09/2018	12/09/2018	12/09/2018
vTRH C ₆ - C ₁₀	mg/kg	<25	<25	<25	<25	<25
TRH C ₆ - C ₁₀ less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
Naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	88	106	109	111	105

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		14823-16	14823-20	14823-23	14823-27	14823-29
Your Reference	UNITS	TP13_0.1	TP15_0.1	TP18_0.1	TP20_0.1	TP21_0.1
Date Sampled		06/09/2018	06/09/2018	06/09/2018	06/09/2018	06/09/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	12/09/2018	12/09/2018	12/09/2018	12/09/2018	12/09/2018
Date analysed	-	12/09/2018	12/09/2018	12/09/2018	12/09/2018	12/09/2018
vTRH C ₆ - C ₁₀	mg/kg	<25	<25	<25	<25	<25
TRH C ₆ - C ₁₀ less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
Naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	103	98	105	103	111

vTRH(C6-C10)/BTEXN in Soil

Our Reference		14823-31	14823-35	14823-38	14823-42	14823-44
Your Reference	UNITS	TP22_0.1	TP24_0.1	TP26_0.1	TP28_0.1	TP29_0.1
Date Sampled		06/09/2018	06/09/2018	06/09/2018	06/09/2018	06/09/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	12/09/2018	12/09/2018	12/09/2018	12/09/2018	12/09/2018
Date analysed	-	13/09/2018	13/09/2018	13/09/2018	13/09/2018	13/09/2018
vTRH C ₆ - C ₁₀	mg/kg	<25	<25	<25	<25	<25
TRH C ₆ - C ₁₀ less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
Naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	94	100	106	99	99

vTRH(C6-C10)/BTEXN in Soil

Our Reference		14823-48	14823-52	14823-54	14823-58	14823-62
Your Reference	UNITS	TP32_0.1	BH09_0.1	BH33_0.1	BH35_0.1	BH37_0.1
Date Sampled		06/09/2018	06/09/2018	06/09/2018	06/09/2018	06/09/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	12/09/2018	12/09/2018	12/09/2018	12/09/2018	12/09/2018
Date analysed	-	13/09/2018	13/09/2018	14/09/2018	14/09/2018	14/09/2018
vTRH C ₆ - C ₁₀	mg/kg	<25	<25	<25	<25	<25
TRH C ₆ - C ₁₀ less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
Naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	94	110	97	95	96

vTRH(C6-C10)/BTEXN in Soil

Our Reference		14823-66	14823-70	14823-74	14823-78	14823-88
Your Reference	UNITS	BH39_0.1	BH41_0.1	BH43_0.1	BH45_0.1	BH50_0.1
Date Sampled		06/09/2018	06/09/2018	06/09/2018	06/09/2018	06/09/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	12/09/2018	12/09/2018	12/09/2018	12/09/2018	12/09/2018
Date analysed	-	14/09/2018	14/09/2018	14/09/2018	14/09/2018	14/09/2018
vTRH C ₆ - C ₁₀	mg/kg	<25	<25	<25	<25	<25
TRH C ₆ - C ₁₀ less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
Naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	100	104	109	114	84

vTRH(C6-C10)/BTEXN in Soil

Our Reference		14823-90
Your Reference	UNITS	BH51_0.1
Date Sampled		06/09/2018
Type of sample		Soil
Date extracted	-	12/09/2018
Date analysed	-	14/09/2018
vTRH C ₆ - C ₁₀	mg/kg	<25
TRH C ₆ - C ₁₀ less BTEX (F1)	mg/kg	<25
Benzene	mg/kg	<0.2
Toluene	mg/kg	<0.5
Ethylbenzene	mg/kg	<1
m+p-xylene	mg/kg	<2
o-Xylene	mg/kg	<1
Naphthalene	mg/kg	<1
Total +ve Xylenes	mg/kg	<1
Surrogate aaa-Trifluorotoluene	%	102

TRH Soil C10-C40 NEPM

Our Reference		14823-1	14823-3	14823-7	14823-10	14823-14
Your Reference	UNITS	TP01_0.1	TP05_0.1	TP07_0.1	TP10_0.1	TP12_0.1
Date Sampled		06/09/2018	06/09/2018	06/09/2018	06/09/2018	06/09/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	12/09/2018	12/09/2018	12/09/2018	12/09/2018	12/09/2018
Date analysed	-	12/09/2018	12/09/2018	12/09/2018	12/09/2018	12/09/2018
TRH >C ₁₀ -C ₁₆	mg/kg	<50	<50	<50	<50	<50
TRH >C ₁₀ - C ₁₆ less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C ₁₆ -C ₃₄	mg/kg	<100	<100	<100	<100	<100
TRH >C ₃₄ -C ₄₀	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	100	92	92	93	92

TRH Soil C10-C40 NEPM

Our Reference		14823-16	14823-20	14823-23	14823-27	14823-29
Your Reference	UNITS	TP13_0.1	TP15_0.1	TP18_0.1	TP20_0.1	TP21_0.1
Date Sampled		06/09/2018	06/09/2018	06/09/2018	06/09/2018	06/09/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	12/09/2018	12/09/2018	12/09/2018	12/09/2018	12/09/2018
Date analysed	-	12/09/2018	12/09/2018	12/09/2018	12/09/2018	12/09/2018
TRH >C ₁₀ -C ₁₆	mg/kg	<50	<50	<50	<50	<50
TRH >C ₁₀ - C ₁₆ less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C ₁₆ -C ₃₄	mg/kg	<100	<100	<100	<100	<100
TRH >C ₃₄ -C ₄₀	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	92	93	91	89	90

TRH Soil C10-C40 NEPM

Our Reference		14823-31	14823-35	14823-38	14823-42	14823-44
Your Reference	UNITS	TP22_0.1	TP24_0.1	TP26_0.1	TP28_0.1	TP29_0.1
Date Sampled		06/09/2018	06/09/2018	06/09/2018	06/09/2018	06/09/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	12/09/2018	12/09/2018	12/09/2018	12/09/2018	12/09/2018
Date analysed	-	12/09/2018	13/09/2018	13/09/2018	13/09/2018	13/09/2018
TRH >C ₁₀ -C ₁₆	mg/kg	<50	<50	<50	<50	<50
TRH >C ₁₀ - C ₁₆ less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C ₁₆ -C ₃₄	mg/kg	<100	<100	<100	<100	<100
TRH >C ₃₄ -C ₄₀	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	90	85	85	86	88

TRH Soil C10-C40 NEPM

Our Reference		14823-48	14823-52	14823-54	14823-58	14823-62
Your Reference	UNITS	TP32_0.1	BH09_0.1	BH33_0.1	BH35_0.1	BH37_0.1
Date Sampled		06/09/2018	06/09/2018	06/09/2018	06/09/2018	06/09/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	12/09/2018	12/09/2018	12/09/2018	12/09/2018	12/09/2018
Date analysed	-	13/09/2018	13/09/2018	13/09/2018	13/09/2018	13/09/2018
TRH >C ₁₀ -C ₁₆	mg/kg	<50	<50	<50	<50	<50
TRH >C ₁₀ - C ₁₆ less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C ₁₆ -C ₃₄	mg/kg	<100	500	140	<100	<100
TRH >C ₃₄ -C ₄₀	mg/kg	<100	120	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	630	140	<50	<50
Surrogate o-Terphenyl	%	87	82	88	85	83

TRH Soil C10-C40 NEPM

Our Reference		14823-66	14823-70	14823-74	14823-78	14823-88
Your Reference	UNITS	BH39_0.1	BH41_0.1	BH43_0.1	BH45_0.1	BH50_0.1
Date Sampled		06/09/2018	06/09/2018	06/09/2018	06/09/2018	06/09/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	12/09/2018	12/09/2018	12/09/2018	12/09/2018	12/09/2018
Date analysed	-	13/09/2018	13/09/2018	14/09/2018	14/09/2018	14/09/2018
TRH >C ₁₀ -C ₁₆	mg/kg	<50	<50	<50	<50	<50
TRH >C ₁₀ - C ₁₆ less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C ₁₆ -C ₃₄	mg/kg	<100	<100	<100	<100	190
TRH >C ₃₄ -C ₄₀	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	190
Surrogate o-Terphenyl	%	83	83	86	85	88

TRH Soil C10-C40 NEPM

Our Reference		14823-90
Your Reference	UNITS	BH51_0.1
Date Sampled		06/09/2018
Type of sample		Soil
Date extracted	-	12/09/2018
Date analysed	-	14/09/2018
TRH >C ₁₀ -C ₁₆	mg/kg	<50
TRH >C ₁₀ - C ₁₆ less Naphthalene (F2)	mg/kg	<50
TRH >C ₁₆ -C ₃₄	mg/kg	<100
TRH >C ₃₄ -C ₄₀	mg/kg	<100
Total +ve TRH (>C10-C40)	mg/kg	<50
Surrogate o-Terphenyl	%	86

PAHs in Soil						
Our Reference		14823-1	14823-2	14823-5	14823-9	14823-12
Your Reference	UNITS	TP01_0.1	TP02_0.1	TP06_0.1	TP08_0.1	TP11_0.1
Date Sampled		06/09/2018	06/09/2018	06/09/2018	06/09/2018	06/09/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	12/09/2018	12/09/2018	12/09/2018	12/09/2018	12/09/2018
Date analysed	-	18/09/2018	18/09/2018	18/09/2018	18/09/2018	18/09/2018
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j&k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene TEQ calc (Zero)	mg/kg	0	0	0	0	0
Benzo(a)pyrene TEQ calc (Half)	mg/kg	0.1	0.1	0.1	0.1	0.1
Benzo(a)pyrene TEQ calc (PQL)	mg/kg	0.2	0.2	0.2	0.2	0.2
Surrogate <i>p</i> -Terphenyl-d ₁₄	%	90	86	84	88	86

PAHs in Soil						
Our Reference		14823-16	14823-18	14823-21	14823-25	14823-29
Your Reference	UNITS	TP13_0.1	TP14_0.1	TP17_0.1	TP19_0.1	TP21_0.1
Date Sampled		06/09/2018	06/09/2018	06/09/2018	06/09/2018	06/09/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	12/09/2018	12/09/2018	12/09/2018	12/09/2018	12/09/2018
Date analysed	-	18/09/2018	18/09/2018	18/09/2018	18/09/2018	18/09/2018
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j&k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene TEQ calc (Zero)	mg/kg	0	0	0	0	0
Benzo(a)pyrene TEQ calc (Half)	mg/kg	0.1	0.1	0.1	0.1	0.1
Benzo(a)pyrene TEQ calc (PQL)	mg/kg	0.2	0.2	0.2	0.2	0.2
Surrogate <i>p</i> -Terphenyl-d ₁₄	%	86	90	88	94	86

PAHs in Soil						
Our Reference		14823-33	14823-36	14823-40	14823-44	14823-46
Your Reference	UNITS	TP23_0.1	TP25_0.1	TP27_0.1	TP29_0.1	TP31_0.1
Date Sampled		06/09/2018	06/09/2018	06/09/2018	06/09/2018	06/09/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	12/09/2018	12/09/2018	12/09/2018	12/09/2018	12/09/2018
Date analysed	-	18/09/2018	18/09/2018	18/09/2018	18/09/2018	18/09/2018
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j&k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene TEQ calc (Zero)	mg/kg	0	0	0	0	0
Benzo(a)pyrene TEQ calc (Half)	mg/kg	0.1	0.1	0.1	0.1	0.1
Benzo(a)pyrene TEQ calc (PQL)	mg/kg	0.2	0.2	0.2	0.2	0.2
Surrogate <i>p</i> -Terphenyl-d ₁₄	%	94	92	92	94	86

PAHs in Soil						
Our Reference		14823-50	14823-56	14823-58	14823-60	14823-64
Your Reference	UNITS	BH04_0.1	BH34_0.1	BH35_0.1	BH36_0.1	BH38_0.1
Date Sampled		06/09/2018	06/09/2018	06/09/2018	06/09/2018	06/09/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	12/09/2018	12/09/2018	12/09/2018	12/09/2018	12/09/2018
Date analysed	-	18/09/2018	18/09/2018	18/09/2018	15/09/2018	15/09/2018
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j&k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene TEQ calc (Zero)	mg/kg	0	0	0	0	0
Benzo(a)pyrene TEQ calc (Half)	mg/kg	0.1	0.1	0.1	0.1	0.1
Benzo(a)pyrene TEQ calc (PQL)	mg/kg	0.2	0.2	0.2	0.2	0.2
Surrogate <i>p</i> -Terphenyl-d ₁₄	%	100	80	86	90	88

PAHs in Soil						
Our Reference		14823-68	14823-72	14823-76	14823-84	14823-86
Your Reference	UNITS	BH40_0.1	BH42_0.1	BH44_0.1	BH48_0.1	BH49_0.1
Date Sampled		06/09/2018	06/09/2018	06/09/2018	06/09/2018	06/09/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	12/09/2018	12/09/2018	12/09/2018	12/09/2018	12/09/2018
Date analysed	-	15/09/2018	15/09/2018	15/09/2018	15/09/2018	15/09/2018
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j&k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene TEQ calc (Zero)	mg/kg	0	0	0	0	0
Benzo(a)pyrene TEQ calc (Half)	mg/kg	0.1	0.1	0.1	0.1	0.1
Benzo(a)pyrene TEQ calc (PQL)	mg/kg	0.2	0.2	0.2	0.2	0.2
Surrogate <i>p</i> -Terphenyl-d ₁₄	%	82	86	96	88	84

Speciated Phenols in Soil						
Our Reference		14823-1	14823-16	14823-29	14823-44	14823-58
Your Reference	UNITS	TP01_0.1	TP13_0.1	TP21_0.1	TP29_0.1	BH35_0.1
Date Sampled		06/09/2018	06/09/2018	06/09/2018	06/09/2018	06/09/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	12/09/2018	12/09/2018	12/09/2018	12/09/2018	12/09/2018
Date analysed	-	18/09/2018	18/09/2018	18/09/2018	18/09/2018	18/09/2018
Phenol	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
2-Chlorophenol	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
2-Methylphenol	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
3/4-Methylphenol	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
2-Nitrophenol	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
2,4-Dimethylphenol	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
2,4-Dichlorophenol	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
2,6-Dichlorophenol	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
2,4,5-Trichlorophenol	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
2,4,6-Trichlorophenol	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
2,4-Dinitrophenol	mg/kg	<2	<2	<2	<2	<2
4-Nitrophenol	mg/kg	<4	<4	<4	<4	<4
2,3,4,6-Tetrachlorophenol	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Pentachlorophenol	mg/kg	<1	<1	<1	<1	<1
4-Chloro-3-Methylphenol	mg/kg	<2	<2	<2	<2	<2
Total +ve Cresols	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Total +ve Phenols	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Surrogate Phenol-d ₆	%	88	90	86	90	80

OCP in Soil - NEPM						
Our Reference		14823-1	14823-16	14823-29	14823-44	14823-58
Your Reference	UNITS	TP01_0.1	TP13_0.1	TP21_0.1	TP29_0.1	BH35_0.1
Date Sampled		06/09/2018	06/09/2018	06/09/2018	06/09/2018	06/09/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	12/09/2018	12/09/2018	12/09/2018	12/09/2018	12/09/2018
Date analysed	-	18/09/2018	18/09/2018	18/09/2018	18/09/2018	18/09/2018
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Hexachlorobenzene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve reported Aldrin + Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve reported DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Mirex	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Toxaphene	mg/kg	<2	<2	<2	<2	<2
Surrogate <i>p</i> -Terphenyl-d ₁₄	%	90	86	86	94	86

OP in Soil - NEPM						
Our Reference		14823-1	14823-16	14823-29	14823-44	14823-58
Your Reference	UNITS	TP01_0.1	TP13_0.1	TP21_0.1	TP29_0.1	BH35_0.1
Date Sampled		06/09/2018	06/09/2018	06/09/2018	06/09/2018	06/09/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	12/09/2018	12/09/2018	12/09/2018	12/09/2018	12/09/2018
Date analysed	-	18/09/2018	18/09/2018	18/09/2018	18/09/2018	18/09/2018
Chlorpyrifos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate <i>p</i> -Terphenyl-d ₁₄	%	90	86	86	94	86

PCBs in Soil						
Our Reference		14823-1	14823-16	14823-29	14823-44	14823-53
Your Reference	UNITS	TP01_0.1	TP13_0.1	TP21_0.1	TP29_0.1	BH16_0.1
Date Sampled		06/09/2018	06/09/2018	06/09/2018	06/09/2018	06/09/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	12/09/2018	12/09/2018	12/09/2018	12/09/2018	12/09/2018
Date analysed	-	18/09/2018	18/09/2018	18/09/2018	18/09/2018	18/09/2018
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate <i>p</i> -Terphenyl-d ₁₄	%	90	86	86	94	96

PCBs in Soil		
Our Reference		14823-58
Your Reference	UNITS	BH35_0.1
Date Sampled		06/09/2018
Type of sample		Soil
Date extracted	-	12/09/2018
Date analysed	-	18/09/2018
Aroclor 1016	mg/kg	<0.1
Aroclor 1221	mg/kg	<0.1
Aroclor 1232	mg/kg	<0.1
Aroclor 1242	mg/kg	<0.1
Aroclor 1248	mg/kg	<0.1
Aroclor 1254	mg/kg	<0.1
Aroclor 1260	mg/kg	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1
Surrogate <i>p</i> -Terphenyl-d ₁₄	%	86

Synthetic Pyrethroids - NEPM

Our Reference		14823-1	14823-16	14823-29	14823-44	14823-58
Your Reference	UNITS	TP01_0.1	TP13_0.1	TP21_0.1	TP29_0.1	BH35_0.1
Date Sampled		06/09/2018	06/09/2018	06/09/2018	06/09/2018	06/09/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	12/09/2018	12/09/2018	12/09/2018	12/09/2018	12/09/2018
Date analysed	-	18/09/2018	18/09/2018	18/09/2018	18/09/2018	18/09/2018
Bifenthrin	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5

Triazine Herbicides in Soil						
Our Reference		14823-1	14823-16	14823-29	14823-44	14823-58
Your Reference	UNITS	TP01_0.1	TP13_0.1	TP21_0.1	TP29_0.1	BH35_0.1
Date Sampled		06/09/2018	06/09/2018	06/09/2018	06/09/2018	06/09/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	12/09/2018	12/09/2018	12/09/2018	12/09/2018	12/09/2018
Date analysed	-	18/09/2018	18/09/2018	18/09/2018	18/09/2018	18/09/2018
Atrazine	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5

Phenoxy Acid Herbicides in Soil						
Our Reference		14823-1	14823-16	14823-29	14823-44	14823-58
Your Reference	UNITS	TP01_0.1	TP13_0.1	TP21_0.1	TP29_0.1	BH35_0.1
Date Sampled		06/09/2018	06/09/2018	06/09/2018	06/09/2018	06/09/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Extracted	-	14/09/2018	14/09/2018	14/09/2018	14/09/2018	14/09/2018
Date analysed	-	15/09/2018	15/09/2018	15/09/2018	15/09/2018	15/09/2018
Clopyralid	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
3,5-Dichlorobenzoic acid	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
o-Chlorophenoxy acetic acid	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
4-CPA	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Dicamba	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Mecoprop	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
MCPA	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Dichloroprop	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2,4-D	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Bromoxynil	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Triclopyr	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2,4,5-TP (Silvex)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2,4,5-T	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
MCPB	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Dinoseb	mg/kg	<1	<1	<1	<1	<1
2,4-DB	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ioxynil	mg/kg	<1	<1	<1	<1	<1
Picloram	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
DCPA (Chlorthal) Diacid	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acifluorfen	mg/kg	<2	<2	<2	<2	<2
2,4,6-T	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2,6-D	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate: 2,4-DCPA	%	98	93	95	87	92

NEPM screen metals in soil

Our Reference		14823-1	14823-2	14823-3	14823-5	14823-7
Your Reference	UNITS	TP01_0.1	TP02_0.1	TP05_0.1	TP06_0.1	TP07_0.1
Date Sampled		06/09/2018	06/09/2018	06/09/2018	06/09/2018	06/09/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	-	13/09/2018	13/09/2018	13/09/2018	13/09/2018	13/09/2018
Date analysed	-	13/09/2018	13/09/2018	13/09/2018	13/09/2018	13/09/2018
Arsenic	mg/kg	19	<4	9	14	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	27	16	24	7	13
Copper	mg/kg	4	6	7	7	2
Lead	mg/kg	10	9	7	11	8
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	5	5	5	5	4
Zinc	mg/kg	8	21	4	14	7
Beryllium	mg/kg	<1	[NA]	[NA]	[NA]	[NA]
Boron	mg/kg	<3	[NA]	[NA]	[NA]	[NA]
Cobalt	mg/kg	2	[NA]	[NA]	[NA]	[NA]
Manganese	mg/kg	43	[NA]	[NA]	[NA]	[NA]
Selenium	mg/kg	<2	[NA]	[NA]	[NA]	[NA]

NEPM screen metals in soil

Our Reference		14823-9	14823-10	14823-12	14823-14	14823-16
Your Reference	UNITS	TP08_0.1	TP10_0.1	TP11_0.1	TP12_0.1	TP13_0.1
Date Sampled		06/09/2018	06/09/2018	06/09/2018	06/09/2018	06/09/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	-	13/09/2018	13/09/2018	13/09/2018	13/09/2018	13/09/2018
Date analysed	-	13/09/2018	13/09/2018	13/09/2018	13/09/2018	13/09/2018
Arsenic	mg/kg	<4	<4	<4	10	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	80	100	78	17	11
Copper	mg/kg	22	31	26	6	1
Lead	mg/kg	10	9	7	17	8
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	26	82	51	7	3
Zinc	mg/kg	27	38	26	10	4
Beryllium	mg/kg	[NA]	[NA]	[NA]	[NA]	<1
Boron	mg/kg	[NA]	[NA]	[NA]	[NA]	<3
Cobalt	mg/kg	[NA]	[NA]	[NA]	[NA]	2
Manganese	mg/kg	[NA]	[NA]	[NA]	[NA]	42
Selenium	mg/kg	[NA]	[NA]	[NA]	[NA]	<2

NEPM screen metals in soil

Our Reference		14823-18	14823-20	14823-21	14823-23	14823-25
Your Reference	UNITS	TP14_0.1	TP15_0.1	TP17_0.1	TP18_0.1	TP19_0.1
Date Sampled		06/09/2018	06/09/2018	06/09/2018	06/09/2018	06/09/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	-	13/09/2018	13/09/2018	13/09/2018	13/09/2018	13/09/2018
Date analysed	-	13/09/2018	13/09/2018	13/09/2018	13/09/2018	13/09/2018
Arsenic	mg/kg	<4	<4	14	<4	24
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	18	76	22	34	12
Copper	mg/kg	4	27	5	4	1
Lead	mg/kg	12	7	9	10	7
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	10	42	6	7	3
Zinc	mg/kg	19	28	9	8	3

NEPM screen metals in soil

Our Reference		14823-27	14823-29	14823-31	14823-33	14823-35
Your Reference	UNITS	TP20_0.1	TP21_0.1	TP22_0.1	TP23_0.1	TP24_0.1
Date Sampled		06/09/2018	06/09/2018	06/09/2018	06/09/2018	06/09/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	-	13/09/2018	13/09/2018	13/09/2018	13/09/2018	13/09/2018
Date analysed	-	13/09/2018	13/09/2018	13/09/2018	13/09/2018	13/09/2018
Arsenic	mg/kg	<4	6	5	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	8	10	33	14	9
Copper	mg/kg	4	5	12	3	3
Lead	mg/kg	8	9	9	9	7
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	5	5	11	4	3
Zinc	mg/kg	12	17	13	4	4
Beryllium	mg/kg	[NA]	<1	[NA]	[NA]	[NA]
Boron	mg/kg	[NA]	<3	[NA]	[NA]	[NA]
Cobalt	mg/kg	[NA]	2	[NA]	[NA]	[NA]
Manganese	mg/kg	[NA]	71	[NA]	[NA]	[NA]
Selenium	mg/kg	[NA]	<2	[NA]	[NA]	[NA]

NEPM screen metals in soil

Our Reference		14823-36	14823-38	14823-40	14823-42	14823-44
Your Reference	UNITS	TP25_0.1	TP26_0.1	TP27_0.1	TP28_0.1	TP29_0.1
Date Sampled		06/09/2018	06/09/2018	06/09/2018	06/09/2018	06/09/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	-	13/09/2018	13/09/2018	13/09/2018	13/09/2018	13/09/2018
Date analysed	-	13/09/2018	13/09/2018	13/09/2018	13/09/2018	13/09/2018
Arsenic	mg/kg	<4	<4	6	6	17
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	20	27	17	16	26
Copper	mg/kg	4	6	2	2	5
Lead	mg/kg	29	8	14	9	9
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	9	7	3	3	6
Zinc	mg/kg	20	12	3	6	19
Beryllium	mg/kg	[NA]	[NA]	[NA]	[NA]	<1
Boron	mg/kg	[NA]	[NA]	[NA]	[NA]	<3
Cobalt	mg/kg	[NA]	[NA]	[NA]	[NA]	8
Manganese	mg/kg	[NA]	[NA]	[NA]	[NA]	77
Selenium	mg/kg	[NA]	[NA]	[NA]	[NA]	<2

NEPM screen metals in soil

Our Reference		14823-46	14823-48	14823-50	14823-54	14823-56
Your Reference	UNITS	TP31_0.1	TP32_0.1	BH04_0.1	BH33_0.1	BH34_0.1
Date Sampled		06/09/2018	06/09/2018	06/09/2018	06/09/2018	06/09/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	-	13/09/2018	13/09/2018	13/09/2018	13/09/2018	13/09/2018
Date analysed	-	13/09/2018	13/09/2018	13/09/2018	13/09/2018	13/09/2018
Arsenic	mg/kg	5	<4	<4	17	31
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	13	9	110	41	24
Copper	mg/kg	3	4	53	18	12
Lead	mg/kg	11	13	11	37	35
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	5	5	74	19	10
Zinc	mg/kg	8	14	94	290	59

NEPM screen metals in soil

Our Reference		14823-58	14823-60	14823-62	14823-64	14823-66
Your Reference	UNITS	BH35_0.1	BH36_0.1	BH37_0.1	BH38_0.1	BH39_0.1
Date Sampled		06/09/2018	06/09/2018	06/09/2018	06/09/2018	06/09/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	-	13/09/2018	13/09/2018	13/09/2018	13/09/2018	13/09/2018
Date analysed	-	13/09/2018	13/09/2018	13/09/2018	13/09/2018	13/09/2018
Arsenic	mg/kg	4	<4	<4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	26	20	77	120	170
Copper	mg/kg	5	4	24	33	48
Lead	mg/kg	12	29	7	10	8
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	5	4	57	71	120
Zinc	mg/kg	23	14	20	70	61
Beryllium	mg/kg	<1	[NA]	[NA]	[NA]	[NA]
Boron	mg/kg	<3	[NA]	[NA]	[NA]	[NA]
Cobalt	mg/kg	2	[NA]	[NA]	[NA]	[NA]
Manganese	mg/kg	40	[NA]	[NA]	[NA]	[NA]
Selenium	mg/kg	<2	[NA]	[NA]	[NA]	[NA]

NEPM screen metals in soil

Our Reference		14823-68	14823-70	14823-72	14823-74	14823-76
Your Reference	UNITS	BH40_0.1	BH41_0.1	BH42_0.1	BH43_0.1	BH44_0.1
Date Sampled		06/09/2018	06/09/2018	06/09/2018	06/09/2018	06/09/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	-	13/09/2018	13/09/2018	13/09/2018	13/09/2018	13/09/2018
Date analysed	-	13/09/2018	13/09/2018	13/09/2018	13/09/2018	13/09/2018
Arsenic	mg/kg	<4	<4	<4	<4	54
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	130	240	120	160	42
Copper	mg/kg	23	68	45	39	16
Lead	mg/kg	14	7	7	8	16
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	53	230	67	92	23
Zinc	mg/kg	58	140	170	54	27

NEPM screen metals in soil

Our Reference		14823-78	14823-80	14823-82	14823-84	14823-86
Your Reference	UNITS	BH45_0.1	BH46_0.1	BH47_0.1	BH48_0.1	BH49_0.1
Date Sampled		06/09/2018	06/09/2018	06/09/2018	06/09/2018	06/09/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	-	13/09/2018	13/09/2018	13/09/2018	13/09/2018	13/09/2018
Date analysed	-	13/09/2018	13/09/2018	13/09/2018	13/09/2018	13/09/2018
Arsenic	mg/kg	7	[NA]	[NA]	7	5
Cadmium	mg/kg	<0.4	[NA]	[NA]	<0.4	<0.4
Chromium	mg/kg	36	[NA]	[NA]	51	52
Copper	mg/kg	12	[NA]	[NA]	16	4
Lead	mg/kg	3	[NA]	[NA]	7	6
Mercury	mg/kg	<0.1	[NA]	[NA]	<0.1	<0.1
Nickel	mg/kg	18	[NA]	[NA]	22	4
Zinc	mg/kg	14	[NA]	[NA]	24	22
Phosphorus	mg/kg	[NA]	4,100	430	320	93

NEPM screen metals in soil

Our Reference		14823-88	14823-92	14823-93	14823-94
Your Reference	UNITS	BH50_0.1	Dup01	Dup02	Dup03
Date Sampled		06/09/2018	06/09/2018	06/09/2018	06/09/2018
Type of sample		Soil	Soil	Soil	Soil
Date digested	-	13/09/2018	13/09/2018	13/09/2018	13/09/2018
Date analysed	-	13/09/2018	13/09/2018	13/09/2018	13/09/2018
Arsenic	mg/kg	7	<4	85	7
Cadmium	mg/kg	<0.4	<0.4	0.4	<0.4
Chromium	mg/kg	64	140	45	20
Copper	mg/kg	21	23	16	13
Lead	mg/kg	7	15	12	5
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	26	52	21	10
Zinc	mg/kg	59	58	30	34
Phosphorus	mg/kg	850	[NA]	[NA]	[NA]

Misc Inorg - soil NEPM

Our Reference		14823-1	14823-2	14823-3	14823-5	14823-7
Your Reference	UNITS	TP01_0.1	TP02_0.1	TP05_0.1	TP06_0.1	TP07_0.1
Date Sampled		06/09/2018	06/09/2018	06/09/2018	06/09/2018	06/09/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	14/09/2018	14/09/2018	14/09/2018	14/09/2018	14/09/2018
Date analysed	-	14/09/2018	14/09/2018	14/09/2018	14/09/2018	14/09/2018
Free Cyanide in soil	mg/kg	<0.5	[NA]	[NA]	[NA]	[NA]
Hexavalent Chromium, Cr ⁶⁺	mg/kg	<1	[NA]	[NA]	[NA]	[NA]
pH 1:5 soil:water	pH Units	[NA]	5.7	6.2	5.1	5.7

Misc Inorg - soil NEPM

Our Reference		14823-10	14823-12	14823-14	14823-16	14823-18
Your Reference	UNITS	TP10_0.1	TP11_0.1	TP12_0.1	TP13_0.1	TP14_0.1
Date Sampled		06/09/2018	06/09/2018	06/09/2018	06/09/2018	06/09/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	14/09/2018	14/09/2018	14/09/2018	14/09/2018	14/09/2018
Date analysed	-	14/09/2018	14/09/2018	14/09/2018	14/09/2018	14/09/2018
Free Cyanide in soil	mg/kg	[NA]	[NA]	[NA]	<0.5	[NA]
Hexavalent Chromium, Cr ⁶⁺	mg/kg	[NA]	[NA]	[NA]	<1	[NA]
pH 1:5 soil:water	pH Units	6.0	6.7	5.8	[NA]	5.9

Misc Inorg - soil NEPM

Our Reference		14823-20	14823-21	14823-23	14823-25	14823-27
Your Reference	UNITS	TP15_0.1	TP17_0.1	TP18_0.1	TP19_0.1	TP20_0.1
Date Sampled		06/09/2018	06/09/2018	06/09/2018	06/09/2018	06/09/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	14/09/2018	14/09/2018	14/09/2018	14/09/2018	14/09/2018
Date analysed	-	14/09/2018	14/09/2018	14/09/2018	14/09/2018	14/09/2018
pH 1:5 soil:water	pH Units	6.3	6.2	5.6	5.8	5.7

Misc Inorg - soil NEPM

Our Reference		14823-29	14823-31	14823-33	14823-35	14823-36
Your Reference	UNITS	TP21_0.1	TP22_0.1	TP23_0.1	TP24_0.1	TP25_0.1
Date Sampled		06/09/2018	06/09/2018	06/09/2018	06/09/2018	06/09/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	14/09/2018	14/09/2018	14/09/2018	14/09/2018	14/09/2018
Date analysed	-	14/09/2018	14/09/2018	14/09/2018	14/09/2018	14/09/2018
Free Cyanide in soil	mg/kg	<0.5	[NA]	[NA]	[NA]	[NA]
Hexavalent Chromium, Cr ⁶⁺	mg/kg	<1	[NA]	[NA]	[NA]	[NA]
pH 1:5 soil:water	pH Units	[NA]	6.3	5.9	5.6	4.5

Misc Inorg - soil NEPM

Our Reference		14823-38	14823-40	14823-42	14823-44	14823-46
Your Reference	UNITS	TP26_0.1	TP27_0.1	TP28_0.1	TP29_0.1	TP31_0.1
Date Sampled		06/09/2018	06/09/2018	06/09/2018	06/09/2018	06/09/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	14/09/2018	14/09/2018	14/09/2018	14/09/2018	14/09/2018
Date analysed	-	14/09/2018	14/09/2018	14/09/2018	14/09/2018	14/09/2018
Free Cyanide in soil	mg/kg	[NA]	[NA]	[NA]	<0.5	[NA]
Hexavalent Chromium, Cr ⁶⁺	mg/kg	[NA]	[NA]	[NA]	<1	[NA]
pH 1:5 soil:water	pH Units	6.5	6.0	5.7	[NA]	5.5

Misc Inorg - soil NEPM

Our Reference		14823-48	14823-50	14823-54	14823-56	14823-58
Your Reference	UNITS	TP32_0.1	BH04_0.1	BH33_0.1	BH34_0.1	BH35_0.1
Date Sampled		06/09/2018	06/09/2018	06/09/2018	06/09/2018	06/09/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	14/09/2018	14/09/2018	14/09/2018	14/09/2018	14/09/2018
Date analysed	-	14/09/2018	14/09/2018	14/09/2018	14/09/2018	14/09/2018
Free Cyanide in soil	mg/kg	[NA]	[NA]	[NA]	[NA]	.0.0
Hexavalent Chromium, Cr ⁶⁺	mg/kg	[NA]	[NA]	[NA]	[NA]	<1
pH 1:5 soil:water	pH Units	5.4	7.6	6.3	6.6	[NA]

Misc Inorg - soil NEPM

Our Reference		14823-60	14823-62	14823-64	14823-66	14823-68
Your Reference	UNITS	BH36_0.1	BH37_0.1	BH38_0.1	BH39_0.1	BH40_0.1
Date Sampled		06/09/2018	06/09/2018	06/09/2018	06/09/2018	06/09/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	14/09/2018	14/09/2018	14/09/2018	14/09/2018	14/09/2018
Date analysed	-	14/09/2018	14/09/2018	14/09/2018	14/09/2018	14/09/2018
pH 1:5 soil:water	pH Units	5.6	5.3	6.1	6.2	6.6

Misc Inorg - soil NEPM

Our Reference		14823-70	14823-72	14823-74	14823-76	14823-78
Your Reference	UNITS	BH41_0.1	BH42_0.1	BH43_0.1	BH44_0.1	BH45_0.1
Date Sampled		06/09/2018	06/09/2018	06/09/2018	06/09/2018	06/09/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	14/09/2018	14/09/2018	14/09/2018	14/09/2018	14/09/2018
Date analysed	-	14/09/2018	14/09/2018	14/09/2018	14/09/2018	14/09/2018
pH 1:5 soil:water	pH Units	5.0	5.7	5.1	4.9	8.5

Misc Inorg - soil NEPM						
Our Reference		14823-80	14823-82	14823-84	14823-86	14823-88
Your Reference	UNITS	BH46_0.1	BH47_0.1	BH48_0.1	BH49_0.1	BH50_0.1
Date Sampled		06/09/2018	06/09/2018	06/09/2018	06/09/2018	06/09/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	14/09/2018	14/09/2018	14/09/2018	14/09/2018	14/09/2018
Date analysed	-	14/09/2018	14/09/2018	14/09/2018	14/09/2018	14/09/2018
pH 1:5 soil:water	pH Units	7.8	5.3	4.4	4.3	4.9
TKN as N in soil	mg/kg	2,600	1,600	1,100	710	6,100
Nitrate as N in soil	mg/kg	2.2	<0.5	<0.5	7.7	1.3
Organic Nitrogen as N	mg/kg	2,600	1,600	1,100	700	6,100
Ammonia as N in soil	mg/kg	18	9.5	4.8	7.0	37
Phosphate as P in soil	mg/kg	12	0.9	0.5	<0.5	2
Nitrite as N in soil	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1

Moisture						
Our Reference	UNITS	14823-1	14823-2	14823-3	14823-5	14823-7
Your Reference		TP01_0.1	TP02_0.1	TP05_0.1	TP06_0.1	TP07_0.1
Date Sampled		06/09/2018	06/09/2018	06/09/2018	06/09/2018	06/09/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	12/09/2018	12/09/2018	12/09/2018	12/09/2018	12/09/2018
Date analysed	-	13/09/2018	13/09/2018	13/09/2018	13/09/2018	13/09/2018
Moisture	%	22	15	21	13	17

Moisture						
Our Reference	UNITS	14823-9	14823-10	14823-12	14823-14	14823-16
Your Reference		TP08_0.1	TP10_0.1	TP11_0.1	TP12_0.1	TP13_0.1
Date Sampled		06/09/2018	06/09/2018	06/09/2018	06/09/2018	06/09/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	12/09/2018	12/09/2018	12/09/2018	12/09/2018	12/09/2018
Date analysed	-	13/09/2018	13/09/2018	13/09/2018	13/09/2018	13/09/2018
Moisture	%	29	18	16	25	15

Moisture						
Our Reference	UNITS	14823-18	14823-20	14823-21	14823-23	14823-25
Your Reference		TP14_0.1	TP15_0.1	TP17_0.1	TP18_0.1	TP19_0.1
Date Sampled		06/09/2018	06/09/2018	06/09/2018	06/09/2018	06/09/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	12/09/2018	12/09/2018	12/09/2018	12/09/2018	12/09/2018
Date analysed	-	13/09/2018	13/09/2018	13/09/2018	13/09/2018	13/09/2018
Moisture	%	20	29	19	24	16

Moisture						
Our Reference	UNITS	14823-27	14823-29	14823-31	14823-33	14823-35
Your Reference		TP20_0.1	TP21_0.1	TP22_0.1	TP23_0.1	TP24_0.1
Date Sampled		06/09/2018	06/09/2018	06/09/2018	06/09/2018	06/09/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	12/09/2018	12/09/2018	12/09/2018	12/09/2018	12/09/2018
Date analysed	-	13/09/2018	13/09/2018	13/09/2018	13/09/2018	13/09/2018
Moisture	%	22	28	24	22	17

Moisture						
Our Reference	UNITS	14823-36	14823-38	14823-40	14823-42	14823-44
Your Reference		TP25_0.1	TP26_0.1	TP27_0.1	TP28_0.1	TP29_0.1
Date Sampled		06/09/2018	06/09/2018	06/09/2018	06/09/2018	06/09/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	12/09/2018	12/09/2018	12/09/2018	12/09/2018	12/09/2018
Date analysed	-	13/09/2018	13/09/2018	13/09/2018	13/09/2018	13/09/2018
Moisture	%	22	18	12	24	19

Moisture						
Our Reference	UNITS	14823-46	14823-48	14823-50	14823-52	14823-53
Your Reference		TP31_0.1	TP32_0.1	BH04_0.1	BH09_0.1	BH16_0.1
Date Sampled		06/09/2018	06/09/2018	06/09/2018	06/09/2018	06/09/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	12/09/2018	12/09/2018	12/09/2018	12/09/2018	12/09/2018
Date analysed	-	13/09/2018	13/09/2018	13/09/2018	13/09/2018	13/09/2018
Moisture	%	25	28	26	8.2	62

Moisture						
Our Reference	UNITS	14823-54	14823-56	14823-58	14823-60	14823-62
Your Reference		BH33_0.1	BH34_0.1	BH35_0.1	BH36_0.1	BH37_0.1
Date Sampled		06/09/2018	06/09/2018	06/09/2018	06/09/2018	06/09/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	12/09/2018	12/09/2018	12/09/2018	12/09/2018	12/09/2018
Date analysed	-	13/09/2018	13/09/2018	13/09/2018	13/09/2018	13/09/2018
Moisture	%	27	17	9.8	15	17

Moisture						
Our Reference	UNITS	14823-64	14823-66	14823-68	14823-70	14823-72
Your Reference		BH38_0.1	BH39_0.1	BH40_0.1	BH41_0.1	BH42_0.1
Date Sampled		06/09/2018	06/09/2018	06/09/2018	06/09/2018	06/09/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	12/09/2018	12/09/2018	12/09/2018	12/09/2018	12/09/2018
Date analysed	-	13/09/2018	13/09/2018	13/09/2018	13/09/2018	13/09/2018
Moisture	%	21	21	21	25	30

Moisture						
Our Reference	UNITS	14823-74	14823-76	14823-78	14823-80	14823-82
Your Reference		BH43_0.1	BH44_0.1	BH45_0.1	BH46_0.1	BH47_0.1
Date Sampled		06/09/2018	06/09/2018	06/09/2018	06/09/2018	06/09/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	12/09/2018	12/09/2018	12/09/2018	12/09/2018	12/09/2018
Date analysed	-	13/09/2018	13/09/2018	13/09/2018	13/09/2018	13/09/2018
Moisture	%	20	14	14	20	11

Moisture						
Our Reference	UNITS	14823-84	14823-86	14823-88	14823-90	14823-92
Your Reference		BH48_0.1	BH49_0.1	BH50_0.1	BH51_0.1	Dup01
Date Sampled		06/09/2018	06/09/2018	06/09/2018	06/09/2018	06/09/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	12/09/2018	12/09/2018	12/09/2018	12/09/2018	12/09/2018
Date analysed	-	13/09/2018	13/09/2018	13/09/2018	13/09/2018	13/09/2018
Moisture	%	21	19	22	24	22

Moisture			
Our Reference		14823-93	14823-94
Your Reference	UNITS	Dup02	Dup03
Date Sampled		06/09/2018	06/09/2018
Type of sample		Soil	Soil
Date prepared	-	12/09/2018	12/09/2018
Date analysed	-	13/09/2018	13/09/2018
Moisture	%	13	12

vTRH(C6-C10)/BTEXN in Water			
Our Reference		14823-95	14823-96
Your Reference	UNITS	Trip	Rinsate
Date Sampled		06/09/2018	06/09/2018
Type of sample		Water	Water
Date extracted	-	10/09/2018	10/09/2018
Date analysed	-	10/09/2018	10/09/2018
TRH C ₆ - C ₉	µg/L	<10	<10
TRH C ₆ - C ₁₀	µg/L	<10	<10
TRH C ₆ - C ₁₀ less BTEX (F1)	µg/L	<10	<10
Benzene	µg/L	<1	<1
Toluene	µg/L	<1	<1
Ethylbenzene	µg/L	<1	<1
m+p-xylene	µg/L	<2	<2
o-xylene	µg/L	<1	<1
Naphthalene	µg/L	<1	<1
Surrogate Dibromofluoromethane	%	101	104
Surrogate toluene-d8	%	99	100
Surrogate 4-BFB	%	96	96

TRH Water(C10-C40) NEPM		
Our Reference		14823-96
Your Reference	UNITS	Rinsate
Date Sampled		06/09/2018
Type of sample		Water
Date extracted	-	11/09/2018
Date analysed	-	12/09/2018
TRH C ₁₀ - C ₁₄	µg/L	<50
TRH C ₁₅ - C ₂₈	µg/L	<100
TRH C ₂₉ - C ₃₆	µg/L	<100
TRH >C ₁₀ - C ₁₆	µg/L	<50
TRH >C ₁₀ - C ₁₆ less Naphthalene (F2)	µg/L	<50
TRH >C ₁₆ - C ₃₄	µg/L	<100
TRH >C ₃₄ - C ₄₀	µg/L	<100
Surrogate o-Terphenyl	%	85

Method ID	Methodology Summary
Inorg-001	pH - Measured using pH meter and electrode in accordance with APHA latest edition, 4500-H+. Please note that the results for water analyses are indicative only as analysis outside of the APHA storage times.
Inorg-008	Moisture content determined by heating at 105 deg C for a minimum of 12 hours.
Inorg-013	Cyanide - total determined colourimetrically after distillation, based on APHA latest edition, 4500-CN_C,E. Free cyanide determined colourimetrically after filtration and confirmed by diffusion. Solids are extracted in a caustic media prior to distillation and analysis.
Inorg-024	Hexavalent Chromium (Cr6+) - determined colourimetrically by discrete analyser.
Inorg-055	Nitrate - determined colourimetrically. Soils are analysed following a water extraction.
Inorg-055	Nitrite - determined colourimetrically based on APHA latest edition NO2- B. Soils are analysed following a water extraction.
Inorg-057	Ammonia - determined colourimetrically based on EPA350.1 and APHA latest edition 4500-NH3 F, Soils are analysed following a KCl extraction.
Inorg-060	Phosphate determined colourimetrically based on EPA365.1 and APHA latest edition 4500 P E. Soils are analysed following a water extraction.
Inorg-062	TKN - determined colourimetrically based on APHA latest edition 4500 Norg.
Metals-020 ICP-AES	Determination of various metals by ICP-AES.
Metals-021 CV-AAS	Determination of Mercury by Cold Vapour AAS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis. Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40).
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS.
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Note, For OCs the Total +ve reported DDD+DDE+DDT PQL is reflective of the lowest individual PQL and is therefore simply a sum of the positive individually report DDD+DDE+DDT.
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Note, the Total +ve Cresols or Phenols PQL is reflective of the lowest individual PQL and is therefore "Total +ve Cresols or Phenols" is simply a sum of the positive individual Cresols or Phenols.

Method ID	Methodology Summary
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013. For soil results:- 1. 'EQ PQL' values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. 'EQ zero' values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. 'EQ half PQL' values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore "Total +ve PAHs" is simply a sum of the positive individual PAHs.
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS.
Org-012	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD or GC-MS. Note, the Total +ve PCBs PQL is reflective of the lowest individual PQL and is therefore "Total +ve PCBs" is simply a sum of the positive individual PCBs.
Org-013	Water samples are analysed directly by purge and trap GC-MS.
Org-014	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater. Note, the Total +ve Xylene PQL is reflective of the lowest individual PQL and is therefore "Total +ve Xylenes" is simply a sum of the positive individual Xylenes.
ORG-031	Acid herbicides and speciated phenols in soil by DCM:Acetone extraction with derivatisation and determination by GC-MS. Haloacetic acids in waters are derivatised and analysed by GC-ECD. Acid herbicides, speciated phenols, carbamates and ureas in water by DCM extraction with derivatisation and determination by GC-MS. Analysed by MPL, NATA accreditation 2901.

