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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



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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	Hanna Multiparameter 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 18th 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.

	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 Hanna Instruments H198494 Multiparameter 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 2023 sampling event. Results are detailed in **Tables 2 to 11**. Comparisons have been made to the previous quarterly rounds of monitoring (December 2022, March and June 2023) also the yearly monitoring of September 2022. 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 2022	MWA Dec 2022	MWA March 2023	MWA June 2023	MWA Sept 2023
IONS	Calcium	mg/L	NA	550	500	500	540	570
	Alkalinity	mg/L	NA	510	510	510	520	540
	Chloride	mg/L	NA	6900	5800	7100	6300	8000
	Fluoride	mg/L	NA	0.1	0.1	0.1	0.1	0.1
	Potassium¹	mg/L	410	3	3	3	4	4
	Magnesium	mg/L	NA	950	960	1000	1000	1100
	Sulphate	mg/L	NA	50	52	56	66	62
HEAVY METALS	Iron	mg/L	0.3	<LOR	0.68	0.180	<LOR	0.01
	Manganese	mg/L	1.9	<LOR	0.037	0.010	0.012	0.07
Phenols	Total phenolics	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	6.2	6.7	6.8	6.6	6.9
	Sodium	mg/L	NA	1800	1900	1800	2100	2000
	Ammonia²	mg/L	0.9	0.049	<LOR	0.17	0.007	0.043
	Nitrate	mg/L	0.7	0.51	0.47	0.49	0.63	0.59
	Total Organic C	mg/L	4	5	8	3	3	5
	EC	µS/cm	NA	17000	20000	20000	19000	20000

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 Sept 2022-Sept 2023
(MWA)**

Sampling Parameter	Units	Threshold Criteria (mg/L)	MWA Sept 2022	MWA Sept 2023
Total dissolved solids	mg/L	NA	14000	14000
Biochemical Oxygen Demand	mg/L	NA	<LOR	<LOR
Phosphate	mg/L	0.015 ^G	0.071	0.076
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	0.54	0.57
Cadmium	mg/L	0.0002	<LOR	<LOR
Copper	mg/L	0.0014	0.002	0.01
Chromium VI	mg/L	0.004	<LOR	<LOR
Chromium (Total)	mg/L	27	<LOR	0.004
Cobalt	mg/L	0.09		<LOR
Lead	mg/L	0.0034	<LOR	<LOR
Mercury	mg/L	0.0006	0.0002	0.00006
Zinc	mg/L	0.008 ^D	0.013	0.025
TRH	mg/L	0.26 ^I	<LOR	<LOR
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 Criteria (mg/L)	MWB Sept 2022	MWB Dec 2022	MWB March 2023	MWB June 2023	MWB Sept 2023
IONS	Calcium	mg/L	NA	470	440	420	470	470
	Alkalinity	mg/L	NA	440	430	440	450	440
	Chloride	mg/L	NA	4700	3400	4800	4200	5200
	Fluoride	mg/L	NA	0.2	0.3	0.3	0.3	0.2
	Potassium¹	mg/L	410	3	3	3	3	4
	Magnesium	mg/L	NA	570	580	600	600	630
	Sulphate	mg/L	NA	77	60	82	91	110
HEAVY METALS	Iron	mg/L	0.3	<LOR	0.07	0.14	<LOR	<LOR
	Manganese	mg/L	1.9	0.014	0.01	0.012	0.017	0.016
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	6.8	6.9	6.9	6.9	6.9
	Sodium	mg/L	NA	1400	1300	1300	1500	1400
	Ammonia²	mg/L	0.9	0.065	<LOR	<LOR	0.073	0.037
	Nitrate	mg/L	0.7	0.32	0.31	0.30	0.38	0.26
	Total Organic C	mg/L	4	5	7	7	9	9
	EC	µS/cm	NA	13000	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 Sept 2022-Sept 2023
(MWB)**

Sampling Parameter	Units	Threshold Criteria (mg/L)	MWB Sept 2022	MWB Sept 2023
Total dissolved solids	mg/L	NA	10000	10000
Biochemical Oxygen Demand	mg/L	NA	<LOR	<LOR
Phosphate	mg/L	0.015	0.02	0.02
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	0.39	0.41
Cadmium	mg/L	0.0002	<LOR	<LOR
Copper	mg/L	0.0014	0.002	0.009
Chromium VI	mg/L	0.004	<LOR	<LOR
Chromium (Total)	mg/L	0.004	0.004	0.005
Cobalt	mg/L	0.09		<LOR
Lead	mg/L	0.0034	<LOR	<LOR
Mercury	mg/L	0.0006	0.00007	<LOR
Zinc	mg/L	0.008	0.009	0.034
TRH	mg/L	0.26 ^l	<LOR	<LOR
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	MWC	MWC	MWC	MWC	MWC
			Criteria (mg/L)	Sept 2022	Dec 2022	March 2023	June 2023	Sept 2023
IONS	Calcium	mg/L	NA	61	300	310	380	390
	Alkalinity (total)	mg/L	NA	600	950	910	990	880
	Chloride	mg/L	NA	840	3100	4200	4000	5500
	Fluoride	mg/L	NA	0.3	0.2	0.2	0.2	0.2
	Potassium¹	mg/L	410	1	2	2	2	3
	Magnesium	mg/L	NA	110	410	450	500	550
	Sulphate	mg/L	NA	170	71	82	87	91
HEAVY METALS	Iron	mg/L	0.3	0.05	1.4	1.4	<LOR	<LOR
	Manganese	mg/L	1.9	0.68	2.1	1.6	1.4	1.9
PHENOLS	Total phenolics	mg/L	0.32	<LOR	<LOR	<LOR	<LOR	<LOR
OCP	OCP³	mg/L	0.000	<LOR	<LOR	<LOR	<LOR	<LOR
MISC. INORGANIC S	pH	pH	6.5 – 8	7.2	6.7	6.9	6.8	6.9
	Sodium	mg/L	NA	500	1500	1600	1900	1800
	Ammonia²	mg/L	0.9	0.05	0.016	0.010	<LOR	<LOR
	Nitrate	mg/L	0.7	1.2	0.11	0.11	0.05	0.068
	Total Organic C	mg/L	4	75	10	7	8	8
	EC	µS/cm	NA	3600	13000	13000	14000	15000

