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E: [admin@engage-es.com.au](mailto:admin@engage-es.com.au)

M: 0478 362 005

**ENGAGE  
ENVIRONMENTAL  
SERVICES**

ABN 13 629 353 662

**ANNUAL  
GROUNDWATER  
MONITORING**

**SCONE WASTE  
FACILITY  
NOBLET ROAD  
SCONE NSW**



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OFFICE  
113 Reservoir Rd  
Glendale NSW 2285

Ph: 0478 362 005

Email: [admin@engage-es.com.au](mailto:admin@engage-es.com.au)

FIELD OFFICE  
Unit 1, 104 George St  
Singleton NSW 2330

Ph: 0478 364 588

Engage Environmental Services Pty Limited: ABN 13 629 353 662



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## ABBREVIATIONS

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

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



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## 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 13<sup>th</sup> September 2022.

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
<b>IONS</b>	<b>Calcium</b>	mg/L	NA	Quarterly
	<b>Alkalinity (total)</b>	mg/L	NA	Quarterly
	<b>Chloride</b>	mg/L	NA	Quarterly
	<b>Fluoride</b>	mg/L	NA	Quarterly
	<b>Potassium<sup>1</sup></b>	mg/L	410	Quarterly
	<b>Magnesium</b>	mg/L	NA	Quarterly
	<b>Sulphate</b>	mg/L	NA	Quarterly
<b>HEAVY METALS</b>	<b>Iron</b>	mg/L	0.3	Quarterly
	<b>Manganese</b>	mg/L	1.9	Quarterly
	<b>Arsenic III &amp; V</b>	mg/L	0.024 (III), 0.013 (V)	Yearly
	<b>Aluminium</b>	mg/L	0.055 (pH > 6.5)	Yearly
	<b>Barium</b>	mg/L	NA	Yearly
	<b>Cadmium</b>	mg/L	0.0002	Yearly
	<b>Cobalt</b>	mg/L	0.001	Yearly
	<b>Copper</b>	mg/L	0.0014	Yearly
	<b>Chromium VI</b>	mg/L	0.001	Yearly
	<b>Chromium III</b>	mg/L	27	Yearly
	<b>Lead</b>	mg/L	0.0034	Yearly
	<b>Mercury</b>	mg/L	0.0006	Yearly
<b>Zinc</b>	mg/L	0.008	Yearly	
<b>PHENOL</b>	<b>Total phenolics</b>	mg/L	0.32	Quarterly
<b>OCP</b>	<b>Organochlorine Pesticide<sup>3</sup> (OCP)</b>	mg/L	0.00001	Quarterly
<b>OPP</b>	<b>OPPs</b>	mg/L	0.006	Yearly

<b>PCB</b>	<b>PCBs</b>	mg/L	0.00001	Yearly
<b>Hydrocarbons</b>	<b>TRH</b>	mg/L	0.26	Yearly
	<b>Benzene</b>	mg/L	0.95	Yearly
	<b>Toluene</b>	mg/L	0.18	Yearly
	<b>Ethylbenzene</b>	mg/L	0.3	Yearly
	<b>Xylene (o+p)</b>	mg/l	0.35	Yearly
	<b>PAHs</b>	mg/L	0.016	Yearly
<b>CVCs/ VOCCs</b>	<b>- Total</b>	mg/L	NA	Yearly
	<b>Tetrachlorethene (TCE)</b>	mg/L	NA	Yearly
	<b>1,1,2-Trichloroethane</b>	mg/L	6.5	Yearly
	<b>Tetrachloroethene (PCE)</b>	mg/L	0.05	Yearly
	<b>1, 1-Dichloroethene</b>	mg/L	0.03	Yearly
	<b>Vinyl Chloride</b>	mg/L	0.0003	Yearly
<b>MISC. INORGA NICS</b>	<b>pH</b>	pH	6.5 – 8	Quarterly
	<b>Sodium</b>	mg/L	NA	Quarterly
	<b>Ammonia<sup>2</sup></b>	mg/L	0.9	Quarterly
	<b>Nitrate</b>	mg/L	50	Quarterly
	<b>Total organic carbon</b>	mg/L	4	Quarterly
	<b>Electrical conductivity</b>	µS/cm	NA	Quarterly
	<b>Total dissolved solids</b>	mg/L	NA	Yearly
	<b>Biochemical Oxygen Phosphate</b>	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 September 2022 sampling event, results are detailed in **Tables 2 to 11**. Comparisons have been made to the previous quarterly rounds of 2021 monitoring (March and June) also the yearly monitoring of December 2021. 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 Sept 2021	MWA Dec 2021	MWA March 2022	MWA June 2022	MWA Sept 2022
<b>IONS</b>	<b>Calcium</b>	mg/L	NA	540	460	66	520	550
	<b>Alkalinity</b>	mg/L	NA	500	610	610	510	510
	<b>Chloride</b>	mg/L	NA	6300	2900	250	7000	6900
	<b>Fluoride</b>	mg/L	NA	0.1	<LOR	0.7	0.2	0.1
	<b>Potassium<sup>1</sup></b>	mg/L	410	3	2	1	3	3
	<b>Magnesium</b>	mg/L	NA	990	920	100	110	950
	<b>Sulphate</b>	mg/L	NA	48	66	29	48	50
<b>HEAVY METALS</b>	<b>Iron</b>	mg/L	0.3	<LOR	<LOR	<LOR	<LOR	<LOR
	<b>Manganese</b>	mg/L	1.9	0.01	0.016	0.009	0.03	<LOR
<b>Phenols</b>	<b>Total</b>	mg/L	0.32	<LOR	<LOR	<LOR	<LOR	<LOR
<b>OCPs</b>	<b>OCP<sup>3</sup></b>	mg/L	0.00001	<LOR	<LOR	<LOR	<LOR	<LOR
<b>MISC. INORGANICS</b>	<b>pH</b>	pH	6.5 – 8	6.8	7.2	7.6	6.9	6.2
	<b>Sodium</b>	mg/L	NA	2100	1500	350	1800	1800
	<b>Ammonia<sup>2</sup></b>	mg/L	0.9	0.068	0.019	0.031	0.037	0.049
	<b>Nitrate</b>	mg/L	0.7	0.6	0.31	0.058	0.55	0.51
	<b>TOC</b>	mg/L	4	3	8	20	5	5
	<b>EC</b>	µS/cm	NA	19000	8900	1600	20000	17000

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 Annual 2021 & Sept 2022 (MWA)**

Sampling Parameter	Units	Threshold Criteria (mg/L)	MWA	MWA
			Annual 2021	Sept 2022
<b>Total dissolved solids</b>	mg/L	NA	6800	14000
<b>Biochemical Oxygen Demand</b>	mg/L	NA	<LOR	<LOR
<b>Phosphate</b>	mg/L	0.015 <sup>G</sup>	<b>0.04</b>	<b>0.071</b>
<b>Arsenic III &amp; V</b>	mg/L	0.024 (III), 0.013	0.001	0.001
<b>Aluminium</b>	mg/L	0.055 (pH > 6.5)	<LOR	<LOR
<b>Barium</b>	mg/L	NA	0.5	0.54
<b>Cadmium</b>	mg/L	0.0002	<LOR	<LOR
<b>Copper</b>	mg/L	0.0014	0.001	<b>0.002</b>
<b>Chromium VI</b>	mg/L	0.004	<b>0.005</b>	<LOR
<b>Chromium (Total)</b>	mg/L	27	0.003	<LOR
<b>Lead</b>	mg/L	0.0034	<LOR	<LOR
<b>Mercury</b>	mg/L	0.0006	<LOR	0.0002
<b>Zinc</b>	mg/L	0.008 <sup>D</sup>	<b>0.034</b>	<b>0.013</b>
<b>Benzene</b>	mg/L	0.95	<LOR	<LOR
<b>Toluene</b>	mg/L	0.18 <sup>L</sup>	<LOR	<LOR
<b>Ethylbenzene</b>	mg/L	0.08 <sup>L</sup>	<LOR	<LOR
<b>Xylene</b>	mg/L		<LOR	<LOR
<b>TRH</b>	mg/L	NA	<LOR	<LOR
<b>Tetrachlorethene (TCE)</b>	mg/L	NA	<LOR	<LOR
<b>1,1,2-Trichloroethane (TCA)</b>	mg/L	6.500	<LOR	<LOR
<b>Tetrachloroethene (PCE)</b>	mg/L	0.05 <sup>N</sup>	<LOR	<LOR
<b>1,1-Dichloroethene</b>	mg/L	0.03 <sup>P</sup>	<LOR	<LOR
<b>Vinyl Chloride</b>	mg/L	0.0003 <sup>N</sup>	<LOR	<LOR
<b>PCBs</b>	mg/L	0.00003 <sup>A</sup>	<LOR	<LOR
<b>PAHs</b>	mg/L	0.016 <sup>B</sup>	<LOR	<LOR
<b>OPPs</b>	mg/L	0.00002 <sup>C</sup>	<LOR	<LOR

**Table 4 – Quarterly Groundwater Results and Comparison (MWB)**

	Analytes	Units	Site	MWB	MWB	MWB	MWB	MWB
			Criteria (mg/L)	Sept 2021	Dec 2021	March 2022	June 2022	Sept 2022
<b>IONS</b>	<b>Calcium</b>	mg/L	NA	480	470	420	460	470
	<b>Alkalinity</b>	mg/L	NA	420	440	430	430	440
	<b>Chloride</b>	mg/L	NA	4300	5000	4600	4800	4700
	<b>Fluoride</b>	mg/L	NA	0.2	0.3	0.2	0.3	0.2
	<b>Potassium<sup>1</sup></b>	mg/L	410	4	2	2	2	3
	<b>Magnesium</b>	mg/L	NA	600	640	620	650	570
	<b>Sulphate</b>	mg/L	NA	76	82	85	81	77
<b>HEAVY METALS</b>	<b>Iron</b>	mg/L	0.3	<LOR	<LOR	0.04	0.06	<LOR
	<b>Manganese</b>	mg/L	1.9	0.02	0.011	0.01	0.01	0.014
<b>OCP</b>	<b>OCP<sup>3</sup></b>	mg/L	0.00001	<LOR	<LOR	<LOR	<LOR	<LOR
<b>PHENOLS</b>	<b>Total phenolics</b>	mg/L	0.32	<LOR	<LOR	<LOR	<LOR	<LOR
<b>MISC. INORGANICS</b>	<b>pH</b>	pH	6.5 – 8	6.9	6.9	6.8	7.0	6.8
	<b>Sodium</b>	mg/L	NA	1500	1300	1000	1300	1400
	<b>Ammonia<sup>2</sup></b>	mg/L	0.9	0.024	0.025	0.011	0.017	0.065
	<b>Nitrate</b>	mg/L	0.7	0.66	0.62	0.38	0.36	0.32
	<b>TOC</b>	mg/L	4	<b>6</b>	<b>5</b>	<b>6</b>	<b>5</b>	<b>5</b>
	<b>EC</b>	µS/cm	NA	14000	14000	13000	14000	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 5 – Yearly Analytes Groundwater Results and Comparison Annual 2021-Sept 2022  
(MWB)**

