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**GROUNDWATER
MONITORING**

**SCONE WASTE
FACILITY
NOBLET ROAD
SCONE NSW**



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ABBREVIATIONS

The following is a list of common abbreviations used in the Contamination Sector within environmental reports.

B(a)P	Benzo(a)Pyrene
BGL	Below Ground Level
BTEX	Benzene, Toluene, Ethyl Benzene, Xylene
CLM	Contaminated Land Management
CSM	Conceptual Site Model
DA	Development Application
DP	Deposited Plan
DQI	Data Quality Indicator
DQO	Data Quality Objective
EIL	Ecological Investigation Level
EPA	Environment Protection Authority (NSW)
EPL	Environmental Protection License
ESL	Ecological Screening Level
LOR	Limit of Reporting
LOT	Allotment
MW	Monitoring Well
NATA	National Association of Testing Authorities
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
NSW	New South Wales
OCP	Organochlorine Pesticides
OEH	Office of Environmental and Heritage
OPP	Organophosphorus Pesticides
PAH	Polycyclic Aromatic Hydrocarbons
PCOC	Potential Contaminant of Concern
PCB	Polychlorinated Biphenyls
QA/QC	Quality Assurance and Quality Control
SAC	Site Acceptance Criteria
SEPP	State Environmental Planning Policy
SWL	Standing Water Level
TCLP	Toxicity Characteristic Leaching Procedure
TRH	Total Recoverable Hydrocarbons
UHSC	Upper Hunter Shire Council
VOC	Volatile Organic Compounds
WHS	Work Health Safety



TABLE OF CONTENTS

1.0 INTRODUCTION.....	1
General.....	1
Briefing.....	1
2.0 SITE CRITERIA AND SAMPLING FREQUENCY.....	2
3.0 SAMPLING METHODOLOGY	4
Groundwater Sampling.....	4
4.0 RESULTS.....	5
5.0 DISCUSSION	156
MWA.....	15
MWB.....	15
MWC.....	16
MWD	16
MWE.....	178
Site and Maintenance	18
6.0 CONCLUSIONS.....	19
REFERENCES	20

FIGURES

Figure 1 Site layout with sample locations

ATTACHMENTS

Attachment 1 Data log
Attachment 2 NATA Accredited Laboratory Results
Attachment 3 Groundwater Field Data Sheets
Attachment 4 YSI water quality meter calibration certificate

1.0 INTRODUCTION

General

Under the requirements of the NSW EPA Environmental Protection Licence (EPL) 5863, Upper Hunter Shire Council (UHSC) is required to conduct quarterly and annual groundwater monitoring of the Scone Waste Facility located on Noblet Road, Scone, NSW, 2337.

The Annual Groundwater Monitoring Report provides a snapshot and trending of analytes of the groundwater conditions at the Site in relation to the current Site Criteria and satisfies the groundwater monitoring requirements of the EPL.

The Scone Waste Facility is an active landfill, it has the potential to be a polluting activity or to adversely impact the groundwater within the immediate vicinity and down hydraulic gradient of the site if there was a leak within the landfill.

Engage Environmental Services (Engage) was commissioned by UHSC to undertake this quarterly round of groundwater monitoring at the site. The quarterly groundwater monitoring was carried out on 14th December 2021.

This report has been prepared utilising information supplied by the client, publicly accessible information, information obtained as part of the onsite fieldwork and analysis, information from Government bodies and from experience, knowledge, and current industry practice.

Briefing

The briefing provided by Upper Hunter Shire Council and contained within EPL 5863 indicates that quarterly groundwater monitoring is required at five locations on the site, monitoring wells A to E (MWA-MWE). As well as a dam located onsite. Monitoring Well D is located within the landfill and the monitoring well accesses the perched water table (leachate) within the landfill. Comparisons against established criteria and historical data allow for trending of data. Trending of data can highlight seasonal variations, increases in analyte concentrations, decreases in analyte concentrations and fluctuations within the dataset. Over a time period the dataset can reveal increasing/decreasing trends highlighting potential site issues.

Refer to **Figure 1: Site Layout with Sample Locations**

2.0 SITE CRITERIA AND SAMPLING FREQUENCY

The groundwater analytical suite and sampling frequency were provided by UHSC and the EPL. Each of the wells have the same sampling regime and analytical suite for sample analysis. The site criterion is sourced from the Australian and New Zealand guidelines for fresh and marine water quality (ANZW 2018) 95% trigger values and National Environment Protection (Assessment of Site Contamination) Measure (NEPM) 2013, unless otherwise stated.

Table 1: Analytes, Site Criteria and Sampling Frequency for Groundwater Monitoring Wells - Quarterly.

	Analytes/Pollutant	Units	Site Criteria NEPM	
			2013 and ANZW 2018 Fresh Water 95%	Sampling Frequency
IONS	Calcium	mg/L	NA	Quarterly
	Alkalinity (total)	mg/L	NA	Quarterly
	Chloride	mg/L	NA	Quarterly
	Fluoride	mg/L	NA	Quarterly
	Potassium¹	mg/L	410	Quarterly
	Magnesium	mg/L	NA	Quarterly
	Sulphate	mg/L	NA	Quarterly
HEAVY METALS	Iron	mg/L	0.3	Quarterly
	Manganese	mg/L	1.9	Quarterly
	Arsenic III & V	mg/L	0.024 (III), 0.013 (V)	Yearly
	Aluminium	mg/L	0.055 (pH > 6.5)	Yearly
	Barium	mg/L	NA	Yearly
	Cadmium	mg/L	0.0002	Yearly
	Cobalt	mg/L	0.001	Yearly
	Copper	mg/L	0.0014	Yearly
	Chromium VI	mg/L	0.001	Yearly
	Chromium III	mg/L	27	Yearly
	Lead	mg/L	0.0034	Yearly
	Mercury	mg/L	0.0006	Yearly
	Zinc	mg/L	0.008	Yearly
PHENOL	Total phenolics	mg/L	0.32	Quarterly
OCP	Organochlorine Pesticide³ (OCP)	mg/L	0.00001	Quarterly
OPP	OPPs	mg/L	0.006	Yearly

PCB	PCBs	mg/L	0.00001	Yearly
Hydrocarbons	TRH	mg/L	0.26	Yearly
	Benzene	mg/L	0.95	Yearly
	Toluene	mg/L	0.18	Yearly
	Ethylbenzene	mg/L	0.3	Yearly
	Xylene (o+p)	mg/l	0.35	Yearly
	PAHs	mg/L	0.016	Yearly
CVCs/ VOCCs	- Total	mg/L	NA	Yearly
	Tetrachlorethene (TCE)	mg/L	NA	Yearly
	1,1,2-Trichloroethane	mg/L	6.5	Yearly
	Tetrachloroethene (PCE)	mg/L	0.05	Yearly
	1, 1-Dichloroethene	mg/L	0.03	Yearly
	Vinyl Chloride	mg/L	0.0003	Yearly
MISC. INORGA NICS	pH	pH	6.5 – 8	Quarterly
	Sodium	mg/L	NA	Quarterly
	Ammonia²	mg/L	0.9	Quarterly
	Nitrate	mg/L	50	Quarterly
	Total organic carbon	mg/L	4	Quarterly
	Electrical conductivity	µS/cm	NA	Quarterly
	Total dissolved solids	mg/L	NA	Yearly
	Biochemical Oxygen Phosphate	mg/L	NA 0.015	Yearly Yearly

1 - World Health Organisation Guidelines for Drinking-water Quality 2009, Poor (acceptable) drinking water criteria.

2 - Criteria value may not protect key species from chronic toxicity, refer to ANZW 2018 for further guidance.

3 - A Trigger value for DDT is used in the absence of a criteria value for Total OCP. DDT has the lowest criteria of OCPs.

3.0 SAMPLING METHODOLOGY

Groundwater Sampling

The five well locations were identified on the site. The site map was cross-referenced to the markings on the monitoring wells to ensure the correct wells were being sampled. Purging and sampling of monitoring wells was conducted in accordance with the NEPM (NEPC, 2013) and the *Guidelines for the Assessment and Management of Groundwater Contamination* (NSW DECC, 2007).

Purging is the process of removing stagnant water from a well, immediately prior to sampling, causing its replacement by groundwater from the adjacent formation that is representative of actual aquifer conditions. In order to determine when a well has been adequately purged, the physical parameters (pH \pm 0.1 unit, electrical conductivity \pm 5%, temperature \pm 0.20, reduction-oxidation (redox) \pm 10%; and dissolved oxygen \pm 10%.) are monitored while the groundwater is removed during purging.

The physical parameters were measured at regular intervals using a YSI Quatro Pro Plus Water Quality Meter. Stable conditions were indicated by monitoring for three consecutive readings of the physical parameters.

Collection of samples were direct into laboratory issued sampling containers for specific analytes. Samples were obtained using a disposable bailer. Care was taken so the bailer did not contact the sample container. All samples were collected and filled into the correct sample containers, a meniscus was formed on each sampling container prior to sealing to reduce or eliminate head space. The samples were placed immediately into a chilled esky to prevent the loss of potential volatile components.

Decontamination procedures between sampling events and sampling locations was undertaken. Sampling equipment was cleaned before and after sampling to prevent cross contamination. The cleaning procedure included:

- New nitrile disposable gloves for each well;
- Washing and wipe down with phosphate free laboratory grade detergent;
- Rinsing of brush before using brush on equipment;
- Using a brush on equipment if necessary;
- Rinsing with deionised water and wipe down with new wipe if necessary; and,
- New disposable bailer used for each well.

Appropriate decontamination procedures were appropriate during groundwater sampling.

4.0 RESULTS

The five groundwater monitoring wells were sampled during the December 2021 sampling event, results are detailed in **Tables 2 to 11**. Comparisons have been made to the previous quarterly rounds of 2021 monitoring (March, June and September) also the yearly monitoring of December 2020. Refer to **Attachment 2** – NATA Accredited Laboratory Results and **Attachment 1** – Data Log.

Table 2 – Quarterly Analytes Groundwater Results and Comparison (MWA)

	Analytes	Units	Site Criteria (mg/L)	MWA Dec 2020	MWA March 2021	MWA June 2021	MWA Sept 2021	MWA Dec 2021
IONS	Calcium	mg/L	NA	600	610	430	540	460
	Alkalinity	mg/L	NA	480	520	500	500	610
	Chloride	mg/L	NA	7200	6800	6900	6300	2900
	Fluoride	mg/L	NA	<LOR	0.1	0.1	0.1	<LOR
	Potassium¹	mg/L	410	2.8	2.9	2	3	2
	Magnesium	mg/L	NA	1200	1300	840	990	920
	Sulphate	mg/L	NA	110	55	58	48	66
HEAVY METALS	Iron	mg/L	0.3	<LOR	<LOR	<LOR	<LOR	<LOR
	Manganese	mg/L	1.9	0.011	0.01	0.017	0.010	0.016
Phenols	Total	mg/L	0.32	<LOR	<LOR	<LOR	<LOR	<LOR
OCPs	OCP³	mg/L	0.00001	<LOR	<LOR	<LOR	<LOR	<LOR
MISC. INORGANICS	pH	pH	6.5 – 8	6.7	6.8	6.8	6.8	7.2
	Sodium	mg/L	NA	1900	2100	1800	2100	1500
	Ammonia²	mg/L	0.9	<LOR	0.006	0.023	0.068	<LOR
	Nitrate	mg/L	0.7	0.49	0.64	0.6	0.6	0.31
	Total Organic	mg/L	4	4	3	5	3	8
	EC	µS/cm	NA	19000	19000	19000	19000	8900

Highlighted results exceed site criteria

<LOR = No Detection. Analyte is below the Laboratory LOR

1 - World Health Organisation Guidelines for Drinking-water Quality 2009, Poor (acceptable) drinking water criteria.

2 - Criteria value may not protect key species from chronic toxicity, refer to ANZW 2018 for further guidance.

3 - A Trigger value for DDT is used in the absence of a criteria value for Total OCP. DDT has the lowest criteria of OCPs.