QUALITY CONTROL: VOCs in soil					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	14823-29
Date extracted	-			12/09/2018	1	12/09/2018	12/09/2018		12/09/2018	12/09/2018
Date analysed	-			12/09/2018	1	12/09/2018	12/09/2018		12/09/2018	13/09/2018
Dichlorodifluoromethane	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
Chloromethane	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
Vinyl Chloride	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
Bromomethane	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
Chloroethane	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
Trichlorofluoromethane	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
1,1-Dichloroethene	mg/kg	0.5	Org-014	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
trans-1,2-dichloroethene	mg/kg	0.5	Org-014	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
1,1-dichloroethane	mg/kg	0.5	Org-014	<0.5	1	<0.5	<0.5	0	72	65
cis-1,2-dichloroethene	mg/kg	0.5	Org-014	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
bromochloromethane	mg/kg	0.5	Org-014	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
chloroform	mg/kg	0.5	Org-014	<0.5	1	<0.5	<0.5	0	74	68
2,2-dichloropropane	mg/kg	0.5	Org-014	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
1,2-dichloroethane	mg/kg	0.5	Org-014	<0.5	1	<0.5	<0.5	0	74	67
1,1,1-trichloroethane	mg/kg	0.5	Org-014	<0.5	1	<0.5	<0.5	0	72	65
1,1-dichloropropene	mg/kg	0.5	Org-014	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
Cyclohexane	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
carbon tetrachloride	mg/kg	0.5	Org-014	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
Benzene	mg/kg	0.2	Org-014	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
dibromomethane	mg/kg	0.5	Org-014	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
1,2-dichloropropane	mg/kg	0.5	Org-014	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
trichloroethene	mg/kg	0.5	Org-014	<0.5	1	<0.5	<0.5	0	80	74
bromodichloromethane	mg/kg	0.5	Org-014	<0.5	1	<0.5	<0.5	0	73	67
trans-1,3-dichloropropene	mg/kg	0.5	Org-014	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
cis-1,3-dichloropropene	mg/kg	0.5	Org-014	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
1,1,2-trichloroethane	mg/kg	0.5	Org-014	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
Toluene	mg/kg	0.5	Org-014	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
1,3-dichloropropane	mg/kg	0.5	Org-014	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
dibromochloromethane	mg/kg	0.5	Org-014	<0.5	1	<0.5	<0.5	0	74	66
1,2-dibromoethane	mg/kg	0.5	Org-014	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
Tetrachloroethene	mg/kg	0.5	Org-014	<0.5	1	<0.5	<0.5	0	76	68
1,1,1,2-tetrachloroethane	mg/kg	0.5	Org-014	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
chlorobenzene	mg/kg	0.5	Org-014	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
Ethylbenzene	mg/kg	0.5	Org-014	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
bromoform	mg/kg	0.5	Org-014	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
m+p-xylene	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
styrene	mg/kg	0.5	Org-014	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
1,1,2,2-tetrachloroethane	mg/kg	0.5	Org-014	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
o-Xylene	mg/kg	0.5	Org-014	<0.5	1	<0.5	<0.5	0	[NT]	[NT]

QUALITY CONTROL: VOCs in soil					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	14823-29
1,2,3-trichloropropane	mg/kg	0.5	Org-014	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
isopropylbenzene	mg/kg	0.5	Org-014	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
bromobenzene	mg/kg	0.5	Org-014	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
n-propyl benzene	mg/kg	0.5	Org-014	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
2-chlorotoluene	mg/kg	0.5	Org-014	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
4-chlorotoluene	mg/kg	0.5	Org-014	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
1,3,5-trimethyl benzene	mg/kg	0.5	Org-014	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
tert-butyl benzene	mg/kg	0.5	Org-014	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
1,2,4-trimethyl benzene	mg/kg	0.5	Org-014	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
1,3-dichlorobenzene	mg/kg	0.5	Org-014	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
sec-butyl benzene	mg/kg	0.5	Org-014	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
1,4-dichlorobenzene	mg/kg	0.5	Org-014	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
4-isopropyl toluene	mg/kg	0.5	Org-014	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
1,2-dichlorobenzene	mg/kg	0.5	Org-014	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
n-butyl benzene	mg/kg	0.5	Org-014	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
1,2-dibromo-3-chloropropane	mg/kg	0.5	Org-014	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
1,2,4-trichlorobenzene	mg/kg	0.5	Org-014	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
hexachlorobutadiene	mg/kg	0.5	Org-014	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
1,2,3-trichlorobenzene	mg/kg	0.5	Org-014	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-014	101	1	100	98	2	100	98
Surrogate aaa-Trifluorotoluene	%		Org-014	110	1	85	103	19	115	88
Surrogate Toluene-d ₈	%		Org-014	99	1	98	98	0	100	98
Surrogate 4-Bromofluorobenzene	%		Org-014	86	1	87	86	1	89	89

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	14823-29
Date extracted	-			12/09/2018	1	12/09/2018	12/09/2018		12/09/2018	12/09/2018
Date analysed	-			12/09/2018	1	12/09/2018	12/09/2018		12/09/2018	13/09/2018
vTRH C ₆ - C ₁₀	mg/kg	25	Org-016	<25	1	<25	<25	0	77	75
Benzene	mg/kg	0.2	Org-016	<0.2	1	<0.2	<0.2	0	77	75
Toluene	mg/kg	0.5	Org-016	<0.5	1	<0.5	<0.5	0	81	78
Ethylbenzene	mg/kg	1	Org-016	<1	1	<1	<1	0	75	75
m+p-xylene	mg/kg	2	Org-016	<2	1	<2	<2	0	75	74
o-Xylene	mg/kg	1	Org-016	<1	1	<1	<1	0	74	74
Naphthalene	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	116	1	88	105	18	107	105

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	14823-90
Date extracted	-			[NT]	48	12/09/2018	12/09/2018		12/09/2018	12/09/2018
Date analysed	-			[NT]	48	13/09/2018	13/09/2018		14/09/2018	14/09/2018
vTRH C ₆ - C ₁₀	mg/kg	25	Org-016	[NT]	48	<25	<25	0	90	101
Benzene	mg/kg	0.2	Org-016	[NT]	48	<0.2	<0.2	0	93	105
Toluene	mg/kg	0.5	Org-016	[NT]	48	<0.5	<0.5	0	94	105
Ethylbenzene	mg/kg	1	Org-016	[NT]	48	<1	<1	0	89	98
m+p-xylene	mg/kg	2	Org-016	[NT]	48	<2	<2	0	88	98
o-Xylene	mg/kg	1	Org-016	[NT]	48	<1	<1	0	89	98
Naphthalene	mg/kg	1	Org-014	[NT]	48	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	[NT]	48	94	109	15	112	98

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	78	12/09/2018	12/09/2018		[NT]	[NT]
Date analysed	-			[NT]	78	14/09/2018	14/09/2018		[NT]	[NT]
vTRH C ₆ - C ₁₀	mg/kg	25	Org-016	[NT]	78	<25	<25	0	[NT]	[NT]
Benzene	mg/kg	0.2	Org-016	[NT]	78	<0.2	<0.2	0	[NT]	[NT]
Toluene	mg/kg	0.5	Org-016	[NT]	78	<0.5	<0.5	0	[NT]	[NT]
Ethylbenzene	mg/kg	1	Org-016	[NT]	78	<1	<1	0	[NT]	[NT]
m+p-xylene	mg/kg	2	Org-016	[NT]	78	<2	<2	0	[NT]	[NT]
o-Xylene	mg/kg	1	Org-016	[NT]	78	<1	<1	0	[NT]	[NT]
Naphthalene	mg/kg	1	Org-014	[NT]	78	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	[NT]	78	114	106	7	[NT]	[NT]

QUALITY CONTROL: TRH Soil C10-C40 NEPM					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	14823-54
Date extracted	-			12/09/2018	16	12/09/2018	12/09/2018		12/09/2018	12/09/2018
Date analysed	-			13/09/2018	16	12/09/2018	12/09/2018		12/09/2018	13/09/2018
TRH >C ₁₀ -C ₁₆	mg/kg	50	Org-003	<50	16	<50	<50	0	73	78
TRH >C ₁₆ -C ₃₄	mg/kg	100	Org-003	<100	16	<100	<100	0	81	67
TRH >C ₃₄ -C ₄₀	mg/kg	100	Org-003	<100	16	<100	<100	0	67	66
Surrogate o-Terphenyl	%		Org-003	88	16	92	91	1	89	84

QUALITY CONTROL: TRH Soil C10-C40 NEPM					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	14823-88
Date extracted	-			[NT]	44	12/09/2018	12/09/2018		12/09/2018	12/09/2018
Date analysed	-			[NT]	44	13/09/2018	13/09/2018		13/09/2018	14/09/2018
TRH >C ₁₀ -C ₁₆	mg/kg	50	Org-003	[NT]	44	<50	<50	0	74	77
TRH >C ₁₆ -C ₃₄	mg/kg	100	Org-003	[NT]	44	<100	<100	0	67	60
TRH >C ₃₄ -C ₄₀	mg/kg	100	Org-003	[NT]	44	<100	<100	0	67	#
Surrogate o-Terphenyl	%		Org-003	[NT]	44	88	88	0	79	85

QUALITY CONTROL: TRH Soil C10-C40 NEPM					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	70	12/09/2018	12/09/2018		[NT]	[NT]
Date analysed	-			[NT]	70	13/09/2018	13/09/2018		[NT]	[NT]
TRH >C ₁₀ -C ₁₆	mg/kg	50	Org-003	[NT]	70	<50	<50	0	[NT]	[NT]
TRH >C ₁₆ -C ₃₄	mg/kg	100	Org-003	[NT]	70	<100	<100	0	[NT]	[NT]
TRH >C ₃₄ -C ₄₀	mg/kg	100	Org-003	[NT]	70	<100	<100	0	[NT]	[NT]
Surrogate o-Terphenyl	%		Org-003	[NT]	70	83	86	4	[NT]	[NT]

QUALITY CONTROL: PAHs in Soil					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	14823-58
Date extracted	-			12/09/2018	16	12/09/2018	12/09/2018		12/09/2018	12/09/2018
Date analysed	-			18/09/2018	16	18/09/2018	18/09/2018		18/09/2018	18/09/2018
Naphthalene	mg/kg	0.1	Org-012	<0.1	16	<0.1	<0.1	0	72	66
Acenaphthylene	mg/kg	0.1	Org-012	<0.1	16	<0.1	<0.1	0	60	66
Acenaphthene	mg/kg	0.1	Org-012	<0.1	16	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012	<0.1	16	<0.1	<0.1	0	84	63
Phenanthrene	mg/kg	0.1	Org-012	<0.1	16	<0.1	<0.1	0	72	66
Anthracene	mg/kg	0.1	Org-012	<0.1	16	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012	<0.1	16	<0.1	<0.1	0	60	63
Pyrene	mg/kg	0.1	Org-012	<0.1	16	<0.1	<0.1	0	60	66
Benzo(a)anthracene	mg/kg	0.1	Org-012	<0.1	16	<0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	<0.1	16	<0.1	<0.1	0	76	72
Benzo(b,j&k)fluoranthene	mg/kg	0.2	Org-012	<0.2	16	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	<0.05	16	<0.05	<0.05	0	64	75
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	<0.1	16	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	<0.1	16	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	<0.1	16	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d ₁₄	%		Org-012	88	16	86	90	5	88	84

QUALITY CONTROL: PAHs in Soil					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	14823-86
Date extracted	-			[NT]	44	12/09/2018	12/09/2018		12/09/2018	12/09/2018
Date analysed	-			[NT]	44	18/09/2018	18/09/2018		15/09/2018	15/09/2018
Naphthalene	mg/kg	0.1	Org-012	[NT]	44	<0.1	<0.1	0	72	74
Acenaphthylene	mg/kg	0.1	Org-012	[NT]	44	<0.1	<0.1	0	76	84
Acenaphthene	mg/kg	0.1	Org-012	[NT]	44	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012	[NT]	44	<0.1	<0.1	0	72	75
Phenanthrene	mg/kg	0.1	Org-012	[NT]	44	<0.1	<0.1	0	72	74
Anthracene	mg/kg	0.1	Org-012	[NT]	44	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012	[NT]	44	<0.1	<0.1	0	64	64
Pyrene	mg/kg	0.1	Org-012	[NT]	44	<0.1	<0.1	0	64	64
Benzo(a)anthracene	mg/kg	0.1	Org-012	[NT]	44	<0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	[NT]	44	<0.1	<0.1	0	76	75
Benzo(b,j&k)fluoranthene	mg/kg	0.2	Org-012	[NT]	44	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	[NT]	44	<0.05	<0.05	0	80	91
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	[NT]	44	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	[NT]	44	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	[NT]	44	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d ₁₄	%		Org-012	[NT]	44	94	90	4	84	84

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	72	12/09/2018	12/09/2018		[NT]	[NT]
Date analysed	-			[NT]	72	15/09/2018	15/09/2018		[NT]	[NT]
Naphthalene	mg/kg	0.1	Org-012	[NT]	72	<0.1	<0.1	0	[NT]	[NT]
Acenaphthylene	mg/kg	0.1	Org-012	[NT]	72	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012	[NT]	72	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012	[NT]	72	<0.1	<0.1	0	[NT]	[NT]
Phenanthrene	mg/kg	0.1	Org-012	[NT]	72	<0.1	<0.1	0	[NT]	[NT]
Anthracene	mg/kg	0.1	Org-012	[NT]	72	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012	[NT]	72	<0.1	<0.1	0	[NT]	[NT]
Pyrene	mg/kg	0.1	Org-012	[NT]	72	<0.1	<0.1	0	[NT]	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-012	[NT]	72	<0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	[NT]	72	<0.1	<0.1	0	[NT]	[NT]
Benzo(b,j&k)fluoranthene	mg/kg	0.2	Org-012	[NT]	72	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	[NT]	72	<0.05	<0.05	0	[NT]	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	[NT]	72	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	[NT]	72	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	[NT]	72	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d ₁₄	%		Org-012	[NT]	72	86	86	0	[NT]	[NT]

QUALITY CONTROL: Speciated Phenols in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	14823-58
Date extracted	-		Org-012	12/09/2018	16	12/09/2018	12/09/2018		12/09/2018	12/09/2018
Date analysed	-		Org-012	18/09/2018	16	18/09/2018	18/09/2018		18/09/2018	18/09/2018
Phenol	mg/kg	0.2	Org-012	<0.2	16	<0.2	<0.2	0	80	66
2-Chlorophenol	mg/kg	0.2	Org-012	<0.2	16	<0.2	<0.2	0	76	66
2-Methylphenol	mg/kg	0.2	Org-012	<0.2	16	<0.2	<0.2	0	80	66
3/4-Methylphenol	mg/kg	0.4	Org-012	<0.4	16	<0.4	<0.4	0	[NT]	[NT]
2-Nitrophenol	mg/kg	0.2	Org-012	<0.2	16	<0.2	<0.2	0	[NT]	[NT]
2,4-Dimethylphenol	mg/kg	0.2	Org-012	<0.2	16	<0.2	<0.2	0	[NT]	[NT]
2,4-Dichlorophenol	mg/kg	0.2	Org-012	<0.2	16	<0.2	<0.2	0	[NT]	[NT]
2,6-Dichlorophenol	mg/kg	0.2	Org-012	<0.2	16	<0.2	<0.2	0	84	75
2,4,5-Trichlorophenol	mg/kg	0.2	Org-012	<0.2	16	<0.2	<0.2	0	[NT]	[NT]
2,4,6-Trichlorophenol	mg/kg	0.2	Org-012	<0.2	16	<0.2	<0.2	0	[NT]	[NT]
2,4-Dinitrophenol	mg/kg	2	Org-012	<2	16	<2	<2	0	[NT]	[NT]
4-Nitrophenol	mg/kg	4	Org-012	<4	16	<4	<4	0	76	79
2,3,4,6-Tetrachlorophenol	mg/kg	0.2	Org-012	<0.2	16	<0.2	<0.2	0	[NT]	[NT]
Pentachlorophenol	mg/kg	1	Org-012	<1	16	<1	<1	0	[NT]	[NT]
4-Chloro-3-Methylphenol	mg/kg	2	Org-012	<2	16	<2	<2	0	[NT]	[NT]
Surrogate Phenol-d ₆	%		Org-012	88	16	90	94	4	94	94

QUALITY CONTROL: OCP in Soil - NEPM						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	14823-58
Date extracted	-			12/09/2018	16	12/09/2018	12/09/2018		12/09/2018	12/09/2018
Date analysed	-			18/09/2018	16	18/09/2018	18/09/2018		18/09/2018	18/09/2018
alpha-BHC	mg/kg	0.1	Org-012	<0.1	16	<0.1	<0.1	0	68	66
Hexachlorobenzene	mg/kg	0.1	Org-012	<0.1	16	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-012	<0.1	16	<0.1	<0.1	0	64	63
gamma-BHC	mg/kg	0.1	Org-012	<0.1	16	<0.1	<0.1	0	[NT]	[NT]
Heptachlor	mg/kg	0.1	Org-012	<0.1	16	<0.1	<0.1	0	64	63
delta-BHC	mg/kg	0.1	Org-012	<0.1	16	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-012	<0.1	16	<0.1	<0.1	0	60	83
Heptachlor Epoxide	mg/kg	0.1	Org-012	<0.1	16	<0.1	<0.1	0	64	63
gamma-Chlordane	mg/kg	0.1	Org-012	<0.1	16	<0.1	<0.1	0	60	66
alpha-chlordane	mg/kg	0.1	Org-012	<0.1	16	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-012	<0.1	16	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-012	<0.1	16	<0.1	<0.1	0	60	66
Dieldrin	mg/kg	0.1	Org-012	<0.1	16	<0.1	<0.1	0	60	66
Endrin	mg/kg	0.1	Org-012	<0.1	16	<0.1	<0.1	0	[NT]	[NT]
Endosulfan II	mg/kg	0.1	Org-012	<0.1	16	<0.1	<0.1	0	[NT]	[NT]
pp-DDD	mg/kg	0.1	Org-012	<0.1	16	<0.1	<0.1	0	72	63
Endrin Aldehyde	mg/kg	0.1	Org-012	<0.1	16	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-012	<0.1	16	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-012	<0.1	16	<0.1	<0.1	0	60	96
Methoxychlor	mg/kg	0.1	Org-012	<0.1	16	<0.1	<0.1	0	[NT]	[NT]
Mirex	mg/kg	0.5	Org-012	<0.5	16	<0.5	<0.5	0	[NT]	[NT]
Toxaphene	mg/kg	2	Org-012	<2	16	<2	<2	0	[NT]	[NT]
Surrogate p-Terphenyl-d ₁₄	%		Org-012	88	16	86	90	5	88	84

Client Reference: 33980 - 30-70 Rows Lane Wallan

QUALITY CONTROL: OP in Soil - NEPM						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	14823-58
Date extracted	-			12/09/2018	16	12/09/2018	12/09/2018		12/09/2018	12/09/2018
Date analysed	-			18/09/2018	16	18/09/2018	18/09/2018		18/09/2018	18/09/2018
Chlorpyrifos	mg/kg	0.1	Org-012	<0.1	16	<0.1	<0.1	0	68	72
Surrogate <i>p</i> -Terphenyl-d ₁₄	%		Org-012	88	16	86	90	5	88	84

QUALITY CONTROL: PCBs in Soil					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	14823-58
Date extracted	-			12/09/2018	16	12/09/2018	12/09/2018		12/09/2018	12/09/2018
Date analysed	-			18/09/2018	16	18/09/2018	18/09/2018		18/09/2018	18/09/2018
Aroclor 1016	mg/kg	0.1	Org-012	<0.1	16	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-012	<0.1	16	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-012	<0.1	16	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-012	<0.1	16	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-012	<0.1	16	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-012	<0.1	16	<0.1	<0.1	0	90	78
Aroclor 1260	mg/kg	0.1	Org-012	<0.1	16	<0.1	<0.1	0	[NT]	[NT]
Surrogate <i>p</i> -Terphenyl-d ₁₄	%		Org-012	88	16	86	90	5	88	84

QUALITY CONTROL: Synthetic Pyrethroids - NEPM					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	14823-58
Date extracted	-			12/09/2018	16	12/09/2018	12/09/2018		12/09/2018	12/09/2018
Date analysed	-			18/09/2018	16	18/09/2018	18/09/2018		18/09/2018	18/09/2018
Bifenthrin	mg/kg	0.5	Org-012	<0.5	16	<0.5	<0.5	0	72	116

QUALITY CONTROL: Triazine Herbicides in Soil					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	14823-58
Date extracted	-			12/09/2018	16	12/09/2018	12/09/2018		12/09/2018	12/09/2018
Date analysed	-			18/09/2018	16	18/09/2018	18/09/2018		18/09/2018	18/09/2018
Atrazine	mg/kg	0.5	Org-012	<0.5	16	<0.5	<0.5	0	68	72

QUALITY CONTROL: Phenoxy Acid Herbicides in Soil					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Clopyralid	mg/kg	0.5	ORG-031	<0.5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
3,5-Dichlorobenzoic acid	mg/kg	0.5	ORG-031	<0.5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
o-Chlorophenoxy acetic acid	mg/kg	0.5	ORG-031	<0.5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
4-CPA	mg/kg	0.5	ORG-031	<0.5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dicamba	mg/kg	0.5	ORG-031	<0.5	[NT]	[NT]	[NT]	[NT]	91	[NT]
Mecoprop	mg/kg	0.5	ORG-031	<0.5	[NT]	[NT]	[NT]	[NT]	95	[NT]
MCPA	mg/kg	0.5	ORG-031	<0.5	[NT]	[NT]	[NT]	[NT]	96	[NT]
Dichloroprop	mg/kg	0.5	ORG-031	<0.5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
2,4-D	mg/kg	0.5	ORG-031	<0.5	[NT]	[NT]	[NT]	[NT]	89	[NT]
Bromoxynil	mg/kg	0.5	ORG-031	<0.5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Triclopyr	mg/kg	0.5	ORG-031	<0.5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
2,4,5-TP (Silvex)	mg/kg	0.5	ORG-031	<0.5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
2,4,5-T	mg/kg	0.5	ORG-031	<0.5	[NT]	[NT]	[NT]	[NT]	83	[NT]
MCPB	mg/kg	0.5	ORG-031	<0.5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dinoseb	mg/kg	1	ORG-031	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
2,4-DB	mg/kg	0.5	ORG-031	<0.5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Ioxynil	mg/kg	1	ORG-031	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Picloram	mg/kg	0.5	ORG-031	<0.5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
DCPA (Chlorthal) Diacid	mg/kg	0.5	ORG-031	<0.5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Acifluorfen	mg/kg	2	ORG-031	<2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
2,4,6-T	mg/kg	0.5	ORG-031	<0.5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
2,6-D	mg/kg	0.5	ORG-031	<0.5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate: 2,4-DCPA	%		ORG-031	100	[NT]	[NT]	[NT]	[NT]	87	[NT]

QUALITY CONTROL: NEPM screen metals in soil					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	14823-9
Date digested	-			13/09/2018	3	13/09/2018	13/09/2018		13/09/2018	13/09/2018
Date analysed	-			13/09/2018	3	13/09/2018	13/09/2018		13/09/2018	13/09/2018
Arsenic	mg/kg	4	Metals-020 ICP-AES	<4	3	9	9	0	98	#
Cadmium	mg/kg	0.4	Metals-020 ICP-AES	<0.4	3	<0.4	<0.4	0	99	81
Chromium	mg/kg	1	Metals-020 ICP-AES	<1	3	24	21	13	95	92
Copper	mg/kg	1	Metals-020 ICP-AES	<1	3	7	4	55	101	106
Lead	mg/kg	1	Metals-020 ICP-AES	<1	3	7	9	25	94	75
Mercury	mg/kg	0.1	Metals-021 CV-AAS	<0.1	3	<0.1	<0.1	0	119	112
Nickel	mg/kg	1	Metals-020 ICP-AES	<1	3	5	6	18	96	86
Zinc	mg/kg	1	Metals-020 ICP-AES	<1	3	4	4	0	95	77
Beryllium	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	[NT]	[NT]	108	92
Boron	mg/kg	3	Metals-020 ICP-AES	<3	[NT]	[NT]	[NT]	[NT]	111	94
Cobalt	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	[NT]	[NT]	99	84
Manganese	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	[NT]	[NT]	103	78
Selenium	mg/kg	2	Metals-020 ICP-AES	<2	[NT]	[NT]	[NT]	[NT]	100	#
Phosphorus	mg/kg	10	Metals-020 ICP-AES	<10	[NT]	[NT]	[NT]	[NT]	89	116

QUALITY CONTROL: NEPM screen metals in soil						Duplicate		Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	14823-50
Date digested	-			[NT]	21	13/09/2018	13/09/2018		13/09/2018	13/09/2018
Date analysed	-			[NT]	21	13/09/2018	13/09/2018		13/09/2018	13/09/2018
Arsenic	mg/kg	4	Metals-020 ICP-AES	[NT]	21	14	16	13	98	81
Cadmium	mg/kg	0.4	Metals-020 ICP-AES	[NT]	21	<0.4	<0.4	0	99	80
Chromium	mg/kg	1	Metals-020 ICP-AES	[NT]	21	22	35	46	95	77
Copper	mg/kg	1	Metals-020 ICP-AES	[NT]	21	5	5	0	101	111
Lead	mg/kg	1	Metals-020 ICP-AES	[NT]	21	9	11	20	94	76
Mercury	mg/kg	0.1	Metals-021 CV-AAS	[NT]	21	<0.1	<0.1	0	119	93
Nickel	mg/kg	1	Metals-020 ICP-AES	[NT]	21	6	8	29	96	110
Zinc	mg/kg	1	Metals-020 ICP-AES	[NT]	21	9	11	20	95	72
Beryllium	mg/kg	1	Metals-020 ICP-AES	[NT]	[NT]	[NT]	[NT]	[NT]	108	90
Boron	mg/kg	3	Metals-020 ICP-AES	[NT]	[NT]	[NT]	[NT]	[NT]	111	93
Cobalt	mg/kg	1	Metals-020 ICP-AES	[NT]	[NT]	[NT]	[NT]	[NT]	99	87
Manganese	mg/kg	1	Metals-020 ICP-AES	[NT]	[NT]	[NT]	[NT]	[NT]	103	79
Selenium	mg/kg	2	Metals-020 ICP-AES	[NT]	[NT]	[NT]	[NT]	[NT]	100	78
Phosphorus	mg/kg	10	Metals-020 ICP-AES	[NT]	[NT]	[NT]	[NT]	[NT]	89	##

QUALITY CONTROL: NEPM screen metals in soil					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	14823-92
Date digested	-			[NT]	38	13/09/2018	13/09/2018		13/09/2018	13/09/2018
Date analysed	-			[NT]	38	13/09/2018	13/09/2018		13/09/2018	13/09/2018
Arsenic	mg/kg	4	Metals-020 ICP-AES	[NT]	38	<4	<4	0	100	#
Cadmium	mg/kg	0.4	Metals-020 ICP-AES	[NT]	38	<0.4	<0.4	0	101	74
Chromium	mg/kg	1	Metals-020 ICP-AES	[NT]	38	27	34	23	98	72
Copper	mg/kg	1	Metals-020 ICP-AES	[NT]	38	6	6	0	99	101
Lead	mg/kg	1	Metals-020 ICP-AES	[NT]	38	8	9	12	98	70
Mercury	mg/kg	0.1	Metals-021 CV-AAS	[NT]	38	<0.1	<0.1	0	108	95
Nickel	mg/kg	1	Metals-020 ICP-AES	[NT]	38	7	9	25	99	84
Zinc	mg/kg	1	Metals-020 ICP-AES	[NT]	38	12	13	8	98	75
Beryllium	mg/kg	1	Metals-020 ICP-AES	[NT]	[NT]	[NT]	[NT]	[NT]	110	85
Boron	mg/kg	3	Metals-020 ICP-AES	[NT]	[NT]	[NT]	[NT]	[NT]	110	83
Cobalt	mg/kg	1	Metals-020 ICP-AES	[NT]	[NT]	[NT]	[NT]	[NT]	101	78
Manganese	mg/kg	1	Metals-020 ICP-AES	[NT]	[NT]	[NT]	[NT]	[NT]	104	##
Selenium	mg/kg	2	Metals-020 ICP-AES	[NT]	[NT]	[NT]	[NT]	[NT]	102	#
Phosphorus	mg/kg	10	Metals-020 ICP-AES	[NT]	[NT]	[NT]	[NT]	[NT]	90	##

QUALITY CONTROL: NEPM screen metals in soil						Duplicate		Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date digested	-			[NT]	64	13/09/2018	13/09/2018		[NT]	[NT]
Date analysed	-			[NT]	64	13/09/2018	13/09/2018		[NT]	[NT]
Arsenic	mg/kg	4	Metals-020 ICP-AES	[NT]	64	<4	<4	0	[NT]	[NT]
Cadmium	mg/kg	0.4	Metals-020 ICP-AES	[NT]	64	<0.4	<0.4	0	[NT]	[NT]
Chromium	mg/kg	1	Metals-020 ICP-AES	[NT]	64	120	120	0	[NT]	[NT]
Copper	mg/kg	1	Metals-020 ICP-AES	[NT]	64	33	34	3	[NT]	[NT]
Lead	mg/kg	1	Metals-020 ICP-AES	[NT]	64	10	9	11	[NT]	[NT]
Mercury	mg/kg	0.1	Metals-021 CV-AAS	[NT]	64	<0.1	<0.1	0	[NT]	[NT]
Nickel	mg/kg	1	Metals-020 ICP-AES	[NT]	64	71	68	4	[NT]	[NT]
Zinc	mg/kg	1	Metals-020 ICP-AES	[NT]	64	70	80	13	[NT]	[NT]

QUALITY CONTROL: NEPM screen metals in soil						Duplicate		Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date digested	-			[NT]	93	13/09/2018	13/09/2018		[NT]	[NT]
Date analysed	-			[NT]	93	13/09/2018	13/09/2018		[NT]	[NT]
Arsenic	mg/kg	4	Metals-020 ICP-AES	[NT]	93	85	70	19	[NT]	[NT]
Cadmium	mg/kg	0.4	Metals-020 ICP-AES	[NT]	93	0.4	<0.4	0	[NT]	[NT]
Chromium	mg/kg	1	Metals-020 ICP-AES	[NT]	93	45	38	17	[NT]	[NT]
Copper	mg/kg	1	Metals-020 ICP-AES	[NT]	93	16	13	21	[NT]	[NT]
Lead	mg/kg	1	Metals-020 ICP-AES	[NT]	93	12	14	15	[NT]	[NT]
Mercury	mg/kg	0.1	Metals-021 CV-AAS	[NT]	93	<0.1	<0.1	0	[NT]	[NT]
Nickel	mg/kg	1	Metals-020 ICP-AES	[NT]	93	21	19	10	[NT]	[NT]
Zinc	mg/kg	1	Metals-020 ICP-AES	[NT]	93	30	26	14	[NT]	[NT]

QUALITY CONTROL: Misc Inorg - soil NEPM					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			14/09/2018	3	14/09/2018	14/09/2018		14/09/2018	[NT]
Date analysed	-			14/09/2018	3	14/09/2018	14/09/2018		14/09/2018	[NT]
Free Cyanide in soil	mg/kg	0.5	Inorg-013	<0.5	[NT]	[NT]	[NT]	[NT]	91	[NT]
Hexavalent Chromium, Cr ⁶⁺	mg/kg	1	Inorg-024	<1	[NT]	[NT]	[NT]	[NT]	102	[NT]
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	3	6.2	5.9	5	100	[NT]
TKN as N in soil	mg/kg	10	Inorg-062	<10	80	2600	2100	21	112	[NT]
Nitrate as N in soil	mg/kg	0.5	Inorg-055	<0.5	80	2.2	2.2	0	88	[NT]
Organic Nitrogen as N	mg/kg	10	Inorg-062	<10	80	2600	2100	21	[NT]	[NT]
Ammonia as N in soil	mg/kg	0.5	Inorg-057	<0.5	80	18	18	0	96	[NT]
Phosphate as P in soil	mg/kg	0.5	Inorg-060	<0.5	80	12	13	8	103	[NT]
Nitrite as N in soil	mg/kg	0.1	Inorg-055	<0.1	80	<0.1	<0.1	0	103	[NT]

QUALITY CONTROL: Misc Inorg - soil NEPM					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	[NT]
Date prepared	-			[NT]	21	14/09/2018	14/09/2018		14/09/2018	[NT]
Date analysed	-			[NT]	21	14/09/2018	14/09/2018		14/09/2018	[NT]
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	21	6.2	5.8	7	101	[NT]

QUALITY CONTROL: Misc Inorg - soil NEPM					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	48	14/09/2018	14/09/2018		[NT]	[NT]
Date analysed	-			[NT]	48	14/09/2018	14/09/2018		[NT]	[NT]
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	48	5.4	5.4	0	[NT]	[NT]

QUALITY CONTROL: Misc Inorg - soil NEPM					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	70	14/09/2018	14/09/2018		[NT]	[NT]
Date analysed	-			[NT]	70	14/09/2018	14/09/2018		[NT]	[NT]
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	70	5.0	5.0	0	[NT]	[NT]

QUALITY CONTROL: Misc Inorg - soil NEPM					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	80	14/09/2018	14/09/2018		[NT]	[NT]
Date analysed	-			[NT]	80	14/09/2018	14/09/2018		[NT]	[NT]
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	80	7.8	7.8	0	[NT]	[NT]

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Water						Duplicate		Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			10/09/2018	[NT]	[NT]	[NT]	[NT]	10/09/2018	[NT]
Date analysed	-			10/09/2018	[NT]	[NT]	[NT]	[NT]	10/09/2018	[NT]
TRH C ₆ - C ₉	µg/L	10	Org-016	<10	[NT]	[NT]	[NT]	[NT]	97	[NT]
TRH C ₆ - C ₁₀	µg/L	10	Org-016	<10	[NT]	[NT]	[NT]	[NT]	97	[NT]
Benzene	µg/L	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	99	[NT]
Toluene	µg/L	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	103	[NT]
Ethylbenzene	µg/L	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	99	[NT]
m+p-xylene	µg/L	2	Org-016	<2	[NT]	[NT]	[NT]	[NT]	92	[NT]
o-xylene	µg/L	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	98	[NT]
Naphthalene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	101	[NT]
Surrogate Dibromofluoromethane	%		Org-016	104	[NT]	[NT]	[NT]	[NT]	100	[NT]
Surrogate toluene-d8	%		Org-016	100	[NT]	[NT]	[NT]	[NT]	101	[NT]
Surrogate 4-BFB	%		Org-016	98	[NT]	[NT]	[NT]	[NT]	96	[NT]

QUALITY CONTROL: TRH Water(C10-C40) NEPM						Duplicate		Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			11/09/2018	[NT]	[NT]	[NT]	[NT]	11/09/2018	[NT]
Date analysed	-			11/09/2018	[NT]	[NT]	[NT]	[NT]	11/09/2018	[NT]
TRH C ₁₀ - C ₁₄	µg/L	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	91	[NT]
TRH C ₁₅ - C ₂₈	µg/L	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	102	[NT]
TRH C ₂₉ - C ₃₆	µg/L	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	107	[NT]
TRH >C ₁₀ - C ₁₆	µg/L	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	91	[NT]
TRH >C ₁₆ - C ₃₄	µg/L	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	102	[NT]
TRH >C ₃₄ - C ₄₀	µg/L	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	107	[NT]
Surrogate o-Terphenyl	%		Org-003	96	[NT]	[NT]	[NT]	[NT]	89	[NT]

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.
Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.	

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

Report Comments

TKN and Acid herbicides analysed by MPL, report 215957.

METALS: The RPD for duplicate results 14823-3 for Copper is accepted due to the inhomogeneous nature of the sample. Triplicate analysis confirms this.

Percent recovery not available for Arsenic & Selenium due to matrix interference, however an acceptable recovery was achieved for the LCS.

Percent recovery is not possible to report due to the high concentration of Manganese & Phosphorus in the samples. However an acceptable recovery was obtained for the LCS.

The RPD for duplicate results 14823-21 for Chromium is accepted due to the inhomogeneous nature of the sample. Triplicate analysis confirms this.

TRH_S: # Percent recovery is not possible to report due to sample matrix interferences.

CERTIFICATE OF ANALYSIS

Work Order : **EM1814545**
Client : **LRM GLOBAL**
Contact : **MR JON LAWSON**
Address : **P.BOX.1237**
 CARLTON VIC 3053
Telephone : **----**
Project : **33980**
Order number : **----**
C-O-C number : **----**
Sampler : **BP, JL**
Site : **3-70 Rowes Lane Wallan**
Quote number : **EN-333-17 Seconday work**
No. of samples received : **3**
No. of samples analysed : **3**

Page : 1 of 2
Laboratory : Environmental Division Melbourne
Contact : Shirley LeCornu
Address : 4 Westall Rd Springvale VIC Australia 3171
Telephone : +61-3-8549 9630
Date Samples Received : 11-Sep-2018 14:30
Date Analysis Commenced : 12-Sep-2018
Issue Date : 14-Sep-2018 10:18



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC



General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
 LOR = Limit of reporting
 ^ = This result is computed from individual analyte detections at or above the level of reporting
 ø = ALS is not NATA accredited for these tests.
 ~ = Indicates an estimated value.

Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Client sample ID

				Split01	Split02	Split03	----	----
Client sampling date / time				06-Sep-2018 00:00	06-Sep-2018 00:00	06-Sep-2018 00:00	----	----
Compound	CAS Number	LOR	Unit	EM1814545-001	EM1814545-002	EM1814545-003	-----	-----
				Result	Result	Result	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	20.6	15.3	14.9	----	----
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	105	6	----	----
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	----	----
Chromium	7440-47-3	2	mg/kg	170	69	24	----	----
Copper	7440-50-8	5	mg/kg	24	15	14	----	----
Lead	7439-92-1	5	mg/kg	18	12	7	----	----
Nickel	7440-02-0	2	mg/kg	70	27	15	----	----
Zinc	7440-66-6	5	mg/kg	83	35	60	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	----	----

QUALITY CONTROL REPORT

Work Order	: EM1814545	Page	: 1 of 3
Client	: LRM GLOBAL	Laboratory	: Environmental Division Melbourne
Contact	: MR JON LAWSON	Contact	: Shirley LeCornu
Address	: P.BOX.1237 CARLTON VIC 3053	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: ----	Telephone	: +61-3-8549 9630
Project	: 33980	Date Samples Received	: 11-Sep-2018
Order number	:	Date Analysis Commenced	: 12-Sep-2018
C-O-C number	: ----	Issue Date	: 14-Sep-2018
Sampler	: BP, JL		
Site	: 3-70 Rowes Lane Wallan		
Quote number	: EN-333-17 Seconday work		
No. of samples received	: 3		
No. of samples analysed	: 3		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC



General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
 CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
 LOR = Limit of reporting
 RPD = Relative Percentage Difference
 # = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 1927563)									
EM1814225-008	Anonymous	EA055: Moisture Content	----	0.1	%	9.4	9.0	4.44	No Limit
EM1814562-003	Anonymous	EA055: Moisture Content	----	0.1	%	4.0	4.3	7.87	No Limit
EG005T: Total Metals by ICP-AES (QC Lot: 1926468)									
EM1814532-009	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	7	6	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	12	11	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	60	66	9.37	0% - 50%
		EG005T: Lead	7439-92-1	5	mg/kg	49	63	26.2	0% - 50%
		EG005T: Zinc	7440-66-6	5	mg/kg	79	66	18.3	0% - 50%
EM1814545-002	Split02	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	69	60	15.1	0% - 20%
		EG005T: Nickel	7440-02-0	2	mg/kg	27	17	43.9	0% - 50%
		EG005T: Arsenic	7440-38-2	5	mg/kg	105	94	11.5	0% - 20%
		EG005T: Copper	7440-50-8	5	mg/kg	15	12	18.6	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	12	12	0.00	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	35	29	17.8	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 1926469)									
EM1814532-009	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EM1814545-002	Split02	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit



Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EG005T: Total Metals by ICP-AES (QCLot: 1926468)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	93.4	78	107
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	93.3	76	108
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	97.5	78	110
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	93.2	78	108
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	92.1	78	106
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	102	80	109
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	98.9	79	110
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1926469)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	78.6	77	104

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike Concentration	Spike Recovery(%) MS	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number			Low	High
EG005T: Total Metals by ICP-AES (QCLot: 1926468)							
EM1814532-011	Anonymous	EG005T: Lead	7439-92-1	50 mg/kg	94.3	76	124
EM1814532-011	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	94.5	78	124
		EG005T: Cadmium	7440-43-9	50 mg/kg	95.5	84	116
		EG005T: Chromium	7440-47-3	50 mg/kg	79.9	79	121
		EG005T: Copper	7440-50-8	50 mg/kg	101	82	124
		EG005T: Nickel	7440-02-0	50 mg/kg	86.9	78	120
		EG005T: Zinc	7440-66-6	50 mg/kg	91.6	74	128
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1926469)							
EM1814532-011	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	86.3	76	116

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EM1814545	Page	: 1 of 4
Client	: LRM GLOBAL	Laboratory	: Environmental Division Melbourne
Contact	: MR JON LAWSON	Telephone	: +61-3-8549 9630
Project	: 33980	Date Samples Received	: 11-Sep-2018
Site	: 3-70 Rowes Lane Wallan	Issue Date	: 14-Sep-2018
Sampler	: BP, JL	No. of samples received	: 3
Order number	:	No. of samples analysed	: 3

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- **NO** Laboratory Control outliers occur.
- **NO** Matrix Spike outliers occur.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- **NO** Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- **NO** Quality Control Sample Frequency Outliers exist.



Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EA055: Moisture Content (Dried @ 105-110°C)								
Soil Glass Jar - Unpreserved (EA055) Split01, Split03	Split02, 	06-Sep-2018	----	----	----	12-Sep-2018	20-Sep-2018	✓
EG005T: Total Metals by ICP-AES								
Soil Glass Jar - Unpreserved (EG005T) Split01, Split03	Split02, 	06-Sep-2018	12-Sep-2018	05-Mar-2019	✓	12-Sep-2018	05-Mar-2019	✓
EG035T: Total Recoverable Mercury by FIMS								
Soil Glass Jar - Unpreserved (EG035T) Split01, Split03	Split02, 	06-Sep-2018	12-Sep-2018	04-Oct-2018	✓	13-Sep-2018	04-Oct-2018	✓



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	15	13.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Total Mercury by FIMS	EG035T	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Total Mercury by FIMS	EG035T	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Total Mercury by FIMS	EG035T	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	17	11.76	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl ₂) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Preparation Methods	Method	Matrix	Method Descriptions
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (2013) Schedule B(3) (Method 202)

APPENDIX D

DIV 5 ASBESTOS REPORT



LRM GLOBAL PTY LTD

65 Stubbs St.
Kensington Victoria 3031
ABN: 34 116 540 277
(03) 9371 3400

Alister Oldham
Crystal Group P/L
22 Church Street
Whittlesea
Victoria 3757

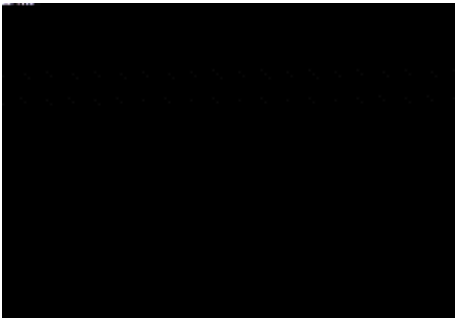
07/09/2018

Dear Alister Oldham,

Please find enclosed our Asbestos Division 5 Survey, conducted at Darraweit Road Wallan VIC - Chicken egg farm on 06/09/2018. This work was conducted for Crystal Group P/L.

If any further information is required or if you have any further queries regarding this information please do not hesitate to contact our office on (03) 9371 3400.

Yours faithfully,



Michael Nguyen
OH&S Consultant
LRM Global Pty Ltd

Our Ref: 34935



ASBESTOS DIVISION 5 SURVEY

Darraweit Road Wallan VIC - Chicken egg farm

Report For:
CRYSTAL GROUP P/L
Report Date:
07/09/2018

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- **Appendix D:** Areas Not Accessible / Not Inspected
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Report Date:	Report ID/Ref:	Primary Auditor:	Authorised by:
07/09/2018	34935	Michael Nguyen	

1.0 EXECUTIVE SUMMARY

LRM Global Pty Ltd was engaged by Crystal Group P/L to undertake an Asbestos Division 5 Survey at Darraweit Road Wallan VIC - Chicken egg farm. The survey was undertaken by Michael Nguyen of LRM Global Pty Ltd on 06/09/2018. The aim of the survey is to identify, assess the risk and recommend control measures for nominated hazardous material at the site prior to commencement of refurbishment or demolition works. The degree of accuracy of this report is subject to the accessibility of areas suspected to contain hazardous materials, therefore only accessible and representative materials were inspected.

The following hazardous materials were included in the survey:

- Asbestos

Survey Site Description:

This large farm site is an old chicken egg farm which contains 3 houses on the property, numerous metal sheds and three long, large chicken sheds mainly constructed out of metal.

1.1 General Findings

LRM Global was engaged by Crystal Group P/L to carry out a Division 5 asbestos assessment of the property located at Darraweit Road, Wallan VIC - Wallan Chicken Egg Farm, for due diligence purposes. The findings are as follows:

Asbestos Containing Materials (ACM)

ACM was identified in the following locations:

Location	Item / Friability	Condition / Priority Level	Recommendations
House (1) - Entry to property, east : External walls (throughout) / Chimney	Fibre cement sheet / Non-friable	Good / 3	Removal prior to demolition works
Egg Store Shed - External area, west side: Bench top	Fibre cement sheet / Non-friable	Good / 3	Removal prior to demolition works
Egg Store Shed - External area, North side: Electrical switchboard	Zelemite panel / Non-friable	Good / 3	Removal prior to demolition works

Chicken Sheds (x3) (south of Property) - External grounds: Loose debris	Fibre cement sheet loose debris / Non- friable	Poor / 1	Removal
--	---	----------	---------

It is recommend that removal of all identified asbestos containing items should be carried out prior to any future demolition works impacting the area. All removal works should be carried out by a licensed asbestos removal contractor and in accordance with Occupational Health and Safety Regulations 2017, Part 4.4. Asbestos.

Furthermore, for all areas/items that were inaccessible and/or had restricted access must be 'assumed positive' to contain asbestos, as per Occupational Health and Safety Regulations 2017, Part 4.4 Asbestos. Ensure that a *Division 6* of all inaccessible areas/items to be carried out prior to any future works impacting on this property.

A list of these areas/items can be found in Appendix D of this report. A full list of items assessed can be found in Appendix A of this report.

1.2 Risk Analysis Findings - Asbestos

Table A: Asbestos Materials Identified (Priority rating of 1 or 2)

Area 1	Surface	Material Type	Friability	Risk	Control Recommendation
Chicken Sheds (x3) - South of property External areas	Grounds (east side)	Debris	Non Friable	Priority 1	Removal

1.3 Risk Analysis Findings - Other Hazardous Materials

No hazardous materials were identified with a priority rating of 1 or 2. Please refer to Appendix A for full audit details including any hazardous materials with priority rating of 3 or 4.

1.4 Definitions for Risk Priority Rating 1 & 2

Priority 1: Hazards with High Risk Potential

A Priority 1 item is defined as an area containing hazardous materials, which are either damaged or are being exposed to continual disturbance. Due to these conditions there is an increased potential for exposure and/or transfer of the material to other parts with continued unrestricted use of this area. It is recommended that these areas are isolated, air-monitoring be conducted (if appropriate) and the hazardous material(s) are promptly removed. After abatement works are completed, a re-inspection should be conducted to confirm that the hazardous materials have been satisfactorily removed.

Priority 2: Hazards with Elevated Risk Potential

A Priority 2 item is defined as an area containing hazardous materials with a potential for disturbance due to the following conditions:

1. Material has been disturbed or damaged and its current condition, while not posing an immediate hazard, is unstable.
2. The material is accessible and can when disturbed present an exposure risk. The material could pose an exposure risk if workers are in close proximity.

2.0 SCOPE OF WORKS

LRM Global was engaged by Crystal Group P/L to carry out a Division 5 asbestos assessment of the property located at Darraweit Road, Wallan VIC - Wallan Chicken Egg Farm, for due diligence purposes. A visual assessment of the buildings was carried out, and sampling was conducted where required.

Our professional judgement and experience was used in the identification and location of asbestos and nominated hazardous materials in accessible and representative areas. However, it is not possible without substantial stripping and demolition of the buildings to guarantee that every source of asbestos and hazardous material was detected. Hence care should be exercised when opening any previously not inspected and non-accessible areas (See Appendix D for a detailed listing of areas Not Accessible and/or Not Inspected).

Should any personnel come across any suspected hazardous material or materials unknown to them, work should cease immediately in the affected areas until further sampling and investigation is performed.

2.1 Regulatory Requirements

This report satisfies the regulatory requirements of the Occupational Health and Safety Regulations - 2017 - Part 4.4 - Asbestos, Division 5 - Asbestos in Workplaces, Subdivisions 2 and 3. Duties of persons who manage or control workplaces and Duties of Employers are required to:

"... A person who manages or controls a workplace must, so far as is reasonably practicable, identify all asbestos present that is under the person's management or control."

If asbestos is identified as present:

"...the person who manages or controls the workplace must determine -

- (a) the location of the asbestos; and*
- (b) the likely source of asbestos that is not fixed or installed; and*
- (c) in relation to asbestos-containing material —*

- (i) the type of asbestos-containing material; and*
- (ii) whether the asbestos-containing material is friable or non-friable; and*
- (iii) the condition of the asbestos-containing material; and*
- (iv) whether the asbestos-containing material is likely to sustain damage or deterioration; and*

(d) so far as is possible, any activities likely to be carried out at the workplace that are, in view of their nature or design, likely to damage or disturb the asbestos."

"In relation to asbestos that is identified, the person who manages or controls the workplace must ensure that -

- (a) the presence and location of the asbestos are clearly indicated; and*
- (b) if reasonably practicable, the indication is by labelling."*

The requirements listed above are detailed in the tables contained within this report.

2.2 Our Methodology

The Asbestos and hazardous materials and risk assessment survey was carried out in accordance with the following guidelines and procedures:

Asbestos Materials

This component of the survey was carried out in accordance with the guidelines documented in the Code of Practice - The Management and Control of Asbestos in Workplaces [NOHSC: 2018(2005)]. Specific risk assessment factors adopted for evaluating asbestos based materials and prioritisation of asbestos risks for abatement during this survey are outlined in Appendix E and F of this report. Bulk samples collected during the survey were analysed by Polarised Light Microscopy supplemented using Dispersion Staining Techniques. For further details and information regarding hazardous materials please refer to Appendix F.

3.0 SURVEY FINDINGS & DOCUMENTATION

3.1 Detailed Survey Findings

All data collected during this survey is itemised in detail within Appendix A. The findings outline the location, material, hazard type, risk assessment and control recommendations for identified hazardous materials. To view a summarised table based on Risk Priority levels 1 and 2 please refer to section 1 of this report.

3.2 Sampling & Laboratory Analysis Results

All samples collected during this survey were analysed at a NATA accredited laboratory. All NATA certified laboratory certificates (analysis results) have been collated in Appendix B.

3.3 Photographic Records

To supplement the collected survey data, photographic records and other documentation may have been utilised. Please refer to Appendix C.

3.4 Areas Not Accessed / Not Inspected

Given the constraints of practicable access encountered during the risk assessment survey, areas that have been regarded as "Non-Accessible" have been noted in detail. These areas are itemised in Appendix D. It should be noted that inaccessible areas are to be deemed as containing asbestos materials until otherwise confirmed by a hygienist. We advise that should refurbishment, demolition or maintenance operations entail possible disturbance of materials in these locations, further investigation and sampling of specific areas should be conducted as part of an asbestos management and abatement programme prior to any works proceeding. It should be noted that the presence of any residual asbestos insulation and applications on steel members, concrete surfaces, pipe work, equipment and adjacent areas from prior abatement or refurbishment works cannot be ascertained without extensive removal and damage to existing insulation, fittings and finishes.

4.0 RECOMMENDATIONS & CONCLUSIONS

Asbestos:

It is recommend that removal of all identified asbestos containing items should be carried out prior to any future demolition works impacting the area. All removal works should be carried out by a licensed asbestos removal contractor and in accordance with Occupational Health and Safety Regulations 2017, Part 4.4. Asbestos.

All areas/items that were inaccessible and/or had restricted access must be 'assumed positive' to contain asbestos, as per Occupational Health and Safety Regulations 2017, Part 4.4 Asbestos. Ensure that a *Division 6* of all inaccessible areas/items to be carried out prior to any future works impacting on this property.

A list of these areas/items can be found in Appendix D of this report. A full list of items assessed can be found in Appendix A of this report.

LABELLING

It is a requirement of the Occupational Health and Safety Regulations - 2017 - Part 4.4 - Asbestos for the employer or occupier to ensure that the presence and location of asbestos materials are clearly identified and where practicable by labelling. This report details items that require labelling and it is recommended to ensure that where possible, an asbestos warning label is placed in all locations to clearly identify the presence of asbestos materials. The asbestos warning label should be affixed to an asbestos based material or access point to an area containing asbestos materials in order to warn personnel of potential exposure to asbestos fibres if the material is disturbed or if this area is to be accessed.



CRYSTAL GROUP P/L:34935
ASBESTOS DIVISION 5 SURVEY

APPENDIX A:

Detailed Survey Findings

This Detailed Survey Findings table shows all audit entries taken during the survey at on 06/09/2018.

APPENDIX A: 34935

Audit Location:
Client:
Survey Company
Audit Ref:
Audit Date:

Darraweit Road Wallan VIC - Chicken egg farm
Crystal Group P/L
LRM Global Pty Ltd
34935
2018-09-06 00:00:00



Asbestos Division 5 Survey | Job Ref: 34935

Title	Surface or Plant/Equipment Type	Source or Item Description	Hazardous Material Type	Photo	Sample	Assessment Status	Friability	Condition	Damage or Deterioration Potential	Activity Level	Accessibility	Priority Level	Re-inspection Schedule	Quantity	Control Recommendation	Comments
Chicken Sheds (x3) - South of property - External areas	Corridor joining sheds - Floor	Timber									Unrestricted Access					
Chicken Sheds (x3) - South of property - External areas	Corridors joining sheds - Walls / Roof	Metal sheeting									Unrestricted Access					
Chicken Sheds (x3) - South of property - External areas	Duct and exhaust units	Metal									Unrestricted Access					
Chicken Sheds (x3) - South of property - External areas	Grounds (east side)	Debris	Asbestos	34935-P-Debris		Positive	Non Friable	Poor	Low	Low	Unrestricted Access	Priority 1			Removal	ACM Debris found randomly around the property. Believe to be from pre-existing sheds. Works to be carried out in accordance with Victorian Occupational Health and Safety Regulations 2017.
Chicken Sheds (x3) - South of property - External areas	Meat / Cool room shed (South east area) - Walls and Roof	Metal throughout									Unrestricted Access					
Chicken Sheds (x3) - South of property - External areas	Roof	Metal									Unrestricted Access					
Chicken Sheds (x3) - South of property - External areas	Shed - South west of Chicken sheds	Metal throughout									Unrestricted Access					
Chicken Sheds (x3) - South of property - External areas	South side of middle chook shed - Sub floor lining	Fibre cement sheeting	Asbestos	34935-P01	34935-01	Negative					Unrestricted Access					Appears to be new.
Chicken Sheds (x3) - South of property - External areas	Sub floor areas	Metal framework / Timber / Biological matter									Unrestricted Access					Loads of debris throughout. Possible ACM debris.
Chicken Sheds (x3) - South of property - External areas	Walls (throughout)	Metal sheeting / Metal framework / Concrete									Unrestricted Access					Visually assessed only.
Chicken Sheds (x3) - South of property - Internal areas	Chook shed (Far west side) - Walls	Metal clad with insulation									Unrestricted Access					SMF insulation visually assessed from a damaged wall panel from south west side of the chook shed.
Chicken Sheds (x3) - South of property - Internal areas	Chook Shed - Walls	Metal									Unrestricted Access					Where accessed and assessed. Unable to gain entry to most of the sheds.
Chicken Sheds (x3) - South of property - Internal areas	Floor	Timber / Metal frame work and stumps									Unrestricted Access					Where assessed.
Chicken Sheds (x3) - South of property - Internal areas	Meat / Cool room shed (South east area) - Internal (throughout)	Unknown	Asbestos			Assumed positive		Unknown			No Access	Priority 4				No entry gained into this part of the shed. Lock doors. Further investigation may be required to determine the presence of ACM.
Egg Store Shed - External	Bench top (north west side of shed)	Fibre cement sheeting	Asbestos	34935-P02	34935-02	Positive	Non Friable	Fair	Low	Low	Unrestricted Access	Priority 3			Removal	Remove prior to demolition works. All future works impacting this item should be carried out in accordance with Victorian Occupational Health and Safety Regulations 2017.
Egg Store Shed - External	Roof / Walls	Metal									Unrestricted Access					
Egg Store Shed - External	Storage tanks (around Store)	Metal / Concrete / Timber Framework									Unrestricted Access					Visually assessed only.

APPENDIX A: 34935

Audit Location:
Client:
Survey Company
Audit Ref:
Audit Date:

Darraweit Road Wallan VIC - Chicken egg farm
Crystal Group P/L
LRM Global Pty Ltd
34935
2018-09-06 00:00:00



Asbestos Division 5 Survey | Job Ref: 34935

Title	Surface or Plant/Equipment Type	Source or Item Description	Hazardous Material Type	Photo	Sample	Assessment Status	Friability	Condition	Damage or Deterioration Potential	Activity Level	Accessibility	Priority Level	Re-inspection Schedule	Quantity	Control Recommendation	Comments
Egg Store Shed - External	Switchboard (North side)	Zelemite panel	Asbestos	34935-P-SwitchBoard		Assumed positive	Non Friable	Good	Low	Low	Unrestricted Access	Priority 3			Removal	Visually assessed only. Remove prior to any demolition. Unable to sample panel due to the unknown live electrical status. Future works impacting on this item, all works should be carried out in accordance with Victorian Occupational Health and Safety Regulations 2017.
Egg Store Shed - External	Switchboard box	Fibre cement sheet infill	Asbestos	34935-P03	34935-03	Negative					Unrestricted Access					Looks like timber.
Egg Store Shed - Internal	All areas	Unknown	Asbestos			Assumed positive		Unknown			No Access	Priority 4				No internal access. Locked. Further investigation required to determine the presence of ACM prior to any major demolition and/or refurbishment works impacting this shed, where these works should be carried out in accordance with OHS Regulations 2017.
House (1) - Entry to property (east) - External areas	Chimney	Fibre cement sheeting	Asbestos		34935-04 (Ref)	Positive	Non Friable	Fair	Low	Low	Unrestricted Access	Priority 3			Removal	Visually assessed only. Same material used for the walls. Removal of this item should be carried out in accordance with Victorian Occupational Health and Safety Regulations 2017.
House (1) - Entry to property (east) - External areas	Eave lining	Fibre cement sheet	Asbestos			Assumed positive		Good			Restricted Access	Priority 4				Visually assessed only, unable to sample due to height restrictions. Further investigation may be required prior to any future demolition works, where these works should be carried out in accordance with the Occupational Health and Safety Regulations 2017.
House (1) - Entry to property (east) - External areas	Entry porch - Walls	Fibre cement sheeting	Asbestos	34935-P05	34935-05	Negative					Unrestricted Access					Appears to be new type material
House (1) - Entry to property (east) - External areas	Roof	Ceramic tiles / Metal sheet (porch)									Unrestricted Access					
House (1) - Entry to property (east) - External areas	Walls (throughout)	Fibre cement sheet / Timber	Asbestos	34935-P04	34935-04	Positive	Non Friable	Fair	Low	Low	Unrestricted Access	Priority 3			Removal	False brick decal pattern on fibre cement sheet. Prior to any future demolition works impacting this item, removal of this item should be carried out in accordance with Victorian Occupational Health and Safety Regulations 2017.
House (1) - Entry to property (east) - Internal	Ceiling	Plaster									Unrestricted Access					
House (1) - Entry to property (east) - Internal	Floor	Carpet									Unrestricted Access					Where visually assessed.
House (1) - Entry to property (east) - Internal	Walls (throughout)	Plaster									Unrestricted Access					Visually assessed only. Possible fibre cement sheet in some areas. Further investigation may be required prior to any future demolition works.
House (2) - Entry to property (west) - External areas	Eaves	Fibre cement sheeting	Asbestos			Assumed positive		Good			Restricted Access	Priority 4				Visually assessed only. Unable to sample due to height restrictions. Further investigation may be required prior to any major future demolition works, where these works should be carried out in accordance with the OHS Regulations 2017.
House (2) - Entry to property (west) - External areas	Roof	Metal sheeting									Unrestricted Access					
House (2) - Entry to property (west) - External areas	Walls	Timber									Unrestricted Access					Visually assessed.
House (2) - Entry to property (west) - Internal	Floor	Carpet									Restricted Access					Visually assessed only. Home occupied with tenants. Further investigation may be required once property is made vacant.
House (2) - Entry to property (west) - Internal	Walls / Ceiling - Throughout	Plaster									Restricted Access					Home occupied with tenants. Visually assessed only. Further investigation may be required once property is vacant.
House (3) - East of Chicken Sheds - External	Eaves	Unknown	Asbestos			Assumed positive		Unknown			Restricted Access	Priority 4				Restricted access to eave lining due to height restrictions. Could not tell if it was timber or cement sheet. Further investigation required prior to any major demolition works.

APPENDIX A: 34935

Audit Location:
Client:
Survey Company:
Audit Ref:
Audit Date:

Darraweit Road Wallan VIC - Chicken egg farm
Crystal Group P/L
LRM Global Pty Ltd
34935
2018-09-06 00:00:00



Asbestos Division 5 Survey | Job Ref: 34935

Title	Surface or Plant/Equipment Type	Source or Item Description	Hazardous Material Type	Photo	Sample	Assessment Status	Friability	Condition	Damage or Deterioration Potential	Activity Level	Accessibility	Priority Level	Re-inspection Schedule	Quantity	Control Recommendation	Comments
House (3) - East of Chicken Sheds - External	Roof	Metal									Unrestricted Access					Visually assessed only.
House (3) - East of Chicken Sheds - External	Walls	Brick									Unrestricted Access					Visually assessed only.
House (3) - East of Chicken Sheds - Internal	Throughout	Unknown	Asbestos			Assumed positive		Unknown			No Access	Priority 4				No internal access due to property being occupied. Further investigation may be required once property is made vacant.



CRYSTAL GROUP P/L:34935
ASBESTOS DIVISION 5 SURVEY

APPENDIX B:

Laboratory Analysis Results

All laboratory analysis results for samples taken during this survey are attached in this appendix



LRM Global Pty Ltd
65 Stubbs Street
Kensington VIC 3031

Fax: (03) 9371 3499
Email: enquiries@lrmglobal.com.au
Web: www.lrmglobal.com.au
Telephone: (03) 9371 3400
ABN: 34 116 540 277

Qualitative Identification of Asbestos in Bulk Samples

Crystal Group P/L
22 Church Street
Whittlesea VIC 3757

Client Ref: 34935

Job Number: 34935.000

Batch Number: .

Received Date: September 10, 2018

Analysed Date: September 10, 2018

No of Samples: 5

Dear Alister Oldham,

This report presents the analytical results of samples collected for asbestos analysis from Darraweit Road Wallan VIC - Wallan Egg Farm.