Sampling Parameter	Units	Threshold Criteria (mg/L)	MWB	MWB
			Annual 2021	Sept 2022
<b>Total dissolved solids</b>	mg/L	NA	12000	10000
<b>Biochemical Oxygen Demand</b>	mg/L	NA	<LOR	<LOR
<b>Phosphate</b>	mg/L	0.015	0.008	<b>0.02</b>
<b>Arsenic III &amp; V</b>	mg/L	0.024 (III), 0.013	<LOR	0.001
<b>Aluminium</b>	mg/L	0.055 (pH > 6.5)	<LOR	<LOR
<b>Barium</b>	mg/L	NA	0.43	0.39
<b>Cadmium</b>	mg/L	0.0002	<LOR	<LOR
<b>Copper</b>	mg/L	0.0014	<LOR	0.002
<b>Chromium VI</b>	mg/L	0.004	<b>0.008</b>	<LOR
<b>Chromium (Total)</b>	mg/L	0.004	0.003	0.004
<b>Lead</b>	mg/L	0.0034	<LOR	<LOR
<b>Mercury</b>	mg/L	0.0006	<LOR	0.00007
<b>Zinc</b>	mg/L	0.008	<b>0.033</b>	<b>0.009</b>
<b>Benzene</b>	mg/L	0.95	<LOR	<LOR
<b>Toluene</b>	mg/L	0.18 <sup>L</sup>	<LOR	<LOR
<b>Ethylbenzene</b>	mg/L	0.08 <sup>L</sup>	<LOR	<LOR
<b>Xylene</b>	mg/L		<LOR	<LOR
<b>TRH</b>	mg/L	NA	<LOR	<LOR
<b>Tetrachlorethene (TCE)</b>	mg/L	NA	<LOR	<LOR
<b>1,1,2-Trichloroethane (TCA)</b>	mg/L	6500 (1,1,2 TCA)	<LOR	<LOR
<b>Tetrachloroethene (PCE)</b>	mg/L	0.05	<LOR	<LOR
<b>1,1-Dichloroethene</b>	mg/L	0.03	<LOR	<LOR
<b>Vinyl Chloride</b>	mg/L	0.0003	<LOR	<LOR
<b>PCBs</b>	mg/L	0.00003	<LOR	<LOR
<b>PAHs</b>	mg/L	0.016	<LOR	<LOR
<b>OPPs</b>	mg/L	0.00002	<LOR	<LOR

**Table 6 – Quarterly Groundwater Results and Comparison (MWC)**

	Analytes	Units	Site	MWC	MWC	MWC	MWC	MWC
			Criteria (mg/L)	Sept 2021	Dec 2021	March 2022	June 2022	Sept 2022
<b>IONS</b>	<b>Calcium</b>	mg/L	NA	330	310	370	300	61
	<b>Alkalinity (total)</b>	mg/L	NA	890	920	930	940	600
	<b>Chloride</b>	mg/L	NA	3400	4200	4000	3800	840
	<b>Fluoride</b>	mg/L	NA	0.2	0.3	0.2	0.2	0.3
	<b>Potassium<sup>1</sup></b>	mg/L	410	3	1	2	2	1
	<b>Magnesium</b>	mg/L	NA	440	450	440	440	110
	<b>Sulphate</b>	mg/L	NA	120	98	120	88	170
<b>HEAVY METALS</b>	<b>Iron</b>	mg/L	0.3	0.01	<LOR	<LOR	<LOR	0.05
	<b>Manganese</b>	mg/L	1.9	<b>4.4</b>	<b>3</b>	<b>2.2</b>	<b>2.1</b>	0.68
<b>PHENOLS</b>	<b>Total phenolics</b>	mg/L	0.32	<LOR	<LOR	<LOR	<LOR	<LOR
<b>OCP</b>	<b>OCP<sup>3</sup></b>	mg/L	0.000	<LOR	<LOR	<LOR	<LOR	<LOR
<b>MISC. INORGANIC S</b>	<b>pH</b>	pH	6.5 – 8	6.8	7	6.9	6.9	7.2
	<b>Sodium</b>	mg/L	NA	1700	1400	2000	1400	500
	<b>Ammonia<sup>2</sup></b>	mg/L	0.9	0.021	0.096	0.048	0.073	0.05
	<b>Nitrate</b>	mg/L	0.7	0.058	0.066	0.11	0.092	<b>1.2</b>
	<b>TOC</b>	mg/L	4	<b>9</b>	<b>8</b>	<b>8</b>	<b>8</b>	<b>75</b>
	<b>EC</b>	µS/cm	NA	13000	13000	11000	13000	3600

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 Annual 2021-Sept 2022  
(MWC)**

Sampling Parameter	Units	Threshold Criteria (mg/L)	MWC Annual 2021	MWC Sept 2022
<b>Total dissolved solids</b>	mg/L	NA	8700	2200
<b>Biochemical Oxygen Demand</b>	mg/L	NA	6	<LOR
<b>Phosphate</b>	mg/L	0.015	<b>0.081</b>	<b>0.04</b>
<b>Arsenic III &amp; V</b>	mg/L	0.024 (III),	<LOR	0.002
<b>Aluminium</b>	mg/L	0.055 (pH > 6.5)	<LOR	<LOR
<b>Barium</b>	mg/L	NA	0.34	0.08
<b>Cadmium</b>	mg/L	0.0002	<LOR	<LOR
<b>Copper</b>	mg/L	0.0014	0.001	<b>0.003</b>
<b>Chromium VI</b>	mg/L	0.004	<LOR	<LOR
<b>Chromium (total)</b>	mg/L	0.004	<LOR	<LOR
<b>Lead</b>	mg/L	0.0034	<LOR	<LOR
<b>Mercury</b>	mg/L	0.0006	<LOR	<LOR
<b>Zinc</b>	mg/L	0.008	<b>0.013</b>	0.005
<b>Benzene</b>	mg/L	0.95	<LOR	<LOR
<b>Toluene</b>	mg/L	0.18	<LOR	<LOR
<b>Ethylbenzene</b>	mg/L	0.08	<LOR	<LOR
<b>Xylene</b>	mg/L		<LOR	<LOR
<b>TRH</b>	mg/L	NA	<LOR	<LOR
<b>Tetrachlorethene (TCE)</b>	mg/L	NA	<LOR	<LOR
<b>1,1,2-Trichloroethane (TCA)</b>	mg/L	6500 (1,1,2 TCA)	<LOR	<LOR
<b>Tetrachloroethene (PCE)</b>	mg/L	0.05	<LOR	<LOR
<b>1,1-Dichloroethene</b>	mg/L	0.03	<LOR	<LOR
<b>Vinyl Chloride</b>	mg/L	0.0003	<LOR	<LOR
<b>PCBs</b>	mg/L	0.00003	<LOR	<LOR
<b>PAHs</b>	mg/L	0.016	<LOR	<LOR
<b>OPPs</b>	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 Sept 2021	MWD Dec 2021	MWD March 2022	MWD June 2022	MWD Sept 2022
<b>IONS</b>	<b>Calcium</b>	mg/L	NA	170	180	220	190	190
	<b>Alkalinity (total)</b>	mg/L	NA	1700	950	1700	1500	1500
	<b>Chloride</b>	mg/L	NA	600	920	1700	1800	1400
	<b>Fluoride</b>	mg/L	NA	0.2	0.2	0.3	0.3	0.3
	<b>Potassium<sup>1</sup></b>	mg/L	410	120	46	79	91	82
	<b>Magnesium</b>	mg/L	NA	170	88	140	170	150
	<b>Sulphate</b>	mg/L	NA	41	98	49	38	85
<b>HEAVY METALS</b>	<b>Iron</b>	mg/L	0.3	<b>0.58</b>	<b>0.44</b>	<b>0.65</b>	<b>0.87</b>	<b>0.75</b>
	<b>Manganese</b>	mg/L	1.9	0.59	0.56	0.59	0.45	0.61
<b>PHENOLS</b>	<b>Total phenolics</b>	mg/L	0.32	<LOR	<LOR	<LOR	<LOR	<LOR
<b>OCP</b>	<b>OCP<sup>3</sup></b>	mg/L	0.00001	<LOR	<LOR	<LOR	<LOR	<LOR
<b>MISC. INORGANICS</b>	<b>pH</b>	pH	6.5 – 8	7.5	7.3	7.4	7.4	7.5
	<b>Sodium</b>	mg/L	NA	970	500	840	1100	810
	<b>Ammonia<sup>2</sup></b>	mg/L	0.9	<b>170</b>	<b>67</b>	<b>130</b>	<b>130</b>	<b>140</b>
	<b>Nitrate</b>	mg/L	0.7	0.008	0.23	0.02	<LOR	0.056
	<b>TOC</b>	mg/L	4	<b>110</b>	<b>77</b>	<b>140</b>	<b>130</b>	<b>220</b>
	<b>EC</b>	µS/cm	NA	8400	4400	7300	8100	6400

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 Annual 2021-Sept 2022  
(MWD)**