**Table 3 – Yearly Analytes Groundwater Results and Comparison Dec 2020-Dec 2021
(MWA)**

Sampling Parameter	Units	Threshold Criteria (mg/L)	MWA Dec 2020	MWA Dec 2021
Total dissolved solids	mg/L	NA	12000	6800
Biochemical Oxygen Demand	mg/L	NA	<LOR	<LOR
Phosphate	mg/L	0.015 ^G	0.063	0.04
Arsenic III & V	mg/L	0.024 (III), 0.013	0.001	0.001
Aluminium	mg/L	0.055 (pH > 6.5)	<LOR	<LOR
Barium	mg/L	NA	0.49	0.5
Cadmium	mg/L	0.0002	<LOR	<LOR
Copper	mg/L	0.0014	0.001	0.001
Chromium VI	mg/L	0.004	0.001	0.005
Chromium (Total)	mg/L	27	0.001	0.003
Lead	mg/L	0.0034	<LOR	<LOR
Mercury	mg/L	0.0006	<LOR	<LOR
Zinc	mg/L	0.008 ^D	0.014	0.034
Benzene	mg/L	0.95	<LOR	<LOR
Toluene	mg/L	0.18 ^L	<LOR	<LOR
Ethylbenzene	mg/L	0.08 ^L	<LOR	<LOR
Xylene			<LOR	<LOR
CVCs/VOCCs:				
- Total	mg/L	NA	<LOR	<LOR
- Tetrachlorethene (TCE)	mg/L	NA	<LOR	<LOR
- 1,1,2-Trichloroethane	mg/L	6.500	<LOR	<LOR
- Tetrachloroethene (PCE)	mg/L	0.05 ^N	<LOR	<LOR
- 1,1-Dichloroethene	mg/L	0.03 ^P	<LOR	<LOR
- Vinyl Chloride		0.0003 ^N	<LOR	<LOR
PCBs	mg/L	0.00003 ^A	<LOR	<LOR
PAHs	mg/L	0.016 ^B	<LOR	<LOR
OPPs	mg/L	0.00002 ^C	<LOR	<LOR

Table 4 – Quarterly Groundwater Results and Comparison (MWB)

	Analytes	Units	Site	MWB	MWB	MWB	MWB	MWB
			Criteria (mg/L)	Dec 2020	March 2021	June 2021	Sept 2021	Dec 2021
IONS	Calcium	mg/L	NA	520	480	410	480	470
	Alkalinity	mg/L	NA	420	420	360	420	440
	Chloride	mg/L	NA	4900	5100	4800	4300	5000
	Fluoride	mg/L	NA	0.2	0.2	0.3	0.2	0.3
	Potassium¹	mg/L	410	2.3	2.4	2	4	2
	Magnesium	mg/L	NA	720	720	520	600	640
	Sulphate	mg/L	NA	85	96	220	76	82
HEAVY METALS	Iron	mg/L	0.3	<LOR	<LOR	<LOR	<LOR	<LOR
	Manganese	mg/L	1.9	0.008	0.008	0.011	0.020	0.011
OCP	OCP³	mg/L	0.00001	<LOR	<LOR	<LOR	<LOR	<LOR
PHENOLS	Total phenolics	mg/L	0.32	<LOR	<LOR	<LOR	<LOR	<LOR
MISC. INORGANICS	pH	pH	6.5 – 8	7	6.9	6.6	6.9	6.9
	Sodium	mg/L	NA	1400	1500	1400	1500	1300
	Ammonia²	mg/L	0.9	<LOR	0.008	<0.01	0.024	<LOR
	Nitrate	mg/L	0.7	0.53	0.55	<0.51	0.6	0.62
	Total Organic C	mg/L	4	4	6	5	6	5
	EC	µS/cm	NA	14000	14000	14000	14000	14000

Highlighted results exceed site criteria

<LOR = No Detection. Analyte is below the Laboratory LOR

1 - World Health Organisation Guidelines for Drinking-water Quality 2009, Poor (acceptable) drinking water criteria.

2 - Criteria value may not protect key species from chronic toxicity, refer to ANZW 2018 for further guidance.

3 - A Trigger value for DDT is used in the absence of a criteria value for Total OCP. DDT has the lowest criteria of OCPs.

**Table 5 – Yearly Analytes Groundwater Results and Comparison Dec 2020-Dec 2021
(MWB)**

Sampling Parameter	Units	Threshold Criteria (mg/L)	MWB Dec 2020	MWB Dec 2021
Total dissolved solids	mg/L	NA	9300	12000
Biochemical Oxygen Demand	mg/L	NA	7	<LOR
Phosphate	mg/L	0.015	0.02	0.008
Arsenic III & V	mg/L	0.024 (III), 0.013	<LOR	<LOR
Aluminium	mg/L	0.055 (pH > 6.5)	<LOR	<LOR
Barium	mg/L	NA	0.37	0.43
Cadmium	mg/L	0.0002	<LOR	<LOR
Copper	mg/L	0.0014	<LOR	<LOR
Chromium VI	mg/L	0.004	0.003	0.008
Chromium (Total)	mg/L	0.004	0.003	0.003
Lead	mg/L	0.0034	<LOR	<LOR
Mercury	mg/L	0.0006	<LOR	<LOR
Zinc	mg/L	0.008	0.009	0.033
Benzene	mg/L	0.95	<LOR	<LOR
Toluene	mg/L	0.18 ^L	<LOR	<LOR
Ethylbenzene	mg/L	0.08 ^L	<LOR	<LOR
Xylene			<LOR	<LOR
CVCs/VOCCs:				
- Total	mg/L	NA	<LOR	<LOR
- Tetrachlorethene (TCE)	mg/L	NA	<LOR	<LOR
- 1,1,2-Trichloroethane	mg/L	6500 (1,1,2 TCA)	<LOR	<LOR
- Tetrachloroethene (PCE)	mg/L	0.05	<LOR	<LOR
- 1,1-Dichloroethene	mg/L	0.03	<LOR	<LOR
- Vinyl Chloride		0.0003	<LOR	<LOR
PCBs	mg/L	0.00003	<LOR	<LOR
PAHs	mg/L	0.016	<LOR	<LOR
OPPs	mg/L	0.00002	<LOR	<LOR

Table 6 – Quarterly Groundwater Results and Comparison (MWC)

	Analytes	Units	Site Criteria (mg/L)	MWC	MWC	MWC	MWC	MWC
				Dec 2020	Mar 2021	June 2021	Sept 2021	Dec 2021
IONS	Calcium	mg/L	NA	390	360	290	330	310
	Alkalinity (total)	mg/L	NA	810	870	850	890	920
	Chloride	mg/L	NA	5700	4200	4000	3400	4200
	Fluoride	mg/L	NA	0.1	0.2	0.2	0.2	0.3
	Potassium¹	mg/L	410	2	2	1	1	1
	Magnesium	mg/L	NA	600	560	390	440	450
	Sulphate	mg/L	NA	120	130	150	120	98
HEAVY METALS	Iron	mg/L	0.3	<LOR	<LOR	<LOR	<LOR	<LOR
	Manganese	mg/L	1.9	3.3	3.2	4.7	4.4	3
PHENOLS	Total phenolics	mg/L	0.32	<LOR	<LOR	<LOR	<LOR	<LOR
OCP	OCP³	mg/L	0.00001	<LOR	<LOR	<LOR	<LOR	<LOR
MISC. INORGANIC S	pH	pH	6.5 – 8	7.1	7	6.9	6.8	7
	Sodium	mg/L	NA	1700	1800	600	1700	1400
	Ammonia²	mg/L	0.9	0.018	0.013	0.03	0.021	0.096
	Nitrate	mg/L	0.7	0.23	0.15	0.14	0.058	0.066
	Total Organic C	mg/L	4	7	8	8	9	8
	EC	µS/cm	NA	14000	13000	13000	13000	13000

Highlighted results exceed site criteria

<LOR = No Detection. Analyte is below the Laboratory LOR

1 - World Health Organisation Guidelines for Drinking-water Quality 2009, Poor (acceptable) drinking water criteria.

2 - Criteria value may not protect key species from chronic toxicity, refer to ANZW 2018 for further guidance.

3 - A Trigger value for DDT is used in the absence of a criteria value for Total OCP. DDT has the lowest criteria of OCPs.

**Table 7 – Yearly Analytes Groundwater Results and Comparison Dec 2020-Dec 2021
(MWC)**

Sampling Parameter	Units	Threshold Criteria (mg/L)	MWC	MWC
			Dec 2020	Dec 2021
Total dissolved solids	mg/L	NA	7500	8700
Biochemical Oxygen Demand	mg/L	NA	33	6
Phosphate	mg/L	0.015	0.04	0.081
Arsenic III & V	mg/L	0.024 (III),	<LOR	<LOR
Aluminium	mg/L	0.055 (pH > 6.5)	<LOR	<LOR
Barium	mg/L	NA	0.31	0.34
Cadmium	mg/L	0.0002	<LOR	<LOR
Copper	mg/L	0.0014	0.001	0.001
Chromium VI	mg/L	0.004	<LOR	<LOR
Chromium (total)	mg/L	0.004	<LOR	<LOR
Lead	mg/L	0.0034	<LOR	<LOR
Mercury	mg/L	0.0006	<LOR	<LOR
Zinc	mg/L	0.008	0.014	0.013
TPH	mg/L	0.6 ¹	<LOR	<LOR
Benzene	mg/L	0.95	<LOR	<LOR
Toluene	mg/L	0.18	<LOR	<LOR
Ethylbenzene	mg/L	0.08	<LOR	<LOR
Xylene			<LOR	<LOR
CVCs/VOCCs:				
- Total	mg/L	NA	<LOR	<LOR
- Tetrachlorethene	mg/L	NA	<LOR	<LOR
- 1,1,2-Trichloroethane	mg/L	6500 (1,1,2 TCA)	<LOR	<LOR
- Tetrachloroethene	mg/L	0.05	<LOR	<LOR
- 1,1-Dichloroethene	mg/L	0.03	<LOR	<LOR
- Vinyl Chloride		0.0003	<LOR	<LOR
PCBs	mg/L	0.00003	<LOR	<LOR
PAHs	mg/L	0.016	<LOR	<LOR
OPPs	mg/L	0.00002	<LOR	<LOR

MWD is a leachate monitoring well which provides access to the perched landfill leachate water table. The Site Criteria for this particular well is only used as a general indicator of the leachate water quality.

Table 8 – Quarterly Groundwater Results and Comparison (MWD)

	Analytes	Units	Site Criteria (mg/L)	MWD (leachate) Dec 2020	MWD (leachate) March 2021	MWD (leachate) June 2021	MWD (leachate) Sept 2021	MWD (leachate) Dec 2021
IONS	Calcium	mg/L	NA	120	160	140	170	180
	Alkalinity (total)	mg/L	NA	2200	1600	1500	1700	950
	Chloride	mg/L	NA	2400	14000	1400	1600	920
	Fluoride	mg/L	NA	0.2	0.2	0.3	0.2	0.2
	Potassium¹	mg/L	410	160	94	67	120	46
	Magnesium	mg/L	NA	210	160	120	170	88
	Sulphate	mg/L	NA	38	23	100	41	98
HEAVY METALS	Iron	mg/L	0.3	0.19	0.47	0.69	0.58	0.44
	Manganese	mg/L	1.9	0.22	0.42	0.5	0.59	0.56
PHENOLS	Total phenolics	mg/L	0.32	<LOR	<LOR	<LOR	<LOR	<LOR
OCP	OCP³	mg/L	0.00001	<LOR	<LOR	<LOR	<LOR	<LOR
MISC. INORGANICS	pH	pH	6.5 – 8	7.7	7.5	7.3	7.5	7.3
	Sodium	mg/L	NA	1200	860	720	970	500
	Ammonia²	mg/L	0.9	260	150	150	170	67
	Nitrate	mg/L	0.7	0.058	<LOR	<LOR	<LOR	0.23
	Total Organic C	mg/L	4	190	120	81	110	77
	EC	µS/cm	NA	9800	7000	6600	8400	4400

Highlighted results exceed site criteria

<LOR = No Detection. Analyte is below the Laboratory LOR

1 - World Health Organisation Guidelines for Drinking-water Quality 2009, Poor (acceptable) drinking water criteria.

2 - Criteria value may not protect key species from chronic toxicity, refer to ANZW 2018 for further guidance.

3 - A Trigger value for DDT is used in the absence of a criteria value for Total OCP. DDT has the lowest criteria of OCPs.