Methodology:

The samples were examined under a Stereo Microscope and selected fibres were analysed by Polarized Light Microscopy in conjunction with Dispersion Staining Method. (**LRM Global ID Method 1**) and AS4964 - 2004

Analytical Results:

Sample No.	Sample Description	Result
34935-01	The sample consisted of fibre cement sheet Location: Rear middle chicken shed Sample Dimensions: 1.0cm X 1.0cm X 0.5cm	No Asbestos Detected Organic Fibre Detected
34935-02	The sample consisted of fibre cement sheet Location: Egg Store shed, west side - Bench top Sample Dimensions: 1.0cm X 1.0cm X 0.5cm	Chrysotile Asbestos Detected Organic Fibre Detected
34935-03	The sample consisted of fibre cement sheet Location: Egg Store shed - North side, switchboard box Sample Dimensions: 1.0cm X 1.0cm X 0.5cm	No Asbestos Detected Organic Fibre Detected
34935-04	The sample consisted of fibre cement sheet Location: House (1) - East of entry to property - External Walls Sample Dimensions: 1.0cm X 1.0cm X 0.5cm	Chrysotile Asbestos Detected Organic Fibre Detected
34935-05	The sample consisted of fibre cement sheet Location: House (1) - East of entry to property - Porch entry walls Sample Dimensions: 1.0cm X 1.0cm X 0.5cm	No Asbestos Detected Organic Fibre Detected



Approved Identifier

Karu Jayasundara



Report Issued by

Karu Jayasundara



**WORLD RECOGNISED
ACCREDITATION**

Accreditation No: 15684

Accredited for compliance with ISO/IEC 17025

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian Standards.

CRYSTAL GROUP P/L:34935
ASBESTOS DIVISION 5 SURVEY

APPENDIX C:

Photographic Records & Drawings

34935-P-Debris



Debris - Positive for asbestos
Chicken Sheds (x3) - South of property -
External areas: Grounds (east side)

34935-P-SwitchBoard



Switchboard panel - Assumed positive for
asbestos
Egg Store Shed - External: Switchboard
(North side)

34935-P01



Fibre cement sheet - Negative for
asbestos.
Chicken Sheds (x3) - South of property -
External areas: South side of middle
chook shed - Sub floor lining

34935-P02



Fibre cement sheet - Positive for asbestos
Egg Store Shed - External: Bench top
(north west side of shed)

34935-P03



Fibre cement sheet - Negative for
asbestos.
Egg Store Shed - External: Switchboard
box

34935-P04



Fibre cement sheet - Positive for asbestos.
House (1) - Entry to property (east) -
External areas: Walls (throughout)

34935-P05

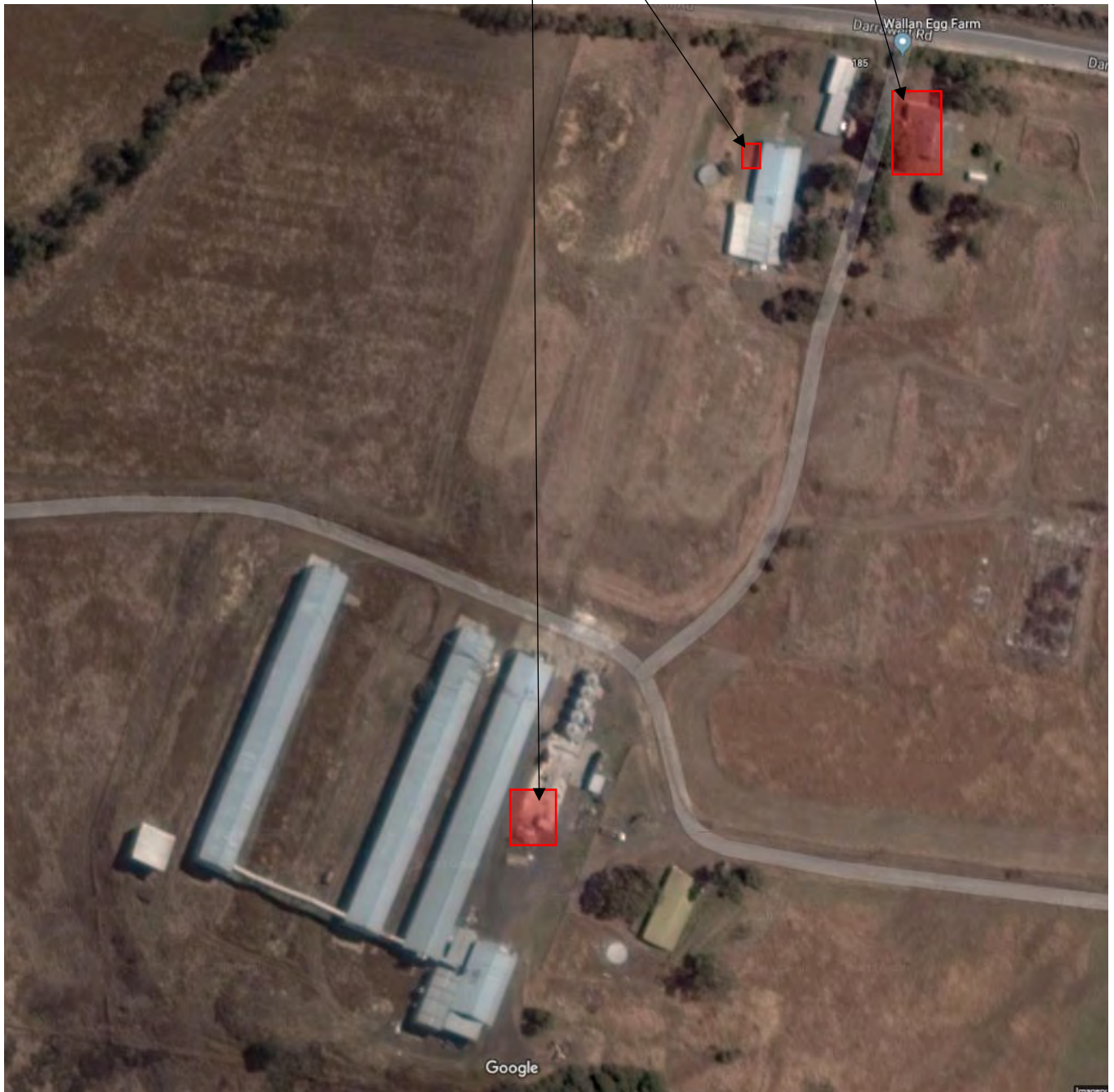


Fibre cement sheet - Negative for
asbestos.
House (1) - Entry to property (east) -
External areas: Entry porch - Walls

Site Aerial Diagram – Wallan Egg Farm

Areas where asbestos was mainly identified -

- House (1) – Entry to property, east - All external walls and chimney lining;
- Egg Store shed – North west area – Bench top
- ACM Debris – East side of chicken Sheds (x3)



CRYSTAL GROUP P/L:34935
ASBESTOS DIVISION 5 SURVEY

APPENDIX D:

Areas Not Accessible / Not Inspected

Table: Audit areas/locations identified as having 'No Access' or 'Restricted Access'

Area 1	Surface or Plant/Equipment Type	Material Type	Comments	Control Recommendation
House (2) - Entry to property (west) Internal	Walls / Ceiling - Throughout	Plaster	Home occupied with tenants. Visually assessed only. Further investigation may be required once property is vacant.	
House (2) - Entry to property (west) Internal	Floor	Carpet	Visually assessed only. Home occupied with tenants. Further investigation may be required once property is made vacant.	
Chicken Sheds (x3) - South of property Internal areas	Meat / Cool room shed (South east area) - Internal (throughout)	Unknown	No entry gained into this part of the shed. Lock doors. Further investigation may be required to determine the presence of ACM.	
Egg Store Shed Internal	All areas	Unknown	No internal access. Locked. Further investigation required to determine the presence of ACM prior to any major demolition and/or refurbishment works impacting this shed, where these works should be carried out in accordance with OHS Regulations 2017.	
House (1) - Entry to property (east) External areas	Eave lining	Fibre cement sheet	Visually assessed only, unable to sample due to height restrictions. Further investigation may be required prior to any future demolition works, where these works should be carried out in accordance with the Occupational Health and Safety Regulations 2017.	
House (2) - Entry to property (west) External areas	Eaves	Fibre cement sheeting	Visually assessed only. Unable to sample due to height restrictions. Further investigation may be required prior to any major future demolition works, where these works should be carried out in accordance with the OHS Regulations 2017.	
House (3) - East of Chicken Sheds External	Eaves	Unknown	Restricted access to eave lining due to height restrictions. Could not tell if it was timber or cement sheet. Further investigation required prior to any major demolition works.	
House (3) - East of Chicken Sheds Internal	Throughout	Unknown	No internal access due to property being occupied. Further investigation may be required once property is made vacant.	

CRYSTAL GROUP P/L:34935
ASBESTOS DIVISION 5 SURVEY

APPENDIX E:

Risk Assessment Criteria

Hazard Potential Risk Assessment Factors

The risk assessment factors utilised in this report relate to the potential of exposure of personnel during refurbishment or demolition works (excluding programmed hazardous material removal works). This assessment is based on the following factors:

- Health risk potential of the material;
- Condition of the material;
- Location of the material;
- and Potential of disturbance.

Where these factors have indicated that there is a possibility of exposure to a hazard, appropriate recommendations for the removal or containment of the material in question are made.

Risk Status Priority Rating for Control of Hazardous Materials

The following schedule of risk status priority rating is adopted to assist in the programming of the removal or containment of risks of hazardous materials in the building.

PRIORITY 1: Hazard with Elevated Risk Potential

Area has hazardous materials, which are either damaged or are being exposed to continual disturbance. Due to these conditions there is an increased potential for exposure and/or transfer of the material to other parts with continued unrestricted use of this area.

It is recommended that the area is isolated, air-monitoring be conducted (if appropriate) and the hazardous material is promptly removed. After abatement works are completed a re-inspection should be conducted to confirm that the hazardous materials have been satisfactorily removed.

PRIORITY 2: Hazard with High Risk Potential

Area has hazardous materials with a potential for disturbance due to the following conditions:

1. Material has been disturbed or damaged and its current condition, while not posing an immediate hazard, is unstable.
2. The material is accessible and can when disturbed present an exposure risk.
3. The material could pose an exposure risk if workers are in close proximity.

PRIORITY 3: Hazard with Low to Medium Risk Potential

Area has hazardous materials where:

1. The condition of the hazardous material is stable and has a low potential for disturbance or;
2. The hazardous material is outside the work area or scope of works and will remain in-situ upon

completion of the project.

PRIORITY 4: Area inaccessible - Hazard Undetermined

An area which has not been accessed during the survey is assumed to contain:

1. Asbestos containing materials as per the Occupational Health and Safety Regulations - 2017 - Part 4.4 - Asbestos 226 / 233
2. Other nominated hazardous materials.

In these circumstances a further assessment must be undertaken when accessibly to the area is available to determine whether asbestos materials are present.

ASBESTOS SURVEY

APPENDIX F:**Hazardous Materials Information**

Hazardous materials typically identified within building structures, ship or plant can be generally classified into 5 main types with the following classifications:

Hazardous Material	Classification	Exposure Standard
Asbestos materials	Category 1 Carcinogen	0.1 f/mL
Synthetic Mineral Fibre	Category 3 Carcinogen	0.5 f/mL
Lead	-	0.15mg/m3
Polychlorinated biphenyls (PCB's)	R33 N; R50-53	0.5mg/m3 (54% Chlorine)
Chlorofluorohydrocarbons (CFC's)	Category 3 Carcinogen; R40 R64 Xn; R48/20	-
Biological Hazards		

1) Asbestos Materials Overview

Asbestos containing materials can be classified into two main groups friable and non-friable; the table below lists the common material found in buildings in the two groups.



PVC or vinyl floor tiles with added asbestos (low %) chrysotile (non-friable)



Open electrical switchboard with asbestos flash guard (non-friable)



Asbestos textiles were widely used as a reinforcing material in friction products. e.g. conveyor and fan belts, brake and clutch linings (non-friable)



Fire retardant door insulation (friable)



Spray coating on a building walkway (friable)



Loose fibres - friable



Asbestos rope seal on drying oven (non-friable)



Chrysotile tape scrim



Metal clad gas Flue containing chrysotile lining (non-friable)



Friable asbestos roof cladding (friable)



Asbestos thermal insulation (friable)



Asbestos brake lining on output shaft of AC motor (friable)



Amosite and chrysotile packing on a water pipe (friable)



Asbestos bitumen coating under metal cladding (non-friable)



Chrysotile pebble dash exterior wall coating (non-friable)



Wall plasters containing asbestos (non-friable)



Asbestos cement (AC)



AC roof and wall cladding (non-friable)



AC downpipe (friable)



Friable asbestos debris (friable)



AC moulding gutter (friable)

1.1) Duties of Persons Who Manage or Control Workplaces

- Asbestos risk assessments are compulsory for employers across Victoria, requiring identification of asbestos type and assessment of exposure risk. Material sampling must be used to confirm or otherwise the presence of asbestos. This complies with the Occupational Health and Safety Regulations - 2017 - Part 4.4 - Asbestos.
- Employers are required to implement controls according to the hierarchy of controls to ensure risk of exposure to employees and building occupants and public is controlled.
- Materials identified as containing asbestos should be removed from any proposed work area or satisfactorily contained prior to commencement of refurbishment or demolition works.
- Asbestos materials should only be removed by a registered asbestos removal contractor as per the Occupational Health and Safety Regulations - 2017 - Part 4.4 - Asbestos.
- It is a requirement of the Occupational Health and Safety Regulations - 2017 - Part 4.4 - Asbestos for the building owner or occupier to ensure that the presence and location of asbestos materials are clearly identified and where practicable, the identification is to be by labelling.
- In the event of any proposed refurbishment or demolition, it is recommended that a current asbestos audit is made available or undertaken prior to the refurbishment or demolition. A risk assessment and

management of all works requires the consideration of the disturbance to any asbestos materials.

- The asbestos register should be maintained accurately and updated if changes occur. Re-inspection of the building must be undertaken as per Occupational Health and Safety Regulations - 2017 - Part 4.4 - Asbestos 228 - Asbestos register to be kept current
- Asbestos register to be kept current :
 - within 5 years from last audit date;
 - where there has been a change in the condition of the asbestos containing materials;
 - Where the asbestos containing material has been removed, enclosed or sealed;
 - Where there is evidence to indicate that the previous risk assessment does not adequately assess the current risk associated with the asbestos containing material;
 - The asbestos register updated accordingly.

Atmospheric monitoring must be provided if it is necessary to determine whether there is a risk associated with the presence of asbestos containing materials or that the exposure standard might be exceeded.

1.2) Records

Records of asbestos audits and registers and abatement records should all be kept. The occupier must be able to provide a copy of the most recent record of results to employers, employees or contractor engaged to work or occupy space within the building or structure as per 'Work Health and Safety Regulations 2011'. Records are to contain all risk assessments, all details of management of remaining asbestos and all details of asbestos removal and disposal. It is recommended that the physical condition and health risk assessment should be conducted annually to maintain the asbestos materials and an up-date the register.

2.0) Synthetic Mineral Fibre Overview

2.1) Definition

Synthetic mineral fibres (SMF) is a generic term used to collectively describe a number of amorphous (non-crystalline) fibrous materials. Commonly referred to as “Man Made Mineral Fibres” (MMMF).

2.2) References

- Worksafe Australia National Code of Practice for Synthetic Mineral Fibres - 1990
- Victorian Occupational Health & Safety Act 2004

2.3) Types of Synthetic Mineral Fibre Materials

Synthetic mineral fibre (SMF) materials, include fibreglass, rockwool and ceramic fibre based products. These products are used in a number of areas throughout buildings. These materials are generally used as insulation within ceilings and walls, as well as heating hot water pipe work and associated mechanical equipment. SMF materials are classified as bonded and unbonded materials. Unbonded SMF material includes loose fill fibreglass or rockwool dry wall or ceiling insulation, and sprayed rockwool to structural steel and acoustic finishes i.e. Roberts M34. Bonded SMF insulation materials include sectional fibreglass and rockwool pipe insulation; ceiling batts, duct blankets (lined and unlined with mesh/foil), dry wall batts insulation and acoustic mineral fibre ceiling tiles etc.

2.4) Duties of Persons In Control of the Area

- When using Synthetic Mineral Fibre, so far as is workable, select materials or product forms so as to minimise the release of fibres and/or dust;
- Engage appropriately qualified contractors to perform works entailing Synthetic Mineral Fibre material;
- Action shall be taken to apply appropriate control strategies on a continuing basis. The aim of these strategies is to reduce exposure to Synthetic Mineral Fibre to the lowest workable levels. Personal protection should not be used to replace other control measures unless they are deemed inadequate or not workable; and
- Ensure appropriate site maintenance throughout building.

2.5) Management of Synthetic Mineral Fibre (SMF)

In all cases, it is essential that SMF materials be handled appropriately to control dust and debris as they are irritating to the skin and mucous membranes. SMF fibres are generally thick and will scratch and puncture the skin causing rashes and irritation to the skin, nose and eye if exposed to high levels of dust and debris. Protective eyewear therefore should be worn if handling SMF materials above the head, i.e. entering ceiling cavities.

2.6) Overall Strategy Action should be taken on a continuing basis to achieve

the lowest workable exposure levels of Synthetic Mineral Fibre. The provision of engineering controls, greater attention to plant cleanliness, in particular within plant rooms and air handling units, and the containment of waste material may achieve this. Additionally, the use of binders or work practices which reduce the liberation of fibres and the provision of appropriate personal protective equipment can help reduce Synthetic Mineral Fibre levels to personnel and the environment.

2.7) Handling and Disposal of SMF Material

- Caution is required when handling SMF products in order to minimise airborne SMF fibre levels. It is recommended that the following code of practice be closely adhered to when handling such materials:
- Synthetic Mineral Fibres, Worksafe Australia, National Standard and National Code of Practice - May

1990.

- Occupational Health and Safety Commission, Document OHS No 34, October 1991 - Safe Use of Synthetic Mineral Fibres, Draft Code of Practice.
- Essentially, SMF materials should be handled in such a way as to minimise dust and disturbance of the materials. Where SMF materials are installed or removed, then suitable controls and appropriate personal protection are to be provided. Consultation should be sought with regard to appropriate procedures prior to the handling of such materials. Disposal of Synthetic Mineral Fibre material should be undertaken in accordance with Victorian EPA requirements.

3) Polychlorinated Biphenyls (PCBs)

3.1) Definition

Polychlorinated Biphenyls (PCBs) are a group of chlorinated organic compounds. PCBs are very stable chemicals that resist change over time and from temperature variation. They are fire resistant and very good insulators.

3.2) References

- Australian & New Zealand Environment and Conservation Council (ANZECC) "Identification of PCB-Containing Capacitors" - 1997
- Environmental Protection Authority "National Polychlorinated Biphenyls Management Plan 2000

3.3) Types of PCB's Used

The major type of PCB matrix has been as an insulating fluid inside transformers and capacitors. These transformers and capacitors range in size but generally are encased within a cylindrical or rectangular metal casing. PCBs have been commonly used in closed or semi-closed systems such as electrical transformers, heat transfer systems, hydraulic fluids, feeder cabling and in the metal case capacitors to fluorescent lights, sodium vapour and mercury vapour lights, and starter capacitors to electrical motors. PCBs will generally only be found in capacitors made before the late 1970's (though some electrical equipment imported after this period may contain PCBs). High voltage and medium voltage feeder cables prior to the use of PVC insulation, particularly the armoured type of cabling may contain PCBs in concentrations sufficient to be a scheduled PCB waste. Importation of PCBs in Australia was banned in 1976. However, they are still present extensively in transformers and capacitors in electrical equipment manufactured prior to this date.

3.4) Duties of Centre Manager

- Notification to EPA where the site holds more than 10kg of PCB's. Notification should include - concentration, quantity and location; and
- Establish an environment improvement plan (EIP) that includes a disposal schedule and appropriate certificates of disposal.

3.5) Handling and Disposal

The management of PCB is outlined in the policy document issued by ANZECC Polychlorinated Biphenyls Management Plan, November 1996. This plan sets out timelines for the eventual phase out and replacement of PCB within workplaces in Australia.

The Victorian Environmental Protection Authority has deemed Polychlorinated Biphenyls to be a prescribed waste. Proper procedures must be undertaken when disposing of items containing PCBs. Registered waste disposal companies are licensed to dispose of Polychlorinated Biphenyls material.

Not all materials containing PCBs are required to be removed. The management strategy depends on the priority of the area in which the material is located and the classification of the PCB containing material. The PCB concentration classifies a material as one of the following:

- PCB Free - materials and wastes are defined for the purposes of the PCB Management Plan as those materials or wastes containing PCBs at concentrations of 2 mg/kg or less.
- Scheduled PCB materials and wastes contain PCBs at levels greater than or equal to either 50mg/kg or 50g
- Non-Scheduled PCB materials or waste contain PCBs at concentration levels between those defined above.

- Basic personal protection equipment should be worn for the removal of capacitors from light fittings, in respect to eye and hand protection.

A building is classified as a priority or non-priority area. A priority area is defined as an area which requires a particularly high level of protection. Such areas include but are not limited to, schools, hospitals, food processing plants, animal feed lots, aquatic spawning areas and endangered species habitats. The PCB quantity for similar equipment such as capacitors in fluorescent light fittings is based on the aggregate weight of PCB in these units.

3.6) Disposal of PCB Materials and Waste

Waste PCBs and cloths and any fouled protective clothing must be disposed of as PCB contaminated waste in a plastic lined drum. The drum must be leak-proof in a sound and clean condition and must be able to be securely locked. The drums should be labelled as follows:

Warning "Caution Contains PCB's"	Packaging Group	II
UN No.2315	Class	6.1
HAZCHEM code 4X		

Pending removal of filled drums, the PCB waste should be stored in a secure location not accessible to the general public or building tenants. This area should be well ventilated and must not contain other Dangerous Goods.

4) Lead Based Paints

4.1) Definition

Lead:

Lead is a naturally occurring metal. Pure lead can combine with other substances to form various lead compounds. Therefore pure lead, lead alloys such as solder or brass, inorganic lead compounds and lead salts are considered lead containing compounds under the Occupational Health & Safety (Lead) Regulations, 2000.

Lead Paint:

Any paint containing greater than 1% by dry weight of lead.

4.2) References

- Occupational Health and Safety Regulations - 2017 - Part 4.3 "Lead"
- Australian standard (AS 4361.2 - 1998) Guide to Lead Paint management Part 2: Residential and commercial buildings

4.3) Lead Processes

The duties contained in the lead regulations only apply to workplaces where lead processes are undertaken. A lead process is a process that generates lead dust, fumes or mist. These may include the following activities:

- Exposure to lead dust or fumes arising from the oxy-welding of lead based materials; and
- Exposure to lead dust or fumes arising from the use of a power tool to remove any surface containing greater than 1% by dry weight of lead and the handling of waste from this process.

4.4) Duties of Facility Managers

- The Facility Manager has the responsibility under the regulations to protect your employees from excessive exposure to lead;
- These duties extend to any contractors and their employees that you hire to work for you; and
- If other people are carrying out tasks on your behalf, you have a responsibility to ensure that the person has the appropriate training, education or experience to carry them out correctly.

4.5) Management of Lead Painted Surfaces

- The health risk associated with lead occurs via an accumulative effect within the human body. Depending on the amount of exposure, side effects of the lead poisoning would not be apparent for many years. It is therefore recommended that workers associated with lead processes (as prescribed in the regulations) have regular medical examinations to monitor the amount of lead in the system.
- The most common exposure risks faced by workers are the inhalation of lead dust or fumes. The creation of the hazards generally relates to abrading or burning lead or lead coated surfaces. Other common sources of lead dust or fumes are as follows:
 - Lead based paints - when removing paint by sanding or heat (e.g. Creating dust), or when welding or cutting steel coated with lead or lead based paints;
 - Welding, oxy cutting of steel coated with lead based paint or primer; o Dismantling of equipment containing lead;
- The abatement of lead painted surfaces and reduction of potential lead exposure risks to workers and the environment requires a review of the potential exposure pathways to lead dust in the project. Local authority requirements, public safety and health requirements, site preparation, waste disposal and contamination control all need to be fully considered therefore, prior to the commencement of the project.
- Lead exposure is likely where painted surfaces are to be removed or treated by mechanically sanding, scraping or other cleaning techniques creating airborne dust and fall-out contaminating ground and building surfaces. Accordingly, lead abatement work must fully contain and control airborne emissions and remove resultant lead contaminated dusts and sludges from work surfaces. The painting contractors must prepare a waste management plan prior to any lead paint management work.
- Workers must also be fully protected against exposure with personnel protective clothing and respiratory protection and employers of these workers must fully comply with the Occupational Health and Safety Regulations - 2017 - Part 4.3 "Lead", including organising medical testing of their employees.
- The Australian Standard Guide to Lead Paint Management Part 2: Residential and Commercial Buildings AS 4361.2-1998 provides guidance for the management of lead-paint on non-industrial structures such as residential, commercial and public buildings. It should also be recognised that that the proposed work site may already be contaminated by lead, caused by earlier paint contamination from poor maintenance or repairing. It may be necessary to determine background levels in surrounding soil within the area where lead removal processes are to take place.
- The options available for the management of lead painted surfaces include:
 - Report and Document;
 - Stabilise the paint;
 - Carrying out lead paint abatement (removal); and
 - A combination of these options.

4.6) Regulatory Requirements

The National Standard for the Control of Inorganic Lead at Work states: "...that a job in which the blood lead level of the employee might be expected to rise above 1.45 milimole per litre of blood, is a lead-risk job."

Examples of processes that would be considered as a lead-risk job area as follows:

- Any work, which exposes a person to dust or fumes of lead arising from the manufacture or handling of dry lead compounds;
- Any work in connection with the manufacture, assembly, handling or repair of, or parts of electrical accumulators (batteries) which involves the manipulation of dry lead compounds, pasting or casting of lead;
- Breaking up or dismantling of lead accumulators and the sorting, packing and handling of plates or another parts containing lead removed or recovered from those accumulators;
- Spraying with molten lead or alloys containing greater than five (5) percent by weight of lead;
- Melting or casting of lead alloys containing ten (10) percent or more by weight of lead in which the temperature of the molten material exceeds 500 C;
- Recovery of lead from its ores, oxides or other compounds by a thermal reduction process;
- By machine grinding, discing, buffing or cutting by power tools lead or alloy containing greater than five (5) percent lead by weight;
- Machine sanding or buffing of surfaces coated with paint containing greater than five (5) percent lead by weight;
- Any process whereby electric arc, oxy-acetylene, oxy gas, plasma arc or a flame is applied, for the purposes of welding, cutting or cleaning, to the surface of any metal which is coated with lead;

5) Biological Hazards

5.1) Overview

A bio-hazardous agent is one that is biological in nature, capable of self-replication and has a capacity to produce deleterious effects upon other biological organisms, particularly humans. Biological agents or substances which could be bio-hazards should include, but not be limited to, infectious or parasitic agents, non-infectious micro-organisms such as some fungi, yeast and algae, plants and plant products, and animal and animal products which cause occupational disease. Note: The above table is a selection of common areas that could harbour biological hazards and should not be regarded as a complete list of hazardous areas. * These biological hazards were not examined in this report. They should be addressed separately if symptoms and or concerns are identified.

5.2) Health Risk

- Biological agents can cause infection to exposed persons through oral, respiratory, mucous membranes, skin puncture and penetration through the skin. This would be chiefly an issue for laboratory technicians handling cultures and blood sera, and for nursing staff during the care of patients with infectious disease. Similarly, cleaners and staff involved in disinfection sterilisation and disposal of infectious waste must adopt safe work procedures to prevent risk of infection.
- Human bio-hazards are a higher risk to persons handling materials contaminated with human waste and blood, or during culturing bacteria, viruses or parasites. Items that come into contact with mucous membranes or non-intact skin are classified as semi-critical items and require high-level disinfection. Similarly, those items that enter sterile body tissues or blood, such as catheters and surgical instruments, also require complete sterilisation.
- Environmental surfaces, such as floors, walls, table-tops and benches are termed non-critical items and are not usually involved in the transmission of infections. Non-critical items are those that come into contact with skin but not with mucous membranes. A detergent, with or without low-level disinfectant activity, is sufficient for the usual, general cleaning of these surfaces.
- Medical equipment surface, such as those on switches and knobs of patient monitoring equipment, may play a role in the transmission of infectious diseases. Provided that these are cleaned with intermediate-level disinfectants, the risk of further transmission of infectious agents would be eliminated.

5.3) Management of Biological Hazards

Handling and Disposal Methods

- The procedures for the safe removal and disposal of the biological hazard will vary depending on the type, location, condition and the potential for exposure the hazard represents. It is recommended that a detailed scope of works be produced for the safe work methods for removal and disposal of the hazard.
- The procedures and safety requirements adopted should be in accordance with the relevant regulations or Australian Standard that applies to the particular hazard to be removed.
- As a basic work method, the area where a biological hazard is identified should be isolated and signposted until proper abatement and disposal procedures are formulated.

CRYSTAL GROUP P/L:34935
ASBESTOS DIVISION 5 SURVEY

APPENDIX G:

Disclaimer

This report was prepared for solely for the purpose set out herein and it is not intended that any other person uses or rely on it. Whilst this report is accurate to the best of our knowledge and belief LRM Global Pty Ltd cannot guarantee completeness or accuracy of any descriptions or conclusions based on information supplied to it during site surveys, visits and interviews. Responsibility is disclaimed for any loss or damage, including but not limited to, any loss or damage suffered by arising from the use of this report or suffered by any other person for any reason whatsoever.

The following should also be noted:

While the survey has attempted to locate all the hazardous materials within the site it should be noted that the survey was a visual inspection and a limited sampling program was conducted. Only those hazardous materials that were physically accessible could be located and identified. Therefore it is possible that materials, which may be concealed within inaccessible areas/voids, may not have been located during the survey. Such inaccessible areas fall into a number of categories.

- (a) Locations behind locked doors.
- (b) Inset set ceilings or wall cavities.
- (c) Those areas accessible only by dismantling equipment or performing minor localised demolition works.
- (d) Service shafts, ducts etc., concealed within the building structure.
- (e) Voids or internal areas of plant, equipment, air conditioning ducts etc.
- (f) Totally inaccessible areas such as voids and cavities created and intimately concealed within the building structure. These voids are only accessible during major demolition works.
- (g) Height restricted areas.

Only minor destructive surveying and sampling techniques were employed to gain access to those areas documented in appendix A. Consequently, without substantial demolition of the building, it is not possible to guarantee that every source of hazardous material has been detected.

During the course of normal site works care should be exercised when entering any previously inaccessible areas or areas mentioned above and it is imperative that work cease pending further sampling if materials suspected of containing asbestos or unknown materials are encountered. Therefore during any refurbishment or demolition works, further investigations may be required should any suspect material be observed in previously inaccessible areas.

This Asbestos Division VI survey report should not be used for the purposes of costing for removal or programming of future refurbishment or demolition works unless accompanied by an appropriate and site-specific scope of works. The scope of work should be inclusive of the required refurbishment or demolition works that the survey was intended for use. This risk assessment report should be read in its entirety and must not be copied, distributed or referred to in part only.



*Yarra Valley
Water*

Wallan Reclaimed Water Re-Use Scheme

Camerons Lane Lots 8 & 9

Preliminary Assessment of Groundwater Monitoring Results

May 2008

File reference: M:\INFRASTRUCTURE SERVICES\Treatment Plant and Trade Waste Division\Treatment Plant Planning\6 STPs\13 Wallan (STP075)\Effluent Recycling\Wallan Lot 8 & 9\Soil and Borelog Investigations\Wallan RRS Prelim GW Assessment May08.doc

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1. Introduction

The Camerons Lane Reuse Scheme was developed as part of Goulburn Valley Water's (GVW) re-use strategy for effluent from the Wallan Sewage Treatment Plant (STP). Stage 1 of the scheme has been completed and covers 92 ha. Stage 2 will develop the remaining 66 ha of the site in the future. The reuse scheme is located at Lots 8 and 9 of Camerons Lane, located south of Wallan, on the western side of the Hume Freeway. The ownership of the Wallan STP and Camerons Lane Lots 8 and 9 was transferred from GVW to Yarra Valley Water (YVW) in January 2006. Irrigation with recycled water of Class C standard commenced at Lots 8 and 9 in early 2006 for pasture establishment for cattle grazing purposes. Approximately 360 ML of Class C water has been utilised for irrigation at the site from early 2006 to March 2008.

Prior to the commencement of irrigation with Class C recycled water, GVW commissioned Sinclair Knight Merz (SKM) in 2005 to conduct a hydrogeological assessment to determine background groundwater conditions at Lots 8 and 9. SKM performed an evaluation of sampling results with a focus on the protection of beneficial use segments as defined in the State Environment Protection Policy (SEPP) (EPA 1997). The SEPP stipulates that groundwater quality should be maintained to protect existing and potential beneficial uses of groundwater resources. The evaluation by SKM indicated that beneficial uses of groundwater in the vicinity of the site are predominately in segments B to C. Segments B to C includes irrigation water, stock water, industry, ecosystem protection, and buildings and structures. As the most likely uses of the groundwater in the area would involve irrigation and stock watering, the relevant guidelines in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC & ARMCANZ, 2000) were utilised as an indication of the quality limits to which the groundwater should be maintained (from here onwards, these guidelines shall be referred to as the 'Guidelines').

This report aims to provide a preliminary assessment of groundwater monitoring data obtained since irrigation with Class C water commenced against background conditions as determined by SKM in 2005, and the relevant guideline values. A more detailed independent assessment of the groundwater monitoring results is planned after additional data is collected following the 2008 irrigation period. Therefore, this report includes:

- a brief background of the groundwater monitoring network and Class C water quality;
- groundwater level monitoring results, and a comparison of post January 2006 groundwater levels with background levels;
- groundwater quality results, and a comparison of groundwater quality results against relevant guidelines and background levels.

2. Background

2.1 Groundwater monitoring

The groundwater monitoring network for Lots 8 and 9 consisted of 21 boreholes and windmills in 2002, of which 12 are still in operation in 2008 (see Appendix 1 for location of borehole sampling sites). Over this period, boreholes and windmills have been removed from operation for various reasons, including boreholes deteriorating or being destroyed during construction of the irrigation scheme. Groundwater levels and quality have been monitored at least annually at the site since 2002. YVW commenced quarterly monitoring in October 2006.

2.2 Class C recycled water for irrigation

The Class C water supplied from the Wallan STP for irrigation at Lots 8 and 9 Camerons Lane contains various parameters for which relevant guidelines values are specified by ANZECC & ARMCANZ (2000). A summary of Class C water quality from the Wallan STP in 2006/07 is given in Table 1. Approximately 360 ML of Class C water was utilised for irrigation at Lots 8 and 9 from early 2006 when irrigation started to April 2008.

Table 1: Wallan Class C water quality results for 2006/07

Parameter	Units	Median
pH	Units	7.9
Biological Oxygen Demand (BOD)	mg/L	12
Suspended Solids (SS)	mg/L	31
Total Phosphorus (TP)	mg/L	12.5
Total Nitrogen (TP)	mg/L	32
Nitrite (NO ₂)	mg/L	0.32
Nitrate (NO ₃)	mg/L	2.45
Ammonia (NH ₃)	mg/L	20
Organic Nitrogen	mg/L	10
Total Kjeldahl Nitrogen (TKN)	mg/L	31
Total Dissolved Solids (TDS)	mg/L	820 [^]
Electrical Conductivity (EC)	uS/cm	825
Sodium Adsorption Ratio (SAR)	Units	6 [^]
<i>E. coli</i>	orgs/100mL	132

[^] Single annual result.

3. Analysis of monitoring data

3.1 Groundwater standing water levels

Of the 21 boreholes in the monitoring network in 2002, standing water levels were recorded for 12 boreholes in both the pre and post-irrigation periods (Figure 1). A relatively consistent slight downward trend in groundwater standing water levels over time has been detected spanning both the pre and post irrigation periods for these 12 boreholes. The standing water levels at the commencement of monitoring in 2002 ranged from 3.47 m to 10.3 m. The standing water level is measured from the top of borehole casing to the water top level in the bore. In March 2008, the groundwater levels generally dropped, with the standing water levels ranging from 3.63 m to 10.91 m. This slight drop in groundwater levels could possibly be due to the dry conditions experienced between 2002 and 2008.

Boreholes 5, 6 and 10 showed increases in groundwater levels. For borehole 5 (BH5), the reported standing water level changed from 9.7 m in 2004 to 7.8 m in 2007. This result can be attributed to an alteration of the well head fitting of BH5 and removal of the post to enable the lateral irrigator to operate in 2006. BH5 was previously surveyed to the Australian Height Datum in March 2002 and this was used to estimate the water levels although alterations of the well head fitting could change the height of the casing. Therefore the elevation to top of casing will need to be re-surveyed and results should be adjusted accordingly. The latest results for boreholes 6 and 10 indicated an increase in groundwater levels.

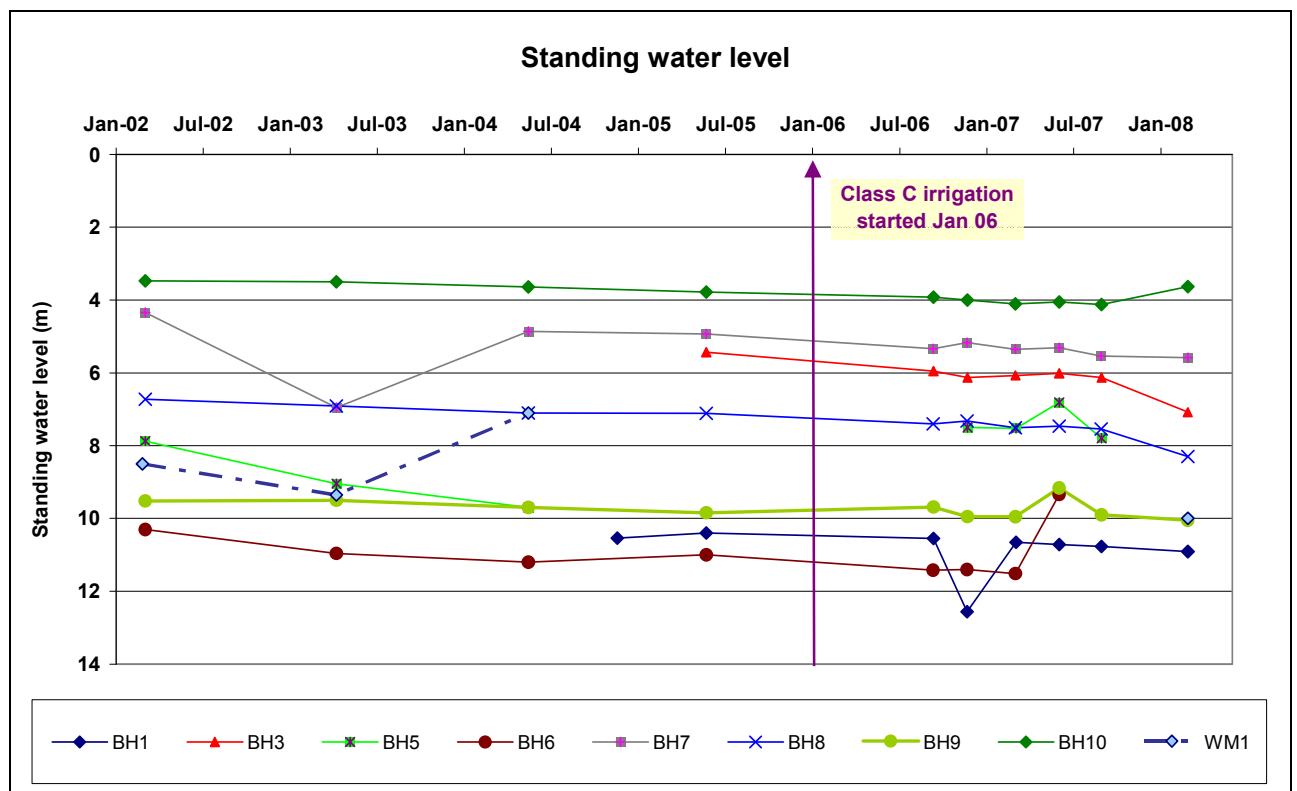


Figure 1: Groundwater levels from on-site bores with data in the pre and post irrigation periods

Groundwater standing water level data for all 21 groundwater bores are shown in Appendix 2 and depicted in Figure 2. For windmill 3 (WM3), the low groundwater level of 26.21m in 2003 may have occurred due to the bore being in operation at the time of monitoring. Groundwater levels could not be recorded for all operational bores over the monitoring period for reasons such as unable to pass equipment through the tops of bores, monitoring equipment could not reach the water table or the bores were dry.

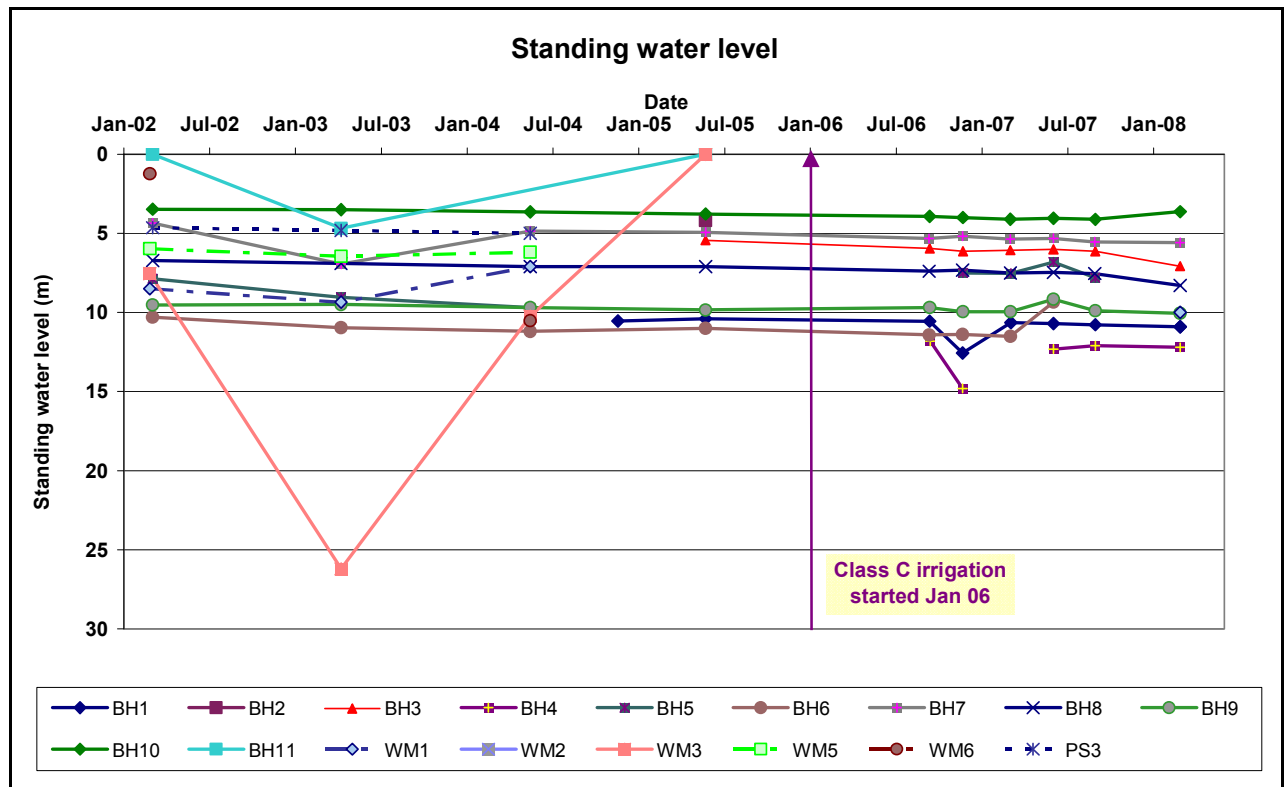


Figure 2: Groundwater levels from all on-site bores

3.2 Groundwater quality

Groundwater sampling from bores has occurred at the site since 2002 with the latest sample results from March 2008. A total of 36 water quality parameters were tested, and these results are shown in Appendix 2.

Eight of the 36 parameters were assessed by SKM in 2005 to establish background conditions and are discussed in the next section. Thirteen of the 36 parameters which have trigger values in the Guidelines for irrigation and stock water are shown below in Table 2 together with the maximum results in the pre and post-irrigation periods.

Table 2: Groundwater quality results and trigger values

Parameter	Unit	Trigger values		Maximum results		Comments
		Irrigation water*	Stock water	Pre-irrigation^	Post-irrigation	
Calcium (Ca)	mg/L		1,000	NA	100	Maximum result(s) below trigger value(s).
Sodium (Na)	mg/L	230 - 460 moderately tolerant crops		NA	1,000	Median value of 270 mg/L within the guidelines. Results above 460 mg/L from BH3, 5 & 10. BH 3 & 10 located north of irrigation area. Only BH5 located within irrigation area. No pre-irrigation data available.
Chloride (Cl)	mg/L	350 - 700 moderately tolerant crops		NA	2,300	Median value of 590 mg/L within the guidelines. Results above 700 mg/L from BH3, 5, 9 & 10. BH 3, 9 & 10 located north of irrigation area. Only BH5 located within irrigation area. No pre-irrigation data available.
Sulphate (SO ₄)	mg/L		1,000	NA	160	Maximum result(s) below trigger value(s).
Cadmium (Cd)	mg/L	STV 0.05; LTV 0.01	0.01	NA	0.002	Maximum result(s) below trigger value(s).
Copper (Cu)	mg/L		0.4 (most sensitive livestock - sheep)	NA	0.04	Maximum result(s) below trigger value(s).
Mercury (Hg)	mg/L		0.002	NA	<0.001	Maximum result(s) below trigger value(s).
Zinc (Zn)	mg/L		20	NA	0.75	Maximum result(s) below trigger value(s).
Arsenic (As)	mg/L	STV 2.0; LTV 0.1	0.5 - 5	NA	0.02	Maximum result(s) below trigger value(s).
Chromium (Cr)	mg/L	STV 0.1; LTV 1	1	NA	0.02	Maximum result(s) below trigger value(s).
Molybdenum (Mo)	mg/L	STV 0.2; LTV 10	0.15	NA	<0.01	Maximum result(s) below trigger value(s).
Selenium (Se)	mg/L	STV 0.02; LTV 0.05	0.02	NA	0.015	Maximum result(s) below trigger value(s).
pH	pH units	Guidance range 6 - 8.5 to limit corrosion & fouling of pumping, irrigation & stock watering systems		12.1	9.3	pH 9.0 - 9.3 from WM2, 5 & 6. WM2 & 6 located on eastern boundary of site. WM5 located north of irrigation area. Maximum pH results of Class C water in 2006/07 and 2007/08 (year to March 2008) was pH 8.1.

* STV – Short-term Trigger Value (short-term use – up to 20 years). LTV - Long-term Trigger Value (short-term use – up to 100 years). Moderately tolerant crops classification selected by SKM to establish background conditions.

^ NA – Not applicable, background condition in pre-irrigation period not assessed.

Majority of results for the thirteen parameters in Table 2 were within the Guidelines. Three parameters (sodium, chloride and pH) recorded maximum results above the trigger values. However, for two of the parameters (sodium and chloride), no pre-irrigation data was available and therefore a comparison with pre-irrigation conditions cannot be made. SKM (2005) concluded that the groundwater flow direction is generally to the south. Thus elevated results for sodium and chloride from boreholes north of the irrigated area are unlikely to be caused by irrigation with Class C water. The guidance range for pH of 6 – 8.5 is to limit the corrosion and fouling of pumping, irrigation and stock watering systems. The slightly elevated pH levels of 9.0 – 9.3 was recorded for three windmills, however a general increase in pH for all boreholes in the irrigated area was not observed (Figure 3). Maximum pH results recorded for Class C water in 2007/08 and 2008/09 (to March 2008) was 8.1. Future monitoring results for Sodium, Chloride and pH should be assessed to determine if irrigation with Class C water is the cause of the elevated results.

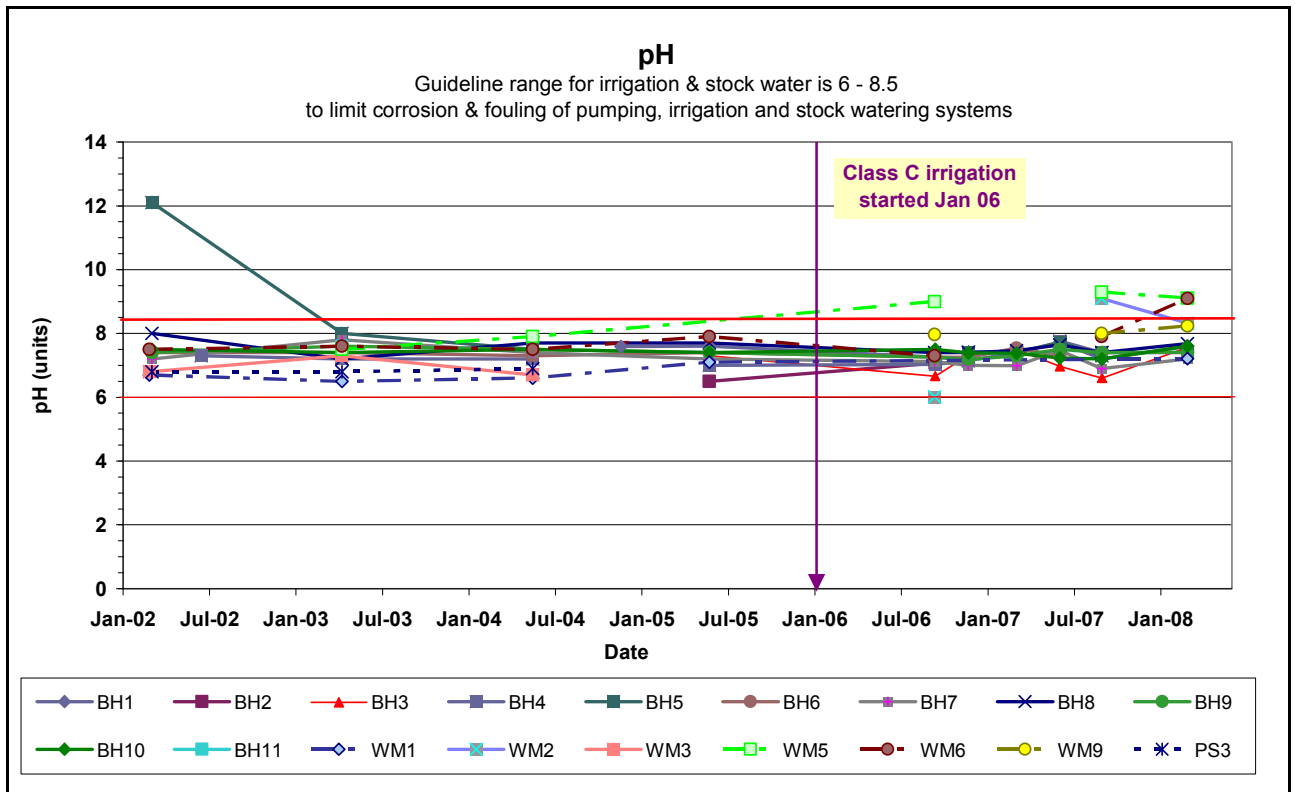


Figure 3: pH results for borehole samples

3.2.1 Comparison with background levels

An assessment by SKM in 2005 aimed to provide an indication of background conditions for eight groundwater quality parameters of particular significance to the beneficial reuse potential of the groundwater in the area. Five parameters are assessed against trigger levels in the Guidelines as listed in Table 3, and a further three parameters without trigger levels (ammonia, Biological Oxygen Demand, Total Kjeldahl Nitrogen) are analysed. The relevant trigger values in Table 3 from the Guidelines for the site were determined by SKM (2005).

Table 3: Guideline trigger values for selected parameters

Parameter	Trigger values	
	Irrigation water	Stock water
Total Dissolved Solids	1,140-2,700 mg/L, av. 1,920 mg/L (root zone salinity for moderately tolerant crops)	2,000 mg/L (no adverse effect for all livestock)
Thermotolerant coliforms, including <i>E. coli</i>	Median <10 orgs/100 mL water	Median <100 orgs/100 mL water
Nitrate as N (nitrogen)	Not specified	< 90 mg/L
Nitrite as N (nitrogen)	Not specified	< 9 mg/L
Total Phosphorus	Short-term trigger value (up to 20 years): 0.8 - 12 mg/L Long-term trigger value (up to 100 years): 0.05 mg/L (to minimize bioclogging of irrigation equipment only)	Not specified

Total Dissolved Solids

Total Dissolved Solids (TDS) is a measure of organic and inorganic matter, and ions dissolved in solution. It is often used to give an indication of salinity. High salinity levels in soils can reduce plant productivity and in extreme cases cause die off of crops or native vegetation.

The TDS values were found to range 300 – 5,000 mg/L and 400 – 7,300 mg/L from bores samples in the pre and post-irrigation periods respectively (Figure 4). The value of 7,300 mg/L from borehole 6 (BH6) in March 2007 was an extreme outlier and the subsequent TDS result from June 2007 was 1,100 mg/L, which is within the pre-irrigation TDS range of 1,100 – 1,400 mg/L. In the post-irrigation period, the majority of the bores sampled had TDS values below the recommended trigger values of 2,700 mg/L for irrigation water and 2,000 mg/L for stock watering. TDS results exceeding guideline trigger values appear unlikely to be related to irrigation, as the exceedence results originated from bores which also showed high TDS results prior to irrigation.

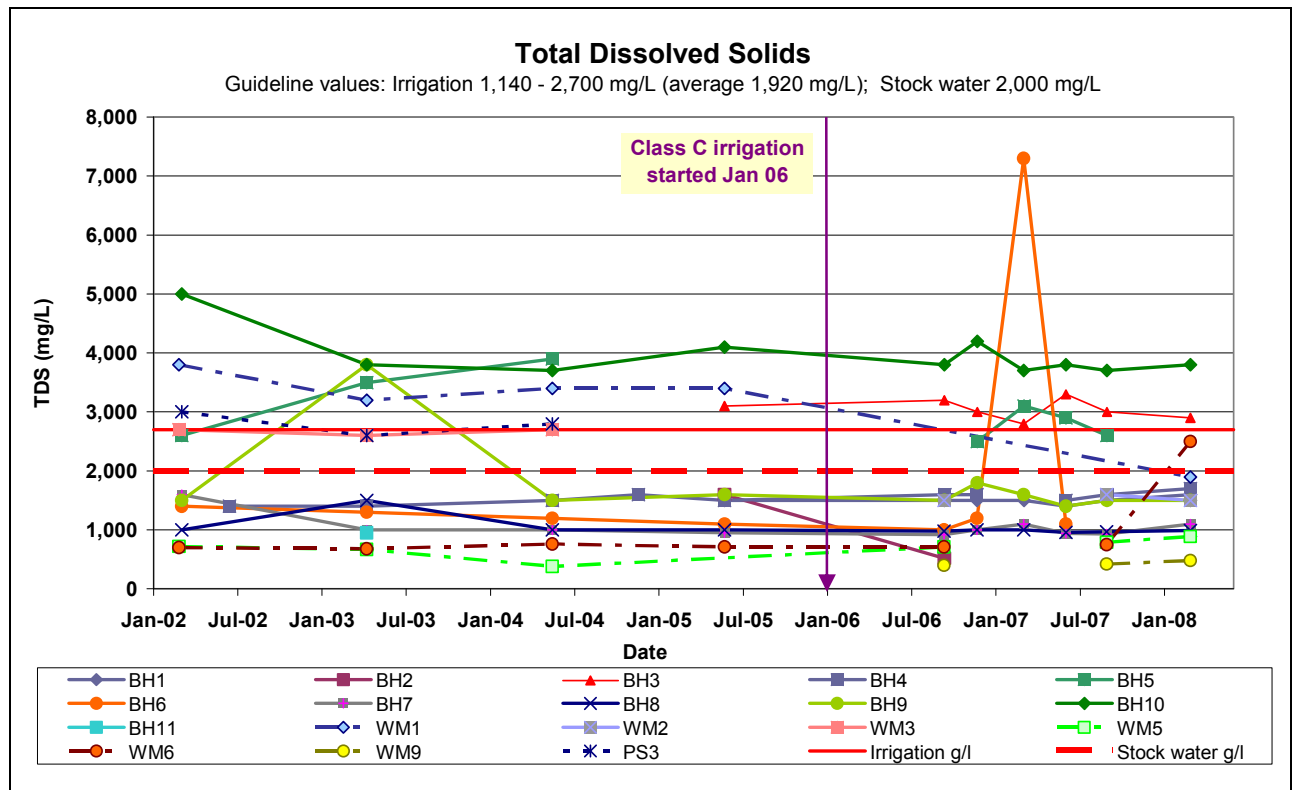


Figure 4: Total Dissolved Solids results for borehole samples

Ammonia

Ammonia is produced from the breakdown of organic nitrogen derived from animal or plant material. Ammonia is used as an indicator of organic nitrogen, and exists as either the ammonium ion (NH_4^+) or ammonia (NH_3).