Sampling Parameter	Units	Threshold Criteria (mg/L)	MWD (leachate) Annual 2021	MWD (leachate) Sept 2022
<b>Total dissolved solids</b>	mg/L	NA	2600	4800
<b>Biochemical Oxygen Demand</b>	mg/L	NA	140	74
<b>Phosphate</b>	mg/L	0.015	<b>0.4</b>	<b>0.042</b>
<b>Arsenic III &amp; V</b>	mg/L	0.024 (III),	0.003	0.009
<b>Aluminium</b>	mg/L	0.055 (pH > 6.5)	<LOR	<LOR
<b>Barium</b>	mg/L	NA	0.4	0.68
<b>Cadmium</b>	mg/L	0.0002	<LOR	<LOR
<b>Copper</b>	mg/L	0.0014	<LOR	<LOR
<b>Chromium VI</b>	mg/L	0.004	<LOR	<LOR
<b>Chromium (total)</b>	mg/L	0.004	<LOR	<b>0.018</b>
<b>Lead</b>	mg/L	0.0034	<LOR	<LOR
<b>Mercury</b>	mg/L	0.0006	<LOR	<LOR
<b>Zinc</b>	mg/L	0.008	<b>0.01</b>	<b>0.01</b>
<b>Benzene</b>	mg/L	0.95	0.002	0.005
<b>Toluene</b>	mg/L	0.18	<LOR	<LOR
<b>Ethylbenzene</b>	mg/L	0.08	<LOR	<LOR
<b>Xylene</b>	mg/L		<LOR	<LOR
<b>TRH</b>	mg/L	NA	2.434	2.249
<b>Tetrachlorethene (TCE)</b>	mg/L	NA	<LOR	<LOR
<b>1,1,2-Trichloroethane (TCA)</b>	mg/L	6.5	<LOR	<LOR
<b>Tetrachloroethene (PCE)</b>	mg/L	0.05	<LOR	<LOR
<b>1,1-Dichloroethene</b>	mg/L	0.03	<LOR	<LOR
<b>Vinyl Chloride</b>	mg/L	0.0003	<LOR	<LOR
<b>PCBs</b>	mg/L	0.00003	<LOR	<LOR
<b>PAHs</b>	mg/L	0.016	<b>0.095</b>	0.012
<b>OPPs</b>	mg/L	0.00002	<LOR	<LOR

**Table 10 –Quarterly Groundwater Results and Comparison (MWE)**

	Analytes	Units	Site Criteria (mg/L)	MWE Sept 2021	MWE Dec 2021	MWE March 2022	MWE June 2022	MWE Sept 2022
<b>IONS</b>	<b>Calcium</b>	mg/L	NA	100	68	140	86	57
	<b>Alkalinity</b>	mg/L	NA	1100	1300	1200	1300	1000
	<b>Chloride</b>	mg/L	NA	770	370	990	69	260
	<b>Fluoride</b>	mg/L	NA	0.4	0.4	1.1	0.5	0.3
	<b>Potassium<sup>1</sup></b>	mg/L	410	2	1	1	0.8	2
	<b>Magnesium</b>	mg/L	NA	110	70	130	100	54
	<b>Sulphate</b>	mg/L	NA	170	96	200	170	18
<b>HEAVY METALS</b>	<b>Iron</b>	mg/L	0.3	0.43	<b>1.9</b>	<b>0.03</b>	<b>0.48</b>	<b>2.2</b>
	<b>Manganese</b>	mg/L	1.9	2	1.1	1.3	0.6	1
<b>PHENOLS</b>	<b>Total phenolics</b>	mg/L	0.32	<LOR	<LOR	<LOR	<LOR	<LOR
<b>OCP</b>	<b>OCP<sup>3</sup></b>	mg/L	0.00001	<LOR	<LOR	<LOR	<LOR	<LOR
<b>MISC. INORGANICS</b>	<b>pH</b>	pH	6.5 – 8	7.2	7.1	7.2	7.3	7.1
	<b>Sodium</b>	mg/L	NA	950	600	700	650	380
	<b>Ammonia<sup>2</sup></b>	mg/L	0.9	0.52	0.021	0.036	0.23	0.068
	<b>Nitrate</b>	mg/L	0.7	<LOR	<LOR	<LOR	<LOR	<LOR
	<b>TOC</b>	mg/L	4	<b>6</b>	<b>14</b>	<b>6</b>	<b>7</b>	<b>150</b>
	<b>EC</b>	µS/c	NA	4600	3300	4900	4500	2300

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 Annual 2021-Sept 2022  
(MWE)**

Sampling Parameter	Units	Threshold Criteria (mg/L)	MWE Annual 2021	MWE Sept 2022
<b>Total dissolved solids</b>	mg/L	NA	1700	1800
<b>Biochemical Oxygen Demand</b>	mg/L	NA	22	26
<b>Phosphate</b>	mg/L	0.015	<b>0.03</b>	<LOR
<b>Arsenic III &amp; V</b>	mg/L	0.024 (III), 0.013	0.008	0.003
<b>Aluminium</b>	mg/L	0.055 (pH > 6.5)	<LOR	<LOR
<b>Barium</b>	mg/L	NA	0.095	0.069
<b>Cadmium</b>	mg/L	0.0002	<LOR	<LOR
<b>Copper</b>	mg/L	0.0014	<LOR	<LOR
<b>Chromium VI</b>	mg/L	0.004	<LOR	<LOR
<b>Chromium (total)</b>	mg/L	0.004	<LOR	<LOR
<b>Lead</b>	mg/L	0.0034	<LOR	<LOR
<b>Mercury</b>	mg/L	0.0006	<LOR	<LOR
<b>Zinc</b>	mg/L	0.008	<b>0.012</b>	0.005
<b>Benzene</b>	mg/L	0.95	<LOR	<LOR
<b>Toluene</b>	mg/L	0.18	<LOR	<LOR
<b>Ethylbenzene</b>	mg/L	0.08	<LOR	<LOR
<b>Xylene</b>	mg/L		<LOR	<LOR
<b>TRH</b>	mg/L	NA	<LOR	<LOR
<b>Tetrachlorethene (TCE)</b>	mg/L	NA	<LOR	<LOR
<b>1,1,2-Trichloroethane (TCA)</b>	mg/L	6.5	<LOR	<LOR
<b>Tetrachloroethene (PCE)</b>	mg/L	0.05	<LOR	<LOR
<b>1,1-Dichloroethene</b>	mg/L	0.03	<LOR	<LOR
<b>Vinyl Chloride</b>	mg/L	0.0003	<LOR	<LOR
<b>PCBs</b>	mg/L	0.00003	<LOR	<LOR
<b>PAHs</b>	mg/L	0.016	<LOR	<LOR
<b>OPPs</b>	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 September 2022 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 increased from 0.04mg/L to 0.071mg/L still above the criteria of 0.015mg/L.
- Copper has increased from 0.001mg/L to 0.002mg/L above the criteria of 0.0014mg/L.
- Zinc has decreased from 0.034mg/L to 0.013 mg/L, still above the site criteria of 0.008mg/L.
- Total Organic Carbon has fluctuated between 3mg/L, below the site criteria, to 20mg/L, above the site criteria of 4mg/L over the course of the year: December 2021 8mg/L, March 2022 20mg/L, June 2022 5mg/L, September 2022 5mg/L.
- Chromium has decreased from 0.05mg/L to below limit of reporting.
- The pH result in September 2022 was below the criteria of between 6.5-8. pH results since the March and June 2022 monitoring periods have decreased.
- Manganese has decreased from 0.03mg/L in June to below limit of reporting in September 2022.
- Magnesium has increased from 110mg/L in June to 950mg/L in September 2022.
- Mercury has increased from below limit of reporting to 0.0002mg/L in September 2022.
- Total dissolved solids have increased from 6800mg/L to 14000mg/L in September 2022.

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 2021-2022 in MWB.
- The concentration of Ammonia has increased from 0.017mg/L in June to 0.065mg/L in September 2022.
- The concentration of Iron has decreased from 0.06mg/L in June to below limit of reporting in September 2022.
- Phosphate has increased from 0.008mg/L in December 2021 to a concentration of 0.033mg/L in September 2022, above the site criteria of 0.015mg/L.
- Zinc concentration increased from 0.033mg/L in December 2021 to 0.009mg/L in September 2022, above site criteria of 0.008mg/L.
- Chromium VI has decreased from 0.008mg/L to below limit of reporting.
- Iron concentration has decreased from 0.06mg/L in June to below limit of reporting in September 2022.
- Arsenic and copper concentrations have increased from below the limit of reporting in December 2021 to 0.001 mg/L and 0.002 mg/L respectively in September 2022.
- Mercury concentrations have increased from below the limit of reporting to 0.00007 mg/L in September 2022.

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. The following changes have occurred in the water quality of MWC:

- The concentration of Manganese has fluctuated throughout the last 5 sampling periods with 5 concentrations above site criteria (1.9mg/L). The concentration of the September 2022 sampling event (0.68mg/L) is lower than the June 2020 sampling event (2.1mg/L).
- Concentration of TOC has fluctuated throughout the last 4 sampling periods with 5 concentrations above site criteria (4mg/L). The concentration of the September 2022 sampling event (75mg/L) is higher than the previous June sampling event (8mg/L).

- Concentration of Phosphate was detected at 0.041mg/L which is below the previous concentration of 0.081mg/L in June 2022, and above the site criteria of 0.015mg/L.
- Calcium concentration decreased from 300mg/L in June 2022 to 61mg/L in September 2022.
- Chloride concentration decreased from 3800mg/L in June to 840mg/L in September 2022.
- Magnesium concentration decreased from 440mg/L in June to 110mg/L in September 2022.
- Zinc concentration slightly decreased from 0.013mg/L in December 2021 to 0.005mg/L in September 2022. September results were below the site criteria of 0.008mg/L.
- Sulphate concentration increased from 88mg/L in June 2022 to 170mg/L in December 2022.
- Iron concentrations have increased from below limit of reporting to 0.05mg/L in September 2022.
- Nitrate concentrations have increased from 0.092mg/L in June to 1.2mg/L in September 2022.
- BOD has reduced from 6mg/L to below limit of reporting in September 2022.
- Arsenic concentrations have increased from below limit of reporting to 0.002mg/L in September 2022.
- Copper concentrations have increased from 0.001mg/L to 0.003mg/L in September 2022.