**Table 9 – Yearly Analytes Groundwater Results and Comparison Dec 2020-Dec 2021
(MWD)**

Sampling Parameter	Units	Threshold	MWD	MWD
		Criteria (mg/L)	(leachate) Dec 2020	(leachate) Dec 2021
Total dissolved solids	mg/L	NA	5200	2600
Biochemical Oxygen Demand	mg/L	NA	81	140
Phosphate	mg/L	0.015	0.78	0.4
Arsenic III & V	mg/L	0.024 (III),	0.01	0.003
Aluminium	mg/L	0.055 (pH > 6.5)	0.03	<LOR
Barium	mg/L	NA	0.88	0.4
Cadmium	mg/L	0.0002	<LOR	<LOR
Copper	mg/L	0.0014	<LOR	<LOR
Chromium VI	mg/L	0.004	0.034	<LOR
Chromium (total)	mg/L	0.004	0.034	<LOR
Lead	mg/L	0.0034	<LOR	<LOR
Mercury	mg/L	0.0006	<LOR	<LOR
Zinc	mg/L	0.008	0.003	0.01
Benzene	mg/L	0.95	0.004	0.002
Toluene	mg/L	0.18	<LOR	<LOR
Ethylbenzene	mg/L	0.08	0.017	<LOR
Xylene			0.001	<LOR
CVCs/VOCCs:				
- Total	mg/L	NA	<LOR	<LOR
- Tetrachlorethene (TCE)	mg/L	NA	<LOR	<LOR
- 1,1,2-Trichloroethane	mg/L	6.5	<LOR	<LOR
- Tetrachloroethene (PCE)	mg/L	0.05	<LOR	<LOR
- 1,1-Dichloroethene	mg/L	0.03	<LOR	<LOR
- Vinyl Chloride		0.0003	<LOR	<LOR
PCBs	mg/L	0.00003	<LOR	<LOR
PAHs	mg/L	0.016	0.092	0.095
OPPs	mg/L	0.00002	<LOR	<LOR

Table 10 –Quarterly Groundwater Results and Comparison (MWE)

	Analytes	Unit	Threshold d Criteria (mg/L)	MWE Dec 2020	MWE Mar 2021	MWE June 2021	MWE Sept 2021	MWE Dec 2021
IONS	Calcium	mg/L	NA	79	92	65	100	68
	Alkalinity	mg/L	NA	1100	1100	1000	1000	1300
	Chloride	mg/L	NA	670	800	520	770	370
	Fluoride	mg/L	NA	0.4	0.4	0.5	0.4	0.4
	Potassium¹	mg/L	410	0.8	1	1	2	1
	Magnesium	mg/L	NA	89	110	67	110	70
	Sulphate	mg/L	NA	150	190	110	170	96
HEAVY METALS	Iron	mg/L	0.3	0.069	<LOR	0.45	0.43	1.9
	Manganese	mg/L	1.9	0.089	0.33	1.3	2.0	1.1
PHENOLS	Total phenolics	mg/L	0.32	<LOR	<LOR	<LOR	<LOR	<LOR
OCP	OCP³	mg/L	0.00001	<LOR	<LOR	<LOR	<LOR	<LOR
MISC. INORGANICS	pH	pH	6.5 – 8	7.4	7.2	7.2	7.2	7.1
	Sodium	mg/L	NA	710	790	560	950	600
	Ammonia²	mg/L	0.9	0.063	0.006	0.005	0.52	0.021
	Nitrate	mg/L	0.7	<LOR	0.002	<LOR	<LOR	<LOR
	Total Organic C	mg/L	4	8	6	16	6	14
	EC	µS/c	NA	3700	4400	3500	4600	3300

Highlighted results exceed site criteria

<LOR = No Detection. Analyte is below the Laboratory LOR

1 - World Health Organisation Guidelines for Drinking-water Quality 2009, Poor (acceptable) drinking water criteria.

2 - Criteria value may not protect key species from chronic toxicity, refer to ANZW 2018 for further guidance.

3 - A Trigger value for DDT is used in the absence of a criteria value for Total OCP. DDT has the lowest criteria of OCPs

**Table 11 – Yearly Analytes Groundwater Results and Comparison Dec 2020-Dec 2021
(MWE)**

Sampling Parameter	Units	Threshold Criteria (mg/L)	MWE Dec 2020	MWE Dec 2021
Total dissolved solids	mg/L	NA	2300	1700
Biochemical Oxygen Demand	mg/L	NA	9	22
Phosphate	mg/L	0.015	0.084	0.03
Arsenic III & V	mg/L	0.024 (III), 0.013	0.004	0.008
Aluminium	mg/L	0.055 (pH > 6.5)	0.02	<LOR
Barium	mg/L	NA	0.053	0.095
Cadmium	mg/L	0.0002	<LOR	<LOR
Copper	mg/L	0.0014	<LOR	<LOR
Chromium VI	mg/L	0.004	<LOR	<LOR
Chromium (total)	mg/L	0.004	<LOR	<LOR
Lead	mg/L	0.0034	<LOR	<LOR
Mercury	mg/L	0.0006	<LOR	<LOR
Zinc	mg/L	0.008	0.009	0.012
Benzene	mg/L	0.95	<LOR	<LOR
Toluene	mg/L	0.18	<LOR	<LOR
Ethylbenzene	mg/L	0.08	<LOR	<LOR
Xylene			<LOR	<LOR
CVCs/VOCCs:				
- Total	mg/L	NA	<LOR	<LOR
- Tetrachlorethene (TCE)	mg/L	NA	<LOR	<LOR
- 1,1,2-Trichloroethane	mg/L	6.5	<LOR	<LOR
- Tetrachloroethene (PCE)	mg/L	0.05	<LOR	<LOR
- 1,1-Dichloroethene	mg/L	0.03	<LOR	<LOR
- Vinyl Chloride		0.0003	<LOR	<LOR
PCBs	mg/L	0.00003	<LOR	<LOR
PAHs	mg/L	0.016	<LOR	<LOR
OPPs	mg/L	0.00002	<LOR	<LOR

5.0 DISCUSSION

The inferred hydraulic gradient for the site is a down gradient towards Parsons Gully to the west. The location of the four wells surrounding the landfill place wells MWA, MWB and MWC down-hydraulic gradient and well MWE up-hydraulic gradient of the landfill. Well MWD is located within the perched landfill water table, this enables access to the leachate within the landfill.

The following is a summary of the significant results for December 2021 in relation to the Site Criteria. Key increasing trends, decreasing trends and exceedances of the threshold criteria are indicated.

MWA

MWA is located in the northwest section of the site and is considered to be a down-hydraulic gradient monitoring well. There is farmland adjoining to the north and west of this location. The following changes have occurred in the water quality of MWA:

- Phosphate has decreased from 0.063mg/L to 0.04mg/L still above the criteria of 0.015mg/L from December 2020 to December 2021.
- Zinc has increased from 0.014mg/L to 0.034 mg/L, still above the site criteria of 0.008mg/L from December 2020 to December 2021.
- Total Organic Carbon has fluctuated between 3mg/L, below the site criteria, to 8mg/L, above the site criteria of 4mg/L over the course of the year: March 3mg/L, June 5mg/L, September 3mg/L, December 8mg/L.
- Chromium VI has increased from 1mg/L to 5mg/L since December 2020 to December 2021

All other analytes reported concentrations consistent with previous monitoring data.

MWB

MWB is located in the southwest section of the site and is considered to be a down-hydraulic gradient monitoring well. There is farmland to the south and west of this location. The well has remained relatively stable.

- The concentration of TOC has fluctuated between 5mg/L and 6mg/L each quarter over 2021 in MWB.
- Phosphate has decreased from 0.02mg/L to a concentration of 0.008mg/L, below the site criteria of 0.015mg/L.
- Zinc concentration increased from 0.009mg/L in December 2020 to 0.033mg/L in December 2021, above site criteria of 0.008mg/L.
- Chromium VI has increased from 3mg/L to 8mg/L since December 2020 to December 2021.

All other analytes reported concentrations consistent with previous monitoring data.

MWC

MWC is located on the southern boundary of the site, down hydraulic gradient of the landfill and onsite dam. There is farmland to the south of well, along with a stand of vegetation immediately south of the well. This well has shown increasing turbidity with sedimentation in observations from the field. There were 4 concentrations which exceeded the site criteria. The following changes have occurred in the water quality of MWC:

- Concentration of Manganese has fluctuated throughout the last 4 sampling periods with 4 concentrations above site criteria (1.9mg/L). The concentration of the December 2021 sampling event (3mg/L) is lower than the September 2020 sampling event (4.4mg/L).
- Concentration of TOC has fluctuated throughout the last 4 sampling periods with 4 concentrations above site criteria (4mg/L). The concentration of the December sampling event (8mg/L) is slightly lower than the previous September sampling event (9mg/L).
- A concentration of Phosphate was detected at 0.081mg/L which is double the previous concentration of 0.04mg/L in December 2020, and above the site criteria of 0.015mg/L.
- Zinc concentration slightly decreased from 0.014mg/L in December 2020 to 0.013mg/L in December 2021. Still above site criteria of 0.008mg/L.
- BOD has reduced from 33mg/L in December 2020 to 6mg/L in 2021.

All other analytes reported concentrations consistent with previous monitoring data.

MWD

The water collected and analysed from well MWD is landfill leachate and as such the Site Criteria is not used to compare the results against. The results of MWD are used as an indicator of current conditions within the landfill with trends and seasonal variations apparent. MWD is also to be used as a comparison to the external monitoring wells.

The following changes occurred in the water quality of the landfill leachate well MWD:

- Ammonia concentration was 67 mg/L in December 2021, the current trend is for the reduction of Ammonia, in December 2020 the concentration was 260mg/L still well above the site criteria of 0.9 mg/L.

- Iron concentration has fluctuated throughout the year with all samples presenting results above the site criteria of 0.3mg/L.
- TOC has decreased from 110 mg/L to a concentration of 77 mg/L, the lowest in 2021, but still well above the site criteria of 4 mg/L
- Phosphate has increased from 0.085mg/L in December 2020 to 0.30mg/L, in December 2021.
- Zinc has increased from 0.003 mg/L in December 2020 to 0.01 mg/L in December 2021 above site criteria at 0.003 mg/L
- PAHs were detected at a concentration of 0.095mg/L, an increase from 0.092mg/L.

Napthalene was within the suite of analytes tested for at the laboratory and was detected in the MWD sample, however this is not a part of the site criteria requirements.

MWE

MWE is located on the eastern boundary of the site and is an up-gradient groundwater monitoring well. There are a series of dams to the east of the well. The following changes have occurred in the water quality of MWE:

- The concentration of TOCs has fluctuated between 6mg/L to 16 mg/L over the past year: March 6mg/L, June 16mg/L, September 6mg/L, December 14mg/L.
- Iron has increase from no detection in March 2021 to 1.9mg/L in December 2021 above site criteria (0.3mg/L)
- Phosphate is above the site criteria (0.015mg/L), at a concentration of 0.03mg/L, a decrease from the previous yearly monitoring period of 0.084mg/L in December 2020.
- Zinc has had a slight increase from the previous yearly monitoring, from 0.009 mg/L to 0.012 mg/L, both above the site criteria of 0.008 mg/L.

All other analytes reported concentrations consistent with previous monitoring data.

The following analytes exceeded the Threshold Criteria during the December 2021 sampling event, excluding the Leachate Monitoring well (MWD); Total Organic Carbon and Zinc in MWA, MWB, MWC & MWE. Phosphate in MWA, MWC & MWE. Chromium VI in MWB. Manganese in MWC. Iron in MWE. Refer to **Attachment 1** – Data Log.

The monitoring well up hydraulic gradient of the site is MWE and there a number of exceedances within this well, including Zinc and Phosphate.

Site and Maintenance

The weather conditions (drought and rain events) and surrounding land uses are likely impacting the local groundwater conditions. The area which had previously been in drought is now experiencing increasing levels of rainfall.

6.0 CONCLUSIONS

There are seasonal fluctuations observed with regional groundwater conditions. The recent weather conditions of increased rainfall throughout 2021 compared to previous years may have influenced the groundwater conditions. Trending of these analytes over time may indicate a seasonal fluctuation, an anomaly or highlight an issue on the site (or surrounding area). The trending of analytes occurs in the annual groundwater monitoring report with a running comparison in the quarterly monitoring reports.

The results and discussion of the laboratory sample analysis from the Scone Waste Facility during the December 2021 sampling event displayed several ongoing exceedances of the Site Criteria. The MWE is considered an upgradient monitoring well and is an indicator of surrounding groundwater conditions.

The following analytes exceeded the Threshold Criteria during the December 2021 sampling event, excluding the Leachate Monitoring well (MWD), Total Organic Carbon and Zinc in MWA, MWB, MWC & MWE, Phosphate in MWA, MWC & MWE, Chromium VI in MWB, Manganese in MWC and Iron in MWE. Continued sampling and data collection will allow robust trending and statistical analysis of data to occur.

The next water sampling event will be a quarterly monitoring event which will be undertaken in March 2022.