Trigger values for irrigation water and stock water for ammonia are not specified in the Guidelines. The concentration of ammonia as nitrogen (N) was found to be less than 1 mg/L in all bores for the entire monitoring period with the exception of two results (Figure 5). The value of 12.0 mg/L for borehole 4 in June 2002 was anomalous as all subsequent readings were less than 1 mg/L. A reading of 250 mg/L from windmill 1 (WM1) in March 2008 is unusual because all previous readings dating back to 2002 were 0.1 mg/L or less. Windmill 1 is located north of the irrigated area, however the ammonia result from the next quarterly sample from this borehole should be assessed to determine if this high reading indicates an upwards trend or was a one-off anomaly. The ammonia concentrations have remained relatively stable over the monitoring period, with the median and 75th percentile value for ammonia in both the pre and post-irrigation periods at 0.1 mg/L.

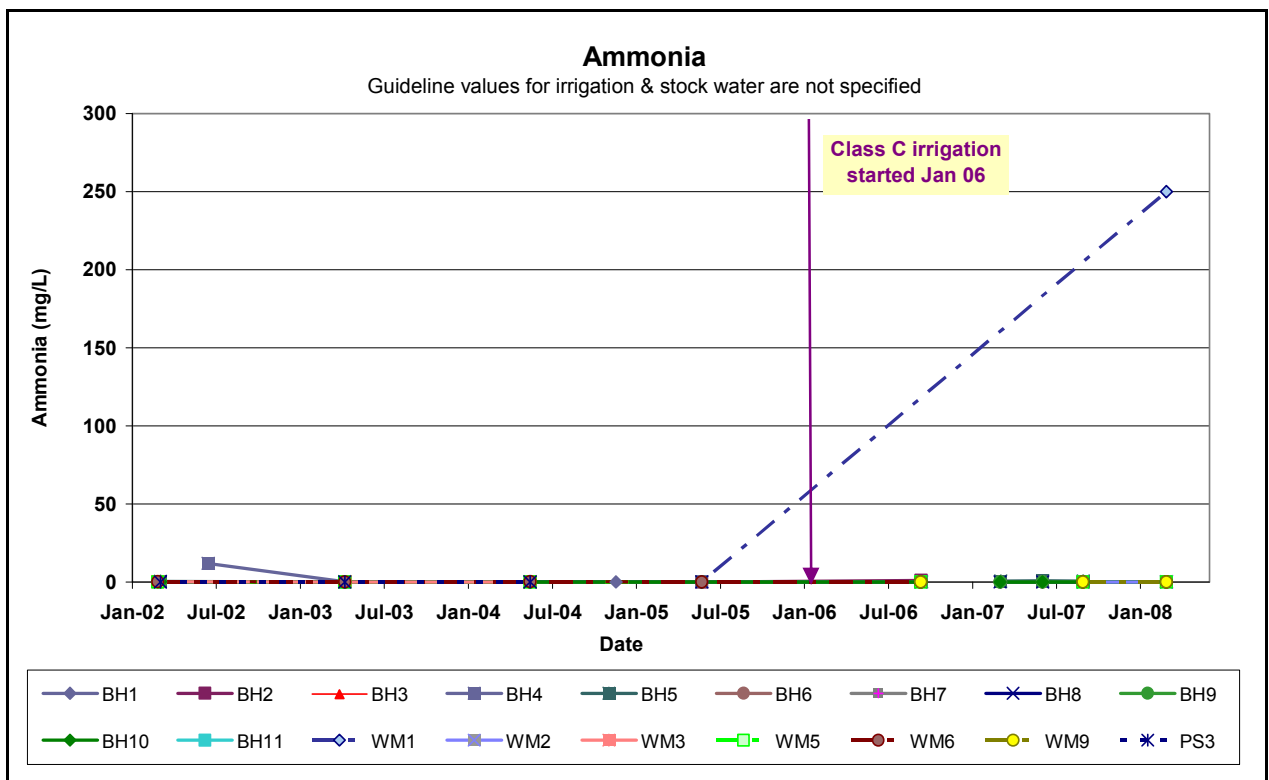


Figure 5: Ammonia results for borehole samples

Nitrate and Nitrite

Nitrate is formed from the oxidation of organic wastes by bacteria. Intensive farming practices can lead to increasing amounts of nitrate in some waters, particularly groundwater. The nitrite ion can be formed by the reduction of nitrate in poorly oxygenated waters and is relatively unstable. Chemical and biological processes can result in further reduction of nitrite to various compounds including ammonia, or oxidation back to nitrate.

Both nitrate and nitrite can be toxic to animals, and nitrite is more toxic than nitrate. The trigger values for nitrite and nitrate as nitrogen (N) in stock water are less than 9 and 90 mg/L respectively. No guideline values have been specified for irrigation waters.

The nitrite as N (nitrogen) concentration was found to range from below 0.01 mg/L to 0.82 mg/L in bores sampled over the pre-irrigation period, and below 0.01 mg/L to 0.42 mg/L in the post-irrigation period (Figure 6). Thus, the concentrations have been relatively stable and well below the recommended trigger value of 9 mg/L for stock water.

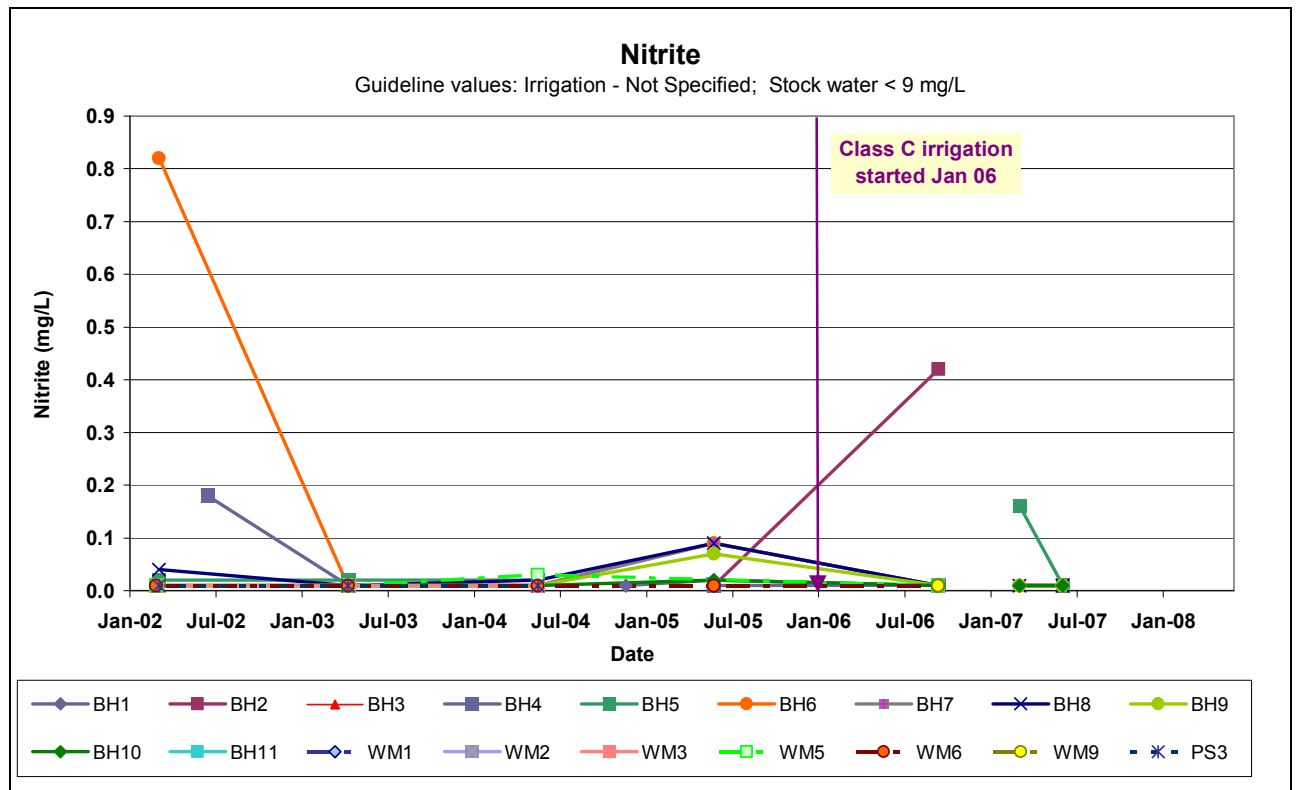


Figure 6: Nitrite as N results for borehole samples

The nitrate as N (nitrogen) concentration measured in groundwater ranged from below 0.01 mg/L to 9.7 mg/L in bores sampled over the pre-irrigation period, and below 0.01 mg/L to 24 mg/L in the post-irrigation period (Figure 7). The 24 mg/L result is unlikely to be related to irrigation with Class C water as it was recorded at borehole 2 (BH2) given that SKM (2005) concluded groundwater is flowing south from the site and BH2 is located north of the irrigated area. These concentrations are well below the trigger value of 90 mg/L for stock water. Excluding three outlying values, the nitrate results across the site have remained relatively stable over the monitoring period.

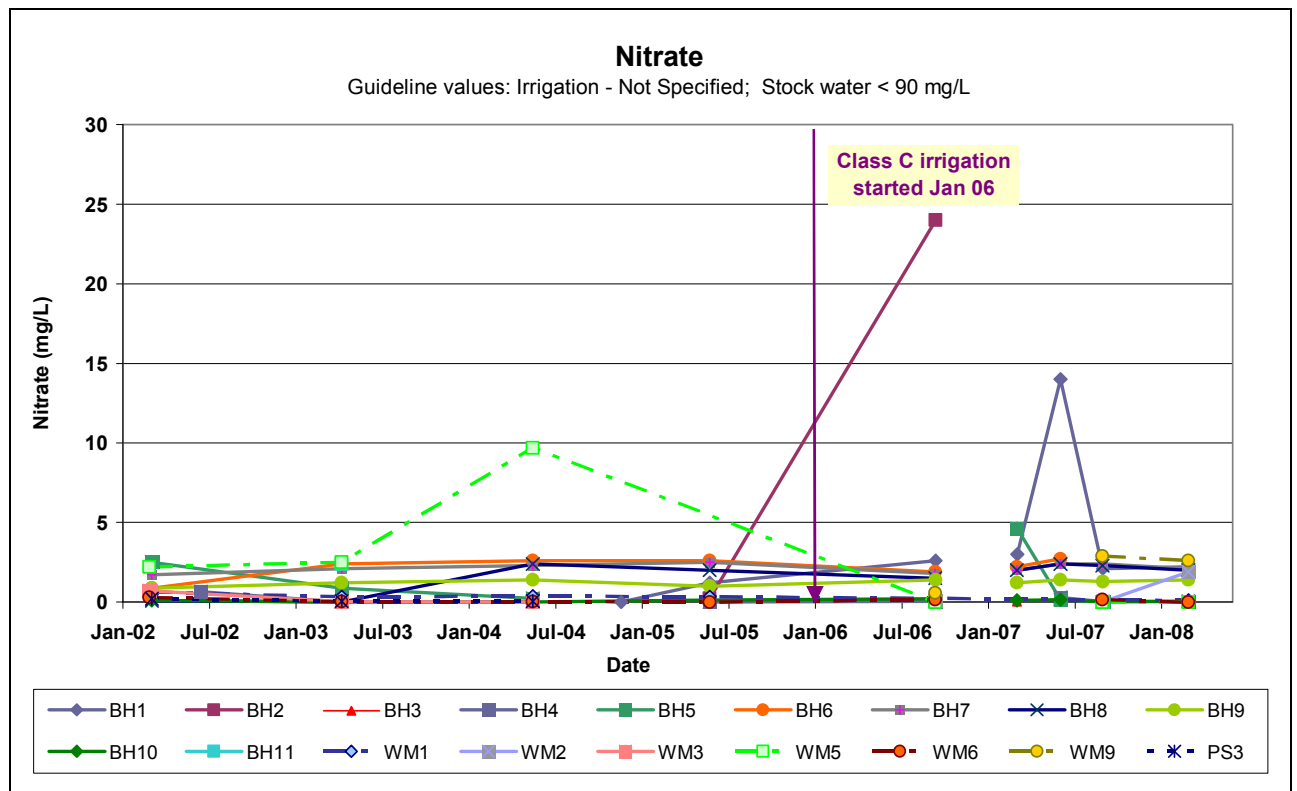


Figure 7: Nitrate as N results for borehole samples

Total Kjeldahl Nitrogen

Total Kjeldahl Nitrogen (TKN) gives an indication of the total organic nitrogen and ammonia present in a solution. A trigger value for irrigation water or stock watering water quality for TKN is not specified in the Guidelines.

With the exception of one outlier in each of the pre and post-irrigation periods, the TKN values were found to range from below 0.3 to 4.7 mg/L in bores sampled over the pre-irrigation period, and below 0.1 to 3.1 mg/L in the post-irrigation period (Figure 8). TKN concentrations have remained relatively low at the site over the monitoring period, with all but two samples collected having TKN concentrations of less than 5.0 mg/L. The 250 mg/L result was recorded for windmill 1 (WM1) which is located north of the irrigated area, however future TKN results for WM1 should be monitored to determine if the 250 mg/L was an anomaly or an indication of an upwards trend.

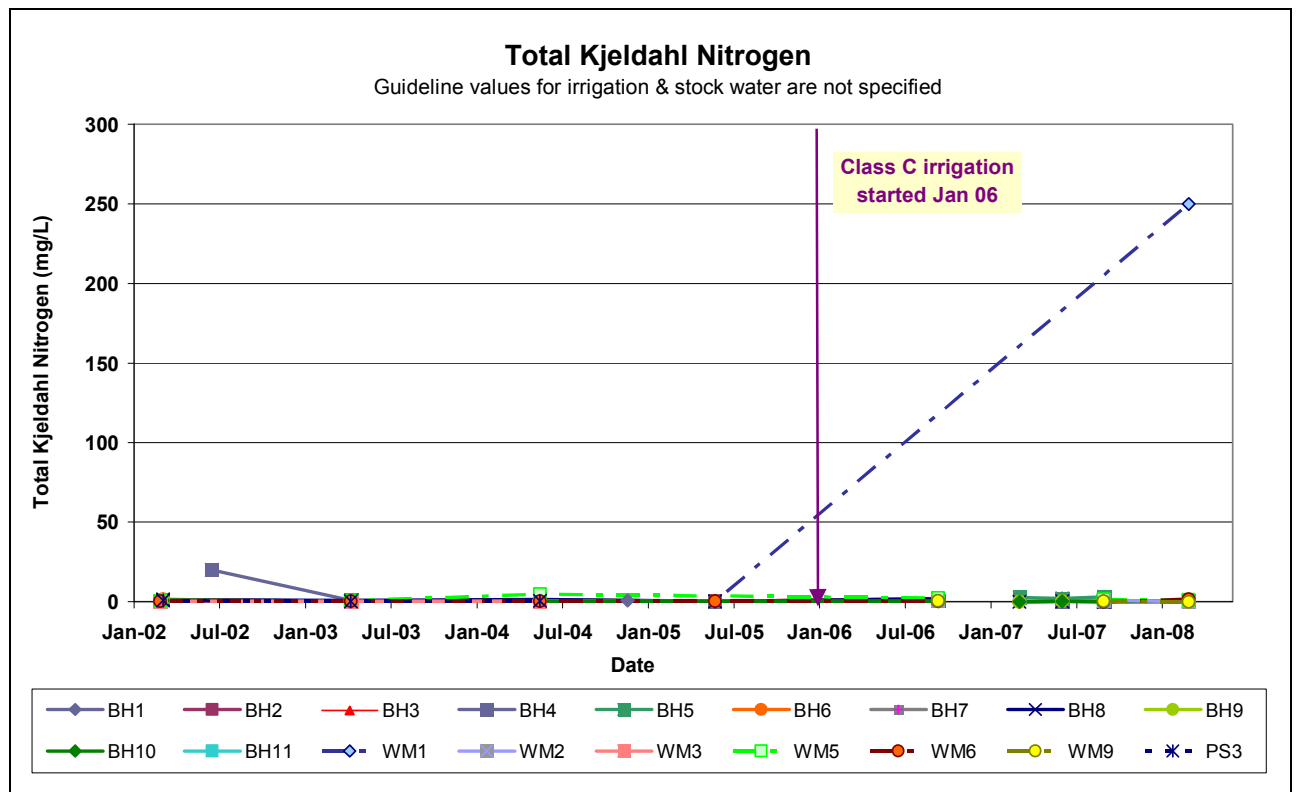


Figure 8: Total Kjeldahl Nitrogen results for borehole samples

Total Phosphorus

Total Phosphorus is the sum of organic and inorganic phosphorus. Phosphorus is a nutrient that can stimulate rapid growth of microorganisms and excessive Phosphorus concentrations can lead to algae blooms in surface water. According to the Guidelines for irrigation waters, the short-term (up to 20 years) trigger range for phosphorus is 0.8-12 mg/L. The long-term (up to 100 years) trigger value of 0.05 mg/L is for the purposes of minimising bioclogging of irrigation equipment only.

Apart from two outliers of 7.6 mg/L in March 2008 and 10 mg/L in October 2006, the range of Total Phosphorus concentrations recorded across the site has remained fairly stable since 2002. In the pre-irrigation period, the Total Phosphorus values ranged from less than 0.01 to 1.3 mg/L. In the post-irrigation period, the majority of values ranged from less than 0.05 to 1.1 mg/L (Figure 9). The two outlying values of 7.6 and 10 mg/L originated from borehole 2 and windmill 1, both located north of the Wallan Recycled Reservoir Storage and outside of the irrigated area. All concentrations, including outliers, were within the short-term trigger values of 0.8 to 12 mg/L for irrigation water.

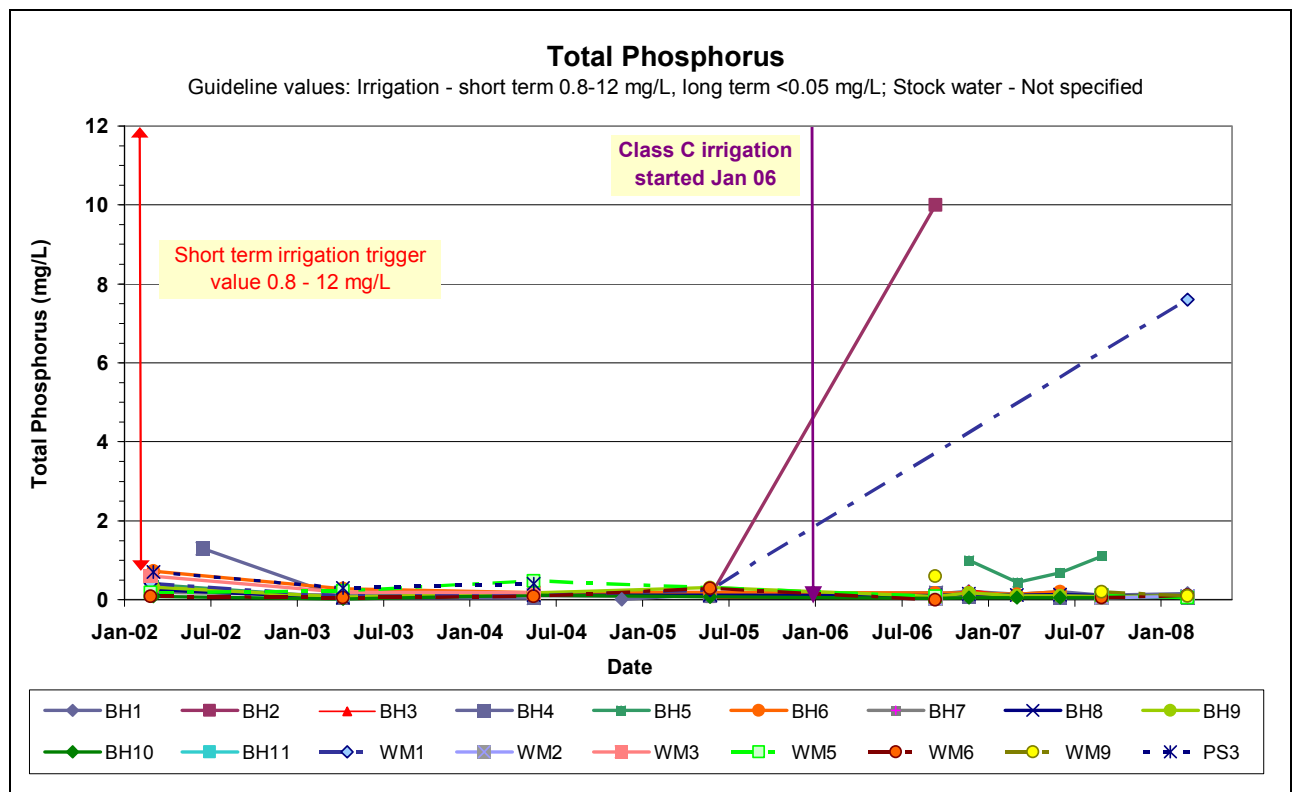


Figure 9: Total Phosphorus results for borehole samples

Biochemical Oxygen Demand

Biochemical Oxygen Demand (BOD) is the amount of oxygen required by microorganisms to decompose the organic matter in a sample of water. A BOD level of 1-2 mg/L is considered very good, 3-5 mg/L moderately clean, 6-9 mg/L somewhat polluted and at levels greater than 100 mg/L, the water supply is considered very polluted with organic waste (SKM 2005).

A BOD median value of less than 2 mg/L and a 75th percentile value of 5 mg/L for the sample set taken over the monitoring period indicates that the majority of samples can be considered very good to moderately clean (Figure 10). Five samples with outlier values greater than 100 mg/L, which indicates highly polluted groundwater, were recorded prior to the commencement of irrigation in 2006. In the post-irrigation period, about 12% (8 out of 64) samples taken had BOD values of greater than 6 mg/L, indicating somewhat polluted groundwater samples from borehole BH3 and windmills WM1, WM5 and WM6. Of these boreholes, BH3 and WM5 also recorded BOD values greater than 6 in the pre-irrigation period. Windmill 1 is located north of the irrigated area. Windmill 6 is located on the eastern boundary of the irrigated area and should be monitored to determine if BOD levels remain elevated in the future.

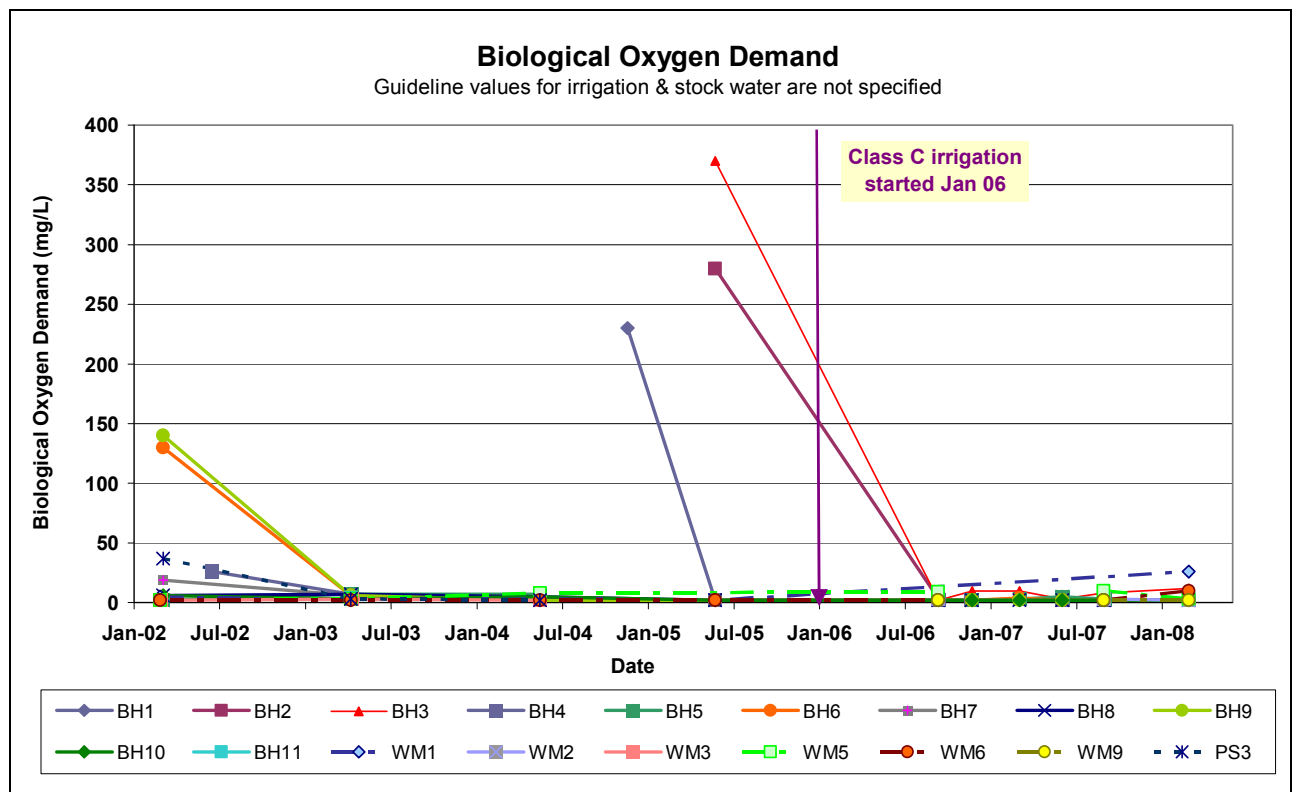


Figure 10: Biological Oxygen Demand results for borehole samples

E. coli

E. coli is a thermotolerant coliform (also known as faecal coliform) predominately found in the faeces of humans and other warm-blooded animals. The detection of *E. coli* is commonly used as an indication of faecal contamination, and therefore the possible presence of microbial pathogens. However, the detection of *E. coli* does not specifically indicate the presence of pathogenic organisms. The *E. coli* guideline trigger median value for irrigation water of 10 orgs/100mL applies to the highest beneficial use of irrigation water, the irrigation of raw human food crops. In comparison, the trigger median value for irrigation of pasture and fodder for dairy animals (without withholding period) is 100 orgs/100mL. For stock watering purposes, the trigger median value is 100 orgs/100 mL. The Guidelines state that investigations of likely causes of elevated thermotolerant coliforms levels are warranted when 20% of results exceed four times the median guideline value.

Median values were calculated per sampling interval and are shown in Table 4. A sampling interval includes the days over which sampling was conducted for the set of boreholes, and spans a maximum of three consecutive days. In the pre-irrigation period, the median value ranged from 0 to 74 orgs/100 mL. Two median values exceeded the trigger value for irrigation water (10 orgs/100 mL), however no values exceeded the trigger value for stock water (100 orgs/100 mL). In the post-irrigation period, the median values ranged from 0 to 9.99 orgs/mL, and hence no exceedence of the trigger values for irrigation or stock water were recorded for the post-irrigation period.

Table 4: Median *E. coli* results for borehole samples

Sampling Interval	<i>E. coli</i> median value* (orgs/100mL)
26/02/02	9.99
4/03/02	0
17/06/02	74
14/04/03	9.99
26/05/04	47.5
1/12/04	9.99
8/06/05	0
January 2006 – Irrigation commenced	
3-5/10/06	0
2/03/07	9.99
27-28/03/07	9.99
28/06/07	10
25-26/09/07	9.99
27/03/08	2

* Laboratory results recorded as <10 orgs/ mL was regarded as 9.99 orgs/mL for the purposes of calculating the median value.

Individual data points for *E. coli* samples showed high variability in the pre and post irrigation periods (Figure 11). The individual data points have also been graphed excluding outliers to highlight the variability (Figure 12). In the post-irrigation period, two extreme outlier results were recorded, 5,800 and 780 orgs/100mL from at borehole 5 in March and June 2007 respectively. These results do not appear to indicate an ongoing elevated trend at borehole 5 as 10 orgs/ 100mL was recorded in September 2007.

No particular trends in *E. coli* levels are apparent at the site that can be attributed to irrigation with Class C water, and median values have not exceeded trigger values for irrigation and stock water in the post-irrigation period.

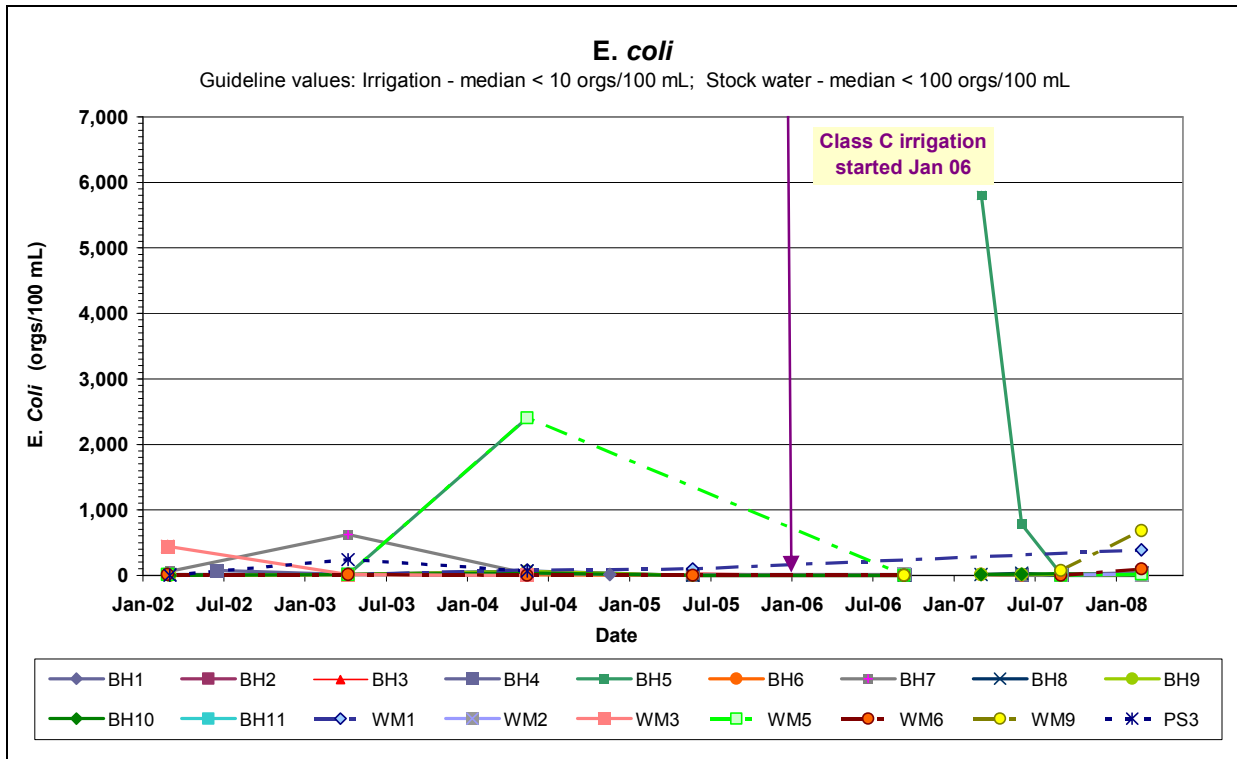


Figure 11: *E. coli* results for borehole samples

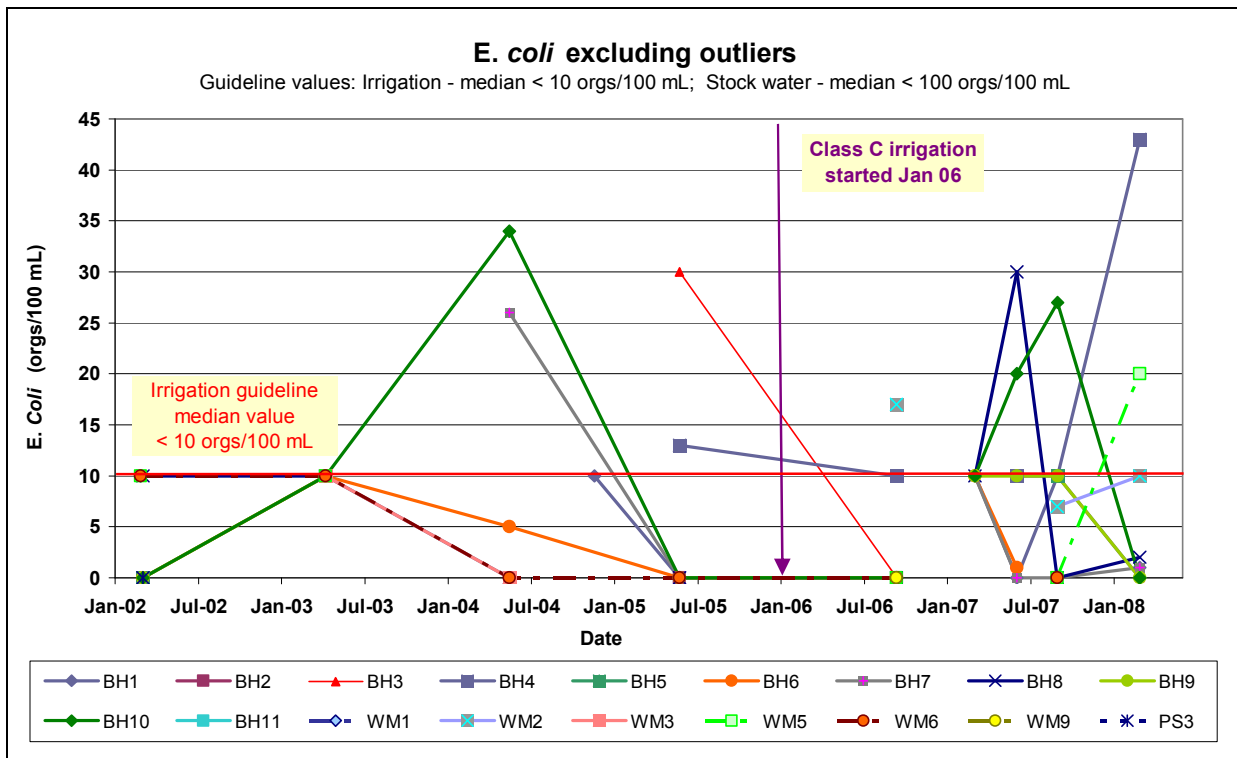


Figure 12: *E. coli* results for borehole samples excluding outliers

4. Conclusions

The main findings from this preliminary assessment of groundwater data from the post-irrigation period are summarised below:

- The slight downward trend in groundwater levels recorded in the pre-irrigation period has continued.

For groundwater quality parameters where the background conditions were assessed by SKM (2005) with trigger values in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC & ARMCANZ, 2000), the following were found:

- Majority of TDS results in the post-irrigation period are below the recommended trigger values. TDS results exceeding trigger values appear unlikely to be related to irrigation, as the exceedence results originated from bores which also showed high TDS results prior to irrigation.
- Nitrite and nitrate as N (nitrogen) concentrations have remained relatively stable, and well below the recommended trigger values.
- Total Phosphorus concentrations recorded across the irrigated area has stayed fairly steady, and were within the short-term trigger values for irrigation water.
- The median *E. coli* concentration results have not exceeded trigger values for irrigation and stock water in the post-irrigation period.

For the other thirteen groundwater quality parameters with trigger values in the Guidelines, the main findings were:

- Ten of the thirteen parameters complied with the Guidelines.
- Results for Sodium, Chloride and pH were recorded above trigger values, however no definite trend due to irrigation could be deduced.

For additional parameters analysed by SKM previously, the following were found:

- Ammonia concentrations have remained relatively stable.
- TKN concentrations have stayed low at the site, with majority of TKN concentrations less than 5.0 mg/L.
- BOD levels showed high variability in the pre and post-irrigation periods, and no significant change in BOD levels in the post-irrigation period was observed. Majority of samples taken indicate the groundwater samples were very good to moderately clean.

Recommendations from this preliminary assessment are:

- Assess the current borehole network for monitoring effectiveness, and determine any changes necessary.
 - If borehole 5 is assessed to remain in the monitoring network, re-survey elevation to top of casing of borehole 5.
- Monitor water levels for boreholes 6 and 10 to determine if an upwards trend is occurring.

- Future monitoring results for Sodium, Chloride and pH should be assessed to determine if irrigation with Class C water was the cause of the elevated results observed.
- TKN for windmill 1 should be monitored to determine if the 250 mg/L result was an anomaly or an indication of an upwards trend.
- Windmill 6 should be monitored to determine if BOD levels remain elevated in the future.
- Future ammonia results for windmill 1 should be evaluated to determine if the high reading of 250 mg/L indicates an upwards trend or was a one-off anomaly.

The recommendations listed above shall be considered for inclusion in the scope of the independent assessment to be conducted after additional data is available following the 2008 irrigation period.

References

ANZECC & ARMCANZ (Australian and New Zealand Environment and Conservation Council & Agriculture and Resource Management Council of Australia and New Zealand) 2000, *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*.

Environmental Protection Authority 1997, *State Environment Protection Policy (Groundwaters of Victoria)*, Publication 592.

SKM 2005, *Wallan Reclaimed Water Re-Use Site – Hydrological Assessment*.

Appendix 1 – Location of sampling sites

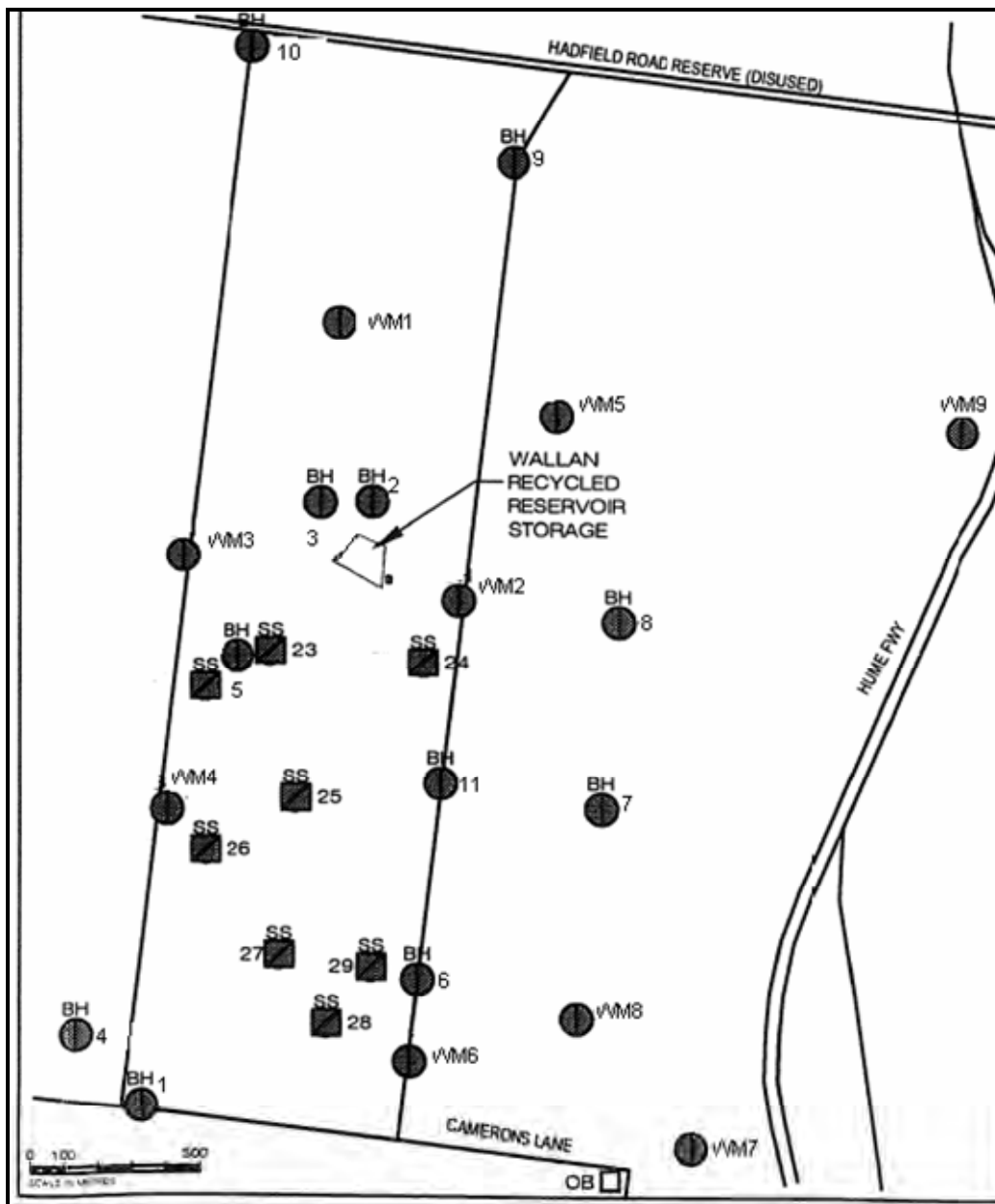


Figure 13: Location of sampling sites

Appendix 2 – Groundwater level & quality data

Appendix 2 -
Groundwater level and quality monitoring results

		BOREHOLE WALRRSBH1 (S9020401-01)								
		1/12/2004	8/06/2005	4/10/2006	14/12/2006	28/03/2007	28/06/2007	26/09/2007	27/03/2008	27/03/2008 duplicate
Parameter	Unit									
Water level	m	10.54	10.4	10.55	12.56	10.65	10.71	10.77	10.91	10.91
Calcium (Ca)	mg/L			44	42	41	42	40		
Magnesium								170		
(Mg)	mg/L			160	180	170	170			
Potassium (K)	mg/L			5.1	5.8	3.3	4.4	4.5		
Sodium (Na)	mg/L			280	290	290	320	290		
Bicarbonate								560		
(HCO ₃)	mg/L			700	690	710	730			
Chloride (Cl)	mg/L			670	560	500	590	600		
								29		
Sulphate (SO ₄)	mg/L			28	29	41	66			
Cadnium (Cd)	mg/L			<0.001	<0.001	<0.001	<0.002	<0.002		
Copper (Cu)	mg/L			<0.01	<0.01	<0.01	<0.01	<0.01		
Mercury (Hg)	mg/L			<0.001	<0.001	<0.001	<0.001	<0.001		
Iron (Fe)	mg/L			0.11	0.23	0.54	0.3	<0.2		
Tin (Sn)	mg/L			<0.01	<0.01	<0.01	<0.01	<0.01		
Zinc (Zn)	mg/L			0.05	0.04	<0.01	<0.02	0.03		
Arsenic (As)	mg/L			<0.001	0.001	0.002	<0.01	<0.01		
Chromium (Cr)	mg/L			<0.01	<0.01	<0.01	<0.01	<0.01		
Molybdenum								<0.01		
(Mo)	mg/L			<0.01	<0.01	<0.01	<0.01			
Selenium (Se)	mg/L			0.004	0.005	0.011	<0.01	<0.01		
TDS	mg/L		1,500	1,500	1,500	1,500	1,400	1,500	1,600	1,500
BOD	mg/L	230	<2	<2	<2	<2	<2	<2	<2	<2
Total P	mg/L	<0.01	0.14	0.15	0.21	0.14	0.2	0.12	0.16	0.16
Nitrate N	mg/L	<0.01	1.2	2.6		3	14	2.1	2.2	2.4
Nitrite N	mg/L	<0.01	0.02	<0.01		<0.01	<0.01			
Ammonia	mg/L	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1
TKN	mg/L	0.9	0.4	0.6		<0.1	0.3	0.2	<0.1	<0.1
Total coliforms	Orgs/100mL			0		390	580	100	310	270
E.Coli	Orgs/100mL	<10	0	0		<10	0	<10	0	1
pH	pH units	7.59	7.6	7.26	7.15	7.4	7.72	7.2	7.6	7.6
EC	uS/cm	3,340	2,830	2,703	2,750	2,700	2,714	2,700	2,587	2,587
Redox	mV			288	206.8	213	413	416	316	316
Dissolved		1.89	5.42					4.6	4.7	4.7
Oxygen (DO)	mg/L			6	6.1	6.8	2.8			
Turbidity	NTU			6.9	6.58	1.5	12.3	7.9		
Temperature	°C	17.3	18.3	15.3	19.1	18.1	12.3	14.6	14.06	14.06
Hardness	mg/L							800		
CO3 as								170		
CaCO3	mg/L									
OH as CaCO3	mg/L							<2		
Alkalinity								730		
(CaCO3)	mg/L									

Appendix 2 -
Groundwater level and quality monitoring results

		BOREHOLE WALRRSBH2 (S9020401-02)					BOREHOLE WALRRSBH3 (S9020401-03)						
		8/06/2005	4/10/2006	15/12/2006	27/03/2007	28/06/2007	8/06/2005	4/10/2006	15/12/2006	27/03/2007	28/06/2007	26/09/2007	27/03/2008
Parameter	Unit												
Water level	m	4.18	No Depth				5.43	5.951	6.125	6.07	6.01	6.13	7.08
Calcium (Ca)	mg/L		12					100	100	97	92	94	
Magnesium (Mg)	mg/L		12					290	300	300	280	290	
Potassium (K)	mg/L		15					14	17	17	11	13	
Sodium (Na)	mg/L		130					880	820	720	700	710	
Bicarbonate (HCO ₃)	mg/L		81					1300	1200	1300	1300	1300	
Chloride (Cl)	mg/L		130					1700	1400	1300	1500	1500	
												31	
Sulphate (SO ₄)	mg/L		60					55	6	<1	33		
Cadnium (Cd)	mg/L		<0.001					<0.001	0.002	<0.001	<0.002	<0.002	
Copper (Cu)	mg/L		<0.01					<0.01	<0.01	<0.01	<0.01	<0.01	
Mercury (Hg)	mg/L		<0.001					<0.001	<0.001	<0.001	<0.001	<0.001	
Iron (Fe)	mg/L		0.3					0.32	0.35	0.46	1.3	1.2	
Tin (Sn)	mg/L		<0.01					<0.01	<0.01	<0.01	<0.01	<0.01	
Zinc (Zn)	mg/L		0.09					0.08	0.06	<0.01	0.02	<0.02	
Arsenic (As)	mg/L		0.002					0.001	0.001	0.001	<0.01	<0.01	
Chromium (Cr)	mg/L		<0.01					0.02	<0.01	<0.01	<0.01	<0.01	
Molybdenum (Mo)	mg/L		<0.01					<0.01	<0.01	<0.01	<0.01	<0.01	
Selenium (Se)	mg/L		<0.001					0.006	0.006	0.003	<0.01	<0.01	
TDS	mg/L	1,600	520				3,100	3,200	3,000	2,800	3,300	3,000	2,900
BOD	mg/L	280	3				370	<2	10	10	3	8	12
Total P	mg/L	0.08	10				0.04	0.03	0.25	0.09	<0.05	0.07	0.07
Nitrate N	mg/L	0.23	24				0.02	0.23		0.02	0.18	<0.01	<0.01
Nitrite N	mg/L	<0.01	0.42				<0.01	<0.01		<0.01	<0.01		
Ammonia	mg/L	<0.1	<1				<0.1	<0.1		0.2	<0.1	0.4	0.6
TKN	mg/L	<0.3	<1				1	<0.3		0.4	<0.3	0.5	0.6
Total coliforms	Orgs/100mL		1600					0		<10	440	63	2000
E.Coli	Orgs/100mL	0	0				30	0		<10	<10	<10	0
pH	pH units	6.5	7.07				7.3	6.66	7.32	7.5	6.97	6.6	7.56
EC	uS/cm	2,940	825				5,310	5,699	5,250	5,400	5,460	5,600	4,876
Redox	mV		192					86	-242.1	-176	170	122	138
Dissolved Oxygen (DO)	mg/L	2.18					2.22					0.3	2.2
Turbidity	NTU		9.9					600	15.4	5	7.1	11	
Temperature	°C	6	21.41				15.4	15.53	23.2	16.5	14.2	14.5	13.93
Hardness	mg/L											1400	
CO3 as CaCO3	mg/L											<2	
OH as CaCO3	mg/L											<2	
Alkalinity (CaCO3)	mg/L											1300	

Appendix 2 -
Groundwater level and quality monitoring results

		BOREHOLE WALRRSBH4 (141975)									
		17/06/2002	14/04/2003	26/05/2004	1/12/2004	8/06/2005	5/10/2006	14/12/2006	28/06/2007	26/09/2007	27/03/2008
Parameter	Unit										
Water level	m						11.82	14.8	12.31	12.11	12.21
Calcium (Ca)	mg/L						49	36	45	44	
Magnesium (Mg)	mg/L						130	100	130	130	
Potassium (K)	mg/L						11	11	9.5	13	
Sodium (Na)	mg/L						370	290	420	370	
Bicarbonate (HCO ₃)	mg/L						810	800	800	710	
Chloride (Cl)	mg/L						610	630	610	580	
										46	
Sulphate (SO ₄)	mg/L						46	57	54		
Cadnium (Cd)	mg/L						<0.001	<0.001	<0.002	<0.002	
Copper (Cu)	mg/L						<0.01	<0.01	<0.01	<0.01	
Mercury (Hg)	mg/L						<0.001	<0.001	<0.001	<0.001	
Iron (Fe)	mg/L						0.94	2.2	0.8	0.6	
Tin (Sn)	mg/L						<0.01	<0.01	<0.01	<0.01	
Zinc (Zn)	mg/L						0.13	0.06	0.05	<0.02	
Arsenic (As)	mg/L						<0.001	0.002	<0.01	<0.01	
Chromium (Cr)	mg/L						<0.01	<0.01	<0.01	<0.01	
Molybdenum (Mo)	mg/L						<0.01	<0.01	<0.01	<0.01	
Selenium (Se)	mg/L						0.002	0.003	<0.01	<0.01	
TDS	mg/L	1,400	1,400	1,500	1,600	1,500	1,600	1,600	1,500	1600	1700
BOD	mg/L	26	7	3		<2	<2	<2	<2	<2	<2
Total P	mg/L	1.3	0.05	0.04		0.11	0.18	0.1	<0.05	<0.05	0.06
Nitrate N	mg/L	0.67	0.01	0.02		<0.01	0.04		0.29	0.02	0.06
Nitrite N	mg/L	0.18	0.01	<0.01		<0.01	0.01		<0.01		
Ammonia	mg/L	12	0.3	<0.1		<0.1	<0.1		<0.1	0.1	0.3
TKN	mg/L	20	0.8	<0.3		<0.3	0.4		<0.3	0.1	0.3
Total coliforms	Orgs/100mL						<10		280	99	>2400
E.Coli	Orgs/100mL	74	10	0		13	<10		10	<10	43
pH	pH units	7.3	7.2	7.2		7	7.03	7.14	7.76	7.4	7.4
EC	uS/cm	2,001	2,200	2,530		2,940	2,899	2,900	2,850	2800	2911
Redox	mV						177	174.3	286	313.0	318
Dissolved Oxygen (DO)	mg/L		1.15	9.11		2.07				1.3	3.8
Turbidity	NTU						3	4.4	2.4		
Temperature	°C	14.8	17.3	13.7		18.6	15.19	19.9	13.3	15.1	12.38
Hardness	mg/L									660	
CO3 as CaCO3	mg/L									90	
OH as CaCO3	mg/L									<2	
Alkalinity (CaCO3)	mg/L									800	

Appendix 2 -
Groundwater level and quality monitoring results

		BOREHOLE WALRRSBH5 (145709)								BOREHOLE WALRRSBH6 (145710)							
		4/03/2002	14/04/2003	26/05/2004	8/06/2005	15/12/2006	28/03/2007	28/06/2007	26/09/2007	4/03/2002	14/04/2003	26/05/2004	8/06/2005	3/10/2006	14/12/2006	27/03/2007	28/06/2007
Parameter	Unit																
Water level	m	7.87	9.04	9.7	0	7.5	7.52	6.81	7.80	10.3	10.96	11.2	11	11.42	11.4	11.51	9.34
Calcium (Ca)	mg/L					77	87	87	71					30	29	29	29
Magnesium (Mg)	mg/L					170	220	220	180					110	110	110	110
Potassium (K)	mg/L					17	11	12	14					3.4	4.6	4.7	4.3
Sodium (Na)	mg/L					790	830	720	660					230	250	270	270
Bicarbonate (HCO ₃)	mg/L					530	690	760	520					580	570	600	580
Chloride (Cl)	mg/L					1300	1500	1500	1300					400	390	380	360
Sulphate (SO ₄)	mg/L					160	120	81						34	37	37	23
Cadnium (Cd)	mg/L					<0.001	<0.001	<0.002	<0.002					<0.001	<0.001	<0.001	<0.002
Copper (Cu)	mg/L					<0.01	0.02	<0.01	<0.01					<0.01	<0.01	<0.01	<0.01
Mercury (Hg)	mg/L					<0.001	<0.001	<0.001	<0.001					<0.001	<0.001	<0.001	<0.001
Iron (Fe)	mg/L					1.1	2.1	2.1	2.4					0.07	0.15	<0.05	0.4
Tin (Sn)	mg/L					<0.01	<0.01	<0.01	<0.01					<0.01	<0.01	<0.01	<0.01
Zinc (Zn)	mg/L					0.12	0.08	<0.02	0.03					0.13	0.14	<0.01	<0.02
Arsenic (As)	mg/L					0.02	0.015	0.01	0.01					<0.001	<0.001	0.001	<0.01
Chromium (Cr)	mg/L					<0.01	<0.01	<0.01	<0.01					<0.01	<0.01	<0.01	<0.01
Molybdenum (Mo)	mg/L					<0.01	<0.01	<0.01	<0.01					<0.01	<0.01	<0.01	<0.01
Selenium (Se)	mg/L					0.01	0.015	<0.01	<0.01					0.003	0.004	0.001	<0.01
TDS	mg/L	2,600	3,500	3,900		2,500	3,100	2,900	2600	1,400	1,300	1,200	1,100	1,000	1,200	7,300	1,100
BOD	mg/L	<2	7	7		<2	3	5	3	130	6	<2	<2	<2	<2	4	<2
Total P	mg/L	0.38	0.05	0.12		1	0.44	0.68	1.1	0.72	0.28	0.18	0.19	0.17	0.17	0.14	0.2
Nitrate N	mg/L	2.5	0.86	0.24			4.6	0.17	<0.01	0.88	2.4	2.6	2.6	1.9		2.2	2.7
Nitrite N	mg/L	0.02	0.02	0.02			0.16	0.01		0.82	<0.01	<0.01	0.09	<0.01		<0.01	<0.01
Ammonia	mg/L	0.5	<0.1	0.1			0.7	0.9	0.6	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1
TKN	mg/L	1.5	0.4	0.7			2.7	2	3.1	1.7	<0.3	1.3	<0.3	2.1		<0.1	<0.3
Total coliforms	Orgs/100mL						>24000	20000	52					2		<10	17
E.Coli	Orgs/100mL	0	10	2400			5800	780	10	0	<10	5	0	0		<10	1
pH	pH units	12.1	8	7.5		7.42	7.4	7.72	7.3	7.4	7.4	7.3	7.4	7.26	7.25	7.54	7.3
EC	uS/cm	5,170	6,180	6,960		4,470	5,500	5,160	4700	2,320	2,130	2,330	2,020	2,055	2,080	2,100	2,242
Redox	mV					-86.2	-31	260	210.0					253	187.1	232.6	414
Dissolved Oxygen (DO)	mg/L	8.74	1.59	7.24					0.7	8.74	1.59	6.54	5.96				
Turbidity	NTU					1.6	3.2	3.5						8.7	7.2	9.6	5.7
Temperature	°C	16.1	15.9	14.5		27.5	51.3	96.8	140					15	3.28	3.4	22.8
Hardness	mg/L					15.7	16.6	13.1	14.2	17.8	16.2	14.7	17.1	17.91	20.4	17.8	12.4
CO3 as CaCO3	mg/L								920								
OH as CaCO3	mg/L								150								
Alkalinity (CaCO3)	mg/L								<2								
									670								