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 140 mg/L in September 2022, the current trend is for the increase of Ammonia, in December 2021 the concentration was 67mg/L.
- TOC has increased from 77 mg/L in December 2021 to a concentration of 220 mg/L in September 2022.
- Phosphate has decreased from 0.4mg/L to 0.042mg/L, in September 2022.

- PAHs were detected at a concentration of 0.012mg/L, a decrease from 0.095mg/L. In particular Naphthalene was detected.
- Total TRH was detected at 2200mg/L.
- Total dissolved solids has increased from 2600mg/L to 4800mg/L in September 2022.
- Nitrate concentrations have increased from below limit of reporting in June to 0.056mg/L in September 2022.

### **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 150 mg/L over the past year: September 2021 - 6mg/L, December 2021 - 14mg/L, March 2022 - 6mg/L, June 2022 - 7mg/L, and September 150mg/L.
- Iron has increased from 0.48mg/L in June 2022 to 2.2mg/L in September 2022 above site criteria (0.3mg/L)
- Zinc has decreased from the previous yearly monitoring, from 0.012 mg/L in December 2021 to 0.005 mg/L in September 2022.
- Sulphate and Magnesium have decreased between the June and September 2022 monitoring periods.
- Chloride concentration increased from 69mg/L in June to 260mg/L in September 2022.

All other analytes reported concentrations consistent with previous monitoring data.

The following analytes exceeded the Threshold Criteria during the September 2022 sampling event, excluding the Leachate Monitoring well (MWD); Total Organic Carbon and Zinc in MWA and MWB. Total Organic Carbon in MWC and MWE. Nitrate in MWC. Phosphate in MWA, MWB, MWC & MWE. Iron in MWE. Copper in MWA, MWB, MWC. pH in MWA. 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 Iron, Total Organic Carbon 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 has had several flooding event over the last 12 months.



## 6.0 CONCLUSIONS

There are seasonal fluctuations observed with regional groundwater conditions. The recent weather conditions of increased rainfall throughout 2021-2022 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 September 2022 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 September 2022 sampling event, excluding the Leachate Monitoring well (MWD), Total Organic Carbon and Zinc in MWA and MWB; Total Organic Carbon in MWC and MWE; Nitrate in MWC; Phosphate in MWA, MWB, MWC & MWE; Iron in MWE; Copper in MWA, MWB, MWC; pH in MWA. 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 December 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.

## FIGURE



**Legend**

● Monitoring Well Location

Image: Google Maps 2019



ENGAGE Environmental  
 Services Pty Limited  
 113 Reservoir Rd  
 Glendale NSW 2285  
 0478 362005

Title: **Figure 1 - Site Layout and Well Locations**

Client	Project No.	Figure No	Date
UHSC	E04-0619	1	17/6/2019
admin@engage-es.com.au	Scale NA	Compiled SC	Revision 3

**Attachment 1**      Data log

ENGAGE ENVIRONMENTAL SERVICES			Threshold Criteria	NA	NA	NA	NA	0.3	NA	0.00001	NA	6.5-8	NA	0.9	0.7	NA	4	0.32	NA		
			Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	pH	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm
			Analytes	Calcium	Alkalinity	Chloride	Fluoride	Iron	Magnesium	Manganese	Organochlorine pesticides (OCP)	Potassium	pH	Sodium	Ammonia	Nitrate	Sulfate	Total organic carbon	Total phenolics	Electrical conductivity (EC)	
			Monitoring frequency	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	
MWA	305662	13/09/2022		550	510	6900	0.1	<0.01	950	<0.005	<0.0002	3	6.2	1800	0.049	0.51	50	5	<0.05	17000	
MWB	305662	13/09/2022		470	440	4700	0.2	<0.01	570	0.014	<0.0002	3	6.8	1400	0.065	0.32	77	5	<0.05	13000	
MWC	305662	13/09/2022		61	600	840	0.3	0.05	110	0.68	<0.0002	1	7.2	500	0.05	1.2	170	75	<0.05	3600	
MWD	305662	13/09/2022		190	1500	1400	0.3	0.75	150	0.61	<0.0002	82	7.5	810	0.140	0.056	85	220	<0.05	6400	
MWE	305662	13/09/2022		57	1000	260	0.3	2.2	54	1	<0.0002	2	7.1	380	0.068	<0.005	18	150	<0.05	2300	

	NA	NA	0.015	0.024 (III)	0.055 (pH>	NA	0.0002	0.09	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	
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
	Total dissolved solids	Biochemical oxygen demand	Phosphate	Arsenic III & V	Aluminium	Barium	Cadmium	Cobalt	Copper	Chromium VI	Chromium (total)	Lead	Mercury	Zinc	PAHs	TRH	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	Yearly	Yearly	Yearly	Yearly
MWA	14000	<5	0.071	0.001	<0.01	0.54	<0.0001	<0.001	0.002	<0.005	0.004	<0.001	0.0002	0.013	ND	<0.01	<0.001	<0.001	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.0002	
MWB	10000	<5	0.02	0.001	<0.01	0.39	<0.0001	<0.001	0.002	<0.005	0.004	<0.001	0.00007	0.009	ND	<0.01	<0.001	<0.001	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.0002	
MWC	2200	<5	0.04	0.002	<0.01	0.08	<0.0001	0.004	0.003	<0.001	<0.001	<0.00005	0.005	ND	<0.01	<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	4800	74	0.042	0.009	<0.01	0.68	<0.0001	0.008	<0.001	<0.005	0.018	<0.001	<0.00005	0.007	0.012	0.005	<0.001	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.0002	
MWE	1800	26	<0.005	0.003	<0.01	0.069	<0.0001	0.001	<0.001	<0.005	<0.001	<0.001	<0.00005	0.005	ND	<0.01	<0.001	<0.001	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.0002	

## **Attachment 2**      NATA Accredited Laboratory Results



## CERTIFICATE OF ANALYSIS 305662

### Client Details

<b>Client</b>	Engage Environmental Services
<b>Attention</b>	Stephen Challinor
<b>Address</b>	113 Reservoir Rd, GLENDALE, NSW, 2285

### Sample Details

<b>Your Reference</b>	<u>E04-0922-UHSC</u>
<b>Number of Samples</b>	5 Water
<b>Date samples received</b>	14/09/2022
<b>Date completed instructions received</b>	14/09/2022

### 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

<b>Date results requested by</b>	21/09/2022
<b>Date of Issue</b>	29/09/2022
<b>Reissue Details</b>	This report replaces R00 created on 21/09/2022 due to: revised report with additional results (Co).
NATA Accreditation Number 2901. This document shall not be reproduced except in full.	
Accredited for compliance with ISO/IEC 17025 - Testing. <b>Tests not covered by NATA are denoted with *</b>	

#### **Results Approved By**

Greta Petzold, Assistant Operation Manager  
Liam Timmins, Organic Instruments Team Leader  
Nick Sarlamis, Assistant Operation Manager

#### **Authorised By**

Nancy Zhang, Laboratory Manager



VHC's in water						
Our Reference		305662-1	305662-2	305662-3	305662-4	305662-5
Your Reference	UNITS	MWA	MWB	MWC	MWD	MWE
Date Sampled		13/09/2022	13/09/2022	13/09/2022	13/09/2022	13/09/2022
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	16/09/2022	16/09/2022	16/09/2022	16/09/2022	16/09/2022
Date analysed	-	19/09/2022	19/09/2022	19/09/2022	19/09/2022	19/09/2022
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	23	<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		305662-1	305662-2	305662-3	305662-4	305662-5
Your Reference	UNITS	MWA	MWB	MWC	MWD	MWE
Date Sampled		13/09/2022	13/09/2022	13/09/2022	13/09/2022	13/09/2022
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	8	<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	%	87	91	89	87	87
Surrogate toluene-d8	%	99	101	101	100	100
Surrogate 4-BFB	%	102	103	103	102	102

vTRH(C6-C10)/BTEXN in Water						
Our Reference		305662-1	305662-2	305662-3	305662-4	305662-5
Your Reference	UNITS	MWA	MWB	MWC	MWD	MWE
Date Sampled		13/09/2022	13/09/2022	13/09/2022	13/09/2022	13/09/2022
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	16/09/2022	16/09/2022	16/09/2022	16/09/2022	16/09/2022
Date analysed	-	19/09/2022	19/09/2022	19/09/2022	19/09/2022	19/09/2022
TRH C <sub>6</sub> - C <sub>9</sub>	µg/L	<10	<10	<10	48	<10
TRH C <sub>6</sub> - C <sub>10</sub>	µg/L	<10	<10	<10	49	<10
TRH C <sub>6</sub> - C <sub>10</sub> less BTEX (F1)	µg/L	<10	<10	<10	44	<10
Benzene	µg/L	<1	<1	<1	5	<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	11	<1
Surrogate Dibromofluoromethane	%	87	91	89	87	87
Surrogate toluene-d8	%	99	101	101	100	100
Surrogate 4-BFB	%	102	103	103	102	102

svTRH (C10-C40) in Water						
Our Reference		305662-1	305662-2	305662-3	305662-4	305662-5
Your Reference	UNITS	MWA	MWB	MWC	MWD	MWE
Date Sampled		13/09/2022	13/09/2022	13/09/2022	13/09/2022	13/09/2022
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	16/09/2022	16/09/2022	16/09/2022	16/09/2022	16/09/2022
Date analysed	-	16/09/2022	16/09/2022	16/09/2022	16/09/2022	16/09/2022
TRH C <sub>10</sub> - C <sub>14</sub>	µg/L	<50	<50	<50	350	<50
TRH C <sub>15</sub> - C <sub>28</sub>	µg/L	<100	<100	<100	1,600	<100
TRH C <sub>29</sub> - C <sub>36</sub>	µg/L	<100	<100	<100	230	<100
Total +ve TRH (C10-C36)	µg/L	<50	<50	<50	2,200	<50
TRH >C <sub>10</sub> - C <sub>16</sub>	µg/L	<50	<50	<50	470	<50
TRH >C <sub>10</sub> - C <sub>16</sub> less Naphthalene (F2)	µg/L	<50	<50	<50	460	<50
TRH >C <sub>16</sub> - C <sub>34</sub>	µg/L	<100	<100	<100	1,600	<100
TRH >C <sub>34</sub> - C <sub>40</sub>	µg/L	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	µg/L	<50	<50	<50	2,100	<50
Surrogate o-Terphenyl	%	81	83	84	112	84