REFERENCES

- *Australian and New Zealand Guidelines for the Management of Contaminated Sites* (ANZECC/NHMRC 1992);
- *Australia and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZW, 2018);
- *Australian Drinking Water Guidelines, National Water Quality Management Strategy 2011*;
- *Contaminated Land Management Act 1997* (NSW);
- *Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites* (NSW EPA 2011);
- *Contaminated Sites: Guidelines on Duty to Report Contamination under the Contamination Land Management Act 1997* (NSW DECC, 2009);
- *Contaminated Sites: Guidelines for the Assessment and Management of Groundwater Contamination* (NSW DEC, 2007);
- *Contaminated Sites: Guidelines on Significant Risk of Harm from Contaminated Land and the Duty to Report* (NSW EPA 1999);
- *Contaminated Sites: Sampling Design Guidelines* (NSW EPA 1995);
- *Environmental Guidelines: Solid Waste Landfills* (NSW EPA, 1996);
- *Environmental Guidelines Solid Waste Landfills* Second edition, (NSW EPA 2016);
- *Health - Based Soil Investigation Levels*, Imray, P & Langley, A, *National Environmental Health Forum Monographs, Soil Series No. 2 (2nd Ed)*, South Australian Health Commission (NEHF 1998);
- *National Environment Protection (Assessment of Site Contamination) Measure (No.1)* (NEPM, 2013) as amended;
- *Storage and Handling of Dangerous Goods Code of Practice 2005*;
- *Work Health and Safety Act 2011* (NSW) and associated regulations.

Attachment 1 Data log

ENGAGE ENVIRONMENTAL SERVICES				Threshold Criteria Units	NA	NA	NA	NA	0.3	NA	1.9	0.00001	NA	6.5–8	NA	0.9	0.7	NA	4	0.32	NA	NA	NA	0.015	
				Analytes	Calcium	Alkalinity	Chloride	Fluoride	Iron	Magnesium	Manganese	Organochlorine pesticides (OCP)	Potassium	pH	pH	Sodium	Ammonia	Nitrate	Sulfate	Total organic carbon	Total phenolics	Electrical conductivity (EC)	Total dissolved solids	Biochemical oxygen demand	Phosphate
				Monitoring frequency	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Yearly	Yearly	Yearly	Yearly
MWA	285448	14.12.2021			460	610	2900	0.5	<0.01	920	0.016	<0.0002	2	7.2	1500	0.019	0.31	66	8	<0.05	8900	6800	<5	0.04	
MWB	285448	14.12.2021			470	440	5000	0.3	<0.01	640	0.011	<0.0002	2	6.9	1300	0.025	0.62	82	5	<0.05	14000	12000	<5	0.008	
MWC	285448	14.12.2021			310	920	4200	0.3	<0.01	450	3	<0.0002	1	7	1400	0.096	0.066	98	8	<0.05	13000	8700	6	0.081	
MWD	285448	14.12.2021			180	950	920	0.2	0.44	88	0.56	<0.0002	46	7.3	500	67	0.23	98	77	<0.05	4400	2600	140	0.4	
MWE	285448	14.12.2021			68	1300	370	0.4	1.9	70	1.1	<0.0002	1	7.1	600	0.021	<0.005	96	14	<0.05	3300	1700	22	0.03	

				0.024 (III) 0.013 (V) mg/L	0.055 (pH>6.5) mg/L	NA	0.0002	0.0014	0.001	NA	0.0034	0.0006	0.008	0.016	0.26	0.95	0.18	0.08	0.35	NA	6500	0.05	0.03	0.0003	0.00003	0.00002	
				Arsenic III & V	Aluminium	Barium	Cadmium	Copper	Chromium VI	Chromium (total)	Lead	Mercury	Zinc	PAHs	TRH FI	Benzene	Toluene	Ethylbenzene	total xylene	Tetrachlorethene (TCE)	1,1,1-Trichloroethane (TCA)	Tetrachloroethene (PCE)	1,2-Dichloroethene	Vinyl Chloride	PCBs	OPPs	
				Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly
MWA	0.001	<0.01		0.5	<0.0001	0.001	<0.005	0.003	<0.001	0.0001	0.034	ND	<0.01	<0.001	<0.001	<0.001	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.0002	
MWB	0.001	<0.01		0.43	<0.0001	<0.001	0.008	0.003	<0.001	<0.00005	0.033	ND	<0.01	<0.001	<0.001	<0.001	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.0002	
MWC	<0.001	<0.01		0.34	<0.0001	<0.001	<0.005	<0.001	<0.001	<0.00005	0.013	ND	<0.01	<0.001	<0.001	<0.001	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.0002	
MWD	0.003	<0.01		0.4	<0.0001	<0.001	<0.005	0.01	<0.001	<0.00005	0.01	0.095	0.032	0.002	<0.001	<0.001	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.0002	
MWE	0.008	<0.01		0.095	<0.0001	<0.001	<0.005	<0.001	<0.001	<0.00005	0.012	ND	<0.01	<0.001	<0.001	<0.001	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.0002	

Attachment 2 NATA Accredited Laboratory Results



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CERTIFICATE OF ANALYSIS 285448

Client Details

Client	Engage Environmental Services
Attention	Stephen Challinor
Address	113 Reservoir Rd, GLENDALE, NSW, 2285

Sample Details

Your Reference	<u>E04-1221-UHSC</u>
Number of Samples	5 Water
Date samples received	15/12/2021
Date completed instructions received	15/12/2021

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	22/12/2021
Date of Issue	22/12/2021

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Accredited for compliance with ISO/IEC 17025 - Testing. **Tests not covered by NATA are denoted with ***

Results Approved By

Diego Bigolin, Inorganics Supervisor
Dragana Tomas, Senior Chemist
Hannah Nguyen, Metals Supervisor
Priya Samarawickrama, Senior Chemist

Authorised By

Nancy Zhang, Laboratory Manager

VHC's in water						
Our Reference		285448-1	285448-2	285448-3	285448-4	285448-5
Your Reference	UNITS	MWA	MWB	MWC	MWD	MWE
Date Sampled		14/12/2021	14/12/2021	14/12/2021	14/12/2021	14/12/2021
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	16/12/2021	16/12/2021	16/12/2021	17/12/2021	16/12/2021
Date analysed	-	16/12/2021	16/12/2021	16/12/2021	20/12/2021	16/12/2021
Dichlorodifluoromethane	µg/L	<10	<10	<10	<10	<10
Chloromethane	µg/L	<10	<10	<10	<10	<10
Vinyl Chloride	µg/L	<10	<10	<10	<10	<10
Bromomethane	µg/L	<10	<10	<10	<10	<10
Chloroethane	µg/L	<10	<10	<10	<10	<10
Trichlorofluoromethane	µg/L	<10	<10	<10	<10	<10
1,1-Dichloroethene	µg/L	<1	<1	<1	<1	<1
Trans-1,2-dichloroethene	µg/L	<1	<1	<1	<1	<1
1,1-dichloroethane	µg/L	<1	<1	<1	<1	<1
Cis-1,2-dichloroethene	µg/L	<1	<1	<1	<1	<1
Bromochloromethane	µg/L	<1	<1	<1	<1	<1
Chloroform	µg/L	<1	<1	<1	<1	<1
2,2-dichloropropane	µg/L	<1	<1	<1	<1	<1
1,2-dichloroethane	µg/L	<1	<1	<1	<1	<1
1,1,1-trichloroethane	µg/L	<1	<1	<1	<1	<1
1,1-dichloropropene	µg/L	<1	<1	<1	<1	<1
Carbon tetrachloride	µg/L	<1	<1	<1	<1	<1
Dibromomethane	µg/L	<1	<1	<1	<1	<1
1,2-dichloropropane	µg/L	<1	<1	<1	<1	<1
Trichloroethene	µg/L	<1	<1	<1	<1	<1
Bromodichloromethane	µg/L	<1	<1	<1	<1	<1
trans-1,3-dichloropropene	µg/L	<1	<1	<1	<1	<1
cis-1,3-dichloropropene	µg/L	<1	<1	<1	<1	<1
1,1,2-trichloroethane	µg/L	<1	<1	<1	<1	<1
1,3-dichloropropane	µg/L	<1	<1	<1	<1	<1
Dibromochloromethane	µg/L	<1	<1	<1	<1	<1
1,2-dibromoethane	µg/L	<1	<1	<1	<1	<1
Tetrachloroethene	µg/L	<1	<1	<1	<1	<1
1,1,1,2-tetrachloroethane	µg/L	<1	<1	<1	<1	<1
Chlorobenzene	µg/L	<1	<1	<1	3	<1
Bromoform	µg/L	<1	<1	<1	<1	<1
1,1,2,2-tetrachloroethane	µg/L	<1	<1	<1	<1	<1
1,2,3-trichloropropane	µg/L	<1	<1	<1	<1	<1
Bromobenzene	µg/L	<1	<1	<1	<1	<1

VHC's in water						
Our Reference		285448-1	285448-2	285448-3	285448-4	285448-5
Your Reference	UNITS	MWA	MWB	MWC	MWD	MWE
Date Sampled		14/12/2021	14/12/2021	14/12/2021	14/12/2021	14/12/2021
Type of sample		Water	Water	Water	Water	Water
2-chlorotoluene	µg/L	<1	<1	<1	<1	<1
4-chlorotoluene	µg/L	<1	<1	<1	<1	<1
1,3-dichlorobenzene	µg/L	<1	<1	<1	<1	<1
1,4-dichlorobenzene	µg/L	<1	<1	<1	5	<1
1,2-dichlorobenzene	µg/L	<1	<1	<1	<1	<1
1,2-dibromo-3-chloropropane	µg/L	<1	<1	<1	<1	<1
1,2,4-trichlorobenzene	µg/L	<1	<1	<1	<1	<1
Hexachlorobutadiene	µg/L	<1	<1	<1	<1	<1
1,2,3-trichlorobenzene	µg/L	<1	<1	<1	<1	<1
Surrogate Dibromofluoromethane	%	100	100	99	110	100
Surrogate toluene-d8	%	99	98	99	99	100
Surrogate 4-BFB	%	122	123	123	104	122

vTRH(C6-C10)/BTEXN in Water						
Our Reference		285448-1	285448-2	285448-3	285448-4	285448-5
Your Reference	UNITS	MWA	MWB	MWC	MWD	MWE
Date Sampled		14/12/2021	14/12/2021	14/12/2021	14/12/2021	14/12/2021
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	16/12/2021	16/12/2021	16/12/2021	17/12/2021	16/12/2021
Date analysed	-	16/12/2021	16/12/2021	16/12/2021	20/12/2021	16/12/2021
TRH C ₆ - C ₉	µg/L	<10	<10	<10	26	<10
TRH C ₆ - C ₁₀	µg/L	<10	<10	<10	34	<10
TRH C ₆ - C ₁₀ less BTEX (F1)	µg/L	<10	<10	<10	32	<10
Benzene	µg/L	<1	<1	<1	2	<1
Toluene	µg/L	<1	<1	<1	<1	<1
Ethylbenzene	µg/L	<1	<1	<1	<1	<1
m+p-xylene	µg/L	<2	<2	<2	<2	<2
o-xylene	µg/L	<1	<1	<1	<1	<1
Naphthalene	µg/L	<1	<1	<1	8	<1
Surrogate Dibromofluoromethane	%	100	100	99	110	100
Surrogate toluene-d8	%	99	98	99	99	100
Surrogate 4-BFB	%	122	123	123	104	122

svTRH (C10-C40) in Water						
Our Reference		285448-1	285448-2	285448-3	285448-4	285448-5
Your Reference	UNITS	MWA	MWB	MWC	MWD	MWE
Date Sampled		14/12/2021	14/12/2021	14/12/2021	14/12/2021	14/12/2021
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	17/12/2021	17/12/2021	17/12/2021	17/12/2021	17/12/2021
Date analysed	-	17/12/2021	17/12/2021	17/12/2021	17/12/2021	17/12/2021
TRH C ₁₀ - C ₁₄	µg/L	<50	<50	<50	220	<50
TRH C ₁₅ - C ₂₈	µg/L	<100	<100	<100	1,600	<100
TRH C ₂₉ - C ₃₆	µg/L	<100	<100	<100	400	<100
Total +ve TRH (C10-C36)	µg/L	<50	<50	<50	2,200	<50
TRH >C ₁₀ - C ₁₆	µg/L	<50	<50	<50	320	<50
TRH >C ₁₀ - C ₁₆ less Naphthalene (F2)	µg/L	<50	<50	<50	310	<50
TRH >C ₁₆ - C ₃₄	µg/L	<100	<100	<100	1,800	<100
TRH >C ₃₄ - C ₄₀	µg/L	<100	<100	<100	220	<100
Total +ve TRH (>C10-C40)	µg/L	<50	<50	<50	2,400	<50
Surrogate o-Terphenyl	%	100	88	96	138	91