Appendix 2 -
Groundwater level and quality monitoring results

		BOREHOLE WALRRSBH7 (145712)									
		4/03/2002	14/04/2003	26/05/2004	8/06/2005	3/10/2006	14/12/2006	27/03/2007	28/06/2007	25/09/2007	27/03/2008
Parameter	Unit										
Water level	m	4.34	6.95	4.86	4.93	5.33	5.165	5.35	5.31	5.54	5.58
Calcium (Ca)	mg/L					46	40	48	46	43	
Magnesium (Mg)	mg/L					97	89	97	98	95	
Potassium (K)	mg/L					6.5	7.6	8.1	5.4	7.2	
Sodium (Na)	mg/L					170	160	200	190	160	
Bicarbonate (HCO ₃)	mg/L					390	380	420	400	340	
Chloride (Cl)	mg/L					410	370	410	390	420	
										18	
Sulphate (SO ₄)	mg/L					15	21	20	16		
Cadnium (Cd)	mg/L					<0.001	<0.001	<0.001	<0.002	<0.002	
Copper (Cu)	mg/L					<0.01	<0.01	<0.01	<0.01	<0.01	
Mercury (Hg)	mg/L					<0.001	<0.001	<0.001	<0.001	<0.001	
Iron (Fe)	mg/L					0.12	0.22	<0.05	0.4	0.3	
Tin (Sn)	mg/L					<0.01	<0.01	<0.01	<0.01	<0.01	
Zinc (Zn)	mg/L					0.06	0.11	<0.01	0.05	0.02	
Arsenic (As)	mg/L					<0.001	<0.001	0.002	<0.01	<0.01	
Chromium (Cr)	mg/L					<0.01	<0.01	<0.01	<0.01	<0.01	
Molybdenum (Mo)	mg/L					<0.01	<0.01	<0.01	<0.01	<0.01	
Selenium (Se)	mg/L					0.002	0.003	0.004	<0.01	<0.01	
TDS	mg/L	1,600	1,000	1,000	950	920	1,000	1,100	940	930	1,100
BOD	mg/L	19	6	3	<2	<2	<2	<2	<2	<2	<2
Total P	mg/L	0.19	0.12	0.1	0.09	0.09	0.11	0.12	0.11	0.1	0.11
Nitrate N	mg/L	1.7	2.1	2.3	2.5	1.8		2	2.4	2.4	2.1
Nitrite N	mg/L	<0.01	<0.01	<0.01	0.09	<0.01		0.01	<0.01		
Ammonia	mg/L	0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1
TKN	mg/L	1.1	<0.3	1.4	<0.3	1.9		<0.1	<0.3	<0.1	0.1
Total coliforms	Orgs/100mL					0		10	25	1	88
E.Coli	Orgs/100mL	61	620	26	0	0		<10	0	0	1
pH	pH units	7.2	7.8	7.4	7.2	7.12	7	6.99	7.47	6.9	7.2
EC	uS/cm	2,500	1,806	2,030	1,787	1,799	1,760	1,900	1,831	1,800	1,731
Redox	mV					251	214.1	251	416	377	261
Dissolved Oxygen (DO)	mg/L	5.27	1.66	5.3	5.1					2	2.8
Turbidity	NTU					4.8	4.2	3.6	1.7		
Temperature	°C	17.3	15.7	13	17.7	14.86	18.2	15.7	12.2	17	13.7
Hardness	mg/L									500	
CO3 as CaCO3	mg/L									36	
OH as CaCO3	mg/L									<2	
Alkalinity (CaCO3)	mg/L									380	

Appendix 2 -
Groundwater level and quality monitoring results

		BOREHOLE WALRRSBH8 (145713)										BOREHOLE WALRRSBH9 (145714)									
		4/03/2002	14/04/2003	26/05/2004	8/06/2005	3/10/2006	14/12/2006	27/03/2007	28/06/2007	25/09/2007	27/03/2008	4/03/2002	14/04/2003	26/05/2004	8/06/2005	4/10/2006	15/12/2006	27/03/2007	28/06/2007	26/09/2007	27/03/2008
Parameter	Unit																				
Water level	m	6.72	6.91	7.1	7.11	7.4	7.326	7.51	7.46	7.54	8.3	9.52	9.5	9.7	9.84	9.688	9.946	9.95	9.16	9.9	10.05
Calcium (Ca)	mg/L					39	38	36	36	36						65	65	58	65	60	
Magnesium (Mg)	mg/L					88	93	82	84	85						160	180	160	170	170	
Potassium (K)	mg/L					3.8	7.4	3.8	3.3	4.9						6.5	13	9	4.8	5.6	
Sodium (Na)	mg/L					220	230	230	230	200						260	270	260	260	260	
Bicarbonate (HCO ₃)	mg/L					440	440	430	430	380						600	560	650	640	560	
Chloride (Cl)	mg/L					400	400	390	370	420						750	730	610	640	650	
										17										17	
Sulphate (SO ₄)	mg/L					16	17	18	14							17	15	19	14		
Cadnium (Cd)	mg/L					<0.001	<0.001	<0.001	<0.002	<0.002						<0.001	0.002	<0.001	<0.002	<0.002	
Copper (Cu)	mg/L					<0.01	<0.01	<0.01	<0.01	<0.01						<0.01	<0.01	<0.01	<0.01	<0.01	
Mercury (Hg)	mg/L					<0.001	<0.001	<0.001	<0.001	<0.001						<0.001	<0.001	<0.001	<0.001	<0.001	
Iron (Fe)	mg/L					0.1	0.2	<0.05	0.2	0.4						0.18	0.35	0.29	0.3	0.3	
Tin (Sn)	mg/L					<0.01	<0.01	<0.01	<0.01	<0.01						<0.01	<0.01	<0.01	<0.01	<0.01	
Zinc (Zn)	mg/L					0.08	0.09	<0.01	<0.02	<0.02						0.2	0.001	<0.01	<0.02	0.08	
Arsenic (As)	mg/L					<0.001	<0.001	0.002	<0.01	<0.01						<0.001	0.001	0.002	<0.01	<0.01	
Chromium (Cr)	mg/L					<0.01	<0.01	<0.01	<0.01	<0.01						<0.01	<0.01	<0.01	<0.01	<0.01	
Molybdenum (Mo)	mg/L					<0.01	<0.01	<0.01	<0.01	<0.01						<0.01	<0.01	<0.01	<0.01	<0.01	
Selenium (Se)	mg/L					0.003	0.003	<0.001	<0.01	<0.01						0.004	0.006	0.004	<0.01	<0.01	
TDS	mg/L	1,000	1,500	1,000	1,000	980	1,000	1,000	960	970	990	1,500	3,800	1,500	1,600	1,500	1,800	1,600	1,400	1,500	1,500
BOD	mg/L	6	7	5	<2	<2	<2	<2	<2	<2	<2	140	6	<2	<2	<2	<2	<2	<2	<2	<2
Total P	mg/L	0.26	0.05	0.12	0.12	0.11	0.15	0.12	0.13	0.11	0.09	0.32	0.06	0.17	0.31	0.09	0.17	0.1	0.1	0.08	0.1
Nitrate N	mg/L	0.07	<0.01	2.4	2	1.5		2	2.4	2.3	2	0.88	1.2	1.4	1	1.4		1.2	1.4	1.3	1.4
Nitrite N	mg/L	0.04	<0.01	0.02	0.09	<0.01		<0.01	<0.01			<0.01	0.01	<0.01	0.07	<0.01		<0.01	<0.01		
Ammonia	mg/L	0.3	0.3	0.2	<0.1	<0.1		<0.1	<0.1	<0.1	0.3	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	<0.1
TKN	mg/L	1.3	0.8	1.7	<0.3	1.9		<0.1	<0.3	<0.1	0.3	1	<0.3	0.6	<0.3	<0.3		<0.1	<0.3	0.2	<0.1
Total coliforms	Orgs/100mL					0		>24000	160	0	>2400					0		<10	10	140	53
E.Coli	Orgs/100mL	<10	<10	68	0	0		<10	30	0	2	0	<10	61	0	0		<10	10	<10	0
pH	pH units	8	7.2	7.7	7.7	7.4	7.4	7.46	7.64	7.4	7.68	7.4	7.6	7.5	7.4	7.26	7.18	7.3	7.5	7.4	7.41
EC	uS/cm	2,001	2,200	1,910	1,901	1,877	1,857	1,900	1,802	1,800	1,730	2,610	7,050	2,510	2,850	2,804	2,780	2,800	2,747	2,700	2,578
Redox	mV					260	140	212	413	378	253					253	194.5	238.3	308	274	289
Dissolved Oxygen (DO)	mg/L		1.15	7.31	6.71					6.2	6.1	5.1	1.85	7.11	6.53					2.6	6
Turbidity	NTU					18.2	3.83	1.8	11.3	11						7.6	6.5	5.8	5.2	10	
Temperature	°C	15.8	17.3	15.5	16.5	14.35	18.4	16.7	12.9	15	14.2	17.1	16.1	13.8	16.5	18.07	14.6	17.3	14.4	15.2	14.55
Hardness	mg/L									440										840	
CO3 as CaCO3	mg/L									50										72	
OH as CaCO3	mg/L									<2										<2	
Alkalinity (CaCO3)	mg/L									430										630	

Appendix 2 -
Groundwater level and quality monitoring results

		BOREHOLE WALRRSBH10 (145715)										BOREHOLE WALRRSBH11 (145711)		
		4/03/2002	14/04/2003	26/05/2004	8/06/2005	4/10/2006	15/12/2006	27/03/2007	28/06/2007	26/09/2007	27/03/2008	4/03/2002	14/04/2003	8/06/2005
Parameter	Unit													
Water level	m	3.47	3.5	3.64	3.78	3.92	4	4.1	4.05	4.12	3.63	0	4.69	0
Calcium (Ca)	mg/L					49	48	42	47	45				
Magnesium (Mg)	mg/L					320	340	310	320	330				
Potassium (K)	mg/L					14	14	14	9.1	13				
Sodium (Na)	mg/L					1000	1000	930	890	920				
Bicarbonate (HCO ₃)	mg/L					850	870	890	900	840				
Chloride (Cl)	mg/L					2300	2300	1900	2000	2100				
										130				
Sulphate (SO ₄)	mg/L					120	110	120	82					
Cadnium (Cd)	mg/L					<0.001	<0.001	<0.001	<0.002	<0.002				
Copper (Cu)	mg/L					<0.01	<0.01	<0.01	<0.01	<0.01				
Mercury (Hg)	mg/L					<0.001	<0.001	<0.001	<0.001	<0.001				
Iron (Fe)	mg/L					0.16	0.6	0.41	0.7	0.8				
Tin (Sn)	mg/L					<0.01	<0.01	<0.01	<0.01	<0.01				
Zinc (Zn)	mg/L					0.17	0.23	0.03	<0.02	0.04				
Arsenic (As)	mg/L					0.004	0.005	0.004	<0.01	<0.01				
Chromium (Cr)	mg/L					<0.01	<0.01	<0.01	<0.01	<0.01				
Molybdenum (Mo)	mg/L					<0.01	<0.01	<0.01	<0.01	<0.01				
Selenium (Se)	mg/L					0.007	0.012	0.007	<0.01	<0.01				
TDS	mg/L	5,000	3,800	3,700	4,100	3,800	4,200	3,700	3,800	3,700	3,800		950	
BOD	mg/L	6	3	5	<2	<2	<2	<2	2	<2			4	
Total P	mg/L	0.08	0.02	0.12	0.07	0.03	0.05	0.05	<0.05	<0.05	0.06		0.12	
Nitrate N	mg/L	0.11	<0.01	<0.01	0.13	0.21		0.1	0.15	0.03	0.05		2.4	
Nitrite N	mg/L	<0.01	<0.01	<0.01	0.02	<0.01		<0.01	<0.01				<0.01	
Ammonia	mg/L	0.2	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1		<0.1	
TKN	mg/L	0.8	0.4	<0.3	<0.3	<0.3		<0.1	<0.3	0.2	0.2		<0.3	
Total coliforms	Orgs/100mL					0		<10	74	2400	160			
E.Coli	Orgs/100mL	0	<10	34	0	0		<10	20	27	0		<10	
pH	pH units	7.5	7.4	7.5	7.4	7.5	7.39	7.38	7.23	7.2	7.6		7.6	
EC	uS/cm	8,500	6,760	7,140	6,870	6,843	6,870	7,000	6,250	6,600	6,274		1,703	
Redox	mV					225	199.9	60	296	170	290			
Dissolved Oxygen (DO)	mg/L		2.15	6.52	5.26					0.6	2.6		1.54	
Turbidity	NTU	6.43				6.6	3.2	2.4	1.9	23				
Temperature	°C	16.8	15.9	13.5	16.4	16.36	15.1	16.5	14.2	14.6	14.64		17.7	
Hardness	mg/L									1500				
CO3 as CaCO3	mg/L									70				
OH as CaCO3	mg/L									<2				
Alkalinity (CaCO3)	mg/L									910				

Appendix 2 -
Groundwater level and quality monitoring results

		BOREHOLE WALLRRSBHWM1 (WM1)					BOREHOLE WALRRSBHWM2 (WM2)					
		26/02/2002	14/04/2003	26/05/2004	8/06/2005	27/03/2008	3/10/2006	14/12/2006	27/03/2007	27/06/2007	25/09/2007	27/03/2008
Parameter	Unit											
Water level	m	8.5	9.35	7.1		10	No Depth	No Depth	No Depth	No Depth	None taken	
Calcium (Ca)	mg/L						35				8.7	
Magnesium (Mg)	mg/L						130				130	
Potassium (K)	mg/L						4.8				6.7	
Sodium (Na)	mg/L						360				400	
Bicarbonate (HCO ₃)	mg/L						770				580	
Chloride (Cl)	mg/L						560				640	
											27	
Sulphate (SO ₄)	mg/L						27					
Cadnium (Cd)	mg/L						<0.001				<0.002	
Copper (Cu)	mg/L						0.01				0.02	
Mercury (Hg)	mg/L						<0.001				<0.001	
Iron (Fe)	mg/L						0.1				<0.2	
Tin (Sn)	mg/L						<0.01				<0.01	
Zinc (Zn)	mg/L						0.03				<0.02	
Arsenic (As)	mg/L						<0.001				<0.01	
Chromium (Cr)	mg/L						<0.01				<0.01	
Molybdenum (Mo)	mg/L						<0.01				<0.01	
Selenium (Se)	mg/L						0.003				<0.01	
TDS	mg/L	3,800	3,200	3,400	3,400	1,900	1,500				1,600	1,500
BOD	mg/L	<5	<2	3	<2	26	3				3	<2
Total P	mg/L	0.41	0.09	0.11	0.24	7.6	0.03				<0.05	0.08
Nitrate N	mg/L	0.62	0.34	0.36	0.33	0.1	0.1				<0.01	1.9
Nitrite N	mg/L	<0.01	<0.01	<0.01	<0.01		<0.01					
Ammonia	mg/L	0.1	<0.1	<0.1	<0.1	250	<0.1				<0.1	<0.1
TKN	mg/L	<0.3	<0.3	<0.3	<0.3	250	0.8				0.8	0.1
Total coliforms	Orgs/100mL					16000	>2400				160	170
E.Coli	Orgs/100mL	10	<10	79	100	390	17				7	<10
pH	pH units	6.7	6.5	6.6	7.1	7.21	6.01				9.1	8.32
EC	uS/cm	8,450	5,700	6,200	6,520	4,374	2,848	2,920	2,910	2,520	2,800	2,456
Redox	mV					108	252				387	242
Dissolved Oxygen (DO)	mg/L	2.97		4.18	2.78	1.9					16.1	7.7
Turbidity	NTU		2.33				18.6					
Temperature	°C	15.2	15.7	12.1	15.6	12.91	1.1				10	
Hardness	mg/L						13.11	15.1	15	7.6	16.5	13.74
CO3 as CaCO3	mg/L										580	
OH as CaCO3	mg/L										180	
Alkalinity (CaCO3)	mg/L										<2	
											750	

Appendix 2 -
Groundwater level and quality monitoring results

		BOREHOLE WALRRSBHWM3 (WM3)				BOREHOLE WALRRSBHWM5 (WM5)							
		26/02/2002	14/04/2003	26/05/2004	8/06/2005	26/02/2002	14/04/2003	26/05/2004	3/10/2006	27/03/2007	27/06/2007	25/09/2007	27/03/2008
Parameter	Unit												
Water level	m	7.55	26.21	10.24	0	5.97	6.45	6.2	No Depth	No Depth	No Depth	None taken	
Calcium (Ca)	mg/L								16			15	
Magnesium (Mg)	mg/L								78			79	
Potassium (K)	mg/L								5.4			7.2	
Sodium (Na)	mg/L								170			150	
Bicarbonate (HCO ₃)	mg/L								330			330	
Chloride (Cl)	mg/L								290			280	
												14	
Sulphate (SO ₄)	mg/L								9				
Cadnium (Cd)	mg/L								<0.001			<0.002	
Copper (Cu)	mg/L								<0.01			<0.01	
Mercury (Hg)	mg/L								<0.001			<0.001	
Iron (Fe)	mg/L								<0.05			<0.2	
Tin (Sn)	mg/L								<0.01			<0.01	
Zinc (Zn)	mg/L								<0.01			0.03	
Arsenic (As)	mg/L								<0.001			<0.01	
Chromium (Cr)	mg/L								<0.01			<0.01	
Molybdenum (Mo)	mg/L								<0.01			<0.01	
Selenium (Se)	mg/L								0.001			<0.01	
TDS	mg/L	2,700	2,600	2,700		720	670	380	710			790	890
BOD	mg/L	<2	3	2		<2	3	8	9			10	3
Total P	mg/L	0.61	0.19	0.18		0.18	0.22	0.48	0.09			0.12	<0.05
Nitrate N	mg/L	0.72	0.02	<0.01		2.2	2.5	9.7	<0.01			<0.01	<0.01
Nitrite N	mg/L	<0.01	<0.01	<0.01		<0.01	<0.01	0.03	<0.01				
Ammonia	mg/L	<0.3	<0.1	<0.1		<0.1	<0.1	0.1	<0.1			<0.1	<0.1
TKN	mg/L	<0.3	<0.3	<0.3		<0.3	0.8	4.7	2.3			1.7	1
Total coliforms	Orgs/100mL								1			91	24000
E.Coli	Orgs/100mL	440	<10	0		<10	<10	2,400	0			0	20
pH	pH units	6.8	7.3	6.7			7.5	7.9	9			9.3	9.11
EC	uS/cm	4,750	4,470	4,720		1,525	1,342	744	1,367	1,488	1,260	1,400	1,481
Redox	mV								219			414	274
Dissolved Oxygen (DO)	mg/L	4.87	1.86	3.2			1.3	6.05				17.6	10.2
Turbidity	NTU								13.6				
Temperature	°C	17.2	17.9	12.5		15.9	17	13.4	9.9	14.6	7.5	38	13.31
Hardness	mg/L								18			360	
CO3 as CaCO3	mg/L											72	
OH as CaCO3	mg/L											<2	
Alkalinity (CaCO3)	mg/L											400	

Appendix 2 -
Groundwater level and quality monitoring results

		BOREHOLE WALRRSBHWM6 (WM6)									
		26/02/2002	14/04/2003	26/05/2004	8/06/2005	3/10/2006	14/12/2006	27/03/2007	27/06/2007	25/09/2007	27/03/2008
Parameter	Unit										
Water level	m	1.24		10.53		No Depth	No Depth	No Depth	No Depth	None taken	
Calcium (Ca)	mg/L					23				21	
Magnesium (Mg)	mg/L					36				34	
Potassium (K)	mg/L					3.6				4.6	
Sodium (Na)	mg/L					230				200	
Bicarbonate (HCO ₃)	mg/L					510				450	
Chloride (Cl)	mg/L					180				170	
										9	
Sulphate (SO ₄)	mg/L					8					
Cadnium (Cd)	mg/L					<0.001				<0.002	
Copper (Cu)	mg/L					0.04				0.02	
Mercury (Hg)	mg/L					<0.001				<0.001	
Iron (Fe)	mg/L					0.09				0.3	
Tin (Sn)	mg/L					<0.01				<0.01	
Zinc (Zn)	mg/L					0.75				0.34	
Arsenic (As)	mg/L					<0.001				<0.01	
Chromium (Cr)	mg/L					<0.01				<0.01	
Molybdenum (Mo)	mg/L					<0.01				<0.01	
Selenium (Se)	mg/L					<0.001				<0.01	
TDS	mg/L	700	680	760	710	710				750	2,500
BOD	mg/L	<2	<2	<2	2	<2				<2	10
Total P	mg/L	0.09	0.05	0.09	0.29	0				0.05	0.11
Nitrate N	mg/L	0.3	0.02	0.02	<0.01	0.16				0.16	<0.01
Nitrite N	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01					
Ammonia	mg/L	0.2	<0.1	0.2	<0.1	<0.1				<0.1	<0.1
TKN	mg/L	<0.3	<0.3	<0.3	<0.3	<0.3				<0.1	1.6
Total coliforms	Orgs/100mL					0				0	960
E.Coli	Orgs/100mL	<10	<10	0	0	0				0	98
pH	pH units	7.5	7.6	7.5	7.9	7.3				7.9	9.1
EC	uS/cm	1,435	1,191	1,337	1,315	1,290	1,280	1,360	1,270	1,300	3,917
Redox	mV					240				370	314
Dissolved Oxygen (DO)	mg/L	3.07	1.69	3.69	7.31					10.9	6.2
Turbidity	NTU					12.1				8.5	
Temperature	°C	16.6	18.4	13.8	18.2	23.4	19.8	18.1	8.8	15.3	9.41
Hardness	mg/L					16.3				190	
CO3 as CaCO3	mg/L									62	
OH as CaCO3	mg/L									<2	
Alkalinity (CaCO3)	mg/L									510	

Appendix 2 -
Groundwater level and quality monitoring results

		BOREHOLE WALRRSBHWM9 (WM9)					BOREHOLE 145708 (PS 3)		
		3/10/2006	14/12/2006	27/03/2007	25/09/2007	27/03/2008	4/03/2002	14/04/2003	26/05/2004
Parameter	Unit								
Water level	m	No Depth	No Depth	No Depth	None taken		4.64	4.81	5
Calcium (Ca)	mg/L	21			21				
Magnesium (Mg)	mg/L	42			42				
Potassium (K)	mg/L	5.1			6.4				
Sodium (Na)	mg/L	81			65				
Bicarbonate (HCO ₃)	mg/L	440			180				
Chloride (Cl)	mg/L	160			150				
					8				
Sulphate (SO ₄)	mg/L	7							
Cadnium (Cd)	mg/L	<0.001			<0.002				
Copper (Cu)	mg/L	<0.01			<0.01				
Mercury (Hg)	mg/L	<0.001			<0.001				
Iron (Fe)	mg/L	0.06			<0.2				
Tin (Sn)	mg/L	<0.01			<0.01				
Zinc (Zn)	mg/L	0.05			0.02				
Arsenic (As)	mg/L	<0.001			<0.01				
Chromium (Cr)	mg/L	<0.01			<0.01				
Molybdenum (Mo)	mg/L	<0.01			<0.01				
Selenium (Se)	mg/L	0.001			<0.01				
TDS	mg/L	400			420	480	3,000	2,600	2,800
BOD	mg/L	<2			<2	<2	37	3	<2
Total P	mg/L	0.1			0.14	0.15	0.13	0.02	0.1
Nitrate N	mg/L	0.58			2.9	2.6	0.2	0.04	0.04
Nitrite N	mg/L	<0.01					<0.01	<0.01	<0.01
Ammonia	mg/L	<0.1			<0.1	<0.1	0.1	<0.1	<0.1
TKN	mg/L	0.6			0.2	<0.1	0.7	<0.3	0.4
Total coliforms	Orgs/100mL	1			170	1200			
E.Coli	Orgs/100mL	0			71	680	0	240	65
pH	pH units	7.97			8	8.24	6.8	6.8	6.9
EC	uS/cm	818	848	752	800	786	5,340	4,540	4,920
Redox	mV	247			374	268			
Dissolved Oxygen (DO)	mg/L				11.2	9.2	7.57	1.71	5.9
Turbidity	NTU	15.3			7.2				
Temperature	°C	17.49	18.4	28.6	15.5	15.49	16.9	16.4	12.9
Hardness	mg/L				230				
CO3 as CaCO3	mg/L				16				
OH as CaCO3	mg/L				<2				
Alkalinity (CaCO3)	mg/L				200				

Lots 8 & 9 Camerons Lane Reuse Scheme

May 12

2008

Assessment of soil
monitoring data for 2006 to
2007

By Arris Pty Ltd

Arris Project: H0509ds

Project Leader: Dr Daryl Stevens

12 May 2008

For Yarra Valley Water



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BRIEF

Assess current soils data for the Wallan recycled water scheme at Lots 8 and 9 Camerons Lane to identify any detrimental agronomic or environmental impacts on soils and plants irrigated with recycled water.

BACKGROUND

Site size

The recycled water irrigation site investigated in this report is located at Lots 8 & 9 Camerons Lane. Lot 8 is located south of Lot 9. Lots 8 & 9 are split in the centre approximately and referred to as the eastern & western side.

The ultimate irrigation scheme will comprise of 158 ha of land. Stage 1 of the scheme has been completed and covers 92 ha. Stage 2 will develop the remaining 66 ha in the future.

Irrigation commenced in January 2006 approximately.

Soil types

The irrigation area consists of a number of soil types formed primarily on basalt formations. A small area of the western portion of the site is located on the sedimentary Kilmore siltstone formation. Soil texture in the top soils is predominantly a light to medium clay with some loamy components. Soil texture in the subsoil is generally a medium to heavy clay.

Plants grown

The eastern side of the Wallan recycled water irrigation site has predominately perennial ryegrass. On the western side, there is predominately perennial ryegrass with some clovers, phalaris, fescue and paspalum.

Recycled water use

Summary of water used for irrigation:

- 2006 142.8 ML
- 2007 165.6 ML
- 2008 51 ML (Jan – April)

On average this equates to approximately 2 ML/ha/year across the whole site.

Recycled water quality

Table 1 Summary of Class C water quality from Wallan Sewage Treatment Plant 2006/07

Parameter	Units	Median	90th Percentile	Average
pH	Units	7.9	8	7.9
Biological Oxygen Demand (BOD)	mg/L	12	31	18
Suspended Solids (SS)	mg/L	31	72	40
Total Phosphorus (TP)	mg/L	12.5	15.9	13.2
Total Nitrogen (TN)	mg/L	32	44	34
Nitrite (NO ₂)	mg/L	0.32	0.69	0.41
Nitrate (NO ₃)	mg/L	2.45	4.6	2.61
Ammonia (NH ₃)	mg/L	20	26	20
Organic Nitrogen (ORG N)	mg/L	10	20.7	11.4
Total Kjeldahl Nitrogen (TKN)	mg/L	31	40	33
Electrical Conductivity (EC)	uS/cm	825	930	832
Sodium Adsorption Ratio (SAR)	Units	6	6	6

Effluent from Wallan Sewage Treatment Plant transferred to Wallan Recycled Reservoir Storage for irrigation'

See Appendix – Table 3 for detailed (Heavy Metals and Volatile Organic Compounds) water quality data (three samples). These data indicate that the total aluminium concentrations in recycled water range from 1.5 to 7.2 mg/L (Table 3). Two of these readings are above the long term trigger value (LTV) of 5 mg/L (ANZECC and ARMCANZ 2000). Given the low pH of the soil (Aluminium is more plant available and toxic at pH <5.5) the form of aluminium in water should be determined (i.e. will it be plant available or is it soil mineral not available or toxic to plants?). A measure of phytotoxic aluminium (Al) in the soil should also be integrated into the soil analysis program.

SOIL ANALYSIS

A summary of soil data for 2006 and 2007 is listed below:

Table 2 Soil analysis for sample from the Camerons Lane Reuse Scheme (2006 and 2007)

Sample	Year	Depth	EC μS/cm	ECe dS/m	pH CaCl	TN	NOx	TKN	TP	OM	Cl	S	Al	CEC meq/100g	ESP %	SAR mmol/L) ^{0.5}
WAL5	2006	0-10	600	4.2	4.5	2700			190	6	85	870	6200	12	10	30
WAL5	2007	0-10	290	2.0	4.9	2300	1	2300	170	5	82	550	3900	13	9.1	1.8
WAL5	2006	20-30	150	0.8	4.6	1100			86	3	110	260	6100	8	7	38
WAL5	2007	20-30	180	0.9	4.9	900	1.7	900	78	<2	62	270	3000	12	6.6	2.4
WAL6	2006	0-10	490	3.4	4.4	3100			230	6	89	830	12000	14	10	29
WAL6	2007	0-10	240	1.7	4.9	2500	0.6	2500	170	5	84	510	5200	21	6.1	2.1
WAL6	2006	20-30	200	1.0	4.6	1500			97	4	110	230	15000	17	7	32
WAL6	2007	20-30	210	1.1	4.4	1600	2.1	1600	73	3	70	310	7800	21	8.9	4.7
WAL7	2006	0-10	440	3.1	4.4	2800			200	7	67	580	14000	19	6	25
WAL7	2007	0-10	210	1.5	4.8	2100	11	2100	130	5	39	380	7700	26	4.3	1.7
WAL7	2006	20-30	170	0.9	4.4	910			93	4	200	360	24000	15	7	29
WAL7	2007	20-30	160	0.8	4.7	1600	8.2	1600	59	4	60	310	10000	32	5.3	2.9
WAL8	2006	0-10	430	3.0	4.3	2800			200	7	71	660	14000	14	8	29
WAL8	2007	0-10	160	1.1	5.1	2100	9.8	2100	47	5	130	250	12000	24	7.2	3
WAL8	2006	20-30	120	0.6	4.5	1000			83	3	150	110	15000	13	6	20
WAL8	2007	20-30	130	0.7	4.7	1200	8.2	1200	61	3	72	260	8400	32	6.1	2.3
WAL9	2006	0-10	380	2.7	4.5	260			230	6	43	590	12000	13	7	22
WAL9	2007	0-10	180	1.3	4.9	2200	1.9	2200	120	5	68	280	8200	25	5.9	3.5
WAL9	2006	20-30	130	0.7	4.8	900			88	3	150	130	19000	22	4	24
WAL9	2007	20-30	140	0.7	4.8	1300	2.6	1300	53	3	87	360	11000	21	9.5	3.3
WAL10	2006	0-10	670	4.7	4.5	3600			270	7	35	820	13000	18	6	28
WAL10	2007	0-10	250	1.8	4.7	3900	39	3900	240	7	17	490	8300	37	2.2	0.93
WAL10	2006	20-30	280	1.4	4.7	1700			130	5	21	470	19000	25	4	32
WAL10	2007	20-30	190	1.0	4.9	1300	26	1300	47	4	17	330	9400	28	2.7	1.4
WAL11	2006	0-10	290	2.0	4.7	2500			180	5	31	470	19000	21	4	33
WAL11	2007	0-10	200	1.4	5.1	2900	21	2900	170	6	29	520	7700	29	1.7	0.51
WAL11	2006	20-30	160	0.8	4.9	1500			110	4	140	220	19000	26	3	41
WAL11	2007	20-30	110	0.6	5.3	1200	7.1	1200	74	4	7	160	12000	31	3	1.4
WAL12	2006	0-10	860	6.0	4.5	3800			230	7	53	2000	13000	22	4	28
WAL12	2007	0-10	300	2.1	5	2400	16	2400	140	5	33	730	7100	22	1.8	0.44
WAL12	2006	20-30	510	2.6	4.6	1500			120	5	19	690	20000	24	4	31
WAL12	2007	20-30	120	0.6	5.1	1500	10	1500	50	4	17	290	7600	32	1.9	0.84
	Average		280	1.8	4.7	1958	10.4	1937	132	4.8	70.3	478	11550	22	5.6	2.1
	Median		205	1.3	4.7	1650	8.2	1850	120	5.0	67.5	370	11500	22	6.0	2.0
	95%ile		632	4.4	5.1	3690	29.3	3150	235	7.0	150.0	848	19450	32	9.7	3.8

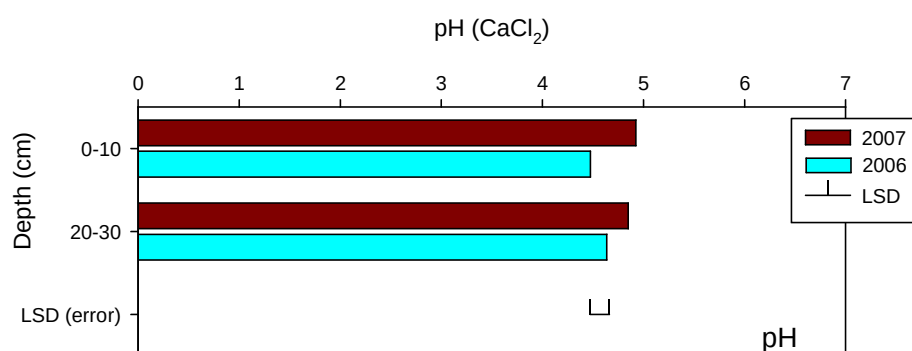
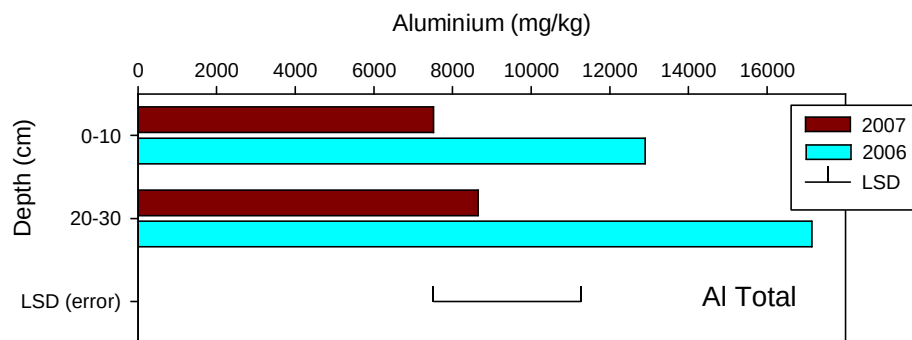
Sampled dates: 4/07/2006 & 4/9/2007. Data supplied by Yarra Valley Water

Note: EC – Electrical conductivity soil:water 1:5 extract; ECe – Soil salinity electrical conductivity, calculated as a factor of 7 for 0-10 cm soil depth and 5 for 20-30 cm soil depth (Cass *et al.* 1995); pH – a measure of acidity or alkalinity; TN - Total Nitrogen; NOx – Nitrate and Nitrite; TKN - Total Kjeldahl Nitrogen; TP - Total Phosphorus; OM – Organic matter; Cl – Chloride; Sulphate - S; Al – Aluminium; CEC – Cation Exchange Capacity; SAR – Sodium Adsorption Ratio.

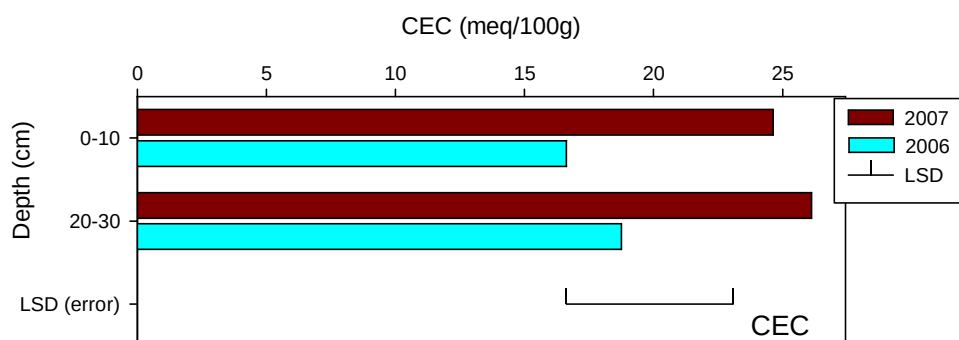
Statistical and graphical software were used to determine analysis of variance (ANOVA) at $p < 0.05$. That is, if there was a 95% probability that the means were different this was considered significantly different. A least significance difference (LSD) has been drawn on all graphs to indicate how great the difference between years and depths needs to be before it is considered significantly different relative to the variability of the soil sampling area (see graphs below).

These data indicate:

- Total soil aluminium (Al) has decreased significantly from 2006 to 2007 (see graphs below). This is the measure of total aluminium in the soil and not relevant as a measure of Al toxicity. There is no rationale for this change other than the soil pH has increased on average from 4.5 to 5 (pH CaCl_2). The increase in soil pH is mostly likely due to the pH of the recycled water used (7.9 - Table 1) or any lime amendment applied to the irrigated pasture. Theoretically, an increase in soil pH should only decrease the amount of Al in soil solutions (plant available) and have little effect on total Aluminium in soils (Peverill *et al.* 1999).
- The increase in soil pH is beneficial as soil pH should ideally be above 5.5 (CaCl_2) and lime should be applied to increase soil pH to avoid Al and Manganese (Mn) toxicity. If the current rate of pH change continues due to recycled water use, one more year of recycled water use may also achieve ideal soil pH values.



- The cation exchange capacity (CEC) has increased significantly in 2007 compared with 2006 (see graph below). Increased CEC is usually beneficial for soils as it helps hold nutrients to make them accessible to the plants. This increase suggests laboratory variability in analysis.

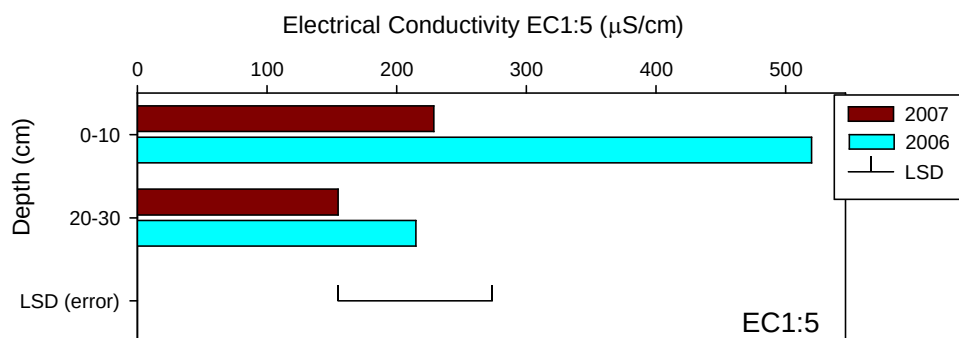


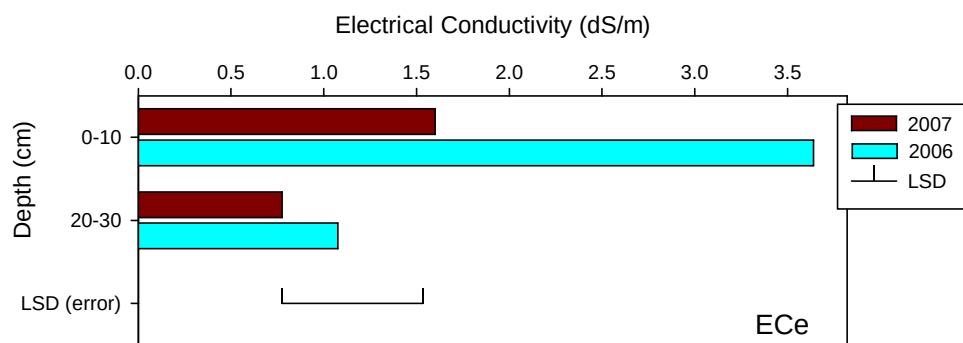
- Electrical conductivity has decreased significantly in 2007 from 2006 in the top 0-10cm (see graphs below). Decreases at 20-30cm were not considered significant and averages are within the variance found across the field site. Overall, soil electrical conductivity is relatively low and suitable in soil textures of light to heavy clays for production of the pastures specified in the area.

The soil salinity electrical conductivity (ECe) threshold for yield reduction (NRMMC and EPHC 2006) for ryegrass, clovers, phalaris, fescue and paspalum are:

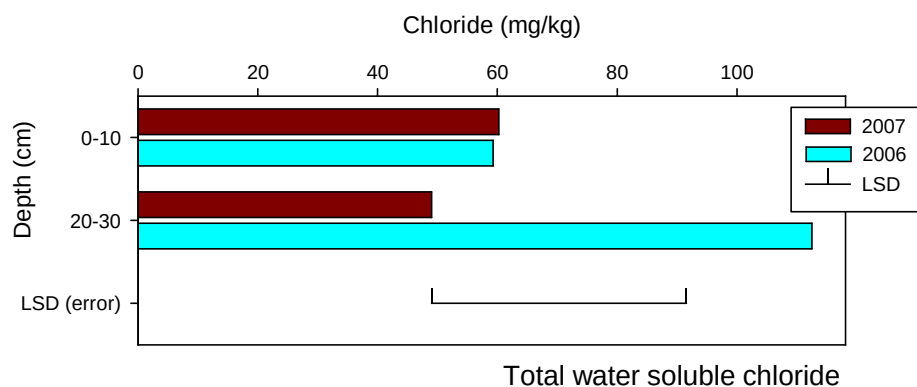
- Perennial ryegrass – 5.6 dS/m
 - Clover – 2 to 8 dS/m depending on species
 - Phalaris – 4 dS/m
 - Fescue – 2 to 8 dS/m depending on species
 - Paspalum – 3 to 40 dS/m depending on species
- On average the soil ECe in 2007 was below the most salt sensitive pasture species irrigated with recycled water (see graphs below). However, on average some 0 – 10 cm depth soil samples exceed these in 2006 (outliners shown in Appendix - Figure 8). These observations suggest that irrigation with recycled water may have improved soil salinity by leaching salts below the 20-30cm depth. It could also mean that rainfall was greater leading to increased leaching in 2007 compared with 2006. Estimates of rainfall at the study site were 285mm in 2006 and 490mm in 2007, supporting this theory. Addition of fertiliser, lime or gypsum in 2006 could also explain the higher EC in the top soil in 2006.

If increased leaching is responsible then deeper leaching of N and P may be an ongoing monitoring requirement if there are risks of N and P moving offsite or into groundwater where N and P could pose environmental risks in aquatic systems.

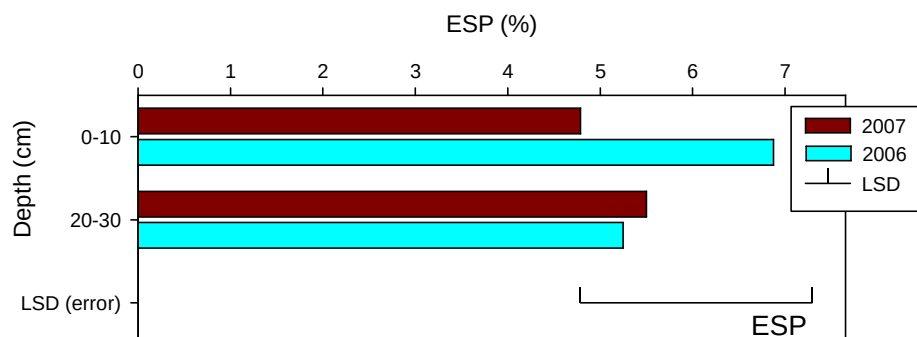




- Chloride concentrations in soils were below levels which may impact on plants grown on site (see graph below). There were no significant changes between 2006 to 2007 in the 0-10cm soil sample, however, there was a significant decrease in the 20-30cm sample.

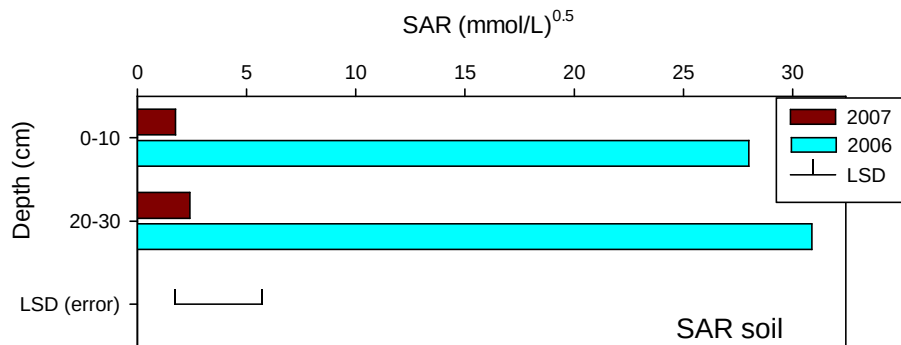


- Difference in Exchangeable Sodium Percentage (ESP) were not considered significant (see graph below), however a similar trend to EC was noted for the top soil (0-10cm lower in 2007). On average, these ESPs are below what is considered sodic (6% - ANZECC and ARMCANZ 2000). However, some soils gave a reading above 6% in 2007 (Table 2) indicating addition of lime may be required to manage sodicity in these soils. The SAR of the recycled water is 6 (Table 1) which is reaching a level that may have a detrimental impact on sensitive soils so changes in soil ESP over the next 2 years should be monitored closely.

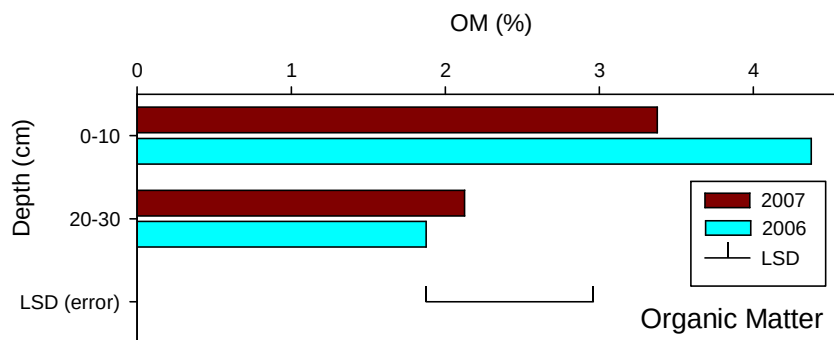


- Soil Sodium Adsorption Ratio (SAR) was much lower for 2007 (see graph below). However, the raw data was not available to check for 2006. These data indicate that there may have been an analytical error in 2006. The 2007 data are on average low and considered suitable

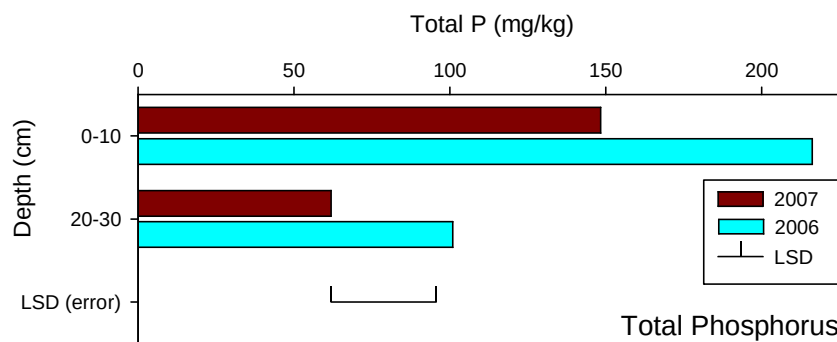
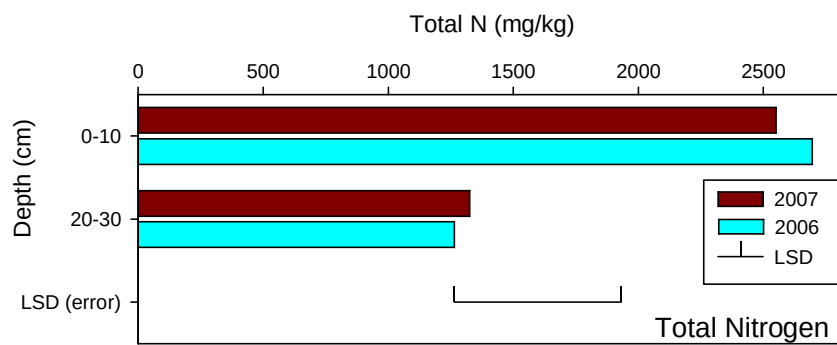
for soil with texture medium to heavy clay. Soil SAR is an indirect measure of ESP and these differences between SAR do not reflect the findings for ESP above; which on the sample soil will have a good correlation. The 2006 SAR has been ignored as it is considered an analytical error. Yarra Valley Water has checked the 2006 lab report and these data are as reported.



- Organic matter (OM) concentrations have not changed significantly from the 2006 to 2007 sampling (see graph below). As expected, OM was lower in the lower soil depths, which is typical of pasture production systems. The trend of lower OM in 2007 may also be related to an increased pH, which would increase the functionality of soil microbes that breakdown OM.



- Total N and P concentrations have not significantly increased from 2006 to 2007 (see graphs below), indicating the irrigation systems are not overloading soils with N and P (NRMMC and EPHC 2006). In fact, total P concentrations decreased significantly across the sample site. This suggests that the P balance overall is negative and sufficient P to meet pasture requirements may not be applied with the current use of recycled water and any fertilisation program. Ideally, plant available N and P in soil should be measured in the future, as this can be used for agronomic advice regarding fertiliser requirements and, if excessive, could pose a risk to the nearby environment.



SUMMARY

This preliminary assessment of soils data from the Wallan recycled water irrigation site indicates:

- Recycled water has generally improved many indicators of soil health measured as part of the monitoring program from 2006 to 2007.
- Addition of lime may be required to manage sodicity in the future – a watching brief is required at this stage.
- Soil pH may rise to desired levels through the use of recycled water. This could also be managed through the addition of lime.
- The risks from deep leaching of N and P may need to be considered, and if appropriate soil sampling modified to manage these risks.

Some soil tests currently undertaken should be stopped and more appropriate tests adopted to manage the risks associated with recycled water use. This includes:

- Changing the aluminium test to phytotoxic aluminium concentrations in soils – NOT total aluminium.
- Changing to plant available N and P concentrations in soils – NOT total N and P concentrations.
- If measuring ESP don't measure soil SAR as it measures the same soil parameter.

REFERENCES

ANZECC, ARMCANZ (2000) 'Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Volume 3, Chapter 9 . Primary Industries — Rationale and Background Information (Irrigation and general water uses, stock drinking water, aquaculture and human consumers of aquatic foods).' (National Water Quality Management Strategy (NWQMS). Australian and New Zealand Environment and Conservation Council, Agriculture and Resource Management Council of Australia and New Zealand: Canberra, Commonwealth of Australia).

Cass A, Walker RR, Fitzpatrick RW (1995) Vineyard soil degradation by salt accumulation and the effect on the performance of the vine. In '9th Australian Wine Industry Technical Conference (1995)'. Adelaide, Australia. Published 1996. pp. 153-160. (Australian Wine Industry Technical Conference Inc., Glen Osmond, SA.).

NRMMC, EPHC (2006) Australian Guidelines for Water Recycling. Managing Health and Environmental Risks. Phase 1. National Water Quality Management Strategy 21. Natural Resource Management Ministerial Council. Environment Protection and Heritage Council Australian Health Ministers' Conference, Canberra, Australia.

Peverill KI, Sparrow LA, Reuter DJ (1999) 'Soil Analysis: An Interpretation Manual.' (CSIRO Publishing: Collingwood, Victoria, Australia).

APPENDIX

Boreholes and soil sample sites

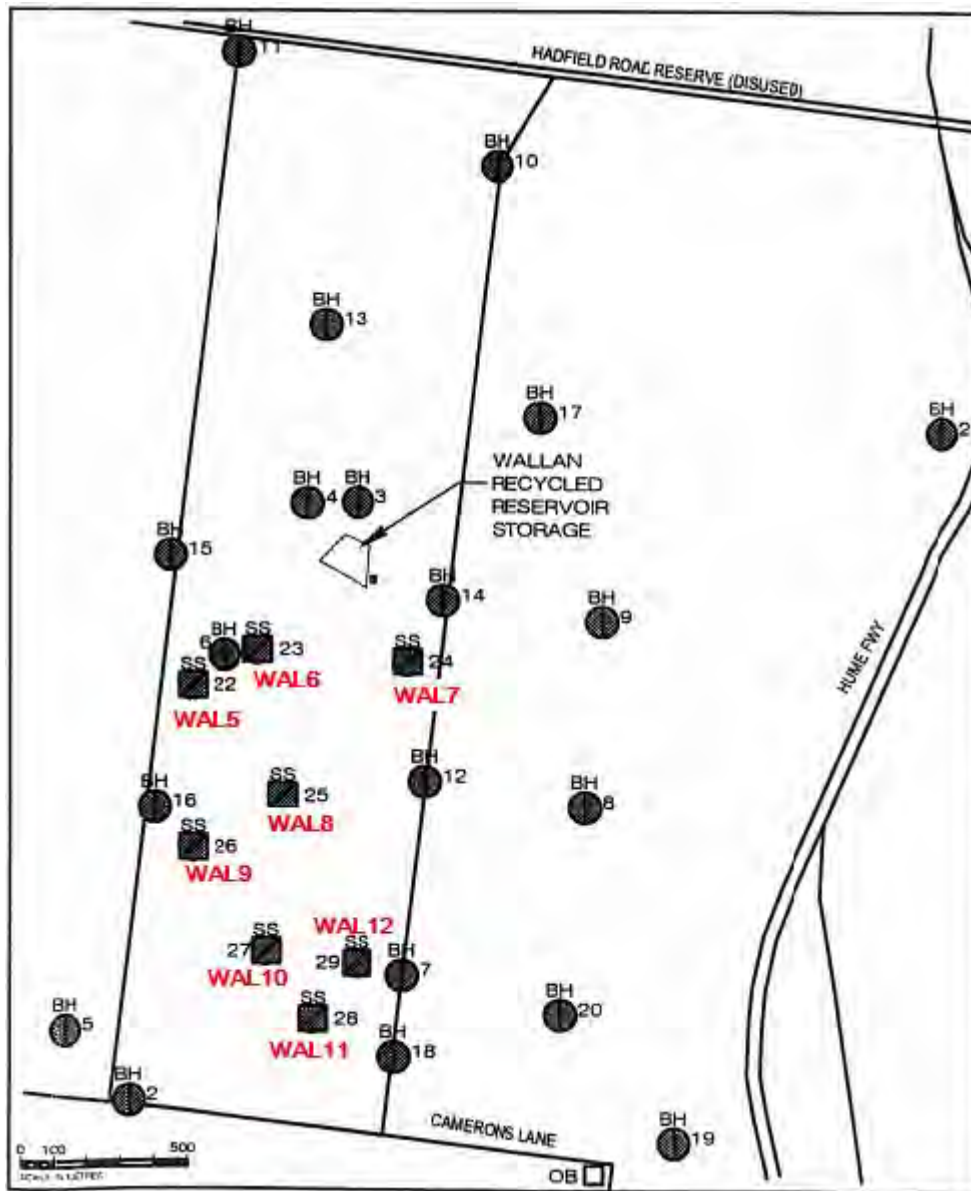


Figure 1 Soil sampling points relative to Wallan Recycled Water Reservoir. Soil sample points in red with prefix WAL.