PAHs in Water						
Our Reference		305662-1	305662-2	305662-3	305662-4	305662-5
Your Reference	UNITS	MWA	MWB	MWC	MWD	MWE
Date Sampled		13/09/2022	13/09/2022	13/09/2022	13/09/2022	13/09/2022
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	16/09/2022	16/09/2022	16/09/2022	16/09/2022	16/09/2022
Date analysed	-	18/09/2022	18/09/2022	18/09/2022	18/09/2022	18/09/2022
Naphthalene	µg/L	<1	<1	<1	12	<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	12	NIL (+)VE
Surrogate p-Terphenyl-d14	%	92	87	92	83	105

Organochlorine Pesticides in Water						
Our Reference		305662-1	305662-2	305662-3	305662-4	305662-5
Your Reference	UNITS	MWA	MWB	MWC	MWD	MWE
Date Sampled		13/09/2022	13/09/2022	13/09/2022	13/09/2022	13/09/2022
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	16/09/2022	16/09/2022	16/09/2022	16/09/2022	16/09/2022
Date analysed	-	18/09/2022	18/09/2022	18/09/2022	18/09/2022	18/09/2022
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	%	86	89	83	87	92

OP Pesticides in Water						
Our Reference		305662-1	305662-2	305662-3	305662-4	305662-5
Your Reference	UNITS	MWA	MWB	MWC	MWD	MWE
Date Sampled		13/09/2022	13/09/2022	13/09/2022	13/09/2022	13/09/2022
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	16/09/2022	16/09/2022	16/09/2022	16/09/2022	16/09/2022
Date analysed	-	18/09/2022	18/09/2022	18/09/2022	18/09/2022	18/09/2022
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	%	86	89	83	87	92

PCBs in Water						
Our Reference		305662-1	305662-2	305662-3	305662-4	305662-5
Your Reference	UNITS	MWA	MWB	MWC	MWD	MWE
Date Sampled		13/09/2022	13/09/2022	13/09/2022	13/09/2022	13/09/2022
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	16/09/2022	16/09/2022	16/09/2022	16/09/2022	16/09/2022
Date analysed	-	18/09/2022	18/09/2022	18/09/2022	18/09/2022	18/09/2022
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	%	86	89	83	87	92



Total Phenolics in Water						
Our Reference		305662-1	305662-2	305662-3	305662-4	305662-5
Your Reference	UNITS	MWA	MWB	MWC	MWD	MWE
Date Sampled		13/09/2022	13/09/2022	13/09/2022	13/09/2022	13/09/2022
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	19/09/2022	19/09/2022	19/09/2022	19/09/2022	19/09/2022
Date analysed	-	19/09/2022	19/09/2022	19/09/2022	19/09/2022	19/09/2022
Total Phenolics (as Phenol)	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05

HM in water - dissolved						
Our Reference		305662-1	305662-2	305662-3	305662-4	305662-5
Your Reference	UNITS	MWA	MWB	MWC	MWD	MWE
Date Sampled		13/09/2022	13/09/2022	13/09/2022	13/09/2022	13/09/2022
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	15/09/2022	15/09/2022	15/09/2022	15/09/2022	15/09/2022
Date analysed	-	15/09/2022	15/09/2022	15/09/2022	15/09/2022	15/09/2022
Arsenic-Dissolved	µg/L	1	1	2	9	3
Cadmium-Dissolved	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium-Dissolved	µg/L	4	4	<1	18	<1
Copper-Dissolved	µg/L	2	2	3	<1	<1
Lead-Dissolved	µg/L	<1	<1	<1	<1	<1
Mercury-Dissolved	µg/L	0.2	0.07	<0.05	<0.05	<0.05
Nickel-Dissolved	µg/L	6	5	25	9	7
Zinc-Dissolved	µg/L	13	9	5	7	5
Iron-Dissolved	µg/L	<10	<10	50	750	2,200
Manganese-Dissolved	µg/L	<5	14	680	610	1,000
Aluminium-Dissolved	µg/L	<10	<10	<10	<10	<10
Barium-Dissolved	µg/L	540	390	80	680	69
Cobalt-Dissolved	µg/L	<1	<1	4	8	1

Ion Balance						
Our Reference		305662-1	305662-2	305662-3	305662-4	305662-5
Your Reference	UNITS	MWA	MWB	MWC	MWD	MWE
Date Sampled		13/09/2022	13/09/2022	13/09/2022	13/09/2022	13/09/2022
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	14/09/2022	14/09/2022	14/09/2022	14/09/2022	14/09/2022
Date analysed	-	14/09/2022	14/09/2022	14/09/2022	14/09/2022	14/09/2022
Calcium - Dissolved	mg/L	550	470	61	190	57
Potassium - Dissolved	mg/L	3	3	1	82	2
Sodium - Dissolved	mg/L	1,800	1,400	500	810	380
Magnesium - Dissolved	mg/L	950	570	110	150	54
Hardness	mgCaCO <sub>3</sub> /L	5,300	3,500	590	1,100	360
Hydroxide Alkalinity (OH <sup>-</sup> ) as CaCO <sub>3</sub>	mg/L	<5	<5	<5	<5	<5
Bicarbonate Alkalinity as CaCO <sub>3</sub>	mg/L	510	440	600	1,500	1,000
Carbonate Alkalinity as CaCO <sub>3</sub>	mg/L	<5	<5	<5	<5	<5
Total Alkalinity as CaCO <sub>3</sub>	mg/L	510	440	600	1,500	1,000
Sulphate, SO <sub>4</sub>	mg/L	50	77	170	85	18
Chloride, Cl	mg/L	6,900	4,700	840	1,400	260
Ionic Balance	%	-5.0	-4.0	-8.0	-11	-9.0

Miscellaneous Inorganics						
Our Reference		305662-1	305662-2	305662-3	305662-4	305662-5
Your Reference	UNITS	MWA	MWB	MWC	MWD	MWE
Date Sampled		13/09/2022	13/09/2022	13/09/2022	13/09/2022	13/09/2022
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	14/09/2022	14/09/2022	14/09/2022	14/09/2022	14/09/2022
Date analysed	-	14/09/2022	14/09/2022	14/09/2022	14/09/2022	14/09/2022
Hexavalent Chromium, Cr <sup>6+</sup>	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005
Ammonia as N in water	mg/L	0.049	0.065	0.050	140	0.068
BOD	mg/L	<5	<5	<5	74	26
Fluoride, F	mg/L	0.1	0.2	0.3	0.3	0.3
Total Organic Carbon	mg/L	5	5	75	220	150
Total Dissolved Solids (grav)	mg/L	14,000	10,000	2,200	4,800	1,800
pH	pH Units	6.2	6.8	7.2	7.5	7.1
Electrical Conductivity	µS/cm	17,000	13,000	3,600	6,400	2,300
Nitrate as N in water	mg/L	0.51	0.32	1.2	0.056	<0.005
Phosphate as P in water	mg/L	0.071	0.02	0.04	0.42	<0.005

Method ID	Methodology Summary
<b>Inorg-001</b>	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.
<b>Inorg-002</b>	Conductivity and Salinity - measured using a conductivity cell at 25°C in accordance with APHA latest edition 2510 and Rayment & Lyons.
<b>Inorg-006</b>	Alkalinity - determined titrimetrically in accordance with APHA latest edition, 2320-B.
<b>Inorg-018</b>	Total Dissolved Solids - determined gravimetrically. The solids are dried at 180+/-10°C.
<b>Inorg-024</b>	Hexavalent Chromium (Cr6+) - determined colourimetrically. Waters samples are filtered on receipt prior to analysis.
<b>Inorg-026</b>	Fluoride determined by ion selective electrode (ISE) in accordance with APHA latest edition, 4500-F-C.
<b>Inorg-031</b>	Total Phenolics by segmented flow analyser (in line distillation with colourimetric finish). Solids are extracted in a caustic media prior to analysis.
<b>Inorg-040</b>	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%.
<b>Inorg-055</b>	Nitrate - determined colourimetrically. Waters samples are filtered on receipt prior to analysis. Soils are analysed following a water extraction.
<b>Inorg-057</b>	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.
<b>Inorg-060</b>	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.
<b>Inorg-079</b>	TOC determined using a TOC analyser using the combustion method. Dissolved requires filtering prior to determination. Analysis using APHA latest edition 5310B.
<b>Inorg-081</b>	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.
<b>Inorg-091</b>	BOD - Analysed in accordance with APHA latest edition 5210 D and in house INORG-091.
<b>Metals-020</b>	Determination of various metals by ICP-AES.
<b>Metals-021</b>	Determination of Mercury by Cold Vapour AAS.
<b>Metals-022</b>	Determination of various metals by ICP-MS.
<b>Org-020</b>	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.
<b>Org-021</b>	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
<b>Org-022/025</b>	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS/GC-MSMS.