PAHs in Water						
Our Reference		285448-1	285448-2	285448-3	285448-4	285448-5
Your Reference	UNITS	MWA	MWB	MWC	MWD	MWE
Date Sampled		14/12/2021	14/12/2021	14/12/2021	14/12/2021	14/12/2021
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	17/12/2021	17/12/2021	17/12/2021	17/12/2021	17/12/2021
Date analysed	-	20/12/2021	20/12/2021	20/12/2021	20/12/2021	20/12/2021
Naphthalene	µg/L	<1	<1	<1	9	<1
Acenaphthylene	µg/L	<1	<1	<1	<1	<1
Acenaphthene	µg/L	<1	<1	<1	<1	<1
Fluorene	µg/L	<1	<1	<1	<1	<1
Phenanthrene	µg/L	<1	<1	<1	<1	<1
Anthracene	µg/L	<1	<1	<1	<1	<1
Fluoranthene	µg/L	<1	<1	<1	<1	<1
Pyrene	µg/L	<1	<1	<1	<1	<1
Benzo(a)anthracene	µg/L	<1	<1	<1	<1	<1
Chrysene	µg/L	<1	<1	<1	<1	<1
Benzo(b,j+k)fluoranthene	µg/L	<2	<2	<2	<2	<2
Benzo(a)pyrene	µg/L	<1	<1	<1	<1	<1
Indeno(1,2,3-c,d)pyrene	µg/L	<1	<1	<1	<1	<1
Dibenzo(a,h)anthracene	µg/L	<1	<1	<1	<1	<1
Benzo(g,h,i)perylene	µg/L	<1	<1	<1	<1	<1
Benzo(a)pyrene TEQ	µg/L	<5	<5	<5	<5	<5
Total +ve PAH's	µg/L	NIL (+)VE	NIL (+)VE	NIL (+)VE	9.5	NIL (+)VE
Surrogate p-Terphenyl-d14	%	129	111	112	110	124

Organochlorine Pesticides in Water						
Our Reference		285448-1	285448-2	285448-3	285448-4	285448-5
Your Reference	UNITS	MWA	MWB	MWC	MWD	MWE
Date Sampled		14/12/2021	14/12/2021	14/12/2021	14/12/2021	14/12/2021
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	17/12/2021	17/12/2021	17/12/2021	17/12/2021	17/12/2021
Date analysed	-	20/12/2021	20/12/2021	20/12/2021	20/12/2021	20/12/2021
alpha-BHC	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
HCB	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
beta-BHC	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
gamma-BHC	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Heptachlor	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
delta-BHC	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Aldrin	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Heptachlor Epoxide	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
gamma-Chlordane	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
alpha-Chlordane	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Endosulfan I	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
pp-DDE	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Dieldrin	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Endrin	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Endosulfan II	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
pp-DDD	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Endrin Aldehyde	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
pp-DDT	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Endosulfan Sulphate	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Methoxychlor	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Surrogate TCMX	%	118	102	105	105	118

OP Pesticides in Water						
Our Reference		285448-1	285448-2	285448-3	285448-4	285448-5
Your Reference	UNITS	MWA	MWB	MWC	MWD	MWE
Date Sampled		14/12/2021	14/12/2021	14/12/2021	14/12/2021	14/12/2021
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	17/12/2021	17/12/2021	17/12/2021	17/12/2021	17/12/2021
Date analysed	-	20/12/2021	20/12/2021	20/12/2021	20/12/2021	20/12/2021
Dichlorvos	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Dimethoate	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Diazinon	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Chlorpyrifos-methyl	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Ronnel	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Fenitrothion	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Malathion	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Chlorpyrifos	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Parathion	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Bromophos ethyl	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Ethion	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Azinphos-methyl (Guthion)	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Surrogate TCMX	%	118	102	105	105	118

PCBs in Water						
Our Reference		285448-1	285448-2	285448-3	285448-4	285448-5
Your Reference	UNITS	MWA	MWB	MWC	MWD	MWE
Date Sampled		14/12/2021	14/12/2021	14/12/2021	14/12/2021	14/12/2021
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	17/12/2021	17/12/2021	17/12/2021	17/12/2021	17/12/2021
Date analysed	-	20/12/2021	20/12/2021	20/12/2021	20/12/2021	20/12/2021
Aroclor 1016	µg/L	<2	<2	<2	<2	<2
Aroclor 1221	µg/L	<2	<2	<2	<2	<2
Aroclor 1232	µg/L	<2	<2	<2	<2	<2
Aroclor 1242	µg/L	<2	<2	<2	<2	<2
Aroclor 1248	µg/L	<2	<2	<2	<2	<2
Aroclor 1254	µg/L	<2	<2	<2	<2	<2
Aroclor 1260	µg/L	<2	<2	<2	<2	<2
Surrogate TCMX	%	118	102	105	105	118

Total Phenolics in Water						
Our Reference		285448-1	285448-2	285448-3	285448-4	285448-5
Your Reference	UNITS	MWA	MWB	MWC	MWD	MWE
Date Sampled		14/12/2021	14/12/2021	14/12/2021	14/12/2021	14/12/2021
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	16/12/2021	16/12/2021	16/12/2021	16/12/2021	16/12/2021
Date analysed	-	16/12/2021	16/12/2021	16/12/2021	16/12/2021	16/12/2021
Total Phenolics (as Phenol)	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05

HM in water - dissolved						
Our Reference		285448-1	285448-2	285448-3	285448-4	285448-5
Your Reference	UNITS	MWA	MWB	MWC	MWD	MWE
Date Sampled		14/12/2021	14/12/2021	14/12/2021	14/12/2021	14/12/2021
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	16/12/2021	16/12/2021	16/12/2021	16/12/2021	16/12/2021
Date analysed	-	16/12/2021	16/12/2021	16/12/2021	16/12/2021	16/12/2021
Arsenic-Dissolved	µg/L	1	1	<1	3	8
Cadmium-Dissolved	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium-Dissolved	µg/L	3	3	<1	10	<1
Copper-Dissolved	µg/L	1	<1	<1	<1	<1
Lead-Dissolved	µg/L	<1	<1	<1	<1	<1
Mercury-Dissolved	µg/L	0.1	<0.05	<0.05	<0.05	<0.05
Nickel-Dissolved	µg/L	5	4	16	6	25
Zinc-Dissolved	µg/L	34	33	13	10	12
Iron-Dissolved	µg/L	<10	<10	<10	440	1,900
Manganese-Dissolved	µg/L	16	11	3,000	560	1,100
Aluminium-Dissolved	µg/L	<10	<10	<10	<10	<10
Barium-Dissolved	µg/L	500	430	340	400	95

Ion Balance						
Our Reference		285448-1	285448-2	285448-3	285448-4	285448-5
Your Reference	UNITS	MWA	MWB	MWC	MWD	MWE
Date Sampled		14/12/2021	14/12/2021	14/12/2021	14/12/2021	14/12/2021
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	15/12/2021	15/12/2021	15/12/2021	15/12/2021	15/12/2021
Date analysed	-	15/12/2021	15/12/2021	15/12/2021	15/12/2021	15/12/2021
Calcium - Dissolved	mg/L	460	470	310	180	68
Potassium - Dissolved	mg/L	2	2	1	46	1
Sodium - Dissolved	mg/L	1,500	1,300	1,400	500	600
Magnesium - Dissolved	mg/L	920	640	450	88	70
Hardness	mgCaCO ₃ /L	4,900	3,800	2,600	810	460
Hydroxide Alkalinity (OH ⁻) as CaCO ₃	mg/L	<5	<5	<5	<5	<5
Bicarbonate Alkalinity as CaCO ₃	mg/L	610	440	920	950	1,300
Carbonate Alkalinity as CaCO ₃	mg/L	<5	<5	<5	<5	<5
Total Alkalinity as CaCO ₃	mg/L	610	440	920	950	1,300
Sulphate, SO ₄	mg/L	66	82	98	98	96
Chloride, Cl	mg/L	2,900	5,000	4,200	920	370
Ionic Balance	%	26	-8.0	-9.0	-9.0	-6.0

Miscellaneous Inorganics						
Our Reference		285448-1	285448-2	285448-3	285448-4	285448-5
Your Reference	UNITS	MWA	MWB	MWC	MWD	MWE
Date Sampled		14/12/2021	14/12/2021	14/12/2021	14/12/2021	14/12/2021
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	15/12/2021	15/12/2021	15/12/2021	15/12/2021	15/12/2021
Date analysed	-	15/12/2021	15/12/2021	15/12/2021	15/12/2021	15/12/2021
Hexavalent Chromium, Cr ⁶⁺	mg/L	<0.005	0.008	<0.005	<0.005	<0.005
Ammonia as N in water	mg/L	0.019	0.025	0.096	67	0.021
BOD	mg/L	<5	<5	6	140	22
Fluoride, F	mg/L	0.5	0.3	0.3	0.2	0.4
Total Organic Carbon	mg/L	8	5	8	77	14
Total Dissolved Solids (grav)	mg/L	6,800	12,000	8,700	2,600	1,700
pH	pH Units	7.2	6.9	7.0	7.3	7.1
Electrical Conductivity	µS/cm	8,900	14,000	13,000	4,400	3,300
Nitrate as N in water	mg/L	0.31	0.62	0.066	0.23	<0.005
Phosphate as P in water	mg/L	0.04	0.008	0.081	0.40	0.03

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-002	Conductivity and Salinity - measured using a conductivity cell at 25°C in accordance with APHA latest edition 2510 and Rayment & Lyons.
Inorg-006	Alkalinity - determined titrimetrically in accordance with APHA latest edition, 2320-B.
Inorg-018	Total Dissolved Solids - determined gravimetrically. The solids are dried at 180+/-10°C.
Inorg-024	Hexavalent Chromium (Cr6+) - determined colourimetrically. Waters samples are filtered on receipt prior to analysis.
Inorg-026	Fluoride determined by ion selective electrode (ISE) in accordance with APHA latest edition, 4500-F-C.
Inorg-031	Total Phenolics by segmented flow analyser (in line distillation with colourimetric finish). Solids are extracted in a caustic media prior to analysis.
Inorg-040	The concentrations of the major ions (mg/L) are converted to milliequivalents and summed. The ionic balance should be within +/- 15% ie total anions = total cations +/-15%.
Inorg-055	Nitrate - determined colourimetrically. Waters samples are filtered on receipt prior to analysis. Soils are analysed following a water extraction.
Inorg-057	Ammonia - determined colourimetrically, based on APHA latest edition 4500-NH3 F. Waters samples are filtered on receipt prior to analysis. Soils are analysed following a KCl extraction.
Inorg-060	Phosphate determined colourimetrically based on EPA365.1 and APHA latest edition 4500 P E. Waters samples are filtered on receipt prior to analysis. Soils are analysed following a water extraction.
Inorg-079	TOC determined using a TOC analyser using the combustion method. Dissolved requires filtering prior to determination. Analysis using APHA latest edition 5310B.
Inorg-081	Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA latest edition, 4110-B. Waters samples are filtered on receipt prior to analysis. Alternatively determined by colourimetry/turbidity using Discrete Analyser.
Inorg-091	BOD - Analysed in accordance with APHA latest edition 5210 D and in house INORG-091.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Metals-022	Determination of various metals by ICP-MS.
Org-020	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.
Org-021	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
Org-022/025	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS/GC-MSMS.

Method ID	Methodology Summary
Org-022/025	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS/GC-MSMS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013.
Org-023	Water samples are analysed directly by purge and trap GC-MS.
Org-023	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)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.