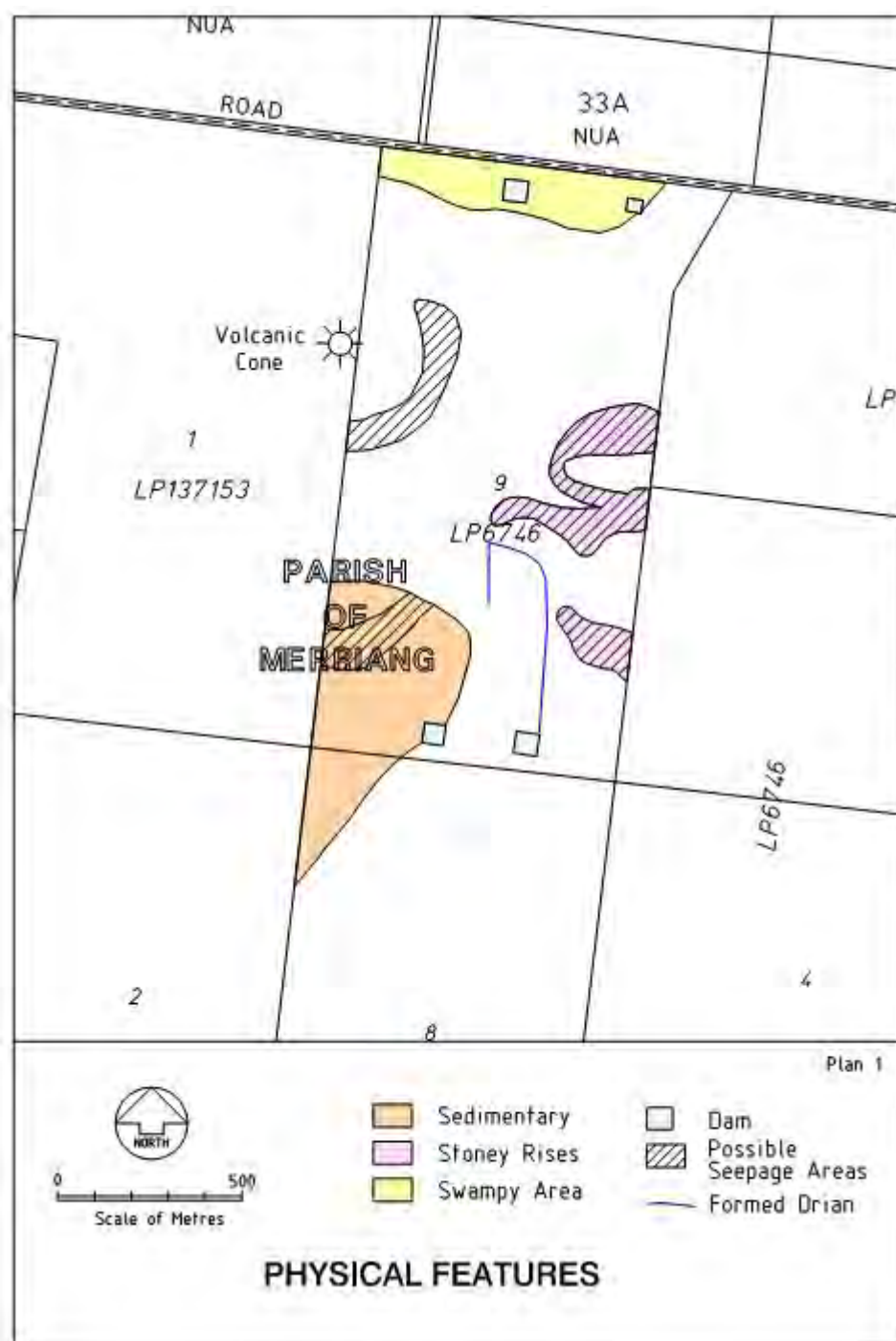


Figure 2 Lot 9 – Physical features of soil irrigation with recycled water at Wallan

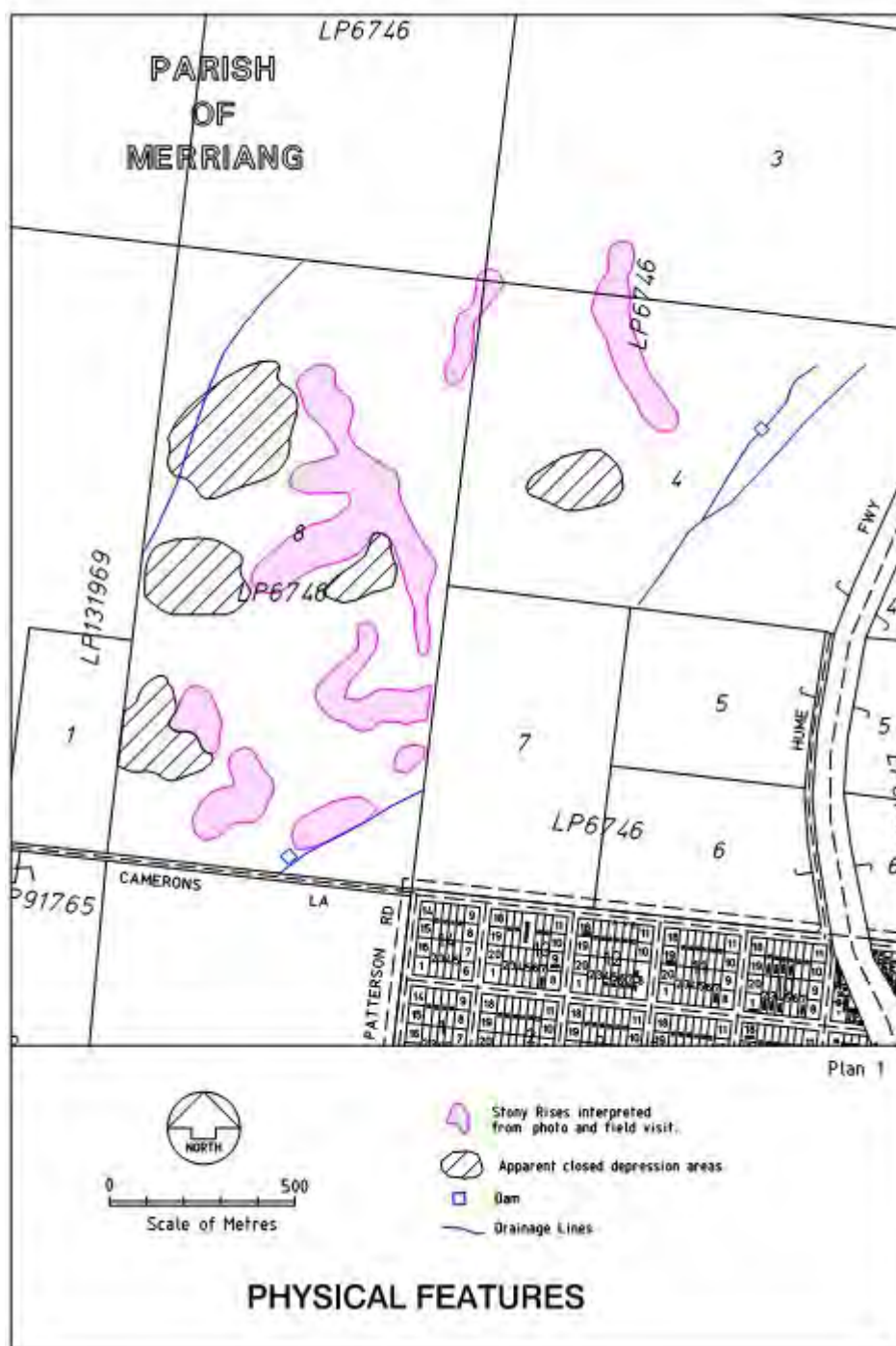


Figure 3 Lot 8 – Physical features of soil irrigation with recycled water at Wallan

Soil pits

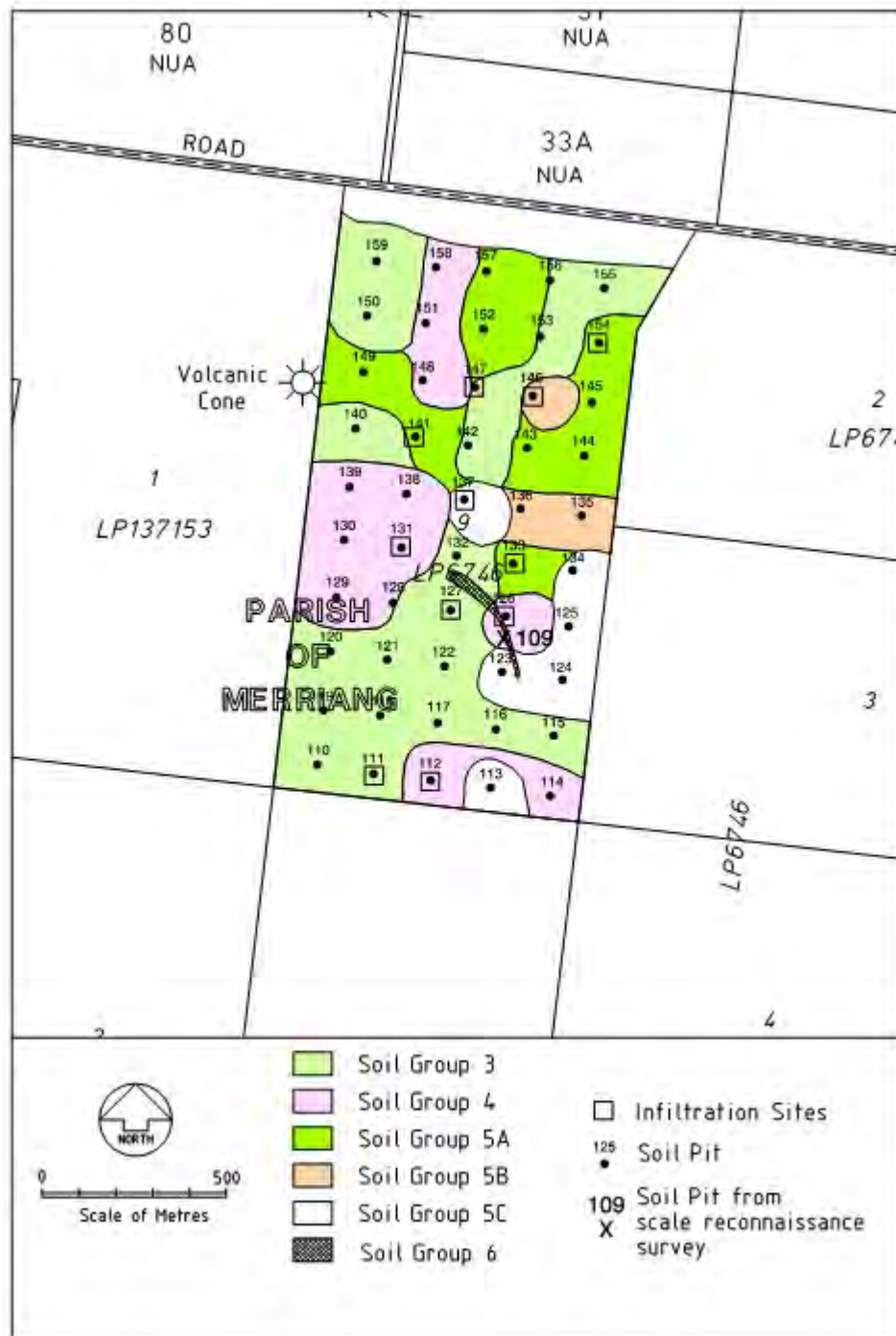


Figure 4 Lot 9 - Soil pit location and soil grouping

Figure 5 **Lot 9 - Soil pit descriptions**





Figure 6 Lot 8 - Soil pit location and soil grouping

Figure 7 **Lot 8 - Soil pit descriptions**



Detailed analysis of recycled water quality at Wallan irrigation site

Table 3 Summary of detailed analysis of recycled water quality supplied to Wallan irrigation site

Parameter	Unit	Value and date sampled		
		27/04/07	12/10/2007	16/4/2008
pH - pH, Units	Units	8.1	7.6	#N/A
BOD5 - Biochemical Oxygen Demand, 5 Day	mg/L	9	13	#N/A
BOD5 Filt - BOD 5 Day (Filt)	mg/L	3	10	#N/A
TKN/TP (HL) - Phosphorus, total as P	mg P / L	17	12	#N/A
SS - Suspended solids	mg/L	19	5	#N/A
EC - Electrical Conductivity @ 25C	uS/cm	1100	830	#N/A
SO4 DA - Sulphate, as SO4	mg/L	58	60	#N/A
TCN - Total Combined Nitrogen	mg/L	23	30	#N/A
NH3 as N (SFA) - Ammonia, as N	mg N / L	13	11	#N/A
MS Total Metals - Aluminium	mg/L	1.5	7.2	5.5
MS Total Metals - Antimony	mg/L	<0.01	<0.01	<0.01
MS Total Metals - Arsenic	mg/L	0.005	<0.01	<0.01
MS Total Metals - Barium	mg/L	0.08	0.05	0.04
MS Total Metals - Beryllium	mg/L	<0.01	<0.01	<0.01
MS Total Metals - Boron	mg/L	0.22	<0.5	<0.2
MS Total Metals - Cadmium	mg/L	<0.001	<0.002	<0.002
MS Total Metals - Chromium	mg/L	<0.01	0.02	0.01
MS Total Metals - Cobalt	mg/L	<0.01	<0.01	<0.01
MS Total Metals - Copper	mg/L	<0.01	0.01	<0.01
MS Total Metals - Iron	mg/L	1.2	5.8	3.0
MS Total Metals - Lead	mg/L	<0.01	<0.01	<0.01
MS Total Metals - Manganese	mg/L	0.08	0.02	<0.01
MS Total Metals - Mercury	mg/L	<0.001	<0.001	<0.001
MS Total Metals - Molybdenum	mg/L	<0.01	<0.01	<0.01
MS Total Metals - Nickel	mg/L	0.01	0.01	<0.01
MS Total Metals - Selenium	mg/L	<0.001	<0.01	<0.01
MS Total Metals - Silver	mg/L	<0.01	<0.05	<0.01
MS Total Metals - Strontium	mg/L	0.13	0.08	0.08
MS Total Metals - Thallium	mg/L	<0.01	<0.01	<0.01
MS Total Metals - Tin	mg/L	<0.01	<0.01	<0.01
MS Total Metals - Titanium	mg/L	0.03	0.04	0.27
MS Total Metals - Vanadium	mg/L	0.01	0.01	0.02
MS Total Metals - Zinc	mg/L	0.01	0.02	<0.01
MAH - Benzene	mg/L	<0.001	<0.001	<0.001
MAH - Toluene	mg/L	<0.001	<0.001	<0.001
MAH - Ethyl Benzene	mg/L	<0.001	<0.001	<0.001
MAH - Xylenes	mg/L	<0.003	<0.003	<0.003
MAH - Styrene	mg/L	<0.001	<0.001	<0.001
MAH - Cumene	mg/L	<0.001	<0.001	<0.001
MAH - 1,2,4-Trimethylbenzene	mg/L	<0.001	<0.001	<0.001
HVOL - 1,1,1,2-Tetrachloroethane	mg/L	<0.001	<0.1	<0.001
HVOL - 1,1,2,2-Tetrachloroethane	mg/L	<0.001	<0.1	<0.001
HVOL - 1,1- Dichloroethane	mg/L	<0.001	<0.1	<0.001
HVOL - 1,1-Dichloroethene	mg/L	<0.001	<0.1	<0.001

Parameter	Unit	Value and date sampled		
		27/04/07	12/10/2007	16/4/2008
HVOL - 1,1-Dichloropropene	mg/L	<0.001	<0.1	<0.001
HVOL - 1,2,3-Trichloropropane	mg/L	<0.001	<0.1	<0.001
HVOL - 1,2-Dibromo-3-chloropropane	mg/L	<0.001	<0.1	<0.001
HVOL - 1,2-Dibromoethane	mg/L	<0.001	<0.1	<0.001
HVOL - 1,2-Dichloroethene [cis]	mg/L	<0.001	<0.1	<0.001
HVOL - 1,2-Dichloroethene [trans]	mg/L	<0.001	<0.1	<0.001
HVOL - 1,2-Dichloroethane	mg/L	<0.001	<0.1	<0.001
HVOL - 1,2-Dichloropropane	mg/L	<0.001	<0.1	<0.001
HVOL - 1,3-Dichloropropane	mg/L	<0.001	<0.1	<0.001
HVOL - 1,3-Dichloropropene [cis]	mg/L	<0.001	<0.1	<0.001
HVOL - 1,3-Dichloropropene [trans]	mg/L	<0.001	<0.1	<0.001
HVOL - 2,2-Dichloropropane	mg/L	<0.001	<0.1	<0.001
HVOL - 2-Chlorotoluene	mg/L	<0.001	<0.1	<0.001
HVOL - 4-Chlorotoluene	mg/L	<0.001	<0.1	<0.001
HVOL - Bromochloromethane	mg/L	<0.001	<0.1	<0.001
HVOL - Bromodichloromethane	mg/L	<0.001	<0.1	<0.001
HVOL - Bromobenzene	mg/L	<0.001	<0.1	<0.001
HVOL - Bromoform (Tribromomethane)	mg/L	<0.001	<0.1	<0.001
HVOL - Carbon Tetrachloride	mg/L	<0.001	<0.1	<0.001
HVOL - Chloroform (Trichloromethane)	mg/L	<0.001	<0.1	<0.001
HVOL - Chlorobenzene	mg/L	<0.001	<0.1	<0.001
HVOL - Dibromochloromethane	mg/L	<0.001	<0.1	<0.001
HVOL - Dibromomethane	mg/L	<0.001	<0.1	<0.001
HVOL - Dichloromethane	mg/L	<0.005	<0.5	<0.005
HVOL - Trichlorofluoromethane (CFC11)	mg/L	<0.002	<0.2	<0.002
HVOL - Tetrachloroethene	mg/L	<0.001	<0.1	<0.001
HVOL - Vinyl Chloride (Monomer)	mg/L	<0.002	<0.2	<0.002
HVOL - 1,1,1-Trichloroethane	mg/L	<0.001	<0.1	<0.001
HVOL - 1,1,2-Trichloroethane	mg/L	<0.001	<0.1	<0.001
HVOL - Trichloroethene	mg/L	<0.001	<0.1	<0.001
SOLVENTS - Acetone	mg/L	<0.01	<0.01	<0.01
SOLVENTS - Acrylonitrile	mg/L	<0.01	<0.01	<0.01
SOLVENTS - Ethylhexyl Acrylate	mg/L	<0.01	<0.01	<0.01
SOLVENTS - Isopropanol (Isopropyl Alcohol)	mg/L	<0.01	<0.01	<0.01
SOLVENTS - Methyl ethyl Ketone	mg/L	<0.01	<0.01	<0.01
SOLVENTS - Methyl Isobutyl Ketone	mg/L	<0.01	<0.01	<0.01
Alg. ScCnt - Algal analyses		#N/A	NR IND	#N/A
Colilert - E.coli MPN Colilert	orgs/100mL	#N/A	<10	#N/A

#N/A = not available

Variability of ECe

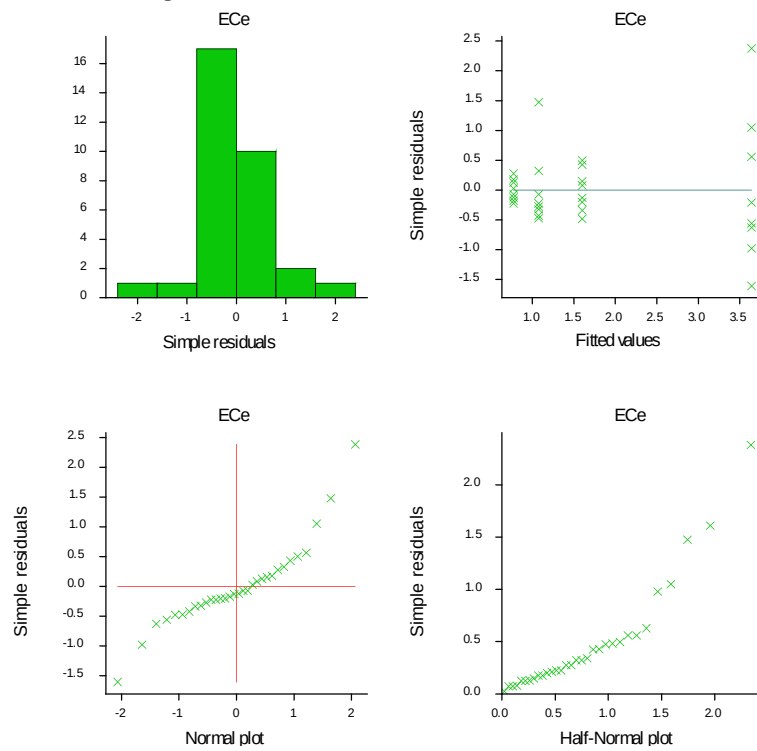


Figure 8 Residual plots for soil ECe values indicating outliers

Beveridge North West PSP

METROPOLITAN PLANNING AUTHORITY

Groundwater Quality Assessment

VW07335_P2_A_FINAL | V2

VW07335

June 2014



Beveridge North West PSP

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Important note about your report

The sole purpose of this report and the associated services performed by Jacobs is assess the water quality within previously installed wells at the Beveridge North West PSP in accordance with the scope of services set out in the contract between Jacobs and the Client. That scope of services, as described in this report, was developed with the Client.

In preparing this report, Jacobs has relied upon, and presumed accurate, any information (or confirmation of the absence thereof) provided by the Client and/or from other sources. Except as otherwise stated in the report, Jacobs has not attempted to verify the accuracy or completeness of any such information. If the information is subsequently determined to be false, inaccurate or incomplete then it is possible that our observations and conclusions as expressed in this report may change.

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1. Introduction

1.1 Background

Sinclair Knight Merz Pty Ltd (Jacobs SKM) was commissioned by the Metropolitan Planning Authority (MPA) to undertake additional groundwater assessment at Lot 8 and 9 Camerons Lane, Beveridge within the Beveridge North West 1059 Precinct Structure Plan (PSP) area. This additional investigation is in accordance with recommendations made in the earlier desktop environmental, hydrological and geotechnical assessment prepared by SKM in October 2013 (SKM, 2013). These properties are owned by Yarra Valley Water and are hereafter collectively referred to as 'the Site'. A site location plan is presented in Figure 1 while the layout (with sampling locations) is presented in Figure 2.

The Beveridge North West PSP Area has been identified as potential future land supply primarily for residential land use, although also with a view to various commercial and community land uses. The aim of the earlier assessment completed in 2013 was to identify opportunities and constraints to the proposed land development which may potentially be caused by existing or past land uses, and site and sub-surface conditions. The YVW site that is the subject of this assessment was observed to be a potentially source of groundwater contamination, since it is currently used for irrigation using recycled water from the nearby Wallan Sewage Treatment Plant (STP). This report documents the additional sampling and analysis program that was undertaken in order to identify the nature, extent and significance of contamination (if any) resulting from this source that may preclude the beneficial uses of groundwater relevant under the proposed future site development.

1.2 Scope of works

The following scope of works was undertaken as part of this assessment:

- Collection of 13 primary groundwater and effluent samples from the site and the immediate perimeter as well as relevant quality control samples
- Laboratory analysis of water samples for contaminants of primary concern
- Comparison of laboratory results against relevant assessment criteria endorsed by EPA Victoria for the protection of human health and the environment
- Comparison of laboratory results against historical results obtained at the site by YVW to assess longer term contaminant concentration trends
- Preparation of a summary report documenting the tasks completed as part of the assessment as well as conclusions and recommendations in relation to the current condition of the site

1.3 Abbreviations and acronyms

- ALS – Australian Laboratory Services
- AS – Australian Standard
- COC – Chain of custody
- DQO – Data quality objectives
- EIL – Ecological investigation level
- EPA – Environment Protection Authority (Victoria)
- ESA – Environmental site assessment
- GAA – Growth Areas Authority (now Metropolitan Planning Authority)
- GVW – Goulburn Valley Water
- HIL – Health investigation level

- HSEC – Health, safety environment and community
- MDL – Method detection limit
- MPA – Metropolitan Planning Authority
- NATA – National Association of Testing Authorities
- NEPC – National Environment Protection Council
- NEPM – National Environment Protection (Assessment of Site Contamination) Amendment Measure
- PQL – Practicable quantitation limit
- PSP – Precinct Structure Plan
- QA/QC – Quality assurance / quality control
- RPD – Relative percentage difference
- SEPP – State Environmental Protection Policy
- SKM – Sinclair Knight Merz
- STP – Sewage treatment plant
- USEPA – United States Environmental Protection Agency
- YVW – Yarra Valley Water

2. Site use and previous investigation

2.1 Site use

The water re-use scheme that currently operates at the site was established by Goulburn Valley Water (GVW) before ownership was transferred to YVW in January 2006 - at this time, irrigation commenced at the site. The water re-use scheme was established by GVW to make use of treated effluent from the nearby Wallan STP. Prior to 2006 historical aerial imagery indicates the site (and much of the surrounding area) was used for agricultural purposes.

Irrigation of the site is ongoing at four main locations. Two boom irrigators operate to the south of the winter storage facility, one in each of the paddocks either side of the access road between Camerons Lane and winter storage reservoir. Each of these irrigators operates over an area of approximately 50 hectares (ha). Two further centre-pivot irrigators operate to the north of the winter storage area, one occupying an area of 10 ha and the other 40 ha. The existing winter storage reservoir currently occupies an area of 5 ha. Figure 2 illustrates the location of the irrigators at the site while Plate 2.1 below provides a selection of photographs of the equipment.



Boom irrigators operating at Lot 8



Boom irrigators at Lot 8, illustrating the spraying mechanism

Plate 2.1 : Boom irrigators in operation at the site

2.2 Previous investigations

This section summarises the previous investigation reports reviewed by SKM as part of this assessment that relate to groundwater.

2.2.1 SKM, 2002 – Wallan Reclaimed Water Re-Use Site: Hydrogeological Assessment

In 2002, GVW commissioned SKM to undertake a hydrogeological assessment to determine background groundwater conditions at Lot 8 and 9 (17 wells). The assessment was undertaken pre-irrigation and provides some relevant “baseline” data.

Groundwater flow direction was determined to be towards the south which is consistent with the latest 2014 assessment (see Figure 4). Groundwater salinity ranged from 920 to 8,500 $\mu\text{S}/\text{cm}$, which is consistent with the latest 2014 assessment (see Section 5.5 for further information). Concentrations of nitrate (as N mg/L) varied between 0.11 – 3.2 mg/L, nitrite from <0.01 – 0.82 mg/L and ammonia <0.01 to 0.5 mg/L across the 17 sampled wells.

A comparison between the current 2014 data vs SKM's 2002 (pre irrigation) data is provided in Section 5.5.

2.2.2 YVW, 2008 – Camerons Lane Lots 8 & 9: Preliminary Assessment of Groundwater Monitoring Results

In 2008 Yarra Valley Water prepared an assessment report documenting the results of periodic groundwater monitoring events undertaken across a network of 18 groundwater monitoring bores and windmills at the site. The purpose of the assessment was to confirm that the irrigation of the site using recycled water was not having a detrimental impact upon groundwater quality and the relevant beneficial use segments as defined in the State Environmental Protection Policy (SEPP). Laboratory results were compared against background results obtained by SKM prior to commencement of irrigation, in order to assess groundwater quality trends. These results were also compared against the ANZECC & ARMCANZ (2000) assessment criteria for the relevant protected beneficial uses which included stock watering, irrigation water, industrial use of groundwater, ecosystem protection and buildings and structures.

Yarra Valley Water concluded that the majority of parameters generally reported stable concentrations trends between pre and post irrigation monitoring. Where exceedances of the relevant criteria were observed, these were either:

- For analytes that also reported exceedances prior to irrigation commencing and were therefore deemed unlikely to have resulted from the irrigation itself (i.e. TDS)
- For analytes that were not tested for during pre-irrigation monitoring and therefore results could not be attributed to irrigation (i.e. sodium, chloride and pH)

The report also provides a summary of the water quality parameters for the recycled irrigation water, which was derived from the Wallan Sewage Treatment Plant. The discharged water is rated as Class C recycled water, which can be used for the following uses (as described by YVW):

'Class C may be used for a number of uses including for cooked or processed human food crops including wine grapes and olives. It can also be used for livestock grazing and fodder and for human food crops grown over a meter above the ground and eaten raw such as apples, pears, table grapes and cherries. It can be used by councils for specific purposes but there are restrictions around human contact'

While nutrient concentrations (nitrate, nitrite and ammonia) as well as E.coli are generally raised, concentrations of metals, selected solvents, volatile organics and monocyclic aromatic hydrocarbons (MAHs) were generally reported below laboratory limits of detection.

3. Investigation methodology

3.1 Selection of sampling locations

Samples were obtained from 13 targeted locations at the site between 11 and 13 March 2014. Twelve of these locations were groundwater sampling locations while a further treated effluent / recycled water sample was collected from the winter storage facility (sample EFF). The treated effluent contained in the winter storage facility is used to irrigate the site. Sampling locations are presented in Figure 2.

Groundwater samples were predominantly collected from locations around the immediate perimeter of Lots 8 and 9, as well as a single location near the existing winter storage reservoir towards the centre of the site. While bores were previously located within a number of the irrigated paddocks, these appear to have been removed since the previous groundwater monitoring report was prepared in 2008. Jacobs SKM assumes these have been removed due to their obstruction of the boom irrigators or other farm machinery. Despite the lack of monitoring wells towards the interior of the site, the perimeter wells selected will provide an indication of potential off-site migration of contaminants of concern at the site (if any) that supplement the results obtained for WSBH, located in the vicinity of the winter storage reservoir.

Treated effluent sampling location EFF has been selected, as it provides a valuable reference against which groundwater quality results for the site can be compared. In order to restrict access to the winter storage reservoir itself, YVW has installed a dedicated sampling point on the external wall of one of the administration buildings nearby. It is from this location that a treated effluent sample was collected (refer Plate 3.1).

3.2 Sampling methodology

Fieldwork undertaken as part of the additional investigations was completed in accordance with Jacobs SKM's standard work procedures for the investigation of contaminated sites. A site-specific Health, Safety, Environment and Community (HSEC) plan was also prepared and implemented by the field team throughout the investigations.

Groundwater samples were collected using a range of methods, depending upon the nature of the groundwater bores installed, the above-ground infrastructure present as well as borehole yields. Sampling methods adopted for the investigation included:

- Low flow (micropurge) sampling
- Disposable bailer
- Foot valve
- Direct sampling from taps or other above-ground sampling points

Low flow sampling was preferentially adopted for the investigation with the general sampling procedure described below.

The depth to water and total depth measurements of each groundwater monitoring well was recorded using a multi-phase interface probe that detects water levels and the presence of non-aqueous phase liquids. To ensure representative groundwater samples were collected from each monitoring well, wells were purged using low flow sampling techniques with a bladder pump and dedicated tubing. Physical and chemical water quality parameters were recorded at regular intervals and once these parameters had stabilised, groundwater samples were collected. During purging, the pumping rate as well as the SWL was recorded to ensure that drawdown of groundwater was minimised and suitable representative samples were collected for laboratory analysis. Where necessary the pumping rate (cycles per minute) was reduced.

Physical and chemical water quality indicator data was recorded using a TPS 90FL multi parameter meter. Parameters recorded included conductivity, reduction/oxidation (redox) potential, pH, dissolved oxygen (mg/L and percentage saturation) and temperature. Stabilisation of parameters was considered to have been reached when three consecutive field measurements were reported within the following ranges:

- Dissolved oxygen (DO) +/- 10%
- Electrical conductivity (EC) +/-3%
- pH +/-0.05; and
- Redox potential +/-10mV

Where stabilisation of all of the above field measurements could not be achieved, sampling was undertaken when the majority of parameters had stabilised. The stabilisation criteria adopted are derived from EPA Victoria *Groundwater Sampling Guidelines*.

Samples were collected in appropriately preserved sampling containers specific to the required analysis. These containers were provided by the primary laboratory (Eurofins-MGT). To assess dissolved metal concentrations, each sample was also field filtered using a disposable 0.45 µM Stericup filter prior to chemical preservation. Samples were immediately placed in a chilled esky before being transferred to the primary laboratory under appropriate chain of custody (CoC) documentation (presented in Appendix D).

Fresh tubing, bladders and Stericup filters dedicated to each location were used when sampling. All non-dedicated sampling equipment was decontaminated between sampling locations to prevent cross contamination. Fresh disposable nitrile gloves were also used at each sampling location.

Low flow sampling methods were preferentially adopted for the investigation. However, in some cases this methodology could not be applied. Alternative sampling approaches were used in the following circumstances:

- Insufficient groundwater. At location BH12 the volume of groundwater in the well was insufficient to allow the low flow sampling equipment to operate effectively (i.e. a water column of less than 1m). As such, a disposable bailer was used for sampling. The well was purged dry and allowed to recharge before a sample was collected for laboratory analysis.
- Poor well recharge. BH11 reported a poor recharge rate using the low flow sampling kit with groundwater drawdown in the well equivalent to the volume of water removed during purging. This was the case even at the lowest possible rate of extraction. As such, groundwater samples collected were not considered representative of the wider aquifer. Therefore, a disposable bailer was used to sample the well instead. Purging using a bailer induced an increased rate of groundwater recharge in the well. As such, the bore could not be purged dry before sampling. Instead, water quality parameters were recorded at regular intervals and a sample for laboratory analysis was collected once these parameters stabilised.
- Partial obstruction of the well. A number of bores were installed with windmills for stock watering purposes. A typical example is presented in Plate 3.1. The existing pumping infrastructure in these wells prevented the use of the low flow sampling pump. As such, sampling was undertaken using a disposable foot valve and LDPE tubing. Where the mill was operational and therefore being continually purged (i.e. BH18) a sample was collected immediately. Where the mill was not operational (i.e. BH15 and BH17) groundwater was purged until water quality parameters stabilised.
- Complete obstruction of the well or sampling points. Where the well or sampling location was obstructed completely samples were instead collected from taps or other connected sampling points. These locations include:
 - BH5 where a sample was collected from a garden tap fed by the target bore (refer Plate 3.1)
 - The bore adjacent to the winter storage facility (named WSBH) where a sample was collected from a tap inside the main building
 - The winter storage facility where an effluent sample (EFF) was collected from a dedicated sampling point outside the compound (refer Plate 3.1)

- BH14 where mill infrastructure necessitated the sample being collected from the mill discharge pipe to an adjacent storage tank



Windmill sampling location BH18. Restricted access to the well



Windmill sampling location BH17 with restricted access to the well



Effluent sampling location (EFF). Pump used to obtain sample



BH5 sampled directly from a tap connected to the bore

Plate 3.1 : Examples of sampling locations

Sampling methods adopted during the investigation are summarised in Table 3.1.

Table 3.1 : Summary of sampling methods adopted

Location		Sampling method	Comments
ID	Description		
BH2	South west corner of Lot 8	Micropurge	
BH5	South west corner of Lot 8	Tap	No direct access to bore
BH7	Eastern perimeter of Lot 8	Micropurge	
BH10	North east corner of Lot 9	Micropurge	
BH11	North west corner of Lot 9	Bailer	Poor recharge rate
BH12	Eastern perimeter of Lot 8	Bailer	Insufficient groundwater for micropurge
BH14	Eastern perimeter of Lot 9	Windmill discharge	
BH15	Western perimeter of Lot 8	Foot valve	Windmill. Restricted access to bore
BH16	Western perimeter of Lot 8	Micropurge	

Location		Sampling method	Comments
ID	Description		
BH17	Eastern perimeter of Lot 9	Foot valve	Windmill. Restricted access to bore
BH18	Eastern perimeter of Lot 8	Foot valve	Windmill. Restricted access to bore
WSBH	Bore adjacent to winter storage	Tap	No direct access to bore
EFF	Treated effluent from winter storage	Tap	No access to winter storage reservoir

3.3 Laboratory analysis

In total, thirteen primary samples and four quality control samples were submitted for laboratory analysis for contaminants of concern. Eurofins-MGT was selected as the primary laboratory to conduct analysis while Australian Laboratory Services (ALS) was used as the secondary quality control laboratory. Both laboratories are accredited by the National Association of Testing Authorities (NATA) for the analyses undertaken. A summary of the samples submitted for analysis is presented in Section 3.3.1 and 3.3.2 below.

3.3.1 Primary samples

Primary groundwater and effluent samples were submitted for analysis as presented in Table 3.2.

Table 3.2 : Summary of analysis of primary water samples

Analysis Suite		Total Samples
Groundwater suite	Dissolved metals (16), nutrients, inorganics and TDS	12
Surface water / effluent	Total metals (16), nutrients, inorganics and TDS	1

NOTES:

- Metals (16) - As, Be, B, Cd, Ca, Cr, Co, Cu, Mg, Mn, Ni, Pb, K, Na, Hg, Zn
- Nutrients – ammonia, nitrate, nitrite, total Kjeldahl nitrogen, total nitrogen
- Inorganics – sulphate, fluoride, total cyanide

3.3.2 Quality control samples

Four quality control samples were submitted for analysis as presented in Table 3.3.

Table 3.3 : Summary of quality control samples

Quality Control Samples		Total Samples
Blind duplicate (intralab duplicate)	Total metals (16), nutrients, inorganics and TDS	1
Split duplicate (interlab duplicate)	Total metals (16), nutrients, inorganics and TDS	1
Rinsate blanks	Total metals (16), nutrients, inorganics	2

NOTES:

- Metals (16) - As, Be, B, Cd, Ca, Cr, Co, Cu, Mg, Mn, Ni, Pb, K, Na, Hg, Zn
- Nutrients – ammonia, nitrate, nitrite, total Kjeldahl nitrogen, total nitrogen
- Inorganics – sulphate, fluoride, total cyanide

Analysis was undertaken in order to satisfy quality criteria outlined in AS 5667.1:1998 'Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples' (Standards Australia, 1998) as well as EPA Victoria *Groundwater Sampling Guidelines* (2000). A discussion of Quality Assurance/Quality Control procedures and results is provided in Appendix A.

3.4 Analytical data validation

Analytical data validation is the process of assessing whether data are in compliance with method requirements and project specifications. The primary objectives of this process are to ensure that data of known quality are reported, and to identify if the data can be used to fulfil the overall project objectives.

The data validation guidelines adopted are based upon data validation guidance documents published by the United States Environmental Protection Agency (USEPA). The process involves the checking of analytical procedure compliance and an assessment of the accuracy and precision of the analytical data from a range of quality control measurements, generated from both the sampling and analytical programs.

Specific elements that have been checked and assessed for this investigation were:

- Preservation and storage of samples upon collection and during transport to the laboratory
- Sample holding times
- Use of appropriate analytical procedures
- Required limits of reporting
- Frequency of conducting quality control measurements
- Laboratory blank results
- Field duplicate results
- Surrogate spike results
- The occurrence of apparently unusual or anomalous results, e.g. laboratory results that appear to be inconsistent with field observations and measurements

4. Regulatory framework

4.1 Legislation and policy

4.1.1 Environment Protection Act 1970

The *Environment Protection Act 1970* established the Victorian Environment Protection Authority (EPA) and made provisions with respect to the powers, duties, and functions of the EPA and the protection of the environment. The Act provides for environmental audits, which are used to provide an authoritative opinion on the suitability of potentially contaminated land for future use, and form an integral part of the land use planning and approval process. The Act also provides the basis for the various environmental health and waste policies / regulations, which provide the framework for the assessment and management of the environmental quality of land, surface waters and groundwater in Victoria.

4.1.2 The Planning and Environment Act 1987

The *Planning and Environment Act 1987* is administered by the Department of Transport, Planning and Local Infrastructure (DTPLI) and sets out the requirements of planning authorities when preparing planning schemes or amendments to planning schemes. The Act requires planning authorities to “take into account any significant effects which it considers the scheme or amendment might have on the environment or which it considers the environment might have on any use or development envisaged in the scheme or amendment”.

Under Section 12 (2) (a) of the Planning and Environment Act 1987, ‘*Ministerial Direction No. 1 – Potentially Contaminated Land*’ requires planning authorities to satisfy themselves that the environmental conditions of land proposed to be used for a sensitive use, agriculture or public open space are, or will be, suitable for that use. This is generally done through the completion of an environmental site assessment and audit process.

4.1.3 Groundwater State Environment Protection Policy 1997

The State Environment Protection Policy (Groundwaters of Victoria) (Groundwater SEPP) defines a range of protected beneficial uses for defined segments of the groundwater environment, which are based on groundwater salinity (total dissolved solids or TDS). The EPA considers that groundwater is *polluted* where current and/or future protected beneficial uses for the relevant segment are precluded. Beneficial uses of groundwater are considered to be precluded when relevant groundwater quality objectives set out in the groundwater SEPP for those beneficial uses have been exceeded, or where non-aqueous phase liquid is present.

Where groundwater has been polluted, groundwater must be cleaned up such that the protection of beneficial uses is restored, or to cleaned up the extent practicable.

The SEPP identifies the following beneficial uses of groundwater that are to be protected:

- Maintenance of marine ecosystems
- Maintenance of freshwater ecosystems
- Potable water supply (desirable)
- Potable mineral water supply
- Agriculture, parks and gardens
- Stock watering
- Industrial water use
- Primary contact recreation (e.g. bathing, swimming)
- Buildings and structures.

Not all of the above beneficial uses are relevant to the PSP area under the proposed future use scenario for the site. Those that are relevant are discussed further in Section 5.3.2 in the context of the reported groundwater salinity (TDS).

4.2 Guidelines and standards

4.2.1 National Environment Protection (Assessment of Site Contamination) Amendment Measure (NEPM) 2013

The NEPM is the national guideline for assessing contaminated sites and was prepared by the National Environment Protection Council (NEPC). The NEPM is implemented in each Australian jurisdiction under the *National Environment Protection Measures (Implementation) Act 1998 (Commonwealth)*. The NEPM document ensures there is a nationally consistent approach to the assessment of contamination. The NEPM provides guidance on the methods of site contamination assessment, environmental and health based investigation levels for soil and groundwater contaminants, human and environmental health risk assessment and reporting requirements. The original NEPM published in 1999 has been recently superseded by a version published in April 2013.

In accordance with the Groundwater SEPP, groundwater quality objectives for protected beneficial uses are primarily sourced from the National Environment Protection (Assessment of Site Contamination) Amendment Measure (NEPC, 2013) ('the NEPM'), specifically those provided in Schedule B(1) of the NEPM, 'Guideline on the Investigation Levels for Soil and Groundwater.'

Groundwater investigation levels (GILs) are defined as 'the concentration of a contaminant in groundwater above which further investigation (point of extraction) or a response (point of use) is required'.

4.2.2 EPA Victoria guidance documents

EPA Victoria has published a number of guideline documents relating to the assessment of groundwater quality in Victoria. These are discussed below.

Groundwater Sampling Guidelines (2000) were published by the EPA under the *Environment Protection Act 1970*. The guidelines have been developed to assist those involved in groundwater sampling to reduce the potential for error, allowing subsequent groundwater management decisions to be based on representative groundwater quality data.

Hydrogeological Assessment (Groundwater Quality) Guidelines published by the EPA in 2006 provide a detailed overview of the requirements for hydrogeological assessments in order to aid owners, developers, potential purchasers and regulators to identify the risk to health and the environment from potential contamination.

The Industrial Waste Resource Guidelines (Sampling and Analysis of Waters, Wastewaters, Soils and Wastes) was published by the EPA in 2009 and provides general direction on appropriate sampling, preservation, storage, analytical and quality assurance procedures.

4.2.3 Australian Standard 5667

Australian Standard 5667.1:1998 'Water Quality Sampling - Part 1: Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples' as well as Australian Standard 5667.1:1998 'Water Quality Sampling - Part 11: Guidance on sampling of groundwaters' provide general principles to be applied to the physical, chemical and microbiological analysis of waters and waste waters. These standards include the principles to be applied to the design of sampling programs, general guidance on sampling techniques, procedures for the preservation and transport of samples.

5. Summary of groundwater results

5.1 General observations and well integrity

A search of the *Visualising Victoria's Groundwater* website indicates that seven of the 12 boreholes selected by Jacobs SKM for sampling are registered by DEPI. While detailed borelogs were not available, a general driller's description of the lithology is provided for five of these. This information is summarised in Table 5.1 and Appendix C.

Table 5.1 : Summary of registered bores

Well Name	Registered ID	Total Depth (mbgl) ¹	Description of Lithology	Bore Condition for Sampling
BH2	S9020401/1	15	Basalt overlain by clay and topsoil	Moderate
BH5	79155	14.63	Weathered basalt	Unknown
BH7	145710	13.7	No information	Good
BH10	145714	20.6	Basalt overlain by clay and topsoil	Good
BH11	145715	18.2	Basalt overlain by clay and topsoil	Good
BH12	145711	15.8	Basalt overlain by clay and topsoil	Good
BH14	N/A	N/A ²	N/A	Good
BH15	N/A	N/A ²	N/A	Moderate
BH16	N/A	41.6 ³	N/A	Poor
BH17	N/A	N/A ²	N/A	Moderate
BH18	N/A	N/A ²	N/A	Moderate
WSBH	S9020401/2	25	No information	Good

NOTES:

1. Registered depth (DEPI)
2. Bore depth could not be established in the field due to well obstruction.
3. Bore depth recorded in the field

During the sampling event, boreholes were observed in varying conditions as described above. Windmill bores (BH14, BH15, BH17 and BH18) were generally in moderate to good condition. Due to the installation of pumping equipment, the top of the wells were not fully sealed at the surface and it is possible that foreign materials and exposure to the environment, more generally, may impact on reported results.

Groundwater wells installed with monument gatics were generally in good condition. These include BH7, BH10, BH11, BH12 and WSBH. BH2 was the only exception where the protective cover had been removed.

BH16 was observed to be in poor condition. It appeared that this bore was formerly a windmill although this structure has now been removed. As such, the top of the well was not sealed to prevent foreign materials entering the well.

Examples of groundwater bore installations are presented in Plate 5.1 while the implications of the condition of the bores are discussed in greater detail in Section 5.4.



Windmill bore BH17. Surface water can readily enter the well



BH16. Former windmill bore no longer sealed

Plate 5.1 : Examples of groundwater bore installations

5.2 Groundwater levels / flow direction

Groundwater was encountered between 5 mbgl and 10 mbgl. However, towards the western perimeter of Lot 8 (BH12) groundwater was encountered at approximately 16 mbgl. These observations correspond well with spatial data obtained from the Victorian Department of Environment and Primary Industry (DEPI) presented in Figure 3.

Groundwater height data indicates the groundwater flow direction is towards the south, towards the creek at the southern end of the site, which is consistent with the previous 2002 SKM assessment (SKM, 2002). A groundwater contour plan is provided as Figure 4.

5.3 Physical and chemical water quality parameters

5.3.1 Field measurements

Physical and chemical groundwater quality parameters were recorded as part of the groundwater sampling program. The parameters reported at stabilisation are presented in Table 5.2. Groundwater sampling forms are provided in Appendix B.

Table 5.2 : Summary of physical and chemical water quality parameters

Well ID ¹	Sample Date	Dissolved Oxygen		EC (mS/cm)	pH	Redox (mV)	Temp (°C)	Comments
		% Sat ¹	mg/L					
BH2	11/03/14	56.4	5.18	2.68	7.29	145	17.6	Clear sample
BH5	11/03/14	43.9	3.61	2.83	7.11	144	23.3	Clear sample
BH7	12/03/14	74.2	6.89	2.12	7.12	90	17.0	Clear sample
BH10	11/03/14	45.0	4.07	2.66	7.15	66	18.3	Clear sample
BH11	12/03/14	38.9	3.72	6.09	7.18	22	15.6	Slightly cloudy
BH12	12/03/14	91.8	8.60	3.88	8.01	141	16.6	High sediment, brown
BH14	12/03/14	22.9	2.11	2.07	6.87	105	17.3	Clear with some flocculent
BH15	13/03/14	61.0	5.81	2.88	7.45	175	15.8	High sediment, brown
BH16	12/03/14	14.3	1.34	3.41	6.41	9	16.5	Slight sediment
BH17	13/03/14	51.9	4.80	1.28	7.41	99	17.2	Slight sediment

Well ID ¹	Sample Date	Dissolved Oxygen		EC (mS/cm)	pH	Redox (mV)	Temp (°C)	Comments
		% Sat ¹	mg/L					
BH18	13/03/14	24.3	2.24	1.29	7.63	139	17.4	Slight sediment, pale brown
WSBH	13/03/14	23.8	2.21	2.59	6.35	143	17.1	Clear
EFF	13/03/14	28.5	2.56	0.972	7.62	87	18.7	Cloudy

NOTES:

1. Percentage saturation is an estimated value that has been calculated based on concentration in mg/L, water temperature and site altitude (300 mADH).

Reported water quality parameters indicate that the groundwater across the site is characterised by a fairly neutral pH with a relatively low salinity, ranging from 1.28 mS/cm (BH17) to 6.09 mS/cm (BH7). The results for reduction/oxidation (redox) potential are positive which is indicative of oxidising conditions. Dissolved oxygen concentrations vary across the site, although concentrations are all below saturation. Samples collected using either a foot valve or a disposable bailer generally report higher dissolved oxygen concentration. These sampling methods agitate the sample to a greater degree than low flow techniques and can result in increased aeration and consequently dissolved oxygen concentrations.

5.3.2 Laboratory total dissolved solids

Laboratory TDS concentrations for groundwater (which are an indicator of salinity) ranged from 700 mg/L to 3,500 mg/L during the most recent round of groundwater monitoring. The average TDS concentration is 1,656 mg/L. In accordance with the Groundwater SEPP, the sampled aquifer is classified as Segment A2 (501 – 1,000 mg/L) based on the lowest reported TDS concentration. As such, the beneficial uses of groundwater to be protected include:

- Maintenance of ecosystems
- Potable water supply (acceptable)
- Potable mineral water supply
- Agriculture, parks and gardens
- Stock watering
- Industrial use
- Primary contact recreation
- Buildings and structures

Of these, use of groundwater for mineral water supply is not considered relevant. Regional groundwater is not considered typical of mineral waters which are naturally effervescent and high in bicarbonate concentrations.

The following sections present the results obtained as part of the most recent sampling event in comparison with the relevant assessment criteria for each of the beneficial uses identified above.

5.4 Laboratory analytical results

Comparison of laboratory results against criteria for individual beneficial uses is detailed in Sections 5.4.1 to 5.4.4 below.

5.4.1 Comparison of laboratory results against human health criteria

Laboratory analytical results were compared against the following criteria for the protection of human health:

- Australian drinking water guidelines (ADWG) (NHMRC & NRMMC, 2011)
- Guidelines for managing risks in recreational waters (GMRRW) (NHMRC, 2008)

These criteria consider the suitability of groundwater at the site for the potable water supply and primary contact recreation protected beneficial uses of groundwater.

Analytes reporting exceedances of the assessment criteria are summarised in Table 5.3 below with tabulated results presented in Data Table A at the end of the report.

Table 5.3 : Summary of exceedances of the assessment criteria for the protection of human health

Contaminant of Concern		Concentration Range ¹		No. Results ²	No. Samples Exceeding Human Health Criteria		
					ADWG		GMRRW
Group	Analyte	Minimum	Maximum		Health	Aesthetic	
Metals	Manganese	<5	750	15	2	4	None
	Nickel	<1	26	15	1	N/A	None
Inorganics	Nitrite (as N)	<2	3,800	15	3 ⁽³⁾	N/A	None
	Sodium	157 mg/L	720 mg/L	15	N/A	11	N/A
	TDS	620 mg/L	3,500 mg/L	15	N/A	15	N/A

NOTES:

1. Units are µg/L unless stated otherwise
2. Includes primary and duplicate samples
3. These nitrite exceedances are from samples collected directly from the winter storage effluent holding pond (EFF)

5.4.2 Comparison of laboratory results against ecological criteria

Laboratory results were compared against the following criteria for the protection of ecosystems:

- Australian water quality guidelines for fresh water (AWQG) (ANZECC & ARMCANZ, 2000)

These criteria consider the suitability of groundwater at the site for the maintenance of ecosystems beneficial use. The maintenance of ecosystems beneficial use is considered to apply to groundwater at the point of discharge to the relevant surface water receptor, in this case, the heavily modified unnamed creek running along the southern portion of site (see Figure 5). Based on the groundwater contour plan, this creek is directly down gradient from site (see Figure 4).

The creek has been heavily modified, including the construction of several storage dams along its alignment - storage dams have been constructed in the southern portion of site, immediately offsite to the south (on the quarry site) and further south, on the recently constructed golf course. As part of construction of the golf course, the actual alignment of the creek has also been re-shaped / moved (see Figure 5). Given the highly modified nature of the creek, an 80% level of ecosystem protection has been assigned for the creek (ANZECC 80% level of ecosystem protection guidelines have been used).

Analytes reporting exceedances of the assessment criteria are summarised in Table 5.4 below with tabulated results presented in Data Table B at the end of the report.

Table 5.4 : Summary of exceedances of the assessment criteria for the protection of ecosystems

Contaminant of Concern		Concentration Range ¹		No. Results ²	No. Samples Exceeding AWQG
Group	Analyte	Minimum	Maximum		
Metals	Copper	<1	300	15	8
	Nickel	<1	26	15	1
	Zinc	<1	360	15	4
Inorganics	Total Cyanide	<5	23	15	1 ⁽³⁾

NOTES:

1. Units are µg/L unless stated otherwise
2. Includes primary and duplicate samples
3. Cyanide exceedance is from a sample collected directly from the winter storage effluent holding pond (EFF)

5.4.3 Comparison of laboratory results against primary use criteria

Laboratory results were compared against the following criteria for the primary use of groundwater:

- Irrigation water short term trigger values (ANZECC, 2000) – up to 20 years
- Recommended water quality trigger values for livestock drinking water (ANZECC & ARMCANZ, 2000)

The irrigation short term trigger value (up to 20 years) was deemed to be applicable for the assessment. These criteria consider the suitability of groundwater at the site for the agriculture, parks and gardens as well as stock watering beneficial uses.

Analytes reporting exceedances of the assessment criteria are summarised in Table 5.5 below with tabulated results presented in Data Table C at the end of the report.

Table 5.5 : Summary of exceedances of the assessment criteria for the primary use of groundwater

Contaminant of Concern		Concentration Range ¹		No. Results ²	No. Samples Exceeding Primary Use Criteria	
					Irrigation Trigger Values (TV)	Stock Watering
Group	Analyte	Minimum	Maximum		Short Term TV	
Inorganics	TDS	620 mg/L	3,500 mg/L	15	None	2

NOTES:

1. Units are µg/L unless stated otherwise
2. Includes primary and duplicate samples

5.4.4 Comparison of laboratory results against industrial use and buildings and structures criteria

Laboratory results were compared against the following criteria for the use of groundwater for industrial purposes and for the protection of buildings and structures:

- Criteria for the industrial use of groundwater (ANZECC, 1992)
- Exposure classification criteria for concrete piles in soil (AS 2159-2009) (Standards Australia, 2009)

Tabulated results presented in Data Table C at the end of the report.