Method ID	Methodology Summary
<b>Org-022/025</b>	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.
<b>Org-023</b>	Water samples are analysed directly by purge and trap GC-MS.
<b>Org-023</b>	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: E04-0922-UHSC

QUALITY CONTROL: VHC's in water				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			16/09/2022	2	16/09/2022	20/09/2022		16/09/2022	[NT]
Date analysed	-			19/09/2022	2	19/09/2022	21/09/2022		19/09/2022	[NT]
Dichlorodifluoromethane	µg/L	10	Org-023	<10	2	<10	<10	0	[NT]	[NT]
Chloromethane	µg/L	10	Org-023	<10	2	<10	<10	0	[NT]	[NT]
Vinyl Chloride	µg/L	10	Org-023	<10	2	<10	<10	0	[NT]	[NT]
Bromomethane	µg/L	10	Org-023	<10	2	<10	<10	0	[NT]	[NT]
Chloroethane	µg/L	10	Org-023	<10	2	<10	<10	0	[NT]	[NT]
Trichlorofluoromethane	µg/L	10	Org-023	<10	2	<10	<10	0	[NT]	[NT]
1,1-Dichloroethene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
Trans-1,2-dichloroethene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
1,1-dichloroethane	µg/L	1	Org-023	<1	2	<1	<1	0	97	[NT]
Cis-1,2-dichloroethene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
Bromochloromethane	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
Chloroform	µg/L	1	Org-023	<1	2	<1	<1	0	95	[NT]
2,2-dichloropropane	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
1,2-dichloroethane	µg/L	1	Org-023	<1	2	<1	<1	0	116	[NT]
1,1,1-trichloroethane	µg/L	1	Org-023	<1	2	<1	<1	0	102	[NT]
1,1-dichloropropene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
Carbon tetrachloride	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
Dibromomethane	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
1,2-dichloropropane	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
Trichloroethene	µg/L	1	Org-023	<1	2	<1	<1	0	116	[NT]
Bromodichloromethane	µg/L	1	Org-023	<1	2	<1	<1	0	93	[NT]
trans-1,3-dichloropropene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
cis-1,3-dichloropropene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
1,1,2-trichloroethane	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
1,3-dichloropropane	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
Dibromochloromethane	µg/L	1	Org-023	<1	2	<1	<1	0	91	[NT]
1,2-dibromoethane	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
Tetrachloroethene	µg/L	1	Org-023	<1	2	<1	<1	0	89	[NT]
1,1,1,2-tetrachloroethane	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
Chlorobenzene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
Bromoform	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
1,1,2,2-tetrachloroethane	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
1,2,3-trichloropropane	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
Bromobenzene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
2-chlorotoluene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
4-chlorotoluene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
1,3-dichlorobenzene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
1,4-dichlorobenzene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]

Client Reference: E04-0922-UHSC

QUALITY CONTROL: VHC's in water						Duplicate		Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
1,2-dichlorobenzene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
1,2-dibromo-3-chloropropane	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
1,2,4-trichlorobenzene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
Hexachlorobutadiene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
1,2,3-trichlorobenzene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
<i>Surrogate</i> Dibromofluoromethane	%		Org-023	86	2	91	107	16	86	[NT]
<i>Surrogate</i> toluene-d8	%		Org-023	98	2	101	102	1	100	[NT]
<i>Surrogate</i> 4-BFB	%		Org-023	100	2	103	101	2	101	[NT]



Client Reference: E04-0922-UHSC

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Water					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			16/09/2022	2	16/09/2022	20/09/2022		16/09/2022	[NT]
Date analysed	-			19/09/2022	2	19/09/2022	21/09/2022		19/09/2022	[NT]
TRH C <sub>6</sub> - C <sub>9</sub>	µg/L	10	Org-023	<10	2	<10	<10	0	107	[NT]
TRH C <sub>6</sub> - C <sub>10</sub>	µg/L	10	Org-023	<10	2	<10	<10	0	107	[NT]
Benzene	µg/L	1	Org-023	<1	2	<1	<1	0	101	[NT]
Toluene	µg/L	1	Org-023	<1	2	<1	<1	0	98	[NT]
Ethylbenzene	µg/L	1	Org-023	<1	2	<1	<1	0	101	[NT]
m+p-xylene	µg/L	2	Org-023	<2	2	<2	<2	0	118	[NT]
o-xylene	µg/L	1	Org-023	<1	2	<1	<1	0	116	[NT]
Naphthalene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-023	86	2	91	107	16	86	[NT]
Surrogate toluene-d8	%		Org-023	98	2	101	102	1	100	[NT]
Surrogate 4-BFB	%		Org-023	100	2	103	101	2	101	[NT]

Client Reference: E04-0922-UHSC

QUALITY CONTROL: svTRH (C10-C40) in Water					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	305662-2
Date extracted	-			16/09/2022	1	16/09/2022	16/09/2022		16/09/2022	16/09/2022
Date analysed	-			16/09/2022	1	16/09/2022	16/09/2022		16/09/2022	16/09/2022
TRH C <sub>10</sub> - C <sub>14</sub>	µg/L	50	Org-020	<50	1	<50	<50	0	90	94
TRH C <sub>15</sub> - C <sub>28</sub>	µg/L	100	Org-020	<100	1	<100	<100	0	92	95
TRH C <sub>29</sub> - C <sub>36</sub>	µg/L	100	Org-020	<100	1	<100	<100	0	86	83
TRH >C <sub>10</sub> - C <sub>16</sub>	µg/L	50	Org-020	<50	1	<50	<50	0	90	94
TRH >C <sub>16</sub> - C <sub>34</sub>	µg/L	100	Org-020	<100	1	<100	<100	0	92	95
TRH >C <sub>34</sub> - C <sub>40</sub>	µg/L	100	Org-020	<100	1	<100	<100	0	86	83
Surrogate o-Terphenyl	%		Org-020	89	1	81	83	2	90	110

Client Reference: E04-0922-UHSC

QUALITY CONTROL: PAHs in Water						Duplicate		Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	305662-3
Date extracted	-			16/09/2022	1	16/09/2022	16/09/2022		16/09/2022	16/09/2022
Date analysed	-			18/09/2022	1	18/09/2022	18/09/2022		18/09/2022	18/09/2022
Naphthalene	µg/L	1	Org-022/025	<1	1	<1	<1	0	97	107
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	91	99
Fluorene	µg/L	1	Org-022/025	<1	1	<1	<1	0	97	107
Phenanthrene	µg/L	1	Org-022/025	<1	1	<1	<1	0	104	112
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	94	100
Pyrene	µg/L	1	Org-022/025	<1	1	<1	<1	0	97	105
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	95	105
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	104	98
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	100	1	92	91	1	89	87

Client Reference: E04-0922-UHSC

QUALITY CONTROL: Organochlorine Pesticides in Water				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	305662-3
Date extracted	-			16/09/2022	1	16/09/2022	16/09/2022		16/09/2022	16/09/2022
Date analysed	-			18/09/2022	1	18/09/2022	18/09/2022		18/09/2022	18/09/2022
alpha-BHC	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	94	104
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	89	103
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	73	85
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	99	111
Heptachlor Epoxide	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	98	108
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	100	111
Dieldrin	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	108	124
Endrin	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	82	92
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	86	100
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	86	98
Methoxychlor	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	91	1	86	91	6	88	89

Client Reference: E04-0922-UHSC

QUALITY CONTROL: OP Pesticides in Water				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	305662-3
Date extracted	-			16/09/2022	1	16/09/2022	16/09/2022		16/09/2022	16/09/2022
Date analysed	-			18/09/2022	1	18/09/2022	18/09/2022		18/09/2022	18/09/2022
Dichlorvos	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	114	124
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	65	73
Fenitrothion	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	65	65
Malathion	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	77	85
Chlorpyrifos	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	86	98
Parathion	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	62	64
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	64	80
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	91	1	86	91	6	88	89

Client Reference: E04-0922-UHSC

QUALITY CONTROL: PCBs in Water						Duplicate		Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	305662-3
Date extracted	-			16/09/2022	1	16/09/2022	16/09/2022		16/09/2022	16/09/2022
Date analysed	-			18/09/2022	1	18/09/2022	18/09/2022		18/09/2022	18/09/2022
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	93	80
Aroclor 1260	µg/L	2	Org-021	<2	1	<2	<2	0	[NT]	[NT]
Surrogate TCMX	%		Org-021	91	1	86	91	6	88	89

Client Reference: E04-0922-UHSC

QUALITY CONTROL: Total Phenolics in Water					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	305662-2
Date extracted	-			19/09/2022	1	19/09/2022	19/09/2022		19/09/2022	19/09/2022
Date analysed	-			19/09/2022	1	19/09/2022	19/09/2022		19/09/2022	19/09/2022
Total Phenolics (as Phenol)	mg/L	0.05	Inorg-031	<0.05	1	<0.05	<0.05	0	105	76

Client Reference: E04-0922-UHSC

QUALITY CONTROL: HM in water - dissolved				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date prepared	-			15/09/2022	1	15/09/2022	15/09/2022		15/09/2022	[NT]
Date analysed	-			15/09/2022	1	15/09/2022	15/09/2022		15/09/2022	[NT]
Arsenic-Dissolved	µg/L	1	Metals-022	<1	1	1	[NT]		99	[NT]
Cadmium-Dissolved	µg/L	0.1	Metals-022	<0.1	1	<0.1	[NT]		100	[NT]
Chromium-Dissolved	µg/L	1	Metals-022	<1	1	4	[NT]		98	[NT]
Copper-Dissolved	µg/L	1	Metals-022	<1	1	2	[NT]		98	[NT]
Lead-Dissolved	µg/L	1	Metals-022	<1	1	<1	[NT]		99	[NT]
Mercury-Dissolved	µg/L	0.05	Metals-021	<0.05	1	0.2	0.2	0	108	[NT]
Nickel-Dissolved	µg/L	1	Metals-022	<1	1	6	[NT]		97	[NT]
Zinc-Dissolved	µg/L	1	Metals-022	<1	1	13	[NT]		100	[NT]
Iron-Dissolved	µg/L	10	Metals-022	<10	1	<10	[NT]		99	[NT]
Manganese-Dissolved	µg/L	5	Metals-022	<5	1	<5	[NT]		101	[NT]
Aluminium-Dissolved	µg/L	10	Metals-022	<10	1	<10	[NT]		94	[NT]
Barium-Dissolved	µg/L	1	Metals-022	<1	1	540	[NT]		99	[NT]
Cobalt-Dissolved	µg/L	1	Metals-022	<1	1	<1	[NT]		98	[NT]