Client Reference: E04-1221-UHSC

QUALITY CONTROL: VHC's in water						Duplicate		Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W3	[NT]
Date extracted	-			16/12/2021	1	16/12/2021	17/12/2021		16/12/2021	[NT]
Date analysed	-			16/12/2021	1	16/12/2021	20/12/2021		16/12/2021	[NT]
Dichlorodifluoromethane	µg/L	10	Org-023	<10	1	<10	<10	0	[NT]	[NT]
Chloromethane	µg/L	10	Org-023	<10	1	<10	<10	0	[NT]	[NT]
Vinyl Chloride	µg/L	10	Org-023	<10	1	<10	<10	0	[NT]	[NT]
Bromomethane	µg/L	10	Org-023	<10	1	<10	<10	0	[NT]	[NT]
Chloroethane	µg/L	10	Org-023	<10	1	<10	<10	0	[NT]	[NT]
Trichlorofluoromethane	µg/L	10	Org-023	<10	1	<10	<10	0	[NT]	[NT]
1,1-Dichloroethene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Trans-1,2-dichloroethene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
1,1-dichloroethane	µg/L	1	Org-023	<1	1	<1	<1	0	87	[NT]
Cis-1,2-dichloroethene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Bromochloromethane	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Chloroform	µg/L	1	Org-023	<1	1	<1	<1	0	84	[NT]
2,2-dichloropropane	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
1,2-dichloroethane	µg/L	1	Org-023	<1	1	<1	<1	0	79	[NT]
1,1,1-trichloroethane	µg/L	1	Org-023	<1	1	<1	<1	0	83	[NT]
1,1-dichloropropene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Carbon tetrachloride	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Dibromomethane	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
1,2-dichloropropane	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Trichloroethene	µg/L	1	Org-023	<1	1	<1	<1	0	108	[NT]
Bromodichloromethane	µg/L	1	Org-023	<1	1	<1	<1	0	86	[NT]
trans-1,3-dichloropropene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
cis-1,3-dichloropropene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
1,1,2-trichloroethane	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
1,3-dichloropropane	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Dibromochloromethane	µg/L	1	Org-023	<1	1	<1	<1	0	87	[NT]
1,2-dibromoethane	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Tetrachloroethene	µg/L	1	Org-023	<1	1	<1	<1	0	89	[NT]
1,1,1,2-tetrachloroethane	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Chlorobenzene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Bromoform	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
1,1,2,2-tetrachloroethane	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
1,2,3-trichloropropane	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Bromobenzene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
2-chlorotoluene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
4-chlorotoluene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
1,3-dichlorobenzene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
1,4-dichlorobenzene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]

Client Reference: E04-1221-UHSC

QUALITY CONTROL: VHC's in water						Duplicate		Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W3	[NT]
1,2-dichlorobenzene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
1,2-dibromo-3-chloropropane	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
1,2,4-trichlorobenzene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Hexachlorobutadiene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
1,2,3-trichlorobenzene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
<i>Surrogate</i> Dibromofluoromethane	%		Org-023	99	1	100	107	7	94	[NT]
<i>Surrogate</i> toluene-d8	%		Org-023	98	1	99	99	0	100	[NT]
<i>Surrogate</i> 4-BFB	%		Org-023	122	1	122	105	15	116	[NT]

Client Reference: E04-1221-UHSC

QUALITY CONTROL: VHC's in water					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	4	17/12/2021	20/12/2021		[NT]	[NT]
Date analysed	-			[NT]	4	20/12/2021	20/12/2021		[NT]	[NT]
Dichlorodifluoromethane	µg/L	10	Org-023	[NT]	4	<10	<10	0	[NT]	[NT]
Chloromethane	µg/L	10	Org-023	[NT]	4	<10	<10	0	[NT]	[NT]
Vinyl Chloride	µg/L	10	Org-023	[NT]	4	<10	<10	0	[NT]	[NT]
Bromomethane	µg/L	10	Org-023	[NT]	4	<10	<10	0	[NT]	[NT]
Chloroethane	µg/L	10	Org-023	[NT]	4	<10	<10	0	[NT]	[NT]
Trichlorofluoromethane	µg/L	10	Org-023	[NT]	4	<10	<10	0	[NT]	[NT]
1,1-Dichloroethene	µg/L	1	Org-023	[NT]	4	<1	<1	0	[NT]	[NT]
Trans-1,2-dichloroethene	µg/L	1	Org-023	[NT]	4	<1	<1	0	[NT]	[NT]
1,1-dichloroethane	µg/L	1	Org-023	[NT]	4	<1	<1	0	[NT]	[NT]
Cis-1,2-dichloroethene	µg/L	1	Org-023	[NT]	4	<1	<1	0	[NT]	[NT]
Bromochloromethane	µg/L	1	Org-023	[NT]	4	<1	<1	0	[NT]	[NT]
Chloroform	µg/L	1	Org-023	[NT]	4	<1	<1	0	[NT]	[NT]
2,2-dichloropropane	µg/L	1	Org-023	[NT]	4	<1	<1	0	[NT]	[NT]
1,2-dichloroethane	µg/L	1	Org-023	[NT]	4	<1	<1	0	[NT]	[NT]
1,1,1-trichloroethane	µg/L	1	Org-023	[NT]	4	<1	<1	0	[NT]	[NT]
1,1-dichloropropene	µg/L	1	Org-023	[NT]	4	<1	<1	0	[NT]	[NT]
Carbon tetrachloride	µg/L	1	Org-023	[NT]	4	<1	<1	0	[NT]	[NT]
Dibromomethane	µg/L	1	Org-023	[NT]	4	<1	<1	0	[NT]	[NT]
1,2-dichloropropane	µg/L	1	Org-023	[NT]	4	<1	<1	0	[NT]	[NT]
Trichloroethene	µg/L	1	Org-023	[NT]	4	<1	<1	0	[NT]	[NT]
Bromodichloromethane	µg/L	1	Org-023	[NT]	4	<1	<1	0	[NT]	[NT]
trans-1,3-dichloropropene	µg/L	1	Org-023	[NT]	4	<1	<1	0	[NT]	[NT]
cis-1,3-dichloropropene	µg/L	1	Org-023	[NT]	4	<1	<1	0	[NT]	[NT]
1,1,2-trichloroethane	µg/L	1	Org-023	[NT]	4	<1	<1	0	[NT]	[NT]
1,3-dichloropropane	µg/L	1	Org-023	[NT]	4	<1	<1	0	[NT]	[NT]
Dibromochloromethane	µg/L	1	Org-023	[NT]	4	<1	<1	0	[NT]	[NT]
1,2-dibromoethane	µg/L	1	Org-023	[NT]	4	<1	<1	0	[NT]	[NT]
Tetrachloroethene	µg/L	1	Org-023	[NT]	4	<1	<1	0	[NT]	[NT]
1,1,1,2-tetrachloroethane	µg/L	1	Org-023	[NT]	4	<1	<1	0	[NT]	[NT]
Chlorobenzene	µg/L	1	Org-023	[NT]	4	3	3	0	[NT]	[NT]
Bromoform	µg/L	1	Org-023	[NT]	4	<1	<1	0	[NT]	[NT]
1,1,2,2-tetrachloroethane	µg/L	1	Org-023	[NT]	4	<1	<1	0	[NT]	[NT]
1,2,3-trichloropropane	µg/L	1	Org-023	[NT]	4	<1	<1	0	[NT]	[NT]
Bromobenzene	µg/L	1	Org-023	[NT]	4	<1	<1	0	[NT]	[NT]
2-chlorotoluene	µg/L	1	Org-023	[NT]	4	<1	<1	0	[NT]	[NT]
4-chlorotoluene	µg/L	1	Org-023	[NT]	4	<1	<1	0	[NT]	[NT]
1,3-dichlorobenzene	µg/L	1	Org-023	[NT]	4	<1	<1	0	[NT]	[NT]
1,4-dichlorobenzene	µg/L	1	Org-023	[NT]	4	5	5	0	[NT]	[NT]

Client Reference: E04-1221-UHSC

QUALITY CONTROL: VHC's in water						Duplicate		Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
1,2-dichlorobenzene	µg/L	1	Org-023	[NT]	4	<1	<1	0	[NT]	[NT]
1,2-dibromo-3-chloropropane	µg/L	1	Org-023	[NT]	4	<1	<1	0	[NT]	[NT]
1,2,4-trichlorobenzene	µg/L	1	Org-023	[NT]	4	<1	<1	0	[NT]	[NT]
Hexachlorobutadiene	µg/L	1	Org-023	[NT]	4	<1	<1	0	[NT]	[NT]
1,2,3-trichlorobenzene	µg/L	1	Org-023	[NT]	4	<1	<1	0	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-023	[NT]	4	110	110	0	[NT]	[NT]
Surrogate toluene-d8	%		Org-023	[NT]	4	99	98	1	[NT]	[NT]
Surrogate 4-BFB	%		Org-023	[NT]	4	104	103	1	[NT]	[NT]

Client Reference: E04-1221-UHSC

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Water				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W3	[NT]
Date extracted	-			16/12/2021	1	16/12/2021	17/12/2021		16/12/2021	[NT]
Date analysed	-			16/12/2021	1	16/12/2021	20/12/2021		16/12/2021	[NT]
TRH C ₆ - C ₉	µg/L	10	Org-023	<10	1	<10	<10	0	102	[NT]
TRH C ₆ - C ₁₀	µg/L	10	Org-023	<10	1	<10	<10	0	102	[NT]
Benzene	µg/L	1	Org-023	<1	1	<1	<1	0	95	[NT]
Toluene	µg/L	1	Org-023	<1	1	<1	<1	0	92	[NT]
Ethylbenzene	µg/L	1	Org-023	<1	1	<1	<1	0	108	[NT]
m+p-xylene	µg/L	2	Org-023	<2	1	<2	<2	0	107	[NT]
o-xylene	µg/L	1	Org-023	<1	1	<1	<1	0	108	[NT]
Naphthalene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-023	110	1	100	107	7	94	[NT]
Surrogate toluene-d8	%		Org-023	100	1	99	99	0	100	[NT]
Surrogate 4-BFB	%		Org-023	105	1	122	105	15	116	[NT]

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Water				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	4	17/12/2021	20/12/2021		[NT]	[NT]
Date analysed	-			[NT]	4	20/12/2021	20/12/2021		[NT]	[NT]
TRH C ₆ - C ₉	µg/L	10	Org-023	[NT]	4	26	17	42	[NT]	[NT]
TRH C ₆ - C ₁₀	µg/L	10	Org-023	[NT]	4	34	22	43	[NT]	[NT]
Benzene	µg/L	1	Org-023	[NT]	4	2	2	0	[NT]	[NT]
Toluene	µg/L	1	Org-023	[NT]	4	<1	<1	0	[NT]	[NT]
Ethylbenzene	µg/L	1	Org-023	[NT]	4	<1	<1	0	[NT]	[NT]
m+p-xylene	µg/L	2	Org-023	[NT]	4	<2	<2	0	[NT]	[NT]
o-xylene	µg/L	1	Org-023	[NT]	4	<1	<1	0	[NT]	[NT]
Naphthalene	µg/L	1	Org-023	[NT]	4	8	4	67	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-023	[NT]	4	110	110	0	[NT]	[NT]
Surrogate toluene-d8	%		Org-023	[NT]	4	99	98	1	[NT]	[NT]
Surrogate 4-BFB	%		Org-023	[NT]	4	104	103	1	[NT]	[NT]

Client Reference: E04-1221-UHSC

QUALITY CONTROL: svTRH (C10-C40) in Water					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	285448-2
Date extracted	-			17/12/2021	1	17/12/2021	17/12/2021		17/12/2021	17/12/2021
Date analysed	-			17/12/2021	1	17/12/2021	17/12/2021		17/12/2021	17/12/2021
TRH C ₁₀ - C ₁₄	µg/L	50	Org-020	<50	1	<50	<50	0	80	128
TRH C ₁₅ - C ₂₈	µg/L	100	Org-020	<100	1	<100	<100	0	84	131
TRH C ₂₉ - C ₃₆	µg/L	100	Org-020	<100	1	<100	<100	0	86	111
TRH >C ₁₀ - C ₁₆	µg/L	50	Org-020	<50	1	<50	<50	0	80	128
TRH >C ₁₆ - C ₃₄	µg/L	100	Org-020	<100	1	<100	<100	0	84	131
TRH >C ₃₄ - C ₄₀	µg/L	100	Org-020	<100	1	<100	<100	0	86	111
Surrogate o-Terphenyl	%		Org-020	110	1	100	92	8	118	88

Client Reference: E04-1221-UHSC

QUALITY CONTROL: PAHs in Water				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	285448-3
Date extracted	-			17/12/2021	1	17/12/2021	17/12/2021		17/12/2021	17/12/2021
Date analysed	-			20/12/2021	1	20/12/2021	20/12/2021		20/12/2021	20/12/2021
Naphthalene	µg/L	1	Org-022/025	<1	1	<1	<1	0	73	120
Acenaphthylene	µg/L	1	Org-022/025	<1	1	<1	<1	0	[NT]	[NT]
Acenaphthene	µg/L	1	Org-022/025	<1	1	<1	<1	0	75	123
Fluorene	µg/L	1	Org-022/025	<1	1	<1	<1	0	84	124
Phenanthrene	µg/L	1	Org-022/025	<1	1	<1	<1	0	106	124
Anthracene	µg/L	1	Org-022/025	<1	1	<1	<1	0	[NT]	[NT]
Fluoranthene	µg/L	1	Org-022/025	<1	1	<1	<1	0	100	112
Pyrene	µg/L	1	Org-022/025	<1	1	<1	<1	0	98	113
Benzo(a)anthracene	µg/L	1	Org-022/025	<1	1	<1	<1	0	[NT]	[NT]
Chrysene	µg/L	1	Org-022/025	<1	1	<1	<1	0	77	103
Benzo(b,j+k)fluoranthene	µg/L	2	Org-022/025	<2	1	<2	<2	0	[NT]	[NT]
Benzo(a)pyrene	µg/L	1	Org-022/025	<1	1	<1	<1	0	107	126
Indeno(1,2,3-c,d)pyrene	µg/L	1	Org-022/025	<1	1	<1	<1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	µg/L	1	Org-022/025	<1	1	<1	<1	0	[NT]	[NT]
Benzo(g,h,i)perylene	µg/L	1	Org-022/025	<1	1	<1	<1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-022/025	137	1	129	110	16	110	115