Groundwater results for the site reported no exceedances of the relevant criteria for either beneficial use.

5.5 Comparison with 2002 analytical data

A comparison between SKM's available 2002 and recent data has been made, to help to assess changes in groundwater conditions over time. Analytical data was available for 6 wells across the site (nitrate, nitrite, ammonia and TDS data) and a comparison is presented in Table 5.6 below.

Table 5.6 : Comparison – 2002 vs 2014 groundwater analytical data

Analyte	Nitrate (mg/L)		Nitrite (mg/L)		Ammonia (mg/L)		TDS (mg/L)	
	2002	2014	2002	2014	2002	2014	2002	2014
BH10 / PS2	0.88	1.6	<0.01	<0.02	0.2	<0.01	1500	1600
BH11 / PS1	0.11	<0.02	<0.01	<0.02	0.2	0.03	5000	3500
BH15 / WM3	0.72	5	<0.01	<0.02	<0.3	<0.01	2700	1700
BH17 / WM5	2.2	3.2	<0.01	<0.02	<0.1	<0.01	720	700
BH18 / WM6	0.3	0.22	<0.01	<0.02	0.2	<0.01	700	770
BH7 / PS5	0.88	2.8	0.82	<0.02	<0.1	<0.01	1400	1200

NOTES:

1. 2002 data is referred to as "Baseline" Data
2. 5 – Concentration significantly increased since 2002 assessment
3. 5 – concentration significantly decreased since 2002 assessment

Concentrations of nitrate, nitrite and ammonia were detected "pre-irrigation" (in 2002), showing these contaminant concentrations were reflective of background and likely regional conditions. The comparison in Table 5.6 shows that concentrations of the analytes have remained relatively consistent over the past 12 years (including TDS), with some increases in nitrate concentrations in two wells (BH15 and BH7).

Jacobs SKM note that all the above concentrations (excluding TDS) are still below applicable criteria used for this assessment (see Section 5.4. and Tables section).

5.6 Discussion of impact on beneficial uses of groundwater

Groundwater is considered to be polluted where groundwater quality is such that the groundwater is unsuitable for a beneficial use (that is, a beneficial use is precluded) and / or it affects beneficial uses of other segments of the environment, such as soil and air.

Groundwater beneath the site has been classified as Segment A2 in accordance with SEPP Groundwaters of Victoria. As discussed in Section 5.3.2, the protection of the following beneficial uses of the groundwater at the site have been assessed:

- Maintenance of ecosystems
- Potable water supply (acceptable)

- Agriculture, parks and gardens
- Industrial water use
- Primary contact recreation (e.g. bathing, swimming)
- Buildings and structures

A discussion of contaminant concentration exceedances of the groundwater quality criteria for each of the beneficial uses is outlined below.

- *Maintenance of ecosystems*: Maintenance of ecosystem criteria were exceeded for copper, nickel and zinc. In several samples. Based on the known previous and current site use (no significant source of these analytes identified), these exceedances are likely reflective of background / regional conditions. Jacobs SKM note there was also an exceedance for cyanide, however, this was a surface water sample collected from the winter storage effluent pond (EFF) and was not collected from underlying groundwater
- *Potable water supply (acceptable)*: Potable water supply criteria were exceeded for manganese, nickel, sodium and TDS in several samples. Based on the known previous and current site use (no significant source of these analytes identified), these exceedances are likely reflective of background / regional conditions. Jacobs SKM note there were also 3 nitrite exceedances reported, however, these were surface water samples collected from the winter storage effluent pond (EFF) and were not collected from underlying groundwater
- *Agriculture, parks and gardens (irrigation)*: Stock irrigation TDS criteria was exceeded in two samples. Jacobs SKM note that TDS concentrations are likely reflective of background / regional conditions (see Table 5.6)
- *Industrial water / Buildings and Structures*: There were no reported exceedances for these beneficial uses
- *Primary contact recreation (e.g. bathing, swimming)*: There were no reported exceedances for this beneficial use

Based on the groundwater sampling program undertaken, exceedances of groundwater quality objectives for heavy metals, sodium and TDS are likely reflective of background or regional conditions. Therefore, no beneficial uses of groundwater are considered to be precluded based on the detected concentrations of contaminants.

5.7 Analytical data quality

It is considered that the QA/QC program was in accordance with recommended good practice (e.g. AS4482.1-2005). Overall the program is adequate considering the scope and nature of the assessment program undertaken. The data are considered sufficiently reliable for the purpose for which they have been obtained and used.

Further discussion in relation to data validation, quality assurance and control is provided in Appendix A.

6. Conclusions and recommendations

6.1 Conclusions

Based on the results of the groundwater sampling and laboratory analysis undertaken, heavy metals, sodium, nitrate and TDS were reported above adopted assessment guidelines. Concentrations of heavy metals and sodium are likely reflective of background / regional conditions, given no significant source of these contaminants were identified as part of the recent Jacobs SKM desktop assessment (Jacobs SKM, 2014). Concentrations of TDS and nitrate are likely mostly reflective of background / regional conditions, based on concentrations reported as part of SKM's 2002 "pre irrigation" groundwater sampling program (SKM, 2002). Jacobs SKM note that some increases in nitrate concentrations were reported as part of the 2014 groundwater sampling program, however, concentrations were still below applicable guidelines adopted for the assessment.

Elevated nitrite and cyanide were reported in the surface water sample collected from the winter storage facility, which holds the treated effluent used for irrigation. However, no contaminant concentrations of these contaminants were reported above adopted assessment guidelines as part of the actual groundwater sampling program.

Therefore, no beneficial uses of groundwater are considered to be precluded based on the detected concentrations of contaminants.

6.2 Recommendations

The groundwater well network should be periodically monitored by YVW (or other) while irrigation is being undertaken to help ensure the underlying groundwater quality remains acceptable for the relevant protected beneficial uses. If groundwater quality deterioration is reported during this routine monitoring this should act as a trigger for further detailed assessment and / or management. Deterioration in this case could be:

- A notable increase in concentrations of contaminants of concern in groundwater above the concentrations that have historically been reported at the site
- Reported exceedances of relevant assessment criteria for protected beneficial uses of groundwater at the site.

7. References

- ANZECC/NHMRC, 2000. *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*. Australian and New Zealand Environment and Conservation Council & National Health and Medical Research Council, October 2000.
- EPAV, 2000. Groundwater Sampling Guidelines. Environment Protection Authority Victoria, Publication 669
- EPAV, 2006. Hydrogeological Assessment (Groundwater Quality) Guidelines. Environment Protection Authority Victoria, Publication No. 668, September 2006
- Jacobs SKM, 2014. Beveridge North West Precinct Structure Plan Area – Desktop Environmental, Hydrogeological and Geotechnical Assessments, Draft V2. Prepared for MPA, April, 2014
- SKM 2002. Wallan WMF and Wallan proposed Re-use Farm Hydrogeological Assessments. Sinclair Night Merz, May 2002
- SKM 2012. Victorian state wide watertable mapping. Prepared for the DSE, 2012
- Victorian Government, 2003. State Environment Protection Policy (Waters of Victoria). Vic. Govt. Gazette No. S107, 4 June 2003
- Victorian Government, 1997. State Environment Protection Policy (Groundwaters of Victoria). Vic. Govt. Gazette, 17 December 1997
- YVW, 2008. Wallan Reclaimed Water Re-Use Scheme: Camerons Lane Lots 8 & 9 – Preliminary Assessment of Groundwater Monitoring Results. Yarra Valley Water, May 2008

Figures

Figure 1 : Site location plan

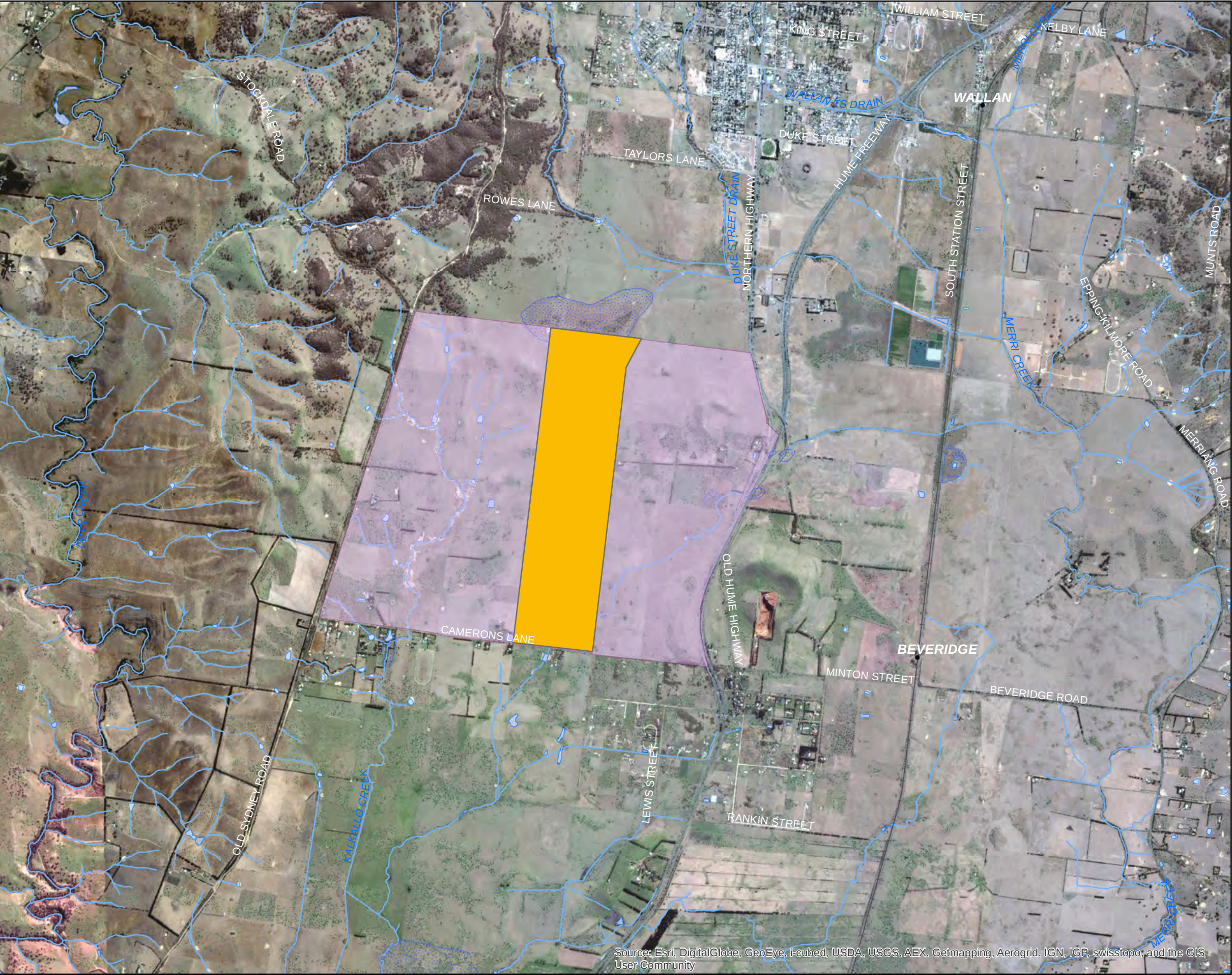
Figure 2 : Site layout

Figure 3 : Depth to groundwater

Figure 4 : Groundwater contour plan

Figure 5 : Heavily modified downstream surface water body

[Figure 1 - Locality Map]



- LEGEND**
- Lot 8 & 9 Camerons Lane
 - PSP Boundary
 - Rail
 - Lake
 - Flat
 - Wetland Swamp
 - Watercourse

JACOBS SKM

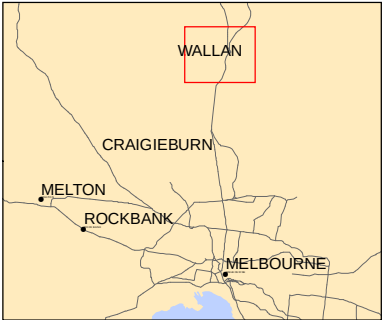
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[Figure 2 - Site Layout : Lot 8 and 9 Camerons Road]



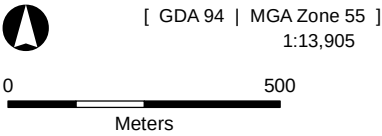
- LEGEND
- Effluent Sample
 - Groundwater Well
 - Winter Storage Reservoir
 - Irrigators
 - Watercourse
 - Freeway
 - Sub-arterial
 - Local Road

JACOBS SKM

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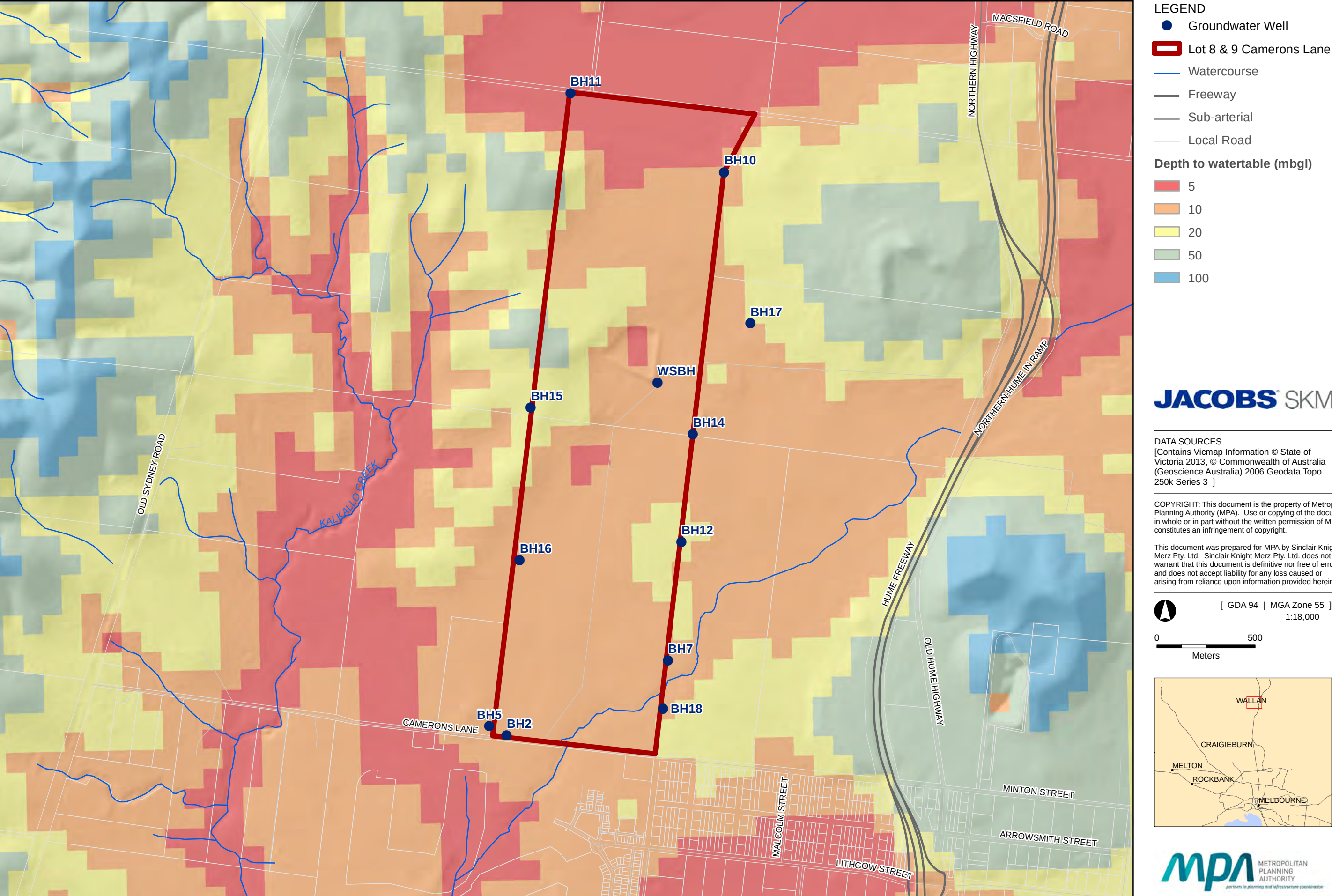
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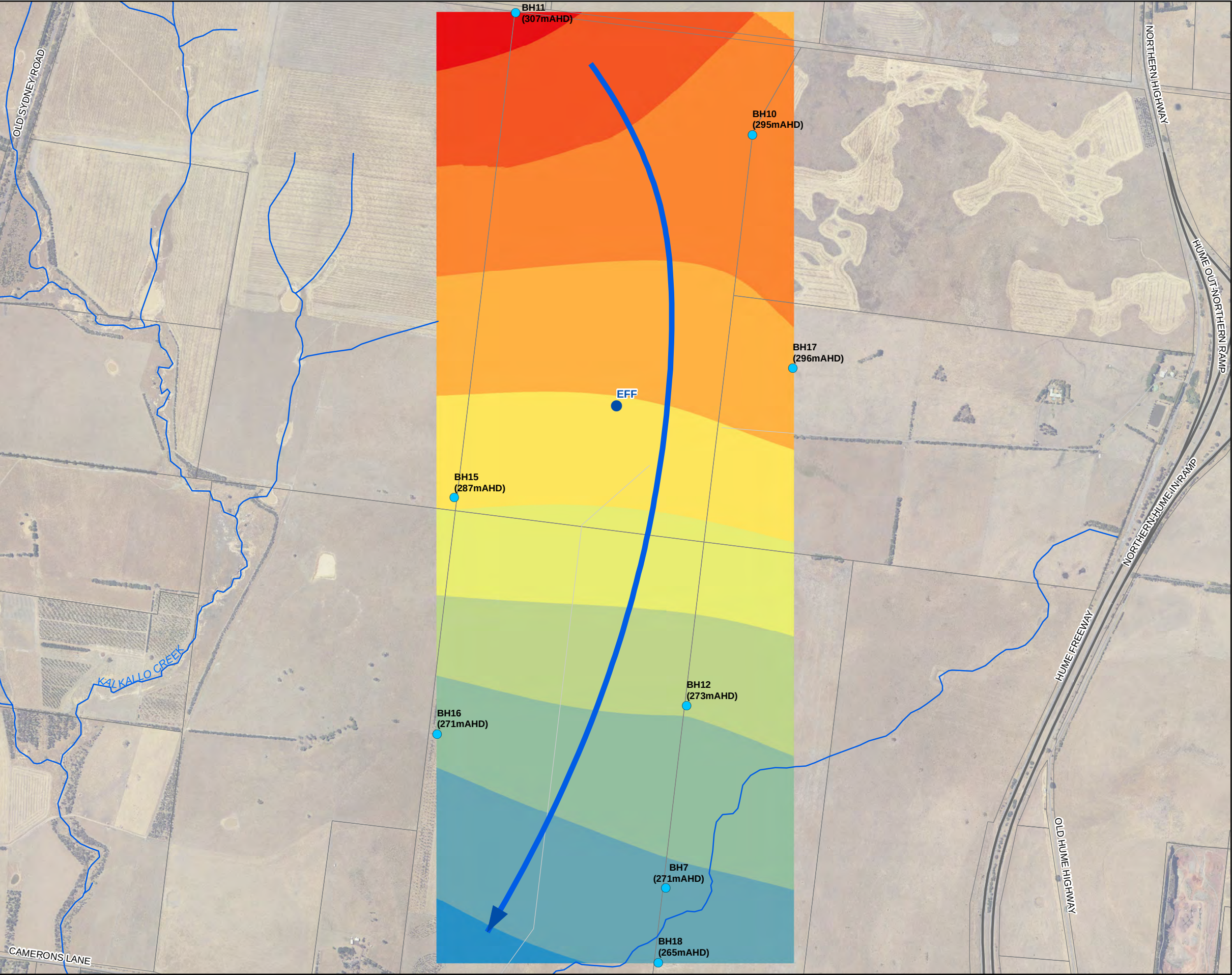


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[Figure 3 - Depth to Watertable : Lot 8 and 9 Camerons Road]



[Figure 4: Groundwater Contour Plan]



LEGEND

- Effluent Sample
- Groundwater Well
- ➔ GroundWaterDirection
- Watercourse
- ▭ Cadastre Parcel

Ground Water Height (mADH)

260 - 265
265 - 270
270 - 275
275 - 280
280 - 285
285 - 290
290 - 295
295 - 300
300 - 305
305 - 310

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[Figure 5 - Heavily Modified Creek]



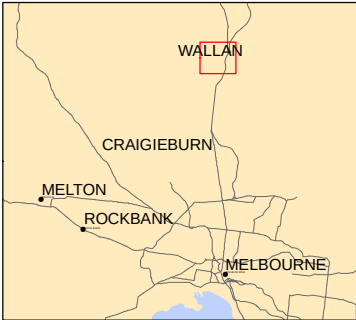
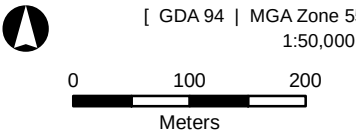
- LEGEND
- PSP Boundary
 - Storage Dam
 - Rail
 - Heavily Modified Creek

NOTES

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Tables

Data Table A : Comparison of groundwater results against criteria for the protection of human health

Data Table B : Comparison of groundwater results against criteria for the protection of ecosystems

Data Table C : Comparison of groundwater results against criteria for the primary use of groundwater

Data Table D : Comparison of groundwater results against criteria for industrial use, buildings and structures

TABLE A :

Comparison of groundwater results against criteria for the protection of human health

Well Code	BH10	BH11	BH12	BH14	BH15	BH16	BH17	BH18	BH2	BH5	BH7	EFF	EFF	EFF	WSBH
Field ID	BH10	BH11	BH12	BH14	BH15	BH16	BH17	BH18	BH2	BH5	BH7	1303-QA1	1303-QA2	EFF	WSBH
Sample Type	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Blind D	Split D	Primary	Primary
Sampled Date	11/03/2014	11/03/2014	12/03/2014	12/03/2014	13/03/2014	12/03/2014	13/03/2014	13/03/2014	11/03/2014	11/03/2014	12/03/2014	13/03/2014	13/03/2014	13/03/2014	13/03/2014
Monitoring Round	March '14	March '14	March '14	March '14	March '14	March '14	March '14	March '14	March '14	March '14	March '14	March '14	March '14	March '14	March '14
Lab Report Number	411557	411868	411868	411868	411868	411868	411868	411868	411557	411557	411868	411868	EM1402371	411868	411868
Sample Description	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	Effluent	Effluent	Effluent	GW

Chemical Name	Units	EQL	Australian Drinking Water Guidelines (ADWG, 2011) Human Health Criteria	Australian Drinking Water Guidelines (ADWG, 2011) Aesthetic Criteria	Recreational Water Quality (GMRRW, 2008)																		
Metals																							
Arsenic	µg/L		10		100	<1	5	3	<1	<1	<1	<1	<1	<1	<1	<1	3	3	3	<1			
Beryllium	µg/L		60		600	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1			
Boron	µg/L		4000		40000	<50	<50	<50	<50	<50	<50	90	50	<50	<50	70	190	70	<50				
Cadmium	µg/L		2		20	<0.2	<0.2	<0.2	<0.2	<0.2	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.1	<0.2	<0.2				
Calcium	µg/L	500				57,000	33,000	16,000	19,000	40,000	78,000	28,000	19,000	36,000	40,000	32,000	21,000	16000	18,000	79,000			
Chromium (III+VI)	µg/L					3	<1	<1	<1	<1	<1	3	<1	<1	<1	<1	<1	8	<1	<1			
Cobalt	µg/L					<1	11	<1	<1	<1	3	<1	<1	<1	<1	<1	1	4	1	1			
Copper	µg/L		2000	1000	20000	<1	<1	3	47	300	24	2	7	<1	13	1	2	9	2	12			
Lead	µg/L		10		10	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1	<1	2	<1	<1			
Magnesium	µg/L	500				170000	290000	230000	110000	140000	240000	82000	40000	160000	130000	130000	21000	17000	18000	170000			
Manganese	µg/L		500	100	5000	<5	240	38	<5	12	750	<5	6	<5	36	13	38	118	29	600			
Mercury	µg/L		1		10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			
Nickel	µg/L		20		200	<1	26	2	1	<1	1	<1	<1	<1	<1	1	5	8	5	3			
Potassium	µg/L	500				5300	10,000	16,000	3600	42,000	33,000	18,000	25,000	5000	10,000	22,000	39,000	21000	47,000	21,000			
Zinc	µg/L	1		3000		7	5	11	30	150	320	14	360	11	16	7	3	20	<1	98			
Inorganics																							
Ammonia as N	µg/L	10				<10	30	270	<10	<10	<10	<10	<10	<10	<10	<10	200	<10	<10	<10			
Cyanide Total	mg/L	0.004	0.08		0.8	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.004	0.023	<0.005	<0.005			
Fluoride	mg/L	0.1	1.5		15	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	0.8	0.7	<0.5			
Kjeldahl Nitrogen Total	mg/L	0.1				<0.2	<0.2	1.6	<0.2	2.7	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	3.2	3.1	<0.2			
Nitrate (as N)	mg/L	0.01	11.287		113	1.6	<0.02	7.3	1.9	5	<0.02	3.2	0.22	2.4	<0.02	2.8	5.5	6.82	5.8	0.08			
Nitrite (as N)	mg/L	0.01	0.912		9.2	<0.02	<0.02	0.22	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	3.8	1.39	3.6	<0.02			
Nitrogen (Total Oxidised)	mg/L	0.01				1.6	<0.05	7.6	1.9	5	<0.05	3.2	0.22	2.4	<0.05	2.8	9.3	8.21	9.4	0.08			
Nitrogen (Total)	µg/L	100				1600	<200	9200	1900	7700	<200	3200	220	2400	<200	2800	9300	11,400	13,000	<200			
Sodium	mg/L	0.5		180		270	720	580	330	400	460	180	250	290	360	280	180	157	180	340			
Sulphate as S	mg/L	5				<5	43	16	11	14	10	<5	<5	7.4	12	12	14	34	14	12			
TDS	mg/L	10		600		1600	3500	2200	1300	1700	2000	700	770	1600	1500	1200	700	1540	620	1800			

TABLE B :

Comparison of groundwater results against criteria for the protection of ecosystems

Well Code	BH10	BH11	BH12	BH14	BH15	BH16	BH17	BH18	BH2	BH5	BH7	EFF	EFF	EFF	WSBH
Field ID	BH10	BH11	BH12	BH14	BH15	BH16	BH17	BH18	BH2	BH5	BH7	1303-QA1	1303-QA2	EFF	WSBH
Sample Type	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Blind D	Split D	Primary	Primary
Sampled Date	11/03/2014	11/03/2014	12/03/2014	12/03/2014	13/03/2014	12/03/2014	13/03/2014	13/03/2014	11/03/2014	11/03/2014	12/03/2014	13/03/2014	13/03/2014	13/03/2014	13/03/2014
Monitoring Round	March '14	March '14	March '14	March '14	March '14	March '14	March '14	March '14	March '14	March '14	March '14	March '14	March '14	March '14	March '14
Lab Report Number	411557	411868	411868	411868	411868	411868	411868	411868	411557	411557	411868	411868	EM1402371	411868	411868
Sample Description	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	Effluent	Effluent	Effluent	GW

Chemical Name	Units	EQL	Freshwater ecosystems (80%) (ANZECC, 2000)														
Metals																	
Arsenic	µg/L			<1	5	3	<1	<1	<1	<1	<1	<1	<1	3	3	3	<1
Beryllium	µg/L			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Boron	µg/L		1300	<50	<50	<50	<50	<50	<50	90	50	<50	<50	70	190	70	<50
Cadmium	µg/L		0.8	<0.2	<0.2	<0.2	<0.2	<0.2	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.1	<0.2	<0.2
Calcium	µg/L	500		57,000	33,000	16,000	19,000	40,000	78,000	28,000	19,000	36,000	40,000	32,000	21,000	16,000	79,000
Chromium (III+VI)	µg/L			3	<1	<1	<1	<1	<1	3	<1	<1	<1	<1	8	<1	<1
Cobalt	µg/L			<1	11	<1	<1	<1	<1	<1	<1	<1	<1	1	4	1	1
Copper	µg/L		2.5	<1	<1	3	47	300	24	2	7	<1	13	1	2	9	12
Lead	µg/L		9.4	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0.002	<1	<1
Magnesium	µg/L	500		170000	290000	230000	110000	140000	240000	82000	40000	160000	130000	21000	17000	18000	170000
Manganese	µg/L		3600	<5	240	38	<5	12	750	<5	60	<5	36	13	38	118	600
Mercury	µg/L		5.4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	µg/L		17	<1	26	2	1	<1	1	<1	<1	<1	1	5	8	5	3
Potassium	µg/L	500		5300	10,000	16,000	3600	42,000	33,000	18,000	25,000	5000	10,000	22,000	39,000	21,000	21,000
Zinc	µg/L	1	31	7	5	11	30	150	320	14	360	11	16	7	3	20	98
Inorganics																	
Ammonia as N	µg/L	10		<10	30	270	<10	<10	<10	<10	<10	<10	<10	<10	200	<10	<10
Cyanide Total	mg/L	0.004	0.018	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.004	0.023	<0.005
Fluoride	mg/L	0.1		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	0.8	<0.5
Kjeldahl Nitrogen Total	mg/L	0.1		<0.2	<0.2	1.6	<0.2	2.7	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	3.2	3.1	<0.2
Nitrate (as N)	mg/L	0.01	17	1.6	<0.02	7.3	1.9	5	<0.02	3.2	0.22	2.4	<0.02	2.8	5.5	6.82	0.08
Nitrite (as N)	mg/L	0.01		<0.02	<0.02	0.22	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	3.8	1.39	<0.02
Nitrogen (Total Oxidised)	mg/L	0.01		1.6	<0.05	7.6	1.9	5	<0.05	3.2	0.22	2.4	<0.05	2.8	9.3	8.21	0.08
Nitrogen (Total)	µg/L	100		1600	<200	9200	1900	7700	<200	3200	220	2400	<200	2800	9300	11,400	<200
Sodium	mg/L	0.5		270	720	580	330	400	460	180	250	290	360	280	180	157	340
Sulphate as S	mg/L	5		<5	43	16	11	14	10	<5	<5	7.4	12	12	14	34	12
TDS	mg/L	10		1600	3500	2200	1300	1700	2000	700	770	1600	1500	1200	700	1540	1800

TABLE C :

Comparison of groundwater results against criteria for the primary use of groundwater

Well Code	BH10	BH11	BH12	BH14	BH15	BH16	BH17	BH18	BH2	BH5	BH7	EFF	EFF	EFF	WSBH
Field ID	BH10	BH11	BH12	BH14	BH15	BH16	BH17	BH18	BH2	BH5	BH7	1303-QA1	1303-QA2	EFF	WSBH
Sample Type	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Blind D	Split D	Primary	Primary
Sampled Date	11/03/2014	11/03/2014	12/03/2014	12/03/2014	13/03/2014	12/03/2014	13/03/2014	13/03/2014	11/03/2014	11/03/2014	12/03/2014	13/03/2014	13/03/2014	13/03/2014	13/03/2014
Monitoring Round	March '14	March '14	March '14	March '14	March '14	March '14	March '14	March '14	March '14	March '14	March '14	March '14	March '14	March '14	March '14
Lab Report Number	411557	411868	411868	411868	411868	411868	411868	411868	411557	411557	411868	411868	EM1402371	411868	411868
Sample Description	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	Effluent	Effluent	Effluent	GW

Chemical Name	Units	EQL	Irrigation Water Short-Term Trigger Values (ANZECC, 2000) - up to 20 years	Stock Watering (ANZECC, 2000)														
Metals																		
Arsenic	µg/L		2000	500	<1	5	3	<1	<1	<1	<1	<1	<1	<1	3	3	3	<1
Beryllium	µg/L		500		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Boron	µg/L			5000	<50	<50	<50	<50	<50	<50	90	50	<50	<50	70	190	70	<50
Cadmium	µg/L		50	10	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.1	<0.2	<0.2
Calcium	µg/L	500			57,000	33,000	16,000	19,000	40,000	78,000	28,000	19,000	36,000	40,000	32,000	21,000	16000	18,000
Chromium (III+VI)	µg/L		1000	1000	3	<1	<1	<1	<1	<1	3	<1	<1	<1	<1	8	<1	<1
Cobalt	µg/L		100	1000	<1	11	<1	<1	<1	3	<1	<1	<1	<1	1	4	1	1
Copper	µg/L		5000	400 ^{#1}	<1	<1	3	47	300	24	2	7	<1	13	1	2	9	12
Lead	µg/L		5000	100	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1	2	<1	<1
Magnesium	µg/L	500			170000	290000	230000	110000	140000	240000	82000	40000	160000	130000	130000	21000	17000	18000
Manganese	µg/L		10,000		<5	240	38	<5	12	750	<5	60	<5	36	13	38	118	29
Mercury	µg/L		2	2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	µg/L		2000	1000	<1	26	2	1	<1	1	<1	<1	<1	<1	1	5	8	5
Potassium	µg/L	500			5300	10,000	16,000	3600	42,000	33,000	18,000	25,000	5000	10,000	22,000	39,000	21000	47,000
Zinc	µg/L	1	5000	20000	7	5	11	30	150	320	14	360	11	16	7	3	20	<1
Inorganics																		
Ammonia as N	µg/L	10			<10	30	270	<10	<10	<10	<10	<10	<10	<10	<10	<10	200	<10
Cyanide Total	mg/L	0.004			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.004	0.023
Fluoride	mg/L	0.1	2	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	0.8	0.7
Kjeldahl Nitrogen Total	mg/L	0.1			<0.2	<0.2	1.6	<0.2	2.7	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	3.2	3.1
Nitrate (as N)	mg/L	0.01			1.6	<0.02	7.3	1.9	5	<0.02	3.2	0.22	2.4	<0.02	2.8	5.5	6.82	5.8
Nitrite (as N)	mg/L	0.01			<0.02	<0.02	0.22	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	3.8	1.39	3.6
Nitrogen (Total Oxidised)	mg/L	0.01			1.6	<0.05	7.6	1.9	5	<0.05	3.2	0.22	2.4	<0.05	2.8	9.3	8.21	9.4
Nitrogen (Total)	µg/L	100	25000		1600	<200	9200	1900	7700	<200	3200	220	2400	<200	2800	9300	11,400	13,000
Sodium	mg/L	0.5			270	720	580	330	400	460	180	250	290	360	280	180	157	180
Sulphate as S	mg/L	5			<5	43	16	11	14	10	<5	<5	7.4	12	12	14	34	14
TDS	mg/L	10		2000 ^{#2}	1600	3500	2200	1300	1700	2000	700	770	1600	1500	1200	700	1540	620

Comments
#1 Trigget value for sheep adopted
#2 Poultry

TABLE D :

Comparison of groundwater results against
criteria for Industrial use, buildings and structures

Well Code	BH10	BH11	BH12	BH14	BH15	BH16	BH17	BH18	BH2	BH5	BH7	EFF	EFF	EFF	WSBH
Field ID	BH10	BH11	BH12	BH14	BH15	BH16	BH17	BH18	BH2	BH5	BH7	1303-QA1	1303-QA2	EFF	WSBH
Sample Type	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Blind D	Split D	Primary	Primary
Sampled Date	11/03/2014	11/03/2014	12/03/2014	12/03/2014	13/03/2014	12/03/2014	13/03/2014	13/03/2014	11/03/2014	11/03/2014	12/03/2014	13/03/2014	13/03/2014	13/03/2014	13/03/2014
Monitoring Round	March '14	March '14	March '14	March '14	March '14	March '14	March '14	March '14	March '14	March '14	March '14	March '14	March '14	March '14	March '14
Lab Report Number	411557	411868	411868	411868	411868	411868	411868	411868	411557	411557	411868	411868	EM1402371	411868	411868
Sample Description	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	Effluent	Effluent	Effluent	GW

Chemical Name	Units	EQL	Industrial Use of Groundwater (ANZECC 1992)	Piling Design (AS2159-2009)														
Metals																		
Arsenic	µg/L				<1	5	3	<1	<1	<1	<1	<1	<1	<1	3	3	3	<1
Beryllium	µg/L				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Boron	µg/L				<50	<50	<50	<50	<50	<50	<50	90	50	<50	<50	70	190	<50
Cadmium	µg/L				<0.2	<0.2	<0.2	<0.2	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.1	<0.2	<0.2
Calcium	µg/L	500	420000		57,000	33,000	16,000	19,000	40,000	78,000	28,000	19,000	36,000	40,000	32,000	21,000	16,000	18,000
Chromium (III+VI)	µg/L	1			3	<1	<1	<1	<1	<1	3	<1	<1	<1	<1	8	<1	<1
Cobalt	µg/L	1			<1	11	<1	<1	<1	3	<1	<1	<1	<1	1	4	1	1
Copper	µg/L	1			<1	<1	3	47	300	24	2	7	<1	13	1	2	9	12
Lead	µg/L	1			<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1	2	<1	<1
Magnesium	µg/L	500			170000	290000	230000	110000	140000	240000	82000	40000	160000	130000	21000	17000	18000	170000
Manganese	µg/L				<5	240	38	<5	12	750	<5	60	<5	36	13	38	118	600
Mercury	µg/L				<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	µg/L				<1	26	2	1	<1	1	<1	<1	<1	<1	5	8	5	3
Potassium	µg/L	500			5300	10,000	16,000	3600	42,000	33,000	18,000	25,000	5000	10,000	22,000	39,000	21,000	21,000
Zinc	µg/L	1			7	5	11	30	150	320	14	360	11	16	7	3	20	98
Inorganics																		
Ammonia as N	µg/L	10			<10	30	270	<10	<10	<10	<10	<10	<10	<10	<10	200	<10	<10
Cyanide Total	mg/L	0.004			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.004	0.023	<0.005
Fluoride	mg/L	0.1			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	0.8	<0.5
Kjeldahl Nitrogen Total	mg/L	0.1			<0.2	<0.2	1.6	<0.2	2.7	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	3.2	<0.2
Nitrate (as N)	mg/L	0.01			1.6	<0.02	7.3	1.9	5	<0.02	3.2	0.22	2.4	<0.02	2.8	5.5	6.82	0.08
Nitrite (as N)	mg/L	0.01			<0.02	<0.02	0.22	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	3.8	1.39	<0.02
Nitrogen (Total Oxidised)	mg/L	0.01			1.6	<0.05	7.6	1.9	5	<0.05	3.2	0.22	2.4	<0.05	2.8	9.3	8.21	0.08
Nitrogen (Total)	µg/L	100			1600	<200	9200	1900	7700	<200	3200	220	2400	<200	2800	9300	11,400	<200
Sodium	mg/L	0.5			270	720	580	330	400	460	180	250	290	360	280	180	157	340
Sulphate as S	mg/L	5		1000	<5	43	16	11	14	10	<5	<5	7.4	12	12	14	34	12
TDS	mg/L	10	35000		1600	3500	2200	1300	1700	2000	700	770	1600	1500	1200	700	1540	1800

TABLE E :

QA QC

Field Duplicate and Split Samples

Sample ID	EFF	1303-QA1	Diff	Average	RPD ⁽¹⁾
Analyte / Laboratory	Eurofins	Eurofins			
Metals					
Arsenic	3	3	0	3	0
Beryllium	<1	<1	NA	NA	NA
Boron	70	70	0	70	0
Cadmium	<0.2	<0.2	NA	NA	NA
Calcium	18,000	21,000	3000	19500	15
Chromium (III+VI)	<1	<1	NA	NA	NA
Cobalt	1	1	0	1	0
Copper	2	2	0	2	0
Lead	<1	<1	NA	NA	NA
Magnesium	18000	21000	3000	19500	15
Manganese	29	38	9	33.5	27
Mercury	<0.1	<0.1	NA	NA	NA
Nickel	5	5	0	5	0
Potassium	47,000	39,000	8,000	43000	19
Zinc	<1	3	NA	NA	NA
Inorganics			NA	NA	NA
Ammonia as N	<10	<10	NA	NA	NA
Cyanide Total	0.023	<0.005	NA	NA	NA
Fluoride	0.7	0.6	0.1	0.65	15
Kjeldahl Nitrogen Total	3.1	<0.2	NA	NA	NA
Nitrate (as N)	5.8	5.5	0.3	5.65	5
Nitrite (as N)	3.6	3.8	0.2	3.7	5
Nitrogen (Total Oxidised)	9.4	9.3	0.1	9.35	1
Nitrogen (Total)	13,000	9300	3,700	11150	33
Sodium	180	180	0	180	0
Sulphate as S	14	14	0	14	0
TDS	620	700	80	660	12

EFF	1303-QA2	Diff	Average	RPD ⁽¹⁾
Eurofins	ALS			
3	3	0	3	0
<1	<1	NA	NA	NA
70	190	120	130	92
<0.2	<0.1	NA	NA	NA
18,000	16000	2,000	17000	12
<1	8	NA	NA	NA
1	4	3	2.5	120
2	9	7	5.5	127
<1	2	NA	NA	NA
18000	17000	1000	17500	6
29	118	89	73.5	121
<0.1	<0.1	NA	NA	NA
5	8	3	6.5	46
47,000	21000	26,000	34000	76
<1	20	NA	NA	NA
<10	200	NA	NA	NA
0.023	<0.004	NA	NA	NA
0.7	0.8	0.1	0.75	13
3.1	3.2	0.1	3.15	3
5.8	6.82	1.02	6.31	16
3.6	1.39	2.21	2.495	89
9.4	8.21	1.19	8.805	14
13,000	11,400	1,600	12200	13
180	157	23	168.5	14
14	34	20	24	83
620	1540	920	1080	85

(1) RPD - Relative Percentage Difference

Rinsate Blank Results

March 2014 Sampling Program				
Sample	Units	EQL	R1-1203	1103-R1
Medium			Water	Water
Date			12/04/2014	11/03/2014
Laboratory			Eurofins	Eurofins
Metals				
Arsenic	mg/L	0.001	< 0.001	< 0.001
Beryllium	mg/L	0.001	< 0.001	< 0.001
Boron	mg/L	0.05	< 0.05	< 0.05
Cadmium	mg/L	0.0002	< 0.0002	< 0.0002
Calcium	mg/L	0.5	< 0.5	< 0.5
Chromium (III+VI)	mg/L	0.001	< 0.001	< 0.001
Cobalt	mg/L	0.001	< 0.001	< 0.001
Copper	mg/L	0.001	< 0.001	< 0.001
Lead	mg/L	0.001	< 0.001	< 0.001
Magnesium	mg/L	0.5	< 0.5	< 0.5
Manganese	mg/L	0.005	< 0.005	< 0.005
Mercury	mg/L	0.001	< 0.001	< 0.001
Nickel	mg/L	0.001	< 0.001	< 0.001
Potassium	mg/L	0.5	< 0.5	< 0.5
Zinc	mg/L	0.001	< 0.001	< 0.001
Inorganics				
Ammonia as N	mg/L	0.01	< 0.01	< 0.01
Cyanide Total	mg/L	0.005	< 0.005	< 0.005
Fluoride	mg/L	0.5	< 0.5	< 0.5
Kjeldahl Nitrogen Total	mg/L	0.2	< 0.2	< 0.2
Nitrate (as N)	mg/L	0.02	< 0.02	< 0.02
Nitrite (as N)	mg/L	0.02	< 0.02	< 0.02
Nitrogen (Total)	µg/L	0.2	< 0.2	< 0.2
Sodium	mg/L	0.5	< 0.5	< 0.5
Sulphate as S	mg/L	5	< 5	< 5

Appendix A. Quality assurance/ quality control

A.1 Scope

This appendix describes the testing methods and quality assurance/quality control (QA/QC) procedures used for analysis of samples obtained during the field activities. This includes:

- Sampling procedures which followed good practice, including sample storage/transport and equipment decontamination procedures
- Well-established and approved analytical methods used by NATA-accredited laboratories
- An adequate number (in compliance with EPA Victoria sampling guidelines) of field blind duplicate samples analysed at the primary laboratory (Eurofins-MGT) for the primary contaminants of potential concern
- An adequate number (in compliance with EPA Victoria sampling guidelines) of field split duplicate samples analysed at the secondary laboratory (ALS) for the principal contaminants of potential concern
- An adequate number (in compliance with EPA Victoria sampling guidelines) of rinsate samples for the principal contaminants of potential concern
- Intra-laboratory QC protocols, including analysis of matrix spike/matrix spike duplicates, laboratory duplicate analysis and method (reagent) blanks
- Other QA/QC protocols in accordance with SKM procedures, based on accepted good practice and relevant guidelines or Australian Standards

The results of the QA/QC Program are detailed in the following sections.

A.2 Field QA/QC

Quality control sampling and analysis is regularly conducted as part of SKM's QA/QC program to validate the integrity of field procedures and assess the reliability of laboratory analyses. The following table outlines the quality control samples collected during the project field activities and the analyses conducted on these samples.

Table A.1 : Quality control samples

Sample type	Sample ID	Analysis conducted	Comments
Blind duplicate	1303-QA1	Total metals (16), nutrients, inorganics and TDS	1303-QA1 is a duplicate of EFF
Split duplicate	1303-QA2	Total metals (16), nutrients, inorganics and TDS	1303-QA2 is a duplicate of EFF
Rinsate blank	1103-R1	Total metals (16), nutrients, inorganics	Collected from rinsate off the sampling pump
Rinsate blank	R1-1203	Total metals (16), nutrients, inorganics	Collected from rinsate off the sampling pump

NOTES:

- Metals (16) - As, Be, B, Cd, Ca, Cr, Co, Cu, Mg, Mn, Ni, Pb, K, Na, Hg, Zn
- Nutrients – ammonia, nitrate, nitrite, total Kjeldahl nitrogen, total nitrogen
- Inorganics – sulphate, fluoride, total cyanide

A.2.1 Sample frequency

A set of soil blind/split duplicate samples were obtained at a frequency of 1 set per 13 primary samples.

The rinsate blank sample was obtained at the rate of one sample per day of field activities per item of dedicated equipment. While sampling was undertaken over three days, on 13 March disposable foot valves were used for undertaking the sampling.

A trip blank was not submitted for analysis as part of the assessment. A trip blank is a blank sample pre-prepared by the laboratory and sent with the sample containers. The trip blank is meant to remain with the samples until they are returned to the laboratory. It is analysed to assess whether concentrations of volatile compounds (if any) can be attributed to cross-contamination during transport and storage of the samples rather

than from site sources. Volatile organic contaminants are not considered primary contaminants of concern at the site and therefore a trip blank was not considered necessary.

A.2.2 Duplicate results

The relative precision of duplicate results was assessed by the magnitude of the Relative Percentage Difference (RPD), calculated as follows:

$$\text{RPD (\%)} = \frac{D_1 - D_2}{(D_1 + D_2) / 2} \times 100$$

Where:

D_1 =duplicate result 1

D_2 =duplicate result 2

An acceptable range for field RPDs is <30-50%. This variation can be expected to be higher for organic compounds than for inorganics, and for low concentrations of analytes. Discussions with laboratories indicate that if detected concentrations are less than five times the detection limit, higher RPDs (up to the theoretical maximum of 200%) are common and may be considered acceptable depending on specific circumstances.

The results of field duplicate analyses and RPD calculations are shown in Table E and can be summarised as follows.

Field blind duplicate (Eurofins-MGT / Eurofins-MGT)

The data quality objective of RPD<30-50% was not exceeded in any sample pairs

Field split duplicate (Eurofins-MGT / ALS)

The data quality objective of RPD<30-50% was exceeded on eight occasions (76 – 127%), for several heavy metals and nitrite, sulphate and TDS

The above exceedances of the data quality objective can likely be attributed to the differences that may exist in the sample preparation and laboratory analysis performed by the two laboratories.

Given both laboratories are NATA accredited, and the field blind duplicates showed satisfactory agreement, the results from the Eurofins-MGT (primary laboratory) laboratory analysis program are deemed to be acceptable.

A.2.3 Rinsate results

Following completion of groundwater sampling using the low flow technique on 11 and 13 March, a rinsate blank sample was taken from the sampling pump. The rinsate samples were collected to assess the potential for cross-contamination between groundwater sampling locations as a result of inadequate equipment decontamination procedures. The rinsate water used to collect the rinsate samples was laboratory provided deionised water. Rinsate results are presented in Table E.

Samples were noted collected on other sampling days, as dedicated / disposable well sampling equipment was used (foot valve or bailer).

Analysis of the rinsate blank sample indicated that no contaminant concentrations were reported above laboratory detection limits. Therefore, decontamination procedures adopted throughout the investigation are deemed adequate.

A.3 Sample holding times

Table A.2 below summarises the approved sample holding times for groundwater samples for particular contaminants of concern, as referenced by Table 1, Schedule B(3) of the NEPM (NEPC, 2013).

Table A.2 : Water analyte holding times

Analyte	Maximum holding time
Metals	6 months
Chromium (Cr VI or Hexavalent)	28 days
Cyanide	14 days
Nitrate	2 days
Nitrite	2 days
TDS	7 days
Ammonia	28 days

A review of the analytical reports indicates that all samples were extracted within the prescribed holding times.

A.4 Laboratory internal QA/QC

All samples were collected in the field by SKM personnel, placed into laboratory prepared sample containers and transferred to the laboratory using appropriate sample preservation procedures and chain-of-custody (CoC) documentation (presented in Appendix D). Samples were submitted to Eurofins-MGT of Oakleigh, Victoria. Split duplicate samples were forwarded to ALS. The analytical data as presented by Eurofins-MGT and ALS is presented in Appendix E. Eurofins-MGT and ALS's analytical methods are certified by the National Association of Testing Authorities (NATA). These methods are also documented in the original laboratory reports.

All analytical laboratories used by SKM are required to adhere to NATA-endorsed testing methodologies and conduct regular quality control checks on their analyses. SKM requires these laboratories to regularly provide results of control/method blanks, repeat duplicates and recoveries.

- Spiked sample recovery tests were performed in the assessment and validation programs by the primary laboratory for key indicators, with acceptable recoveries in the range 70 – 130%. All spiked sample recoveries were reported within this range.
- Internal laboratory duplicate analyses were undertaken for key indicators during the assessment, with consistent agreement between duplicate data pairs – the 30% data quality objective was not exceeded
- Reagent (method) blank analyses by the laboratory did not detect any contaminants, indicating no contamination from laboratory sources

A.5 Suitability of method detection limits

Eurofins-MGT and ALS's practical quantification limits/method detection limits were reviewed and compared with the adopted assessment criteria. All PQLs/MDLs were below the relevant criterion for all analytes.

A.6 Conclusions and statement of analytical reliability

It is considered that the QA/QC program was in accordance with recommended good practice (e.g. AS5667.1-1998 and EPA Victoria *Groundwater Sampling Guidelines*), with some minor non-compliances with data quality objectives noted above. Overall the program is adequate considering the scope and nature of the assessment program undertaken. The data are considered sufficiently reliable for the purpose for which they have been obtained and used.

Appendix B. Groundwater sampling sheets

WELL No:

BH5

SKM

Project No: VW07335

Project Name: Beveridge PSP - GW Sampling

Date: 11 /04/2014

Development

Performed By: _____ Well Diameter : 50mm

Development Method

Time Started	SWL (start)	Volume Removed
--------------	-------------	----------------

Time Stopped SWL (end) Discharge Rate

Comments

Bore Depth (start)

Bore Depth (end) _____

NAPL Present

(If yes, thickness)

Purging

Performed By: C.Bannister / W Rodger

Purge Method ~~MicroPurge~~ Kit Tap - (or) tap for 5 minutes.

Time Started	10:50	SWL (start)	✓	Volume Removed	300
--------------	-------	-------------	---	----------------	-----

Time Stopped SWL (end) Discharge Rate

Comments Bare connected to a nearby tea. Ra

tap to purge then sampled.

Bore Depth (start) Bore Depth (end)

NAPL Present

(If yes, thickness) ☒

Sampling

Performed By: C.Bannister / W Rodger

Sampling Method ~~Micropurge Kit~~ Top Sampling Depth

Time Started: 1:00 SWI (start): 1:00

Time Stopped: _____ SWL (end) _____

Tubing Type _____

Comments

Duplicate Sample Collected? Y / N

Duplicate Sample ID:

Field Analyses

[illegible]

Well Volume Calculations

Casing Diameter		25mm	50mm	100mm	125mm	150mm	200mm	250mm	300mm
Conversion Factor		0.98	1.96	7.85	31.4	49.1	70.7	125.7	196.3

TOTAL WELL DEPTH (-) WATER LEVEL (=) WATER COLUMN
_____ m (-) _____ (=) _____

WATER COLUMN (X) CONVERSION FACTOR (=) LITRES PER WELL VOLUME
 _____ (X) _____ (=) _____ L

Refer to Work Instructions WI113, WI114 and WI115

WELL DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

WELL No:

BH10

SKM

Project No: VW07335

Project Name: Beveridge PSP - GW Sampling

Date: 11/04/2014

Development

Performed By: Well Diameter: 50mm

Development Method

Time Started

SWL (start)

Volume Removed

Bore Depth (start)

Time Stopped

SWL (end)

Discharge Rate

Bore Depth (end)

Comments

NAPL Present

(If yes, thickness)

Purging

Performed By: C.Bannister / W Rodger

Purge Method Micropurge Kit

Time Started 15:15

SWL (start) 9.800 TOW

Volume Removed 5L

Bore Depth (start) 20.130 TOW

Time Stopped 15:31

SWL (end) 9.760

Discharge Rate 4 to 3 CPM

Bore Depth (end)

Comments

Reduced cycles from CPM 4 to 3 after 1 Litre. GW level stabilised

NAPL Present

(If yes, thickness)

Sampling

Performed By: C.Bannister / W Rodger

Sampling Method Micropurge Kit

Sampling Depth

Time Started 15:31

SWL (start) 9.700

Time Stopped 15:40

SWL (end) 9.760

Tubing Type twin

Comments

clear sample

Duplicate Sample Collected?

Y/N

Duplicate Sample ID:

Field Analyses

Time	Volume Removed (L)	EC (uS/cm)	pH	Temp (C)	Redox (mV)	Dissolved Oxygen (%) (mg/L)		Comments (colour, turbidity, odours, sheen, etc)
15:15	0.5	2.77ms	7.30	21.5	75	5.03ppm	9.700	4cpm Clear
15:18	1.0	2.73	7.22	19.1	69	4.39ppm	9.670	" "
15:20	2.0	2.70	7.19	18.3	67	4.20	9.750	3cpm "
15:23	3.0	2.68	7.15	18.3	67	3.94	9.730	" "
15:27	4.0	2.66	7.14	18.4	66	3.93	9.750	" "
15:31	5.0	2.66	7.15	18.3	66	4.07	9.760	" "
Sampled @ 5.0 litres. Clear.								

WELL DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

WELL No:

BH11

SKM

Project No: VW07335

Project Name: Beveridge PSP - GW Sampling

Date: 11 /04/2014

Development

Performed By: _____ Well Diameter: 50mm

Development Method _____

Time Started _____ SWL (start) _____ Volume Removed _____

Time Stopped _____ SWL (end) _____ Discharge Rate _____

Comments _____

Bore Depth (start) _____

Bore Depth (end) _____

NAPL Present _____

(If yes, thickness) _____

Purging

Performed By: C.Bannister / W Rodger

Purge Method Micropurge Kit

Time Started 13:45 SWL (start) 4.055 Volume Removed _____

Time Stopped _____ SWL (end) _____ Discharge Rate _____

Comments _____

Bore Depth (start) 18.850 bTow

Bore Depth (end) _____

NAPL Present _____

(If yes, thickness) _____

Sampling

Performed By: C.Bannister / W Rodger

Sampling Method Micropurge Kit

Sampling Depth 17mbTow

Time Started _____

SWL (start) 3.760 bTow

Time Stopped _____

SWL (end) _____

Tubing Type Twin

Comments V. Slightly milky, clearing quickly. Started CPM4, changed to CPM1.