QUALITY CONTROL: HM in water - dissolved				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	4	15/09/2022	15/09/2022		[NT]	[NT]
Date analysed	-			[NT]	4	15/09/2022	15/09/2022		[NT]	[NT]
Arsenic-Dissolved	µg/L	1	Metals-022	[NT]	4	9	8	12	[NT]	[NT]
Cadmium-Dissolved	µg/L	0.1	Metals-022	[NT]	4	<0.1	<0.1	0	[NT]	[NT]
Chromium-Dissolved	µg/L	1	Metals-022	[NT]	4	18	16	12	[NT]	[NT]
Copper-Dissolved	µg/L	1	Metals-022	[NT]	4	<1	<1	0	[NT]	[NT]
Lead-Dissolved	µg/L	1	Metals-022	[NT]	4	<1	<1	0	[NT]	[NT]
Mercury-Dissolved	µg/L	0.05	Metals-021	[NT]	4	<0.05	[NT]		[NT]	[NT]
Nickel-Dissolved	µg/L	1	Metals-022	[NT]	4	9	9	0	[NT]	[NT]
Zinc-Dissolved	µg/L	1	Metals-022	[NT]	4	7	6	15	[NT]	[NT]
Iron-Dissolved	µg/L	10	Metals-022	[NT]	4	750	730	3	[NT]	[NT]
Manganese-Dissolved	µg/L	5	Metals-022	[NT]	4	610	580	5	[NT]	[NT]
Aluminium-Dissolved	µg/L	10	Metals-022	[NT]	4	<10	<10	0	[NT]	[NT]
Barium-Dissolved	µg/L	1	Metals-022	[NT]	4	680	650	5	[NT]	[NT]
Cobalt-Dissolved	µg/L	1	Metals-022	[NT]	4	8	8	0	[NT]	[NT]



Client Reference: E04-0922-UHSC

QUALITY CONTROL: Ion Balance				Duplicate			Spike Recovery %			
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			14/09/2022	1	14/09/2022	14/09/2022		14/09/2022	[NT]
Date analysed	-			14/09/2022	1	14/09/2022	14/09/2022		14/09/2022	[NT]
Calcium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	550	[NT]		99	[NT]
Potassium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	3	[NT]		98	[NT]
Sodium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	1800	[NT]		92	[NT]
Magnesium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	950	[NT]		100	[NT]
Hardness	mgCaCO <sub>3</sub> /L	3	Metals-020	[NT]	1	5300	[NT]		[NT]	[NT]
Hydroxide Alkalinity (OH <sup>-</sup> ) as CaCO <sub>3</sub>	mg/L	5	Inorg-006	<5	1	<5	[NT]		[NT]	[NT]
Bicarbonate Alkalinity as CaCO <sub>3</sub>	mg/L	5	Inorg-006	<5	1	510	[NT]		[NT]	[NT]
Carbonate Alkalinity as CaCO <sub>3</sub>	mg/L	5	Inorg-006	<5	1	<5	[NT]		[NT]	[NT]
Total Alkalinity as CaCO <sub>3</sub>	mg/L	5	Inorg-006	<5	1	510	[NT]		100	[NT]
Sulphate, SO <sub>4</sub>	mg/L	1	Inorg-081	<1	1	50	49	2	94	[NT]
Chloride, Cl	mg/L	1	Inorg-081	<1	1	6900	7000	1	98	[NT]
Ionic Balance	%		Inorg-040	[NT]	1	-5.0	[NT]		[NT]	[NT]

Client Reference: E04-0922-UHSC

QUALITY CONTROL: Miscellaneous Inorganics				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	305662-2
Date prepared	-			14/09/2022	1	14/09/2022	14/09/2022		14/09/2022	14/09/2022
Date analysed	-			14/09/2022	1	14/09/2022	14/09/2022		14/09/2022	14/09/2022
Hexavalent Chromium, Cr <sup>6+</sup>	mg/L	0.005	Inorg-024	<0.005	1	<0.005	<0.005	0	102	101
Ammonia as N in water	mg/L	0.005	Inorg-057	<0.005	1	0.049	0.034	36	107	103
BOD	mg/L	5	Inorg-091	<5	1	<5	[NT]		80	[NT]
Fluoride, F	mg/L	0.1	Inorg-026	<0.1	1	0.1	0.1	0	103	92
Total Organic Carbon	mg/L	1	Inorg-079	<1	1	5	5	0	95	123
Total Dissolved Solids (grav)	mg/L	5	Inorg-018	<5	1	14000	[NT]		115	[NT]
pH	pH Units		Inorg-001	[NT]	1	6.2	[NT]		98	[NT]
Electrical Conductivity	µS/cm	1	Inorg-002	<1	1	17000	[NT]		95	[NT]
Nitrate as N in water	mg/L	0.005	Inorg-055	<0.005	1	0.51	0.52	2	101	92
Phosphate as P in water	mg/L	0.005	Inorg-060	<0.005	1	0.071	0.072	1	104	95

QUALITY CONTROL: Miscellaneous Inorganics				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	2	14/09/2022	14/09/2022		[NT]	[NT]
Date analysed	-			[NT]	2	14/09/2022	14/09/2022		[NT]	[NT]
Hexavalent Chromium, Cr <sup>6+</sup>	mg/L	0.005	Inorg-024	[NT]	2	<0.005	[NT]		[NT]	[NT]
Ammonia as N in water	mg/L	0.005	Inorg-057	[NT]	2	0.065	[NT]		[NT]	[NT]
BOD	mg/L	5	Inorg-091	[NT]	2	<5	[NT]		[NT]	[NT]
Fluoride, F	mg/L	0.1	Inorg-026	[NT]	2	0.2	[NT]		[NT]	[NT]
Total Organic Carbon	mg/L	1	Inorg-079	[NT]	2	5	[NT]		[NT]	[NT]
Total Dissolved Solids (grav)	mg/L	5	Inorg-018	[NT]	2	10000	9800	2	[NT]	[NT]
pH	pH Units		Inorg-001	[NT]	2	6.8	[NT]		[NT]	[NT]
Electrical Conductivity	µS/cm	1	Inorg-002	[NT]	2	13000	[NT]		[NT]	[NT]
Nitrate as N in water	mg/L	0.005	Inorg-055	[NT]	2	0.32	[NT]		[NT]	[NT]
Phosphate as P in water	mg/L	0.005	Inorg-060	[NT]	2	0.02	[NT]		[NT]	[NT]

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

## Quality Control Definitions

<b>Blank</b>	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.
<b>Duplicate</b>	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.
<b>Matrix Spike</b>	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.
<b>LCS (Laboratory Control Sample)</b>	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.
<b>Surrogate Spike</b>	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.

Where matrix spike recoveries fall below the lower limit of the acceptance criteria (e.g. for non-labile or standard Organics <60%), positive result(s) in the parent sample will subsequently have a higher than typical estimated uncertainty (MU estimates supplied on request) and in these circumstances the sample result is likely biased significantly low.

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

VOC vials have headspace

VHC's in water - The PQL for 305662-4 has been raised due to the sample matrix thereby requiring a dilution.

## **Attachment 3**      Groundwater Field Data Sheets

## GROUNDWATER MONITORING FIELD DATA SHEET

<b>Project:</b> E04-0922 Scone	<b>Sample ID:</b> MWA
<b>Client:</b> UHSC	<b>Sampler:</b> DB
<b>Site Address:</b> Noblet Road Scone	<b>Date:</b> 13.9.22

<b>Well Information</b>			
Monument damaged: <b>Rusty</b>	YES / <b>NO</b> / N/A	Well ID visible:	<b>YES</b> / NO / N/A
Locked well casing:	YES / <b>NO</b> / N/A	Cap on PVC casing:	<b>YES</b> / NO / N/A
Cement footing damaged:	YES / <b>NO</b> / N/A	Water in monument casing:	YES / <b>NO</b> / N/A
Standing water, vegetation around monument:	YES / <b>NO</b> / N/A	Internal obstruction in casing:	YES / <b>NO</b> / N/A
Well Damaged:	YES / <b>NO</b> / N/A	Odours from groundwater:	YES / <b>NO</b> / N/A
Casing above ground: .....0.77.....	m agl	<b>Weather Conditions:</b>	
Standing water level: ..... 6.905.....	m bgl	Temperature >15 <input type="checkbox"/>	15-20 X
Total well depth: .....15.66 .....	m bgl	20-25 <input type="checkbox"/>	25-30 <input type="checkbox"/>
Initial well volume: .....	L	Clear <input type="checkbox"/>	Partly cloudy X    Overcast <input type="checkbox"/>
Water level after purging: .....8.30.....	m bgl	Calm <input type="checkbox"/>	Slight breeze X    Moderate breeze <input type="checkbox"/>
Volume of water purged: .....	L		Windy <input type="checkbox"/>
Water level at time of sampling: .....8.30.....	m bgl		
Well purged dry:	YES / <b>NO</b>		
Purging equipment:	Bailer		
Sample equipment:	Bailer	Fine X	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 <sup>-1</sup> )	EC (µS cm <sup>-1</sup> )	pH	Redox (mV)	Temp (°C)	Salinity	Comments
10:03am	3.07	18221	5.91	-209.6	19.4		Water clear no smell
10:10am	2.40	18693	6.34	-212.1	19.8		
10:14am	2.40	18643	6.34	-211.3	20.3		
10:16am	2.37	18658	6.32	-212.9			

### Water Quality and General Comments:

Water was clear no odour or sheen or hydrocarbons. Vegetation around monument and no standing water around monument. Landfill works.