Client Reference: E04-1221-UHSC

QUALITY CONTROL: Organochlorine Pesticides in Water				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	285448-3
Date extracted	-			17/12/2021	1	17/12/2021	17/12/2021		17/12/2021	17/12/2021
Date analysed	-			20/12/2021	1	20/12/2021	20/12/2021		20/12/2021	20/12/2021
alpha-BHC	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	75	116
HCB	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
beta-BHC	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	88	110
gamma-BHC	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Heptachlor	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	88	123
delta-BHC	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Aldrin	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	73	101
Heptachlor Epoxide	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	91	106
gamma-Chlordane	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
alpha-Chlordane	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Endosulfan I	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
pp-DDE	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	95	123
Dieldrin	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	107	101
Endrin	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	92	124
Endosulfan II	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
pp-DDD	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	91	124
Endrin Aldehyde	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
pp-DDT	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Endosulfan Sulphate	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	92	124
Methoxychlor	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	124	1	118	101	16	123	107

Client Reference: E04-1221-UHSC

QUALITY CONTROL: OP Pesticides in Water				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	285448-3
Date extracted	-			17/12/2021	1	17/12/2021	17/12/2021		17/12/2021	17/12/2021
Date analysed	-			20/12/2021	1	20/12/2021	20/12/2021		20/12/2021	20/12/2021
Dichlorvos	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	83	111
Dimethoate	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Diazinon	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Chlorpyrifos-methyl	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Ronnel	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	93	124
Fenitrothion	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	75	97
Malathion	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	92	124
Chlorpyrifos	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	96	136
Parathion	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	71	95
Bromophos ethyl	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Ethion	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	75	96
Azinphos-methyl (Guthion)	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	124	1	118	101	16	123	107

Client Reference: E04-1221-UHSC

QUALITY CONTROL: PCBs in Water				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	285448-3
Date extracted	-			17/12/2021	1	17/12/2021	17/12/2021		17/12/2021	17/12/2021
Date analysed	-			20/12/2021	1	20/12/2021	20/12/2021		20/12/2021	20/12/2021
Aroclor 1016	µg/L	2	Org-021	<2	1	<2	<2	0	[NT]	[NT]
Aroclor 1221	µg/L	2	Org-021	<2	1	<2	<2	0	[NT]	[NT]
Aroclor 1232	µg/L	2	Org-021	<2	1	<2	<2	0	[NT]	[NT]
Aroclor 1242	µg/L	2	Org-021	<2	1	<2	<2	0	[NT]	[NT]
Aroclor 1248	µg/L	2	Org-021	<2	1	<2	<2	0	[NT]	[NT]
Aroclor 1254	µg/L	2	Org-021	<2	1	<2	<2	0	97	113
Aroclor 1260	µg/L	2	Org-021	<2	1	<2	<2	0	[NT]	[NT]
Surrogate TCMX	%		Org-021	124	1	118	101	16	123	107

Client Reference: E04-1221-UHSC

QUALITY CONTROL: Total Phenolics in Water					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	285448-2
Date extracted	-			16/12/2021	1	16/12/2021	16/12/2021		16/12/2021	16/12/2021
Date analysed	-			16/12/2021	1	16/12/2021	16/12/2021		16/12/2021	16/12/2021
Total Phenolics (as Phenol)	mg/L	0.05	Inorg-031	<0.05	1	<0.05	<0.05	0	107	78

Client Reference: E04-1221-UHSC

QUALITY CONTROL: HM in water - dissolved				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W3	[NT]
Date prepared	-			16/12/2021	1	16/12/2021	16/12/2021		16/12/2021	[NT]
Date analysed	-			16/12/2021	1	16/12/2021	16/12/2021		16/12/2021	[NT]
Arsenic-Dissolved	µg/L	1	Metals-022	<1	1	1	1	0	90	[NT]
Cadmium-Dissolved	µg/L	0.1	Metals-022	<0.1	1	<0.1	<0.1	0	91	[NT]
Chromium-Dissolved	µg/L	1	Metals-022	<1	1	3	3	0	87	[NT]
Copper-Dissolved	µg/L	1	Metals-022	<1	1	1	1	0	87	[NT]
Lead-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	92	[NT]
Mercury-Dissolved	µg/L	0.05	Metals-021	<0.05	1	0.1	0.1	0	114	[NT]
Nickel-Dissolved	µg/L	1	Metals-022	<1	1	5	5	0	87	[NT]
Zinc-Dissolved	µg/L	1	Metals-022	<1	1	34	32	6	87	[NT]
Iron-Dissolved	µg/L	10	Metals-022	<10	1	<10	<10	0	85	[NT]
Manganese-Dissolved	µg/L	5	Metals-022	<5	1	16	15	6	86	[NT]
Aluminium-Dissolved	µg/L	10	Metals-022	<10	1	<10	<10	0	80	[NT]
Barium-Dissolved	µg/L	1	Metals-022	<1	1	500	500	0	100	[NT]

Client Reference: E04-1221-UHSC

QUALITY CONTROL: Ion Balance				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	285448-2
Date prepared	-			15/12/2021	1	15/12/2021	15/12/2021		15/12/2021	15/12/2021
Date analysed	-			15/12/2021	1	15/12/2021	15/12/2021		15/12/2021	15/12/2021
Calcium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	460	470	2	[NT]	[NT]
Potassium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	2	2	0	[NT]	[NT]
Sodium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	1500	1500	0	[NT]	[NT]
Magnesium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	920	920	0	[NT]	[NT]
Hardness	mgCaCO ₃ /L	3		<3	1	4900	5000	2	[NT]	[NT]
Hydroxide Alkalinity (OH ⁻) as CaCO ₃	mg/L	5	Inorg-006	<5	1	<5	<5	0	[NT]	[NT]
Bicarbonate Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	1	610	600	2	[NT]	[NT]
Carbonate Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	1	<5	<5	0	[NT]	[NT]
Total Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	1	610	600	2	106	[NT]
Sulphate, SO ₄	mg/L	1	Inorg-081	<1	1	66	66	0	92	78
Chloride, Cl	mg/L	1	Inorg-081	<1	1	2900	2900	0	109	#
Ionic Balance	%		Inorg-040	[NT]	1	26	26	0	[NT]	[NT]

Client Reference: E04-1221-UHSC

QUALITY CONTROL: Miscellaneous Inorganics				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	285448-2
Date prepared	-			15/12/2021	1	15/12/2021	15/12/2021		15/12/2021	15/12/2021
Date analysed	-			15/12/2021	1	15/12/2021	15/12/2021		15/12/2021	15/12/2021
Hexavalent Chromium, Cr ⁶⁺	mg/L	0.005	Inorg-024	<0.005	1	<0.005	<0.005	0	100	93
Ammonia as N in water	mg/L	0.005	Inorg-057	<0.005	1	0.019	0.020	5	111	112
BOD	mg/L	5	Inorg-091	<5	1	<5	[NT]		97	[NT]
Fluoride, F	mg/L	0.1	Inorg-026	<0.1	1	0.5	0.5	0	98	85
Total Organic Carbon	mg/L	1	Inorg-079	<1	1	8	8	0	98	102
Total Dissolved Solids (grav)	mg/L	5	Inorg-018	<5	1	6800	6800	0	92	[NT]
pH	pH Units		Inorg-001	[NT]	1	7.2	7.3	1	100	[NT]
Electrical Conductivity	µS/cm	1	Inorg-002	<1	1	8900	8900	0	100	[NT]
Nitrate as N in water	mg/L	0.005	Inorg-055	<0.005	1	0.31	0.31	0	107	110
Phosphate as P in water	mg/L	0.005	Inorg-060	<0.005	1	0.04	0.04	0	111	120

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.	
The recommended maximums for analytes in urine are taken from "2018 TLVs and BEIs", as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.	
Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2	

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 (not SPOCAS); 60-140% for organics/SPOCAS (+/-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.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.

Report Comments

ION_BALANCE:# Percent recovery is not applicable due to the high concentration of the analyte/s in the sample/s. However an acceptable recovery was obtained for the LCS.

The mass imbalance may be caused different preservation of the samples for the cations the preservation of HNO₃ and filtration was used while for anions the non-preservation of the bottle was used.



CHAIN OF CUSTODY - Client

ENVIROLAB GROUP - National phone number 1300 42 43 44

Sydney Lab - Envirolab Services
12 Ashley St, Chatswood, NSW 2067
Ph 02 9910 6200 / sydney@envirolab.com.au

Combo1=TRH/BTEX/Pb
Combo2=TRH/BTEX/PAH/Pb
Combo3=TRH/BTEX/PAH/Met
Combo4=TRH/BTEX/PAH/Met/Phen
Combo5=TRH/BTEX/PAH/OC/PCB/Met
Combo6=TRH/BTEX/PAH/OC/OP/PCB/Met
Combo7=TRH/BTEX/PAH/OC/PCB/Met/Phen
Combo8=TRH/BTEX/PAH/OC/OP/PCB/Met/Phen
Combo9=TRH/BTEX/PAH/OC/PCB/Met/Phen/CN
Combo10=TRH/BTEX/PAH/OC/OP/PCB/Met/Phen/CN
Combo11=TRH/BTEX/PAH/OC/PCB/12met/Phen/CN
Combo12=TRH/BTEX/PAH/OC/PCB/Met/TCLP-PAH,6 Met
Combo13=TRH/BTEX/PAH/OC/OP/PCB/Met/TCLP-PAH,6Met

A Combo with an 'A' indicates Asbestos is also needed.

Client: Engage Environmental Services
Contact Person: Stephen Challinor
Project Mgr: Stephen
Sampler: Stephen Challinor
Address: 113 Reservoir Rd, Glendale NSW 2285
Phone: 0478 362 005 Mob: 0478362005
Email: stephen.challinor@engage-es.com.au;
results@engage-es.com.au

Client Project Name / Number / Site etc (ie report title): E04-1221 - UHSC
PO No.:
Envirolab Quote No. :
Date results required:
Or choose: STANDARD
Note: Inform lab in advance if urgent turnaround is required - surcharges apply
Report format: esdat / equis /
Lab Comments:

Sample information

Tests Required

Comments

Envirolab Sample ID	Client Sample ID or information	Depth	Date sampled	Type of sample	Combo 8 with 12 metals: Fe, Mn, As, Al, Ba, Cd, Co, Cr, Cr, Pb, Hg, Zn	Cation suite: Ca, K, Na, Mg	Anions major: Chloride, Sulfate, alkalinity	Chromium Hexavalent	Ammonia	BOD	Chlorinated volatile compounds	Fluoride	TOC	TDS	Phosphate	Nitrate	EC	pH	Provide as much information about the sample as you can
1	MWA		14/12/2021	Water	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
2	MWB		14/12/2021	Water	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
3	MWC		14/12/2021	Water	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
4	MWD		14/12/2021	Water	X	X	X	X	X	X	X	X	X	X	X	X	X	X	leachate
5	MWE		14/12/2021	Water	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

Relinquished by (Company): Engage Environmental Services
Print Name: Stephen Challinor
Date & Time: 15/12/21
Signature: [Signature]

Received by (Company): ELS Syd
Print Name: K. Core
Date & Time: 15/12/21 1330
Signature: [Signature]

Lab use only:
Samples Received: Cool or Ambient (circle one)
Temperature Received at: 16 (if applicable)
Transported by: Hand delivered / courier

White - Lab copy / Blue - Client copy / Pink - Retain in Book Page No:



Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200

Job No: 285448

Date Received: 15/12/21
Time Received: 1330
Received By: K.C.
Temp: Cool / Ambient
Cooling: Ice / Icepack
Security: Intact / Broken

Attachment 3 Groundwater Field Data Sheets

GROUNDWATER FIELD DATA SHEET

Project: E04-1221	Sample ID: MWA
Client: UHSC – Scone Waste Facility	Sampler: C Lang
Site Address:	Date: December 2021

Well Information			
Monument damaged:	YES / NO / N/A	Well ID visible:	YES / NO / N/A
Locked well casing:	YES / NO / N/A	Cap on PVC casing:	YES / NO / N/A
Cement footing damaged:	YES / NO / N/A	Water in monument casing:	YES / NO / N/A
Standing water, vegetation around monument:	YES / NO / N/A	Internal obstruction in casing:	YES / NO / N/A
Well Damaged:	YES / NO / N/A	Odours from groundwater:	YES / NO / N/A
Casing above ground:	m agl	Weather Conditions:	
Standing water level: 7.56.....	m bgl	Temperature	15-20 <input type="checkbox"/> 20-25 <input checked="" type="checkbox"/>
Total well depth: 15.55.....	m bgl		25-30 <input type="checkbox"/> >30 <input type="checkbox"/>
Initial well volume:	L	Clear <input checked="" type="checkbox"/>	Partly cloudy <input type="checkbox"/> Overcast <input type="checkbox"/>
Water level after purging:	m bgl	Calm <input checked="" type="checkbox"/>	Slight breeze <input type="checkbox"/> Moderate breeze <input type="checkbox"/>
Volume of water purged:	L		Windy <input type="checkbox"/>
Water level at time of sampling:	m bgl		
Well purged dry:	YES / NO		
Purging equipment:			
Sample equipment:		Fine <input checked="" type="checkbox"/>	Showers <input type="checkbox"/> Rain <input type="checkbox"/>

Note: 50mm internal diameter pipe = 1.96 L/m.