Duplicate Sample Collected? Y N

Duplicate Sample ID: _____

Field Analyses

Time	Volume Removed (L)	EC (uS/cm)	pH	Temp (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (colour, turbidity, odours, sheen, etc)
13:58	0.5	6.29mS	7.21	19.5	161	1.92ppm		3.760 CPM4 slightly milky.
14:00	1.0	6.35	7.07	18.3	6	1.17		4.04 CPM3 clearing
14:04	1.5	6.35	7.04	18.8	-15	0.94		4.16 CPM1 clearing
14:09	2.0	6.35	7.05	19.9	-30	0.70		4.39 " "
14:16	2.5	6.35	7.08	20.8	-36	0.64		4.48 " "
No recharge - left to bail with disposable bailer to purge dry.								
Bailed:								
9:45	40L	5.87	7.19	15.9	104	4.10ppm		
9:47	45L	6.35	7.15	15.7	61	6.61ppm		
9:49	47L	6.13	7.13	15.6	46	8.04		
9:51	50L	6.26	7.16	15.6	33	8.76		
9:53	52L	6.35	7.19	15.6	26	4.46		
9:55	54L	6.09	7.18	15.6	22	3.72		
Sampled using bailer.								
Stabilisation Criteria								
		+/- 3%	+/- 0.05	+/- 10%	+/- 10%	+/- 10%		

Well Volume Calculations

Casing Diameter	25mm	50mm	100mm	125mm	150mm	200mm	250mm	300mm
Conversion Factor	0.98	1.96	7.85	31.4	49.1	70.7	125.7	196.3

TOTAL WELL DEPTH (-) WATER LEVEL (=) WATER COLUMN
_____ m (-) _____ (=) _____

WATER COLUMN (X) CONVERSION FACTOR (=) LITRES PER WELL VOLUME
_____ (X) _____ (=) _____ L

Refer to Work Instructions WI113, WI114 and WI115

WELL No:

BH12

SKM

Project No: VW07335

Project Name: Beveridge PSP - GW Sampling

Date: 12/04/2014

Development

Performed By: Well Diameter : 50mm

Development Method

Time Started	SWL (start)	Volume Removed
--------------	-------------	----------------

Time Stopped _____ SWL (end) _____ Discharge Rate _____

Comments _____

Bore Depth (start)

Bore Depth (end)

NAPL Present

(If yes, thickness)

Purging

Performed By: C.Bannister / W Rodger

Purge Method Micropurge Kit Barker

Time Started 15:47 SWL (start) 16.10 mToc Volume Removed

Time Stopped _____ SWL (end) _____ Discharge Rate _____

Comments: Better to sample only 1m of water

Bore Depth (start) 17.30 m bToc

Bore Depth (end)

NAPL Present

(If yes, thickness)

Sampling

Performed By: C.Bannister / W Rodger

Sampling Method Micropurge Kit Boiler Sampling Depth 100 cm

Time Started _____ SWL (start) _____

Time Stopped _____ SWL (end) _____

Tubing Type

Comments Sediment in well.

Duplicate Sample Collected? Y / N

Duplicate Sample ID: _____

Field Analyses

Time	Volume Removed (L)	EC ($\mu\text{S/cm}$)	pH	Temp ($^{\circ}\text{C}$)	Redox (mV)	Dissolved Oxygen		Comments (colour, turbidity, odours, sheen, etc)
						(%)	(mg/L)	
15:47	1L	3.89ms	8.15	17.3	160	2.52		Sediment, brown.
15:49	3L	3.88	8.01	16.6	141	8.60		"
	Purged Dry.							
Stabilisation Criteria		+/- 3%	+/- 0.05	+/- 10%	+/- 10%	+/- 10%		

Well Volume Calculations

Casing Diameter		25mm	50mm	100mm	125mm	150mm	200mm	250mm	300mm
Conversion Factor		0.98	1.96	7.85	31.4	49.1	70.7	125.7	196.3

TOTAL WELL DEPTH (-) WATER LEVEL (=) WATER COLUMN
m (-) (=)

WATER COLUMN (X) CONVERSION FACTOR (=) LITRES PER WELL VOLUME
(X) _____ (=) _____ L

WELL No:

BH14

SKM

Project No: VW07335

Project Name: Beveridge PSP - GW Sampling

Date: 12/04/2014

Development

Performed By: Well Diameter : 50mm

Development Method

Time Started	SWL (start)	Volume Removed
--------------	-------------	----------------

Time Stopped	SWL (end)	Discharge Rate
--------------	-----------	----------------

Comments

Bore Depth (start)

Bore Depth (end)

NAPL Present

(If yes, thickness)

Purging

Performed By: C.Bannister / W Rodger

Purge Method Micropurge Kit

Time Started	SWL (start)	Volume Removed
--------------	-------------	----------------

Time Stopped SWL (end) Discharge Rate

Comments

Bore Depth (start)

Bore Depth (end)

NAPL Present

(If yes, thickness)

Sampling

Performed By: C.Bannister / W Rodger

Sampling Method Micropurge Kit Sampled from windmill. Sampling Depth

Time Started _____ SWL (start) _____

Time Stopped SWL (end)

Tubing Type

Comments

Duplicate Sample Collected? Y / N Duplicate Sample ID:

Duplicate Sample ID:

Field Analyses

[illegible]

Well Volume Calculations

Casing Diameter		25mm	50mm	100mm	125mm	150mm	200mm	250mm	300mm
Conversion Factor		0.98	1.96	7.85	31.4	49.1	70.7	125.7	196.3

TOTAL WELL DEPTH (-) WATER LEVEL (=) WATER COLUMN

$$m(-) \quad (=)$$

WATER COLUMN (X) CONVERSION FACTOR (=) LITRES PER WELL VOLUME

(X) _____ (=) _____ L

Refer to Work Instructions WI113, WI114 and WI115

WELL DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

WELL No:

BHL6

SKM

Project No: VW07335

Project Name: Beveridge PSP - GW Sampling

Date: 16/04/2014

Development

Performed By: Well Diameter: 50mm

Development Method

Time Started SWL (start) Volume Removed

Time Stopped SWL (end) Discharge Rate

Comments

Bore Depth (start)

Bore Depth (end)

NAPL Present

(If yes, thickness)

Top of well.

Purging

Performed By: C.Bannister / W Rodger

Purge Method Micropurge Kit 1P BTOW

Time Started 13:34 SWL (start) 6.030 Volume Removed 8L

Time Stopped SWL (end) Discharge Rate CPM4

Comments

Bore Depth (start) 41.600 BTOW

Bore Depth (end)

NAPL Present

(If yes, thickness) No

Sampling

Performed By: C.Bannister / W Rodger

Sampling Method Micropurge Kit

Sampling Depth 25m BTOW

Time Started 13:30

SWL (start) 6.030

Time Stopped 13:35

SWL (end) 6.030

Tubing Type Twin

Comments Slight sediment in well.

Duplicate Sample Collected? Y / N

Duplicate Sample ID:

Field Analyses

Time	Volume Removed (L)	EC (uS/cm)	pH	Temp (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (colour, turbidity, odours, sheen, etc)
13:34	0.5	3.38ms	6.46	18.1	14	1.87		6.030 clear CPM4
13:16	1.0	3.41	6.46	16.7	9	1.16		6.030 clear "
13:18	2.0	3.41	6.38	16.6	6	0.85		6.030 "
13:20	3.0	3.40	6.37	16.7	6	0.91		6.030 "
13:22	4.0	3.40	6.35	16.5	6	0.97		6.030 "
13:24	5.0	3.39	6.35	16.4	7	1.05		6.030 "
13:26	6.0	3.38	6.40	16.5	8	1.14		6.030 "
13:28	7.0	3.38	6.41	16.5	9	1.27		6.030 "
13:30	8.0	3.41	6.41	16.5	9	1.34		6.030 "
Sampled @ 8.0 Litres								
Stabilisation Criteria								
		+/- 3%	+/- 0.05	+/- 10%	+/- 10%	+/- 10%		

Slight sediment
"
"
"
"
"
"
"
"
"

Well Volume Calculations

Casing Diameter	25mm	50mm	100mm	125mm	150mm	200mm	250mm	300mm
Conversion Factor	0.98	1.96	7.85	31.4	49.1	70.7	125.7	196.3

TOTAL WELL DEPTH (-) WATER LEVEL (=) WATER COLUMN
m (-) (=)

WATER COLUMN (X) CONVERSION FACTOR (=) LITRES PER WELL VOLUME
(X) (=) L

.Refer to Work Instructions WI113, WI114 and WI115

WELL No:

BA17

SKM

Project No: VW07335

Project Name: Beveridge PSP - GW Sampling

Date: 13 /04/2014

Development

Performed By: Well Diameter : 50mm

Development Method

Time Started _____ SWL (start) _____ Volume Removed _____

Time Stopped SWL (end) Discharge Rate

Comments

Bore Depth (start)

Bore Depth (end)

NAPL Present

(If yes, thickness)

Purging

Performed By: C.Bannister / W Rodger

Purge Method, Micropurge Kit Cost value

Time Started 12:41 SWL (start) 6.70 m Total Volume Removed

Time Stopped 12:58 SWL (end) Discharge Rate $\checkmark$

Comments Windmill. Not swinging.

Bore Depth (start) /

Bore Depth (end) /

NAPL Present

(If yes, thickness) N/A

Sampling

Performed By: C.Bannister / W Rodger

Sampling Method	Micropurge Kit	Foot value	Sampling Depth
-----------------	----------------	------------	----------------

Time Started 12:55 SWL (start

Time Stopped 13:00 SWL (end)

Tubing Type

Comments

Duplicate Sample Collected?

Y/N

Duplicate Sample ID:

Field Analyses

[illegible]

Well Volume Calculations

Casing Diameter		25mm	50mm	100mm	125mm	150mm	200mm	250mm	300mm
Conversion Factor		0.98	1.96	7.85	31.4	49.1	70.7	125.7	196.3

TOTAL WELL DEPTH (-) WATER LEVEL (=) WATER COLUMN

m (-) _____ (=) _____

WATER COLUMN (X) CONVERSION FACTOR (=) LITRES PER WELL VOLUME

WATER COLUMN (X) = CONCENTRATION () = _____ L

Appendix C. Lithology of registered bores



Bore Details: 79155

[Printable Version](#)

Lithology details for bore: 79155

Log Type	From (m)	To (m)	Description
Driller	0.00	14.63	WEATHERED BASALT

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Bore Details: 145710

[Printable Version](#)

Lithology details for bore: 145710

Log Type	From (m)	To (m)	Description
Driller	0.00	1.00	TOPSOIL & SUBSOIL
Driller	1.00	2.00	CLAY & LOOSE ROCKS
Driller	2.00	2.10	BROWN CLAY
Driller	2.10	2.70	GREY CLAY
Driller	2.70	2.90	LIGHT BROWN CLAY
Driller	2.90	4.30	HARD BLUESTONE
Driller	4.30	12.00	WEATHERED BASALT
Driller	12.00	13.70	VERY HARD BLUESTONE

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Bore Details: 145714

[Printable Version](#)

Lithology details for bore: 145714

Log Type	From (m)	To (m)	Description
Driller	0.00	1.00	TOP SOIL & RUBBLE
Driller	1.00	1.80	RED BROWN CLAY
Driller	1.80	16.70	VERY HARD BLUESTONE
Driller	16.70	17.30	FRACTURED BLUESTONE
Driller	17.30	20.60	HARD BLUESTONE

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Bore Details: 145715

[Printable Version](#)

Lithology details for bore: 145715

Log Type	From (m)	To (m)	Description
Driller	0.00	1.00	GREY TOPSOIL & CLAY
Driller	1.00	3.10	GREY CLAY
Driller	3.10	4.30	RED BROWN CLAY
Driller	4.30	7.40	LIGHT GREY CLAY
Driller	7.40	17.20	WEATHERED BASALT
Driller	17.20	18.20	YELLOW CLAY

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Bore Details: 145711

[Printable Version](#)

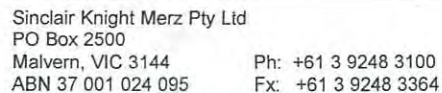
Lithology details for bore: 145711

Log Type	From (m)	To (m)	Description
Driller	0.00	0.50	TOPSOIL & BOULDERS
Driller	0.50	1.20	GREY CLAY
Driller	1.20	1.40	YELLOW CAY
Driller	1.40	9.00	VERY HARD BLUESTONE
Driller	9.00	13.00	WEATHERED BASALT
Driller	13.00	15.80	VERY HARD BLUESTONE

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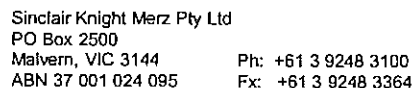
Appendix D. Chain of custody documentation



LAB: Eurofins
ADDRESS: 3-5 Kingston Town Close, Oakleigh
PHONE: 9564 7055
FAX: 9564 7190

[illegible]

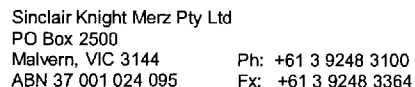
41155



LAB: Eurofins
ADDRESS: 3-5 Kingston Town Close, Oakleigh
PHONE: 9564 7055
FAX: 9564 7190

Page 1 of 1

[illegible]



LAB: ALS
ADDRESS:
PHONE:
FAX:

[illegible]

Appendix E. Laboratory certificates of analysis

Jacobs SKM
PO Box 312 Flinders Lane
Melbourne
VIC 8009

Certificate of Analysis



NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025.
The results of the tests, calibrations and/or
measurements included in this document are traceable
to Australian/national standards.

Attention: Corey Bannister

Report 411557-W
Client Reference BEVERIDGE PSP GW SAMPLING PROGRAM - MAR 14 VW07335
Received Date Mar 12, 2014

Client Sample ID			BH2 Water	BH5 Water	BH10 Water
Sample Matrix					
Eurofins mgt Sample No.			M14-Ma08465	M14-Ma08466	M14-Ma08467
Date Sampled			Mar 11, 2014	Mar 11, 2014	Mar 11, 2014
Test/Reference	LOR	Unit			
Ammonia (as N)	0.01	mg/L	< 0.01	< 0.01	< 0.01
Cyanide (total)	0.005	mg/L	< 0.005	< 0.005	< 0.005
Fluoride	0.5	mg/L	< 0.5	< 0.5	< 0.5
Nitrate (as N)	0.02	mg/L	2.4	< 0.02	1.6
Nitrite (as N)	0.02	mg/L	< 0.02	< 0.02	< 0.02
Sulphate (as S)	5	mg/L	7.4	12	< 5
Total Dissolved Solids	10	mg/L	1600	1500	1600
Total Nitrogen Set (as N)					
Nitrate & Nitrite (as N)	0.05	mg/L	2.4	< 0.05	1.6
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	< 0.2	< 0.2	< 0.2
Total Nitrogen (as N)	0.2	mg/L	2.4	< 0.2	1.6
Heavy Metals					
Arsenic (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001
Beryllium (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001
Boron (filtered)	0.05	mg/L	0.05	< 0.05	< 0.05
Cadmium (filtered)	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002
Chromium (filtered)	0.001	mg/L	< 0.001	< 0.001	0.003
Cobalt (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001
Copper (filtered)	0.001	mg/L	< 0.001	0.013	< 0.001
Lead (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001
Manganese (filtered)	0.005	mg/L	< 0.005	0.036	< 0.005
Mercury (filtered)	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001
Nickel (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001
Zinc (filtered)	0.001	mg/L	0.011	0.016	0.007
Alkali Metals					
Calcium	0.5	mg/L	36	40	57
Magnesium	0.5	mg/L	160	130	170
Potassium	0.5	mg/L	5.0	10	5.3
Sodium	0.5	mg/L	290	360	270

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Ammonia (as N) - Method: APHA 4500-NH3 Ammonia Nitrogen by FIA	Melbourne	Mar 13, 2014	28 Day
Cyanide (total) - Method: USEPA 9010 Cyanide	Melbourne	Mar 12, 2014	14 Day
Fluoride - Method: LM-LTM-INO-4300 (Fluoride by Ion Chromatography)	Melbourne	Mar 12, 2014	28 Day
Nitrate (as N) - Method: APHA 4500-NO3 Nitrate Nitrogen by FIA	Melbourne	Mar 13, 2014	2 Day
Nitrite (as N) - Method: APHA 4500-NO2 Nitrite Nitrogen by FIA	Melbourne	Mar 13, 2014	2 Day
Sulphate (as S) - Method: In house MGT1110A (SO4 by Discrete Analyser)	Melbourne	Mar 12, 2014	28 Day
Total Dissolved Solids - Method: APHA 2540C Total Dissolved Solids	Melbourne	Mar 17, 2014	7 Day
Total Nitrogen Set (as N) Nitrate & Nitrite (as N) - Method: APHA 4500-NO3/NO2 Nitrate-Nitrite Nitrogen by FIA	Melbourne	Mar 13, 2014	28 Day
Total Kjeldahl Nitrogen (as N) - Method: APHA 4500 TKN	Melbourne	Mar 13, 2014	7 Day
Heavy Metals (filtered) - Method: USEPA 6020 Heavy Metals	Melbourne	Mar 12, 2014	180 Day
Mobil Metals : Metals M15 - Method: USEPA 6010/6020 Heavy Metals & USEPA 7470/71 Mercury	Melbourne	Mar 12, 2014	28 Day
Alkali Metals - Method: USEPA 6010 Alkali Metals	Melbourne	Mar 12, 2014	180 Day

Eurofins | mgt Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. Actual PQLs are matrix dependant. Quoted PQLs may be raised where sample extracts are diluted due to interferences.
4. Results are uncorrected for matrix spikes or surrogate recoveries.
5. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
6. Samples were analysed on an 'as received' basis. 7. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Acknowledgment.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

****NOTE:** pH duplicates are reported as a range NOT as RPD

UNITS

mg/kg: milligrams per Kilogram

ug/l: micrograms per litre

ppb: Parts per billion

org/100ml: Organisms per 100 millilitres

MPN/100mL: Most Probable Number of organisms per 100 millilitres

mg/l: milligrams per litre

ppm: Parts per million

%: Percentage

NTU: Units

TERMS

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery
CRM	Certified Reference Material - reported as percent recovery
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands. In the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
Batch Duplicate	A second piece of analysis from a sample outside of the clients batch of samples but run within the laboratory batch of analysis.
Batch SPIKE	Spike recovery reported on a sample from outside of the clients batch of samples but run within the laboratory batch of analysis.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
ASLP	Australian Standard Leaching Procedure (AS4439.3)
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within
TEQ	Toxic Equivalency Quotient

QC - ACCEPTANCE CRITERIA

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries : Recoveries must lie between 50-150% - Phenols 20-130%.

QC DATA GENERAL COMMENTS

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxophene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxophene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Arochlor 1260 in Matrix Spikes and LCS's.
9. For Matrix Spikes and LCS results a dash " - " in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPD's are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Ammonia (as N)	mg/L	< 0.01			0.01	Pass	
Cyanide (total)	mg/L	< 0.005			0.005	Pass	
Fluoride	mg/L	< 0.5			0.5	Pass	
Nitrate (as N)	mg/L	< 0.02			0.02	Pass	
Nitrite (as N)	mg/L	< 0.02			0.02	Pass	
Sulphate (as S)	mg/L	< 5			5	Pass	
Total Dissolved Solids	mg/L	< 10			10	Pass	
Method Blank							
Total Nitrogen Set (as N)							
Nitrate & Nitrite (as N)	mg/L	< 0.05			0.05	Pass	
Total Kjeldahl Nitrogen (as N)	mg/L	< 0.2			0.2	Pass	
Method Blank							
Heavy Metals							
Arsenic (filtered)	mg/L	< 0.001			0.001	Pass	
Beryllium (filtered)	mg/L	< 0.001			0.001	Pass	
Boron (filtered)	mg/L	< 0.05			0.05	Pass	
Cadmium (filtered)	mg/L	< 0.0002			0.0002	Pass	
Chromium (filtered)	mg/L	< 0.001			0.001	Pass	
Cobalt (filtered)	mg/L	< 0.001			0.001	Pass	
Copper (filtered)	mg/L	< 0.001			0.001	Pass	
Lead (filtered)	mg/L	< 0.001			0.001	Pass	
Manganese (filtered)	mg/L	< 0.005			0.005	Pass	
Mercury (filtered)	mg/L	< 0.0001			0.0001	Pass	
Nickel (filtered)	mg/L	< 0.001			0.001	Pass	
Zinc (filtered)	mg/L	< 0.001			0.001	Pass	
Method Blank							
Alkali Metals							
Calcium	mg/L	< 0.5			0.5	Pass	
Magnesium	mg/L	< 0.5			0.5	Pass	
Sodium	mg/L	< 0.5			0.5	Pass	
LCS - % Recovery							
Ammonia (as N)	%	99			70-130	Pass	
Cyanide (total)	%	109			70-130	Pass	
Fluoride	%	99			70-130	Pass	
Nitrate (as N)	%	102			70-130	Pass	
Nitrite (as N)	%	92			70-130	Pass	
Sulphate (as S)	%	109			70-130	Pass	
LCS - % Recovery							
Total Nitrogen Set (as N)							
Nitrate & Nitrite (as N)	%	102			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	%	92			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic (filtered)	%	87			80-120	Pass	
Boron (filtered)	%	91			80-120	Pass	
Cadmium (filtered)	%	88			80-120	Pass	
Chromium (filtered)	%	88			80-120	Pass	
Cobalt (filtered)	%	86			80-120	Pass	
Copper (filtered)	%	87			80-120	Pass	
Lead (filtered)	%	87			80-120	Pass	
Manganese (filtered)	%	88			80-120	Pass	

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Mercury (filtered)			%	80			70-130	Pass	
Nickel (filtered)			%	86			80-120	Pass	
Zinc (filtered)			%	89			80-120	Pass	
LCS - % Recovery									
Alkali Metals									
Calcium			%	89			70-130	Pass	
Magnesium			%	88			70-130	Pass	
Potassium			%	80			70-130	Pass	
Sodium			%	83			70-130	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
				Result 1					
Ammonia (as N)	M14-Ma08323	NCP	%	99			70-130	Pass	
Cyanide (total)	M14-Ma05350	NCP	%	104			70-130	Pass	
Fluoride	M14-Ma08094	NCP	%	101			70-130	Pass	
Nitrate (as N)	M14-Ma08323	NCP	%	104			70-130	Pass	
Nitrite (as N)	M14-Ma08323	NCP	%	86			70-130	Pass	
Sulphate (as S)	M14-Ma08436	NCP	%	90			70-130	Pass	
Spike - % Recovery									
Total Nitrogen Set (as N)				Result 1					
Nitrate & Nitrite (as N)	M14-Ma08323	NCP	%	104			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	M14-Ma10615	NCP	%	87			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic (filtered)	M14-Ma08600	NCP	%	85			70-130	Pass	
Beryllium (filtered)	M14-Ma08600	NCP	%	81			75-125	Pass	
Boron (filtered)	M14-Ma08600	NCP	%	78			75-125	Pass	
Cadmium (filtered)	M14-Ma08600	NCP	%	76			70-130	Pass	
Chromium (filtered)	M14-Ma08600	NCP	%	83			70-130	Pass	
Cobalt (filtered)	M14-Ma08600	NCP	%	80			75-125	Pass	
Copper (filtered)	M14-Ma08600	NCP	%	77			70-130	Pass	
Lead (filtered)	M14-Ma08600	NCP	%	80			70-130	Pass	
Manganese (filtered)	M14-Ma08600	NCP	%	81			70-130	Pass	
Mercury (filtered)	M14-Ma09544	NCP	%	92			70-130	Pass	
Nickel (filtered)	M14-Ma08600	NCP	%	77			70-130	Pass	
Zinc (filtered)	M14-Ma08600	NCP	%	79			70-130	Pass	
Spike - % Recovery									
Alkali Metals				Result 1					
Calcium	M14-Ma08462	NCP	%	92			70-130	Pass	
Magnesium	M14-Ma08462	NCP	%	100			70-130	Pass	
Potassium	M14-Ma08462	NCP	%	82			70-130	Pass	
Sodium	M14-Ma08462	NCP	%	98			70-130	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
				Result 1	Result 2	RPD			
Ammonia (as N)	M14-Ma08323	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Cyanide (total)	M14-Ma07187	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Fluoride	M14-Ma08094	NCP	mg/L	0.63	0.61	3.0	30%	Pass	
Nitrate (as N)	M14-Ma08323	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Nitrite (as N)	M14-Ma08323	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Sulphate (as S)	M14-Ma08754	NCP	mg/L	180	180	<1	30%	Pass	

Duplicate								
Total Nitrogen Set (as N)				Result 1	Result 2	RPD		
Nitrate & Nitrite (as N)	M14-Ma08323	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass
Total Kjeldahl Nitrogen (as N)	M14-Ma10615	NCP	mg/L	< 0.2	< 0.2	<1	30%	Pass
Duplicate								
Heavy Metals				Result 1	Result 2	RPD		
Arsenic (filtered)	M14-Ma08600	NCP	mg/L	0.0017	0.0016	1.6	30%	Pass
Beryllium (filtered)	M14-Ma08600	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Boron (filtered)	M14-Ma08600	NCP	mg/L	0.35	0.34	2.5	30%	Pass
Cadmium (filtered)	M14-Ma08600	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass
Chromium (filtered)	M14-Ma08600	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Cobalt (filtered)	M14-Ma08600	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Copper (filtered)	M14-Ma08600	NCP	mg/L	0.013	0.013	3.5	30%	Pass
Lead (filtered)	M14-Ma08600	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Manganese (filtered)	M14-Ma08600	NCP	mg/L	0.031	0.030	4.7	30%	Pass
Mercury (filtered)	M14-Ma09544	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass
Nickel (filtered)	M14-Ma08600	NCP	mg/L	0.0065	0.0064	2.6	30%	Pass
Zinc (filtered)	M14-Ma08600	NCP	mg/L	0.095	0.095	<1	30%	Pass
Duplicate								
Alkali Metals				Result 1	Result 2	RPD		
Calcium	M14-Ma09226	NCP	mg/L	5.4	5.7	5.0	30%	Pass
Magnesium	M14-Ma09226	NCP	mg/L	46	47	2.0	30%	Pass
Potassium	M14-Ma08462	NCP	mg/L	25	28	14	30%	Pass
Sodium	M14-Ma09226	NCP	mg/L	190	190	2.0	30%	Pass
Duplicate								
				Result 1	Result 2	RPD		
Total Dissolved Solids	M14-Ma08467	CP	mg/L	1600	1600	3.0	30%	Pass



Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Organic samples had Teflon liners	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Authorised By

Adrian Tabacchiera	Client Services
Emily Rosenberg	Senior Analyst-Metal (VIC)
Huong Le	Senior Analyst-Inorganic (VIC)

Glenn Jackson
Laboratory Manager



- Indicates Not Requested
* Indicates NATA accreditation does not cover the performance of this service

Uncertainty data is available on request
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Jacobs SKM
PO Box 312 Flinders Lane
Melbourne
VIC 8009

Certificate of Analysis



NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025.
The results of the tests, calibrations and/or
measurements included in this document are traceable
to Australian/national standards.

Attention: Corey Bannister

Report 411868-W
Client Reference BEVERIDGE PSP GW SAMPLING PROGRAM MAR 14 VW07335
Received Date Mar 14, 2014

Client Sample ID			EFF Water	WSBH Water	BH15 Water	BH18 Water
Sample Matrix			M14-Ma10861	M14-Ma10862	M14-Ma10863	M14-Ma10864
Eurofins mgt Sample No.			Mar 13, 2014	Mar 13, 2014	Mar 13, 2014	Mar 13, 2014
Date Sampled						
Test/Reference	LOR	Unit				
Ammonia (as N)	0.01	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
Cyanide (total)	0.005	mg/L	0.023	< 0.005	< 0.005	< 0.005
Fluoride	0.5	mg/L	0.7	< 0.5	< 0.5	< 0.5
Nitrate (as N)	0.02	mg/L	5.8	0.08	5.0	0.22
Nitrite (as N)	0.02	mg/L	3.6	< 0.02	< 0.02	< 0.02
Sulphate (as S)	5	mg/L	14	12	14	< 5
Total Dissolved Solids	10	mg/L	620	1800	1700	770
Total Nitrogen Set (as N)						
Nitrate & Nitrite (as N)	0.05	mg/L	9.4	0.08	5.0	0.22
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	3.1	< 0.2	2.7	< 0.2
Total Nitrogen (as N)	0.2	mg/L	13	< 0.2	7.7	0.22
Heavy Metals						
Arsenic (filtered)	0.001	mg/L	0.003	< 0.001	< 0.001	< 0.001
Beryllium (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Boron (filtered)	0.05	mg/L	0.07	< 0.05	< 0.05	0.09
Cadmium (filtered)	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Chromium (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Cobalt (filtered)	0.001	mg/L	0.001	0.001	< 0.001	< 0.001
Copper (filtered)	0.001	mg/L	0.002	0.012	0.30	0.007
Lead (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Manganese (filtered)	0.005	mg/L	0.029	0.60	0.012	0.060
Mercury (filtered)	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Nickel (filtered)	0.001	mg/L	0.005	0.003	< 0.001	< 0.001
Zinc (filtered)	0.001	mg/L	< 0.001	0.098	0.15	0.36
Alkali Metals						
Calcium	0.5	mg/L	18	79	40	19
Magnesium	0.5	mg/L	18	170	140	40
Potassium	0.5	mg/L	47	21	42	25
Sodium	0.5	mg/L	180	340	400	250

Client Sample ID Sample Matrix Eurofins mgt Sample No. Date Sampled Test/Reference	LOR	Unit	BH7 Water M14-Ma10865 Mar 12, 2014	BH17 Water M14-Ma10866 Mar 13, 2014	BH12 Water M14-Ma10867 Mar 12, 2014	BH14 Water M14-Ma10868 Mar 12, 2014
Ammonia (as N)	0.01	mg/L	< 0.01	< 0.01	0.27	< 0.01
Cyanide (total)	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Fluoride	0.5	mg/L	< 0.5	< 0.5	< 0.5	< 0.5
Nitrate (as N)	0.02	mg/L	2.8	3.2	7.3	1.9
Nitrite (as N)	0.02	mg/L	< 0.02	< 0.02	0.22	< 0.02
Sulphate (as S)	5	mg/L	12	< 5	16	11
Total Dissolved Solids	10	mg/L	1200	700	2200	1300
Total Nitrogen Set (as N)						
Nitrate & Nitrite (as N)	0.05	mg/L	2.8	3.2	7.6	1.9
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	< 0.2	< 0.2	1.6	< 0.2
Total Nitrogen (as N)	0.2	mg/L	2.8	3.2	9.2	1.9
Heavy Metals						
Arsenic (filtered)	0.001	mg/L	< 0.001	< 0.001	0.003	< 0.001
Beryllium (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Boron (filtered)	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Cadmium (filtered)	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Chromium (filtered)	0.001	mg/L	< 0.001	0.003	< 0.001	< 0.001
Cobalt (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Copper (filtered)	0.001	mg/L	0.001	0.002	0.003	0.047
Lead (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	0.001
Manganese (filtered)	0.005	mg/L	0.013	< 0.005	0.038	< 0.005
Mercury (filtered)	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Nickel (filtered)	0.001	mg/L	0.001	< 0.001	0.002	0.001
Zinc (filtered)	0.001	mg/L	0.007	0.014	0.011	0.030
Alkali Metals						
Calcium	0.5	mg/L	32	28	16	19
Magnesium	0.5	mg/L	130	82	230	110
Potassium	0.5	mg/L	22	18	16	3.6
Sodium	0.5	mg/L	280	180	580	330

Client Sample ID Sample Matrix Eurofins mgt Sample No. Date Sampled Test/Reference	LOR	Unit	BH16 Water M14-Ma10869 Mar 12, 2014	BH11 Water M14-Ma10870 Mar 11, 2014	1303-QA1 Water M14-Ma10871 Mar 13, 2014	R1-1203 Water M14-Ma10872 Mar 12, 2014
Ammonia (as N)	0.01	mg/L	< 0.01	0.03	< 0.01	< 0.01
Cyanide (total)	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Fluoride	0.5	mg/L	< 0.5	< 0.5	0.6	< 0.5
Nitrate (as N)	0.02	mg/L	< 0.02	< 0.02	5.5	< 0.02
Nitrite (as N)	0.02	mg/L	< 0.02	< 0.02	3.8	< 0.02
Sulphate (as S)	5	mg/L	10	43	14	< 5
Total Dissolved Solids	10	mg/L	2000	3500	700	-
Total Nitrogen Set (as N)						
Nitrate & Nitrite (as N)	0.05	mg/L	< 0.05	< 0.05	9.3	< 0.05
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	< 0.2	< 0.2	< 0.2	< 0.2
Total Nitrogen (as N)	0.2	mg/L	< 0.2	< 0.2	9.3	< 0.2

Client Sample ID Sample Matrix Eurofins mgt Sample No. Date Sampled Test/Reference	LOR	Unit	BH16 Water M14-Ma10869 Mar 12, 2014	BH11 Water M14-Ma10870 Mar 11, 2014	1303-QA1 Water M14-Ma10871 Mar 13, 2014	R1-1203 Water M14-Ma10872 Mar 12, 2014
Heavy Metals						
Arsenic	0.001	mg/L	-	-	-	< 0.001
Arsenic (filtered)	0.001	mg/L	< 0.001	0.005	0.003	-
Beryllium	0.001	mg/L	-	-	-	< 0.001
Beryllium (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	-
Boron	0.05	mg/L	-	-	-	< 0.05
Boron (filtered)	0.05	mg/L	< 0.05	< 0.05	0.07	-
Cadmium	0.0002	mg/L	-	-	-	< 0.0002
Cadmium (filtered)	0.0002	mg/L	0.0002	< 0.0002	< 0.0002	-
Chromium	0.001	mg/L	-	-	-	< 0.001
Chromium (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	-
Cobalt	0.001	mg/L	-	-	-	< 0.001
Cobalt (filtered)	0.001	mg/L	0.003	0.011	0.001	-
Copper	0.001	mg/L	-	-	-	< 0.001
Copper (filtered)	0.001	mg/L	0.024	< 0.001	0.002	-
Lead	0.001	mg/L	-	-	-	< 0.001
Lead (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	-
Manganese	0.005	mg/L	-	-	-	< 0.005
Manganese (filtered)	0.005	mg/L	0.75	0.24	0.038	-
Mercury	0.0001	mg/L	-	-	-	< 0.0001
Mercury (filtered)	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	-
Nickel	0.001	mg/L	-	-	-	< 0.001
Nickel (filtered)	0.001	mg/L	0.001	0.026	0.005	-
Zinc	0.001	mg/L	-	-	-	< 0.001
Zinc (filtered)	0.001	mg/L	0.32	0.005	0.003	-
Alkali Metals						
Calcium	0.5	mg/L	78	33	21	< 0.5
Magnesium	0.5	mg/L	240	290	21	< 0.5
Potassium	0.5	mg/L	33	10	39	< 0.5
Sodium	0.5	mg/L	460	720	180	< 0.5

Client Sample ID Sample Matrix Eurofins mgt Sample No. Date Sampled Test/Reference	LOR	Unit	1103-R1 Water M14-Ma10873 Mar 11, 2014
Ammonia (as N)	0.01	mg/L	< 0.01
Cyanide (total)	0.005	mg/L	< 0.005
Fluoride	0.5	mg/L	< 0.5
Nitrate (as N)	0.02	mg/L	< 0.02
Nitrite (as N)	0.02	mg/L	< 0.02
Sulphate (as S)	5	mg/L	< 5
Total Nitrogen Set (as N)			
Nitrate & Nitrite (as N)	0.05	mg/L	< 0.05
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	< 0.2
Total Nitrogen (as N)	0.2	mg/L	< 0.2

Client Sample ID			1103-R1
Sample Matrix			Water
Eurofins mgt Sample No.			M14-Ma10873
Date Sampled			Mar 11, 2014
Test/Reference	LOR	Unit	
Heavy Metals			
Arsenic	0.001	mg/L	< 0.001
Beryllium	0.001	mg/L	< 0.001
Boron	0.05	mg/L	< 0.05
Cadmium	0.0002	mg/L	< 0.0002
Chromium	0.001	mg/L	< 0.001
Cobalt	0.001	mg/L	< 0.001
Copper	0.001	mg/L	< 0.001
Lead	0.001	mg/L	< 0.001
Manganese	0.005	mg/L	< 0.005
Mercury	0.0001	mg/L	< 0.0001
Nickel	0.001	mg/L	< 0.001
Zinc	0.001	mg/L	< 0.001
Alkali Metals			
Calcium	0.5	mg/L	< 0.5
Magnesium	0.5	mg/L	< 0.5
Potassium	0.5	mg/L	< 0.5
Sodium	0.5	mg/L	< 0.5

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.

A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Ammonia (as N) - Method: APHA 4500-NH3 Ammonia Nitrogen by FIA	Melbourne	Mar 14, 2014	28 Day
Cyanide (total) - Method: USEPA 9010 Cyanide	Melbourne	Mar 14, 2014	14 Day
Fluoride - Method: LM-LTM-INO-4300 (Fluoride by Ion Chromatography)	Melbourne	Mar 18, 2014	28 Day
Nitrate (as N) - Method: APHA 4500-NO3 Nitrate Nitrogen by FIA	Melbourne	Mar 14, 2014	2 Day
Nitrite (as N) - Method: APHA 4500-NO2 Nitrite Nitrogen by FIA	Melbourne	Mar 14, 2014	2 Day
Sulphate (as S) - Method: In house MGT1110A (SO4 by Discrete Analyser)	Melbourne	Mar 14, 2014	28 Day
Total Dissolved Solids - Method: APHA 2540C Total Dissolved Solids	Melbourne	Mar 20, 2014	7 Day
Total Nitrogen Set (as N) Nitrate & Nitrite (as N) - Method: APHA 4500-NO3/NO2 Nitrate-Nitrite Nitrogen by FIA	Melbourne	Mar 14, 2014	28 Day
Total Kjeldahl Nitrogen (as N) - Method: APHA 4500 TKN	Melbourne	Mar 14, 2014	7 Day
Heavy Metals - Method: USEPA 6010/6020 Heavy Metals	Melbourne	Mar 14, 2014	180 Day
Heavy Metals (filtered) - Method: USEPA 6020 Heavy Metals	Melbourne	Mar 14, 2014	180 Day
Mobil Metals : Metals M15 - Method: USEPA 6010/6020 Heavy Metals & USEPA 7470/71 Mercury	Melbourne	Mar 14, 2014	28 Day
Alkali Metals - Method: USEPA 6010 Alkali Metals	Melbourne	Mar 14, 2014	180 Day

Eurofins | mgt Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. Actual PQLs are matrix dependant. Quoted PQLs may be raised where sample extracts are diluted due to interferences.
4. Results are uncorrected for matrix spikes or surrogate recoveries.
5. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
6. Samples were analysed on an 'as received' basis. 7. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Acknowledgment.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

****NOTE:** pH duplicates are reported as a range NOT as RPD

UNITS

mg/kg: milligrams per Kilogram

ug/l: micrograms per litre

ppb: Parts per billion

org/100ml: Organisms per 100 millilitres

MPN/100mL: Most Probable Number of organisms per 100 millilitres

mg/l: milligrams per litre

ppm: Parts per million

%: Percentage

NTU: Units

TERMS

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery
CRM	Certified Reference Material - reported as percent recovery
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands. In the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
Batch Duplicate	A second piece of analysis from a sample outside of the clients batch of samples but run within the laboratory batch of analysis.
Batch SPIKE	Spike recovery reported on a sample from outside of the clients batch of samples but run within the laboratory batch of analysis.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
ASLP	Australian Standard Leaching Procedure (AS4439.3)
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within
TEQ	Toxic Equivalency Quotient

QC - ACCEPTANCE CRITERIA

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries : Recoveries must lie between 50-150% - Phenols 20-130%.

QC DATA GENERAL COMMENTS

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxophene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxophene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Arochlor 1260 in Matrix Spikes and LCS's.
9. For Matrix Spikes and LCS results a dash " - " in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPD's are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Ammonia (as N)	mg/L	< 0.01			0.01	Pass	
Fluoride	mg/L	< 0.5			0.5	Pass	
Nitrate (as N)	mg/L	< 0.02			0.02	Pass	
Nitrite (as N)	mg/L	< 0.02			0.02	Pass	
Sulphate (as S)	mg/L	< 5			5	Pass	
Total Dissolved Solids	mg/L	< 10			10	Pass	
Method Blank							
Total Nitrogen Set (as N)							
Nitrate & Nitrite (as N)	mg/L	< 0.05			0.05	Pass	
Total Kjeldahl Nitrogen (as N)	mg/L	< 0.2			0.2	Pass	
Method Blank							
Heavy Metals							
Arsenic	mg/L	< 0.001			0.001	Pass	
Arsenic (filtered)	mg/L	< 0.001			0.001	Pass	
Beryllium	mg/L	< 0.001			0.001	Pass	
Beryllium (filtered)	mg/L	< 0.001			0.001	Pass	
Boron	mg/L	< 0.05			0.05	Pass	
Boron (filtered)	mg/L	< 0.05			0.05	Pass	
Cadmium	mg/L	< 0.0002			0.0002	Pass	
Cadmium (filtered)	mg/L	< 0.0002			0.0002	Pass	
Chromium	mg/L	< 0.001			0.001	Pass	
Chromium (filtered)	mg/L	< 0.001			0.001	Pass	
Cobalt	mg/L	< 0.001			0.001	Pass	
Cobalt (filtered)	mg/L	< 0.001			0.001	Pass	
Copper	mg/L	< 0.001			0.001	Pass	
Copper (filtered)	mg/L	< 0.001			0.001	Pass	
Lead	mg/L	< 0.001			0.001	Pass	
Lead (filtered)	mg/L	< 0.001			0.001	Pass	
Manganese	mg/L	< 0.005			0.005	Pass	
Manganese (filtered)	mg/L	< 0.005			0.005	Pass	
Mercury	mg/L	< 0.0001			0.0001	Pass	
Mercury (filtered)	mg/L	< 0.0001			0.0001	Pass	
Nickel	mg/L	< 0.001			0.001	Pass	
Nickel (filtered)	mg/L	< 0.001			0.001	Pass	
Zinc	mg/L	< 0.001			0.001	Pass	
Zinc (filtered)	mg/L	< 0.001			0.001	Pass	
Method Blank							
Alkali Metals							
Calcium	mg/L	< 0.5			0.5	Pass	
Magnesium	mg/L	< 0.5			0.5	Pass	
Potassium	mg/L	< 0.5			0.5	Pass	
LCS - % Recovery							
Ammonia (as N)	%	90			70-130	Pass	
Fluoride	%	91			70-130	Pass	
Nitrate (as N)	%	107			70-130	Pass	
Nitrite (as N)	%	96			70-130	Pass	
Sulphate (as S)	%	108			70-130	Pass	
LCS - % Recovery							
Total Nitrogen Set (as N)							
Nitrate & Nitrite (as N)	%	107			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	%	98			70-130	Pass	

Test				Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
LCS - % Recovery										
Heavy Metals										
Arsenic				%	93			80-120	Pass	
Arsenic (filtered)				%	94			80-120	Pass	
Beryllium				%	90			80-120	Pass	
Boron				%	85			80-120	Pass	
Boron (filtered)				%	98			80-120	Pass	
Cadmium				%	90			80-120	Pass	
Cadmium (filtered)				%	93			80-120	Pass	
Chromium				%	89			80-120	Pass	
Chromium (filtered)				%	92			80-120	Pass	
Cobalt				%	89			80-120	Pass	
Cobalt (filtered)				%	93			80-120	Pass	
Copper				%	88			80-120	Pass	
Copper (filtered)				%	93			80-120	Pass	
Lead				%	90			80-120	Pass	
Lead (filtered)				%	91			80-120	Pass	
Manganese				%	89			80-120	Pass	
Manganese (filtered)				%	91			80-120	Pass	
Mercury				%	80			75-125	Pass	
Mercury (filtered)				%	80			70-130	Pass	
Nickel				%	89			80-120	Pass	
Nickel (filtered)				%	91			80-120	Pass	
Zinc				%	92			80-120	Pass	
Zinc (filtered)				%	94			80-120	Pass	
LCS - % Recovery										
Alkali Metals										
Calcium				%	80			70-130	Pass	
Magnesium				%	81			70-130	Pass	
Potassium				%	98			70-130	Pass	
Sodium				%	81			70-130	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1				Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery										
				Result 1						
Ammonia (as N)	M14-Ma09777	NCP	%	82				70-130	Pass	
Nitrate (as N)	M14-Ma09777	NCP	%	104				70-130	Pass	
Nitrite (as N)	M14-Ma09777	NCP	%	95				70-130	Pass	
Spike - % Recovery										
Total Nitrogen Set (as N)				Result 1						
Nitrate & Nitrite (as N)	M14-Ma09777	NCP	%	104				70-130	Pass	
Total Kjeldahl Nitrogen (as N)	M14-Ma10233	NCP	%	95				70-130	Pass	
Spike - % Recovery										
Heavy Metals				Result 1						
Arsenic (filtered)	M14-Ma11361	NCP	%	92				70-130	Pass	
Beryllium (filtered)	M14-Ma11361	NCP	%	78				75-125	Pass	
Boron (filtered)	M14-Ma11361	NCP	%	79				75-125	Pass	
Cadmium (filtered)	M14-Ma11361	NCP	%	82				70-130	Pass	
Chromium (filtered)	M14-Ma11361	NCP	%	89				70-130	Pass	
Cobalt (filtered)	M14-Ma11361	NCP	%	86				75-125	Pass	
Copper (filtered)	M14-Ma11361	NCP	%	85				70-130	Pass	
Lead (filtered)	M14-Ma11361	NCP	%	86				70-130	Pass	
Manganese (filtered)	M14-Ma11361	NCP	%	84				70-130	Pass	
Nickel (filtered)	M14-Ma11361	NCP	%	81				70-130	Pass	
Zinc (filtered)	M14-Ma11361	NCP	%	77				70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Alkali Metals				Result 1					
Calcium	M14-Ma10190	NCP	%	116			70-130	Pass	
Magnesium	M14-Ma10190	NCP	%	118			70-130	Pass	
Potassium	M14-Ma09241	NCP	%	108			70-130	Pass	
Sodium	M14-Ma10233	NCP	%	89			70-130	Pass	
Spike - % Recovery									
				Result 1					
Cyanide (total)	M14-Ma10867	CP	%	75			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Mercury (filtered)	M14-Ma10868	CP	%	84			70-130	Pass	
Spike - % Recovery									
				Result 1					
Fluoride	M14-Ma10871	CP	%	97			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	M14-Ma10322	NCP	%	81			75-125	Pass	
Beryllium	M14-Ma10322	NCP	%	77			75-125	Pass	
Boron	M14-Ma09244	NCP	%	91			75-125	Pass	
Cadmium	M14-Ma10322	NCP	%	75			75-125	Pass	
Chromium	M14-Ma10322	NCP	%	81			75-125	Pass	
Cobalt	M14-Ma10322	NCP	%	77			75-125	Pass	
Copper	M14-Ma09244	NCP	%	92			75-125	Pass	
Lead	M14-Ma10322	NCP	%	82			75-125	Pass	
Manganese	M14-Ma10322	NCP	%	83			75-125	Pass	
Mercury	M14-Ma11981	NCP	%	78			70-130	Pass	
Nickel	M14-Ma09244	NCP	%	84			75-125	Pass	
Zinc	M14-Ma09244	NCP	%	87			75-125	Pass	
Spike - % Recovery									
				Result 1					
Sulphate (as S)	M14-Ma10873	CP	%	106			70-130	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
				Result 1	Result 2	RPD			
Ammonia (as N)	M14-Ma09777	NCP	mg/L	0.030	0.030	7.0	30%	Pass	
Nitrate (as N)	M14-Ma09777	NCP	mg/L	0.070	0.060	15	30%	Pass	
Nitrite (as N)	M14-Ma09777	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Duplicate									
Total Nitrogen Set (as N)				Result 1	Result 2	RPD			
Nitrate & Nitrite (as N)	M14-Ma09777	NCP	mg/L	0.070	0.060	15	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic (filtered)	M14-Ma09544	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Beryllium (filtered)	M14-Ma09544	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Boron (filtered)	M14-Ma09544	NCP	mg/L	0.17	0.17	1.3	30%	Pass	
Cadmium (filtered)	M14-Ma09544	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium (filtered)	M14-Ma09544	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Cobalt (filtered)	M14-Ma09544	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Copper (filtered)	M14-Ma09544	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Lead (filtered)	M14-Ma09544	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Manganese (filtered)	M14-Ma09544	NCP	mg/L	0.31	0.31	2.3	30%	Pass	
Nickel (filtered)	M14-Ma09544	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Zinc (filtered)	M14-Ma09544	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	

Duplicate								
				Result 1	Result 2	RPD		
Total Dissolved Solids	M14-Ma10862	CP	mg/L	1800	1900	5.0	30%	Pass
Duplicate								
				Result 1	Result 2	RPD		
Cyanide (total)	M14-Ma10867	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass
Duplicate								
Heavy Metals				Result 1	Result 2	RPD		
Mercury (filtered)	M14-Ma10868	CP	mg/L	< 0.0001	0.0002	200	30%	Fail
Duplicate								
				Result 1	Result 2	RPD		
Total Dissolved Solids	M14-Ma10870	CP	mg/L	3500	3700	5.0	30%	Pass
Duplicate								
Alkali Metals				Result 1	Result 2	RPD		
Calcium	M14-Ma10870	CP	mg/L	33	35	5.0	30%	Pass
Magnesium	M14-Ma10870	CP	mg/L	290	300	3.0	30%	Pass
Potassium	M14-Ma10870	CP	mg/L	10	11	4.0	30%	Pass
Sodium	M14-Ma10870	CP	mg/L	720	720	1.0	30%	Pass
Duplicate								
				Result 1	Result 2	RPD		
Fluoride	M14-Ma10871	CP	mg/L	0.6	0.6	2.0	30%	Pass
Duplicate								
Heavy Metals				Result 1	Result 2	RPD		
Arsenic	M14-Ma10322	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Beryllium	M14-Ma10322	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Boron	M14-Ma10322	NCP	mg/L	0.18	0.17	3.4	30%	Pass
Cadmium	M14-Ma10322	NCP	mg/L	< 0.0002	< 0.0005	<1	30%	Pass
Chromium	M14-Ma10322	NCP	mg/L	0.013	0.013	3.6	30%	Pass
Cobalt	M14-Ma10322	NCP	mg/L	0.014	0.013	6.1	30%	Pass
Copper	M14-Ma10322	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Lead	M14-Ma10322	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Manganese	M14-Ma10322	NCP	mg/L	0.027	0.027	<1	30%	Pass
Mercury	M14-Ma11665	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass
Nickel	M14-Ma10322	NCP	mg/L	0.064	0.064	<1	30%	Pass
Zinc	M14-Ma10322	NCP	mg/L	0.033	0.032	1.0	30%	Pass
Duplicate								
				Result 1	Result 2	RPD		
Sulphate (as S)	M14-Ma10873	CP	mg/L	< 5	< 5	<1	30%	Pass
Duplicate								
Total Nitrogen Set (as N)				Result 1	Result 2	RPD		
Total Kjeldahl Nitrogen (as N)	M14-Ma10873	CP	mg/L	< 0.2	< 0.2	<1	30%	Pass



Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Organic samples had Teflon liners	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
Q15	The RPD reported passes Eurofins mgt's Acceptance Criteria as stipulated in SOP 05. Refer to Glossary Page of this report for further details

Authorised By

Adrian Tabacchiera	Client Services
Emily Rosenberg	Senior Analyst-Metal (VIC)
Huong Le	Senior Analyst-Inorganic (VIC)

Glenn Jackson
Laboratory Manager



- Indicates Not Requested
 - * Indicates NATA accreditation does not cover the performance of this service
- Uncertainty data is available on request

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CERTIFICATE OF ANALYSIS

Work Order	: EM1402371	Page	: 1 of 4
Client	: SINCLAIR KNIGHT MERZ	Laboratory	: Environmental Division Melbourne
Contact	: MR COREY BANNISTER	Contact	: Carol Walsh
Address	: P O BOX 312 FLINDERS LANE MELBOURNE VIC AUSTRALIA 8009	Address	: 4 Westall Rd Springvale VIC Australia 3171
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Facsimile	: +61 03 9248 3364	Facsimile	: +61-3-8549 9601
Project	: VW07335 Beveridge PSP GW Sampling Program - Mar 14	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 17-MAR-2014
Sampler	: CB	Issue Date	: 21-MAR-2014
Site	: ----		
Quote number	: EN/003/13	No. of samples received	: 1
		No. of samples analysed	: 1

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results



NATA Accredited Laboratory 825

Accredited for compliance with
ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics
Herman Lin	Laboratory Manager	Melbourne Inorganics



General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

- **EK026SF : EM1402322-001 matrix spike failed for total cyanide due to possible sample interference. This has been confirmed by re-analysis.**
- **TDS by method EA-015 may bias high due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.**

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	1303-QA2	----	----	----	----
Client sampling date / time				13-MAR-2014 15:00	----	----	----	----	
Compound	CAS Number	LOR	Unit	EM1402371-001	----	----	----	----	
EA015: Total Dissolved Solids									
Total Dissolved Solids @180°C	----	10	mg/L	1540	----	----	----	----	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	34	----	----	----	----	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	16	----	----	----	----	
Magnesium	7439-95-4	1	mg/L	17	----	----	----	----	
Sodium	7440-23-5	1	mg/L	157	----	----	----	----	
Potassium	7440-09-7	1	mg/L	21	----	----	----	----	
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L	0.003	----	----	----	----	
Beryllium	7440-41-7	0.001	mg/L	<0.001	----	----	----	----	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	----	----	----	----	
Chromium	7440-47-3	0.001	mg/L	0.008	----	----	----	----	
Copper	7440-50-8	0.001	mg/L	0.009	----	----	----	----	
Cobalt	7440-48-4	0.001	mg/L	0.004	----	----	----	----	
Nickel	7440-02-0	0.001	mg/L	0.008	----	----	----	----	
Lead	7439-92-1	0.001	mg/L	0.002	----	----	----	----	
Zinc	7440-66-6	0.005	mg/L	0.020	----	----	----	----	
Manganese	7439-96-5	0.001	mg/L	0.118	----	----	----	----	
Boron	7440-42-8	0.05	mg/L	0.19	----	----	----	----	
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	----	----	----	----	
EK026SF: Total CN by Segmented Flow Analyser									
Total Cyanide	57-12-5	0.004	mg/L	<0.004	----	----	----	----	
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	0.8	----	----	----	----	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.20	----	----	----	----	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	----	0.01	mg/L	1.39	----	----	----	----	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	6.82	----	----	----	----	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	1303-QA2	----	----	----	----
				Client sampling date / time	13-MAR-2014 15:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EM1402371-001	----	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser - Continued									
Nitrite + Nitrate as N	----	0.01	mg/L	8.21	----	----	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	3.2	----	----	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L	11.4	----	----	----	----	----