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## GROUNDWATER MONITORING FIELD DATA SHEET

<b>Project:</b> E04-0922 Scone	<b>Sample ID:</b> MWB
<b>Client:</b> UHSC	<b>Sampler:</b> DB
<b>Site Address:</b> Noblet Road Scone	<b>Date:</b> 13.9.22

<b>Well Information</b>			
Monument damaged: <b>Rusty</b>	YES / <b>NO</b> / N/A	Well ID visible:	<b>YES</b> / NO / N/A
Locked well casing:	YES / <b>NO</b> / N/A	Cap on PVC casing:	<b>YES</b> / NO / N/A
Cement footing damaged:	YES / <b>NO</b> / N/A	Water in monument casing:	YES / <b>NO</b> / N/A
Standing water, vegetation around monument:	YES / <b>NO</b> / N/A	Internal obstruction in casing:	YES / <b>NO</b> / N/A
Well Damaged: Rusty	YES / <b>NO</b> / N/A	Odours from groundwater:	YES / <b>NO</b> / N/A
Casing above ground: .....0.8.....	m agl	<b>Weather Conditions:</b>	
Standing water level: ..... 6.427.....	m bgl	Temperature >15 <input type="checkbox"/>	15-20 X
Total well depth: .....14.04 .....	m bgl	20-25 <input type="checkbox"/>	25-30 <input type="checkbox"/>
Initial well volume: .....	L	Clear <input type="checkbox"/>	Partly cloudy X    Overcast <input type="checkbox"/>
Water level after purging: .....6.822.....	m bgl	Calm <input type="checkbox"/>	Slight breeze X    Moderate breeze <input type="checkbox"/>
Volume of water purged: .....	L		Windy <input type="checkbox"/>
Water level at time of sampling: .....6.822.....	m bgl	Fine X	Showers <input type="checkbox"/> Rain <input type="checkbox"/>
Well purged dry:	YES / <b>NO</b>		
Purging equipment:	Bailer		
Sample equipment:	Bailer		

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

### Water Quality Details:

Time am / pm	DO (mg/L <sup>-1</sup> )	EC (μS cm <sup>-1</sup> )	pH	Redox (mV)	Temp (°C)	Salinity	Comments
10:48am	1.84	13151	5.97	-214.3	20.6		
10:50am	2.02	13211	6.26	-215.6	20.6		
10:53am	2.01	13193	6.35	-215.5	20.5		
10:55am	2.01	13193	6.35	-215.6	20.5		

### Water Quality and General Comments:

Water was clear no odour or sheen or hydrocarbons. Vegetation around monument and no standing water around monument.

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## GROUNDWATER MONITORING FIELD DATA SHEET

<b>Project:</b> E04-0922 Scone	<b>Sample ID:</b> MWC
<b>Client:</b> UHSC	<b>Sampler:</b> DB
<b>Site Address:</b> Noblet Road Scone	<b>Date:</b> 13.9.22

### **Well Information**

Monument damaged: <b>Rusty</b>	YES / <b>NO</b> / N/A	Well ID visible:	YES / NO / N/A
Locked well casing:	YES / <b>NO</b> / N/A	Cap on PVC casing:	<b>YES</b> / NO / N/A
Cement footing damaged:	YES / <b>NO</b> / N/A	Water in monument casing:	YES / <b>NO</b> / N/A
Standing water, vegetation around monument:	YES / <b>NO</b> / N/A	Internal obstruction in casing:	YES / <b>NO</b> / N/A
Well Damaged: Rusty	YES / <b>NO</b> / N/A	Odours from groundwater:	YES / <b>NO</b> / N/A
Casing above ground: .....0.75.....	m agl	<b>Weather Conditions:</b>	
Standing water level: ..... 4.967.....	m bgl	Temperature >15 <input type="checkbox"/>	15-20 X
Total well depth: .....12.6 .....	m bgl	20-25 <input type="checkbox"/>	25-30 <input type="checkbox"/>
Initial well volume: .....	L	Clear <input type="checkbox"/>	Partly cloudy X Overcast X
Water level after purging: .....5.163.....	m bgl	Calm X	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: .....5.163.....	m bgl		
Well purged dry:	YES / <b>NO</b>		
Purging equipment:	Bailer		
Sample equipment:	Bailer	Fine X	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 <sup>-1</sup> )	EC (μS cm <sup>-1</sup> )	pH	Redox (mV)	Temp (°C)	Salinity	Comments
11:22am	2.02	3575	6.45	-267.2	19.1		
11:24am	1.62	3442	6.55	-266.2	18.9		
11:26am	1.64	3525	6.60	261.1	19.0		
11:28am	1.62	3520	6.58	-265.2	19.0		

### **Water Quality and General Comments:**

Water was clear no odour or sheen or hydrocarbons. Vegetation around monument and no standing water around monument.

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## GROUNDWATER MONITORING FIELD DATA SHEET

<b>Project:</b> E04-0622 Scone	<b>Sample ID:</b> MWD Leachate well
<b>Client:</b> UHSC	<b>Sampler:</b> DB
<b>Site Address:</b> Noblet Road Scone	<b>Date:</b> 13.9.22

<b>Well Information</b>			
Monument damaged: Rusty	YES / NO / N/A	Well ID visible:	YES / <b>NO</b> / N/A
Locked well casing:	YES / NO / <b>N/A</b>	Cap on PVC casing:	YES / NO / <b>N/A</b>
Cement footing damaged:	YES / NO / <b>N/A</b>	Water in monument casing:	YES / <b>NO</b> / N/A
Standing water, vegetation around monument:	YES / NO / N/A	Internal obstruction in casing:	YES / <b>NO</b> / N/A
Well Damaged: Rusty	YES / NO / <b>N/A</b>	Odours from groundwater:	<b>YES</b> / NO / N/A
Casing above ground: .....N/A.....	m agl	<b>Weather Conditions:</b>	
Standing water level: ..... 9.643.....	m bgl	Temperature >15 <input type="checkbox"/>	15-20 <input type="checkbox"/>
Total well depth: .....12.96 .....	m bgl	20-25 X	25-30 <input type="checkbox"/>
Initial well volume: .....	L	Clear <input type="checkbox"/>	Partly cloudy X
Water level after purging: .....9.816.....	m bgl	Overcast	<input type="checkbox"/>
Volume of water purged: .....	L	Calm X	Slight breeze <input type="checkbox"/>
Water level at time of sampling: .....9.816.....	m bgl	Moderate breeze	<input type="checkbox"/>
Well purged dry:	YES / <b>NO</b>	Windy	<input type="checkbox"/>
Purging equipment:	Bailer	Fine X	Showers <input type="checkbox"/>
Sample equipment:	Bailer	Rain	<input type="checkbox"/>

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

### Water Quality Details:

Time am / pm	DO (mg/L <sup>-1</sup> )	EC (µS cm <sup>-1</sup> )	pH	Redox (mV)	Temp (°C)	Salinity	Comments
12:48pm	0.78	5306	7.44	-286.9	25.6		Dark green sediment in water
12:50pm	1.73	5639	6.80	-266.8	26.7		
12:52pm	0.63	5957	6.88	-260.4	26.9		
12:54pm	0.46	6126	6.89	263.0	27.0		

### Water Quality and General Comments:

Water was dark green tinged with some sediment, methane odour, no sheen or hydrocarbons. Vegetation around monument and no standing water around monument. Monitoring well was cut to ground level. Well, was surrounded by tyres.

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## GROUND WATER MONITORING FIELD DATA SHEET

<b>Project:</b> E04-0622 Scone	<b>Sample ID:</b> MWE
<b>Client:</b> UHSC	<b>Sampler:</b> DB
<b>Site Address:</b> Noblet Road Scone	<b>Date:</b> 13.9.22

<b>Well Information</b>			
Monument damaged: <b>Rusty</b>	YES / <b>NO</b> / N/A	Well ID visible:	<b>YES</b> / NO / N/A
Locked well casing:	YES / <b>NO</b> / N/A	Cap on PVC casing:	<b>YES</b> / NO / N/A
Cement footing damaged:	YES / <b>NO</b> / N/A	Water in monument casing:	YES / <b>NO</b> / N/A
Standing water, vegetation around monument:	YES / <b>NO</b> / N/A	Internal obstruction in casing:	YES / <b>NO</b> / N/A
Well Damaged: Rusty	YES / <b>NO</b> / N/A	Odours from groundwater:	YES / <b>NO</b> / N/A
Casing above ground: .....0.68.....	m agl	<b>Weather Conditions:</b>	
Standing water level: ..... 2.834.....	m bgl	Temperature >15 <input type="checkbox"/>	15-20 <input type="checkbox"/>
Total well depth: .....9.46 .....	m bgl	20-25 X	25-30 <input type="checkbox"/>
Initial well volume: .....	L	Clear <input type="checkbox"/>	Partly cloudy X    Overcast <input type="checkbox"/>
Water level after purging: .....3.34.....	m bgl	Calm <input type="checkbox"/>	Slight breeze X    Moderate breeze <input type="checkbox"/>
Volume of water purged: .....	L	Windy <input type="checkbox"/>	
Water level at time of sampling: .....3.34.....	m bgl	Fine X	Showers <input type="checkbox"/> Rain <input type="checkbox"/>
Well purged dry:	YES / <b>NO</b>		
Purging equipment:	Bailer		
Sample equipment:	Bailer		

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

### Water Quality Details:

Time am / pm	DO (mg/L <sup>-1</sup> )	EC (μS cm <sup>-1</sup> )	pH	Redox (mV)	Temp (°C)	Salinity	Comments
12:13pm	1.76	2044	6.47	-287.0	17.6		
12:15pm	1.08	2038	6.53	-270.9	17.3		
12:17pm	1.09	2044	5.67	-266.6	17.4		
12:19pm	1.10	2040	5.70	-266.8	17.4		

### Water Quality and General Comments:

Water was clear, no odour or sheen or hydrocarbons. Vegetation around monument and no standing water around monument.

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**Attachment 4**      Water Quality Meter Calibration Certificate

**Multi Parameter Water Meter**

Instrument YSI Quatro Pro Plus  
 Serial No. 11E101629



Air-Met Scientific Pty Ltd  
 1300 137 067

Item	Test	Pass	Comments
Battery	Charge Condition	✓	
	Fuses	✓	
	Capacity	✓	
Switch/keypad Display	Operation	✓	
	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
2. pH 7.00		pH 7.00		381241	pH 7.01
3. pH 4.00		pH 4.00		389384	pH 3.90
4. mV		235.8mV		385070/387761	235.8mV
5. EC		2.76mS		385041	2.76mS
6. Temp		21.9°C		MultiTherm	21.5°C
7. DO		0ppm		379624	0.00ppm

Calibrated by: Alex Buist

Calibration date: 9/09/2022

Next calibration due: 9/10/2022