Water Quality Details:

Time am / pm	DO (mg/L ⁻¹)	EC (μ S cm ⁻¹)	pH	Redox (mV)	Temp (°C)	Salinity (% Refract)	Comments
10:15	8.30	16312	7.78	65.6	20.9	0.82	
10:18	7.19	16290	7.65	66.8	20.7	0.84	
10:22	7.12	16140	7.49	65.3	20.8	1.24	
10:25	7.13	15970	7.53	61.2	20.7	1.29	
10:26	7.11	15990	7.53	62.1	20.7	1.28	

Water Quality and General Comments:

No odour, no sheen
cloudy _____

GROUNDWATER FIELD DATA SHEET

Project: E04-1221	Sample ID: MWB
Client: UHSC – Scone Waste Facility	Sampler: C Lang
Site Address:	Date: December 2021

Well Information			
Monument damaged:	YES / NO / N/A	Well ID visible:	YES / NO / N/A
Locked well casing:	YES / NO / N/A	Cap on PVC casing:	YES / NO / N/A
Cement footing damaged:	YES / NO / N/A	Water in monument casing:	YES / NO / N/A
Standing water, vegetation around monument:	YES / NO / N/A	Internal obstruction in casing:	YES / NO / N/A
Well Damaged:	YES / NO / N/A	Odours from groundwater:	YES / NO / N/A
Casing above ground:	m agl	Weather Conditions:	
Standing water level: 7.30.....	m bgl	Temperature	15-20 <input type="checkbox"/> 20-25 <input checked="" type="checkbox"/>
Total well depth: 15.92.....	m bgl		25-30 <input type="checkbox"/> >30 <input type="checkbox"/>
Initial well volume:	L	Clear <input checked="" type="checkbox"/>	Partly cloudy <input type="checkbox"/> Overcast <input type="checkbox"/>
Water level after purging:	m bgl	Calm <input checked="" type="checkbox"/>	Slight breeze <input type="checkbox"/> Moderate breeze <input type="checkbox"/>
Volume of water purged:	L		Windy <input type="checkbox"/>
Water level at time of sampling:	m bgl		
Well purged dry:	YES / NO		
Purging equipment:			
Sample equipment:		Fine <input checked="" type="checkbox"/>	Showers <input type="checkbox"/> Rain <input type="checkbox"/>

Note: 50mm internal diameter pipe = 1.96 L/m.

Water Quality Details:

Time am / pm	DO (mg/L ⁻¹)	EC (μ S cm ⁻¹)	pH	Redox (mV)	Temp (°C)	Salinity (% Refract)	Comments
10:48	2.62	13348	6.66	178.9	20.7	4.22	
10:49	2.75	13332	6.72	178.0	20.6	8.59	
10:53	3.53	13247	6.79	177.6	20.5	8.45	
10:55	3.26	13189	6.82	175.4	20.7	8.61	
10:56	3.20	13224	6.80	176.0	20.7	8.59	

Water Quality and General Comments:

No odour, no sheen clear with
sed. _____

GROUNDWATER FIELD DATA SHEET

Project: E04-1221	Sample ID: MWC
Client: UHSC – Scone Waste Facility	Sampler: C Lang
Site Address:	Date: December 2021

Well Information			
Monument damaged:	YES / NO / N/A	Well ID visible:	YES / NO / N/A
Locked well casing:	YES / NO / N/A	Cap on PVC casing:	YES / NO / N/A
Cement footing damaged:	YES / NO / N/A	Water in monument casing:	YES / NO / N/A
Standing water, vegetation around monument:	YES / NO / N/A	Internal obstruction in casing:	YES / NO / N/A
Well Damaged:	YES / NO / N/A	Odours from groundwater:	YES / NO / N/A
Casing above ground:	m agl	Weather Conditions:	
Standing water level: 5.68.....	m bgl	Temperature	15-20 <input type="checkbox"/> 20-25 <input checked="" type="checkbox"/>
Total well depth: 15.52.....	m bgl		25-30 <input type="checkbox"/> >30 <input type="checkbox"/>
Initial well volume:	L	Clear <input checked="" type="checkbox"/>	Partly cloudy <input type="checkbox"/> Overcast <input type="checkbox"/>
Water level after purging:	m bgl	Calm <input checked="" type="checkbox"/>	Slight breeze <input type="checkbox"/> Moderate breeze <input type="checkbox"/>
Volume of water purged:	L		Windy <input type="checkbox"/>
Water level at time of sampling:	m bgl		
Well purged dry:	YES / NO		
Purging equipment:			
Sample equipment:		Fine <input checked="" type="checkbox"/>	Showers <input type="checkbox"/> Rain <input type="checkbox"/>

Note: 50mm internal diameter pipe = 1.96 L/m.

Water Quality Details:

Time am / pm	DO (mg/L ⁻¹)	EC (μS cm ⁻¹)	pH	Redox (mV)	Temp (°C)	Salinity (% Refract)	Comments
11:17	1.61	11174	6.92	184.4	20.6	7.75	
11:21	2.36	11125	6.94	183.2	20.1	7.66	
11:23	2.56	11099	6.96	187.9	20	7.66	
11:26	2.60	11074	6.96	188.4	19.9	7.64	

Water Quality and General Comments:

No odour, no sheen, brown
cloudy _____

GROUNDWATER FIELD DATA SHEET

Project: E04-1221	Sample ID: MWD
Client: UHSC – Scone Waste Facility	Sampler: C Lang
Site Address:	Date: December 2021

Well Information			
Monument damaged:	YES / NO / N/A	Well ID visible:	YES / NO / N/A
Locked well casing:	YES / NO / N/A	Cap on PVC casing:	YES / NO / N/A
Cement footing damaged:	YES / NO / N/A	Water in monument casing:	YES / NO / N/A
Standing water, vegetation around monument:	YES / NO / N/A	Internal obstruction in casing:	YES / NO / N/A
Well Damaged:	YES / NO / N/A	Odours from groundwater:	YES / NO / N/A
Casing above ground:	m agl	Weather Conditions:	
Standing water level: 9.35.....	m bgl	Temperature 15-20 <input type="checkbox"/>	20-25 <input checked="" type="checkbox"/>
Total well depth: 13.2.....	m bgl	25-30 <input type="checkbox"/>	>30 <input type="checkbox"/>
Initial well volume:	L	Clear <input checked="" type="checkbox"/>	Partly cloudy <input type="checkbox"/> Overcast <input type="checkbox"/>
Water level after purging:	m bgl	Calm <input checked="" type="checkbox"/>	Slight breeze <input type="checkbox"/> Moderate breeze <input type="checkbox"/>
Volume of water purged:	L	Windy <input type="checkbox"/>	
Water level at time of sampling:	m bgl	Fine <input checked="" type="checkbox"/>	Showers <input type="checkbox"/> Rain <input type="checkbox"/>
Well purged dry:	YES / NO		
Purging equipment:			
Sample equipment:			

Note: 50mm internal diameter pipe = 1.96 L/m.

Water Quality Details:

Time am / pm	DO (mg/L ⁻¹)	EC (μS cm ⁻¹)	pH	Redox (mV)	Temp (°C)	Salinity (% Refract)	Comments
12:36	2.66	12074	7.35	238.4	28.2	1.89	
12:40	1.71	11099	7.72	236.3	27.6	1.20	
12:44	1.21	11103	7.3	229.9	27.6	2.32	
12:47	1.18	10998	7.28	223.2	27.2	1.36	

Water Quality and General Comments:

Leachete, odour, , brown

GROUNDWATER FIELD DATA SHEET

Project: E04-1221	Sample ID: MWE
Client: UHSC – Scone Waste Facility	Sampler: C Lang
Site Address:	Date: December 2021

Well Information			
Monument damaged:	YES / NO / N/A	Well ID visible:	YES / NO / N/A
Locked well casing:	YES / NO / N/A	Cap on PVC casing:	YES / NO / N/A
Cement footing damaged:	YES / NO / N/A	Water in monument casing:	YES / NO / N/A
Standing water, vegetation around monument:	YES / NO / N/A	Internal obstruction in casing:	YES / NO / N/A
Well Damaged:	YES / NO / N/A	Odours from groundwater:	YES / NO / N/A
Casing above ground:	m agl	Weather Conditions:	
Standing water level: 3.15.....	m bgl	Temperature 15-20 <input type="checkbox"/>	20-25 <input checked="" type="checkbox"/>
Total well depth: 9.26.....	m bgl	25-30 <input type="checkbox"/>	>30 <input type="checkbox"/>
Initial well volume:	L	Clear <input checked="" type="checkbox"/>	Partly cloudy <input type="checkbox"/> Overcast <input type="checkbox"/>
Water level after purging:	m bgl	Calm <input checked="" type="checkbox"/>	Slight breeze <input type="checkbox"/> Moderate breeze <input type="checkbox"/>
Volume of water purged:	L	Windy <input type="checkbox"/>	
Water level at time of sampling:	m bgl	Fine <input checked="" type="checkbox"/>	Showers <input type="checkbox"/> Rain <input type="checkbox"/>
Well purged dry:	YES / NO		
Purging equipment:			
Sample equipment:			

Note: 50mm internal diameter pipe = 1.96 L/m.

Water Quality Details:

Time am / pm	DO (mg/L ⁻¹)	EC (μS cm ⁻¹)	pH	Redox (mV)	Temp (°C)	Salinity (% Refract)	Comments
11.58	1.91	2870	7.05	134.5	19.5	1.47	
12.02	1.96	2846	7.08	118.4	19.0	1.45	
12.06	1.91	2777	7.14	90.3	18.9	1.5	
12.09	1.94	2804	7.10	100.1	19.0	1.45	

Water Quality and General Comments:

No odour, no sheen, clear with
sed. _____

Attachment 4 Water Quality Meter Calibration Certificate

Multi Parameter Water Meter



Instrument **YSI Quatro Pro Plus**
 Serial No. **20M101174**

Air-Met Scientific Pty Ltd
 1300 137 067

Item	Test	Pass	Comments
Battery	Charge Condition	✓	
	Fuses	✓	
	Capacity	✓	
Switch/keypad	Operation	✓	
	Display		
Display	Intensity	✓	
	Operation (segments)	✓	
Grill Filter	Condition	✓	
	Seal	✓	
PCB	Condition	✓	
Connectors	Condition	✓	
Sensor	1. pH	✓	
	2. mV	✓	
	3. EC	✓	
	4. D.O	✓	
	5. Temp	✓	
Alarms	Beeper		
	Settings		
Software	Version		
Data logger	Operation		
Download	Operation		
Other tests:			

Certificate of Calibration

This is to certify that the above instrument has been calibrated to the following specifications:

Sensor	Serial no	Standard Solutions	Certified	Solution Bottle Number	Instrument Reading
1. PH 10.00		PH1 10.00		370064	pH 9.88
2. pH 7.00		pH 7.00		368081	pH 7.00
3. pH 4.00		pH 4.00		367234	pH 3.95
4. mV		229.6mV		365451/370891	229.9mV
5. EC		2.76mS		362912	2.74mS
6. D.O		0.00 ppm		371864	0.00 ppm
7. Temp		21.8°C		MultiTherm	21.7°C

Calibrated by: Kylie Rawlings

Calibration date: 8/12/2021

Next calibration due: 9/06/2022