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 Sept 2022- 2023 (MWC)

Sampling Parameter	Units	Threshold Criteria (mg/L)	MWC Sept 2022	MWC Sept 2023
Total dissolved solids	mg/L	NA	2200	9900
Biochemical Oxygen Demand	mg/L	NA	<LOR	16
Phosphate	mg/L	0.015	0.04	0.02
Arsenic III & V	mg/L	0.024 (III),	0.002	<LOR
Aluminium	mg/L	0.055 (pH> 6.5)	<LOR	<LOR
Barium	mg/L	NA	0.08	0.4
Cadmium	mg/L	0.0002	<LOR	<LOR
Copper	mg/L	0.0014	0.003	0.007
Chromium VI	mg/L	0.004	<LOR	<LOR
Chromium (total)	mg/L	0.004	<LOR	<LOR
Cobalt	mg/L	0.09		0.008
Lead	mg/L	0.0034	<LOR	<LOR
Mercury	mg/L	0.0006	<LOR	<LOR
Zinc	mg/L	0.008	0.005	0.026
TRH	mg/L	0.26 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 Sept 2022	MWD Dec 2022	MWD March 2023	MWD June 2023	MWD Sept 2023
IONS	Calcium	mg/L	NA	190	220	110	160	160
	Alkalinity (total)	mg/L	NA	1500	1900	2200	2300	1900
	Chloride	mg/L	NA	1400	2000	2800	2200	3400
	Fluoride	mg/L	NA	0.3	0.3	0.2	0.3	0.2
	Potassium¹	mg/L	410	82	100	1	130	110
	Magnesium	mg/L	NA	150	220	120	270	280
	Sulphate	mg/L	NA	85	200	95	62	51
HEAVY METALS	Iron	mg/L	0.3	0.75	2.6	3.1	0.87	0.88
	Manganese	mg/L	1.9	0.61	0.49	0.38	0.38	0.39
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	7.5	7.5	7.6	7.4	7.8
	Sodium	mg/L	NA	810	1300	790	1600	1500
	Ammonia²	mg/L	0.9	140	180	230	220	200
	Nitrate	mg/L	0.7	0.056	<LOR	<LOR	<LOR	<LOR
	Total Organic C	mg/L	4	220	190	440	220	240
	EC	µS/cm	NA	6400	11000	12000	11000	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 9 – Yearly Analytes Groundwater Results and Comparison Sept 2022-Sept 2023
(MWD)**

Sampling Parameter	Units	Threshold Criteria (mg/L)	MWD	MWD
			(leachate) Sept 2022	(leachate) Sept 2023
Total dissolved solids	mg/L	NA	4800	6800
Biochemical Oxygen Demand	mg/L	NA	74	62
Phosphate	mg/L	0.015	0.042	0.69
Arsenic III & V	mg/L	0.024 (III),	0.009	0.008
Aluminium	mg/L	0.055 (pH > 6.5)	<LOR	<LOR
Barium	mg/L	NA	0.68	0.97
Cadmium	mg/L	0.0002	<LOR	<LOR
Copper	mg/L	0.0014	<LOR	0.005
Chromium VI	mg/L	0.004	<LOR	<LOR
Chromium (total)	mg/L	0.004	0.018	0.027
Cobalt	mg/L	0.09		0.021
Lead	mg/L	0.0034	<LOR	<LOR
Mercury	mg/L	0.0006	<LOR	<LOR
Zinc	mg/L	0.008	0.01	0.03
TRH	mg/L	0.26 ¹	2.1	6.1
Benzene	mg/L	0.95	0.005	0.004
Toluene	mg/L	0.18	<LOR	<LOR
Ethylbenzene	mg/L	0.08	<LOR	<LOR
Xylene			<LOR	0.003
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	0.012	0.007
OPPs	mg/L	0.00002	<LOR	<LOR

Table 10 –Quarterly Groundwater Results and Comparison (MWE)

	Analytes	Units	Site Criteria (mg/L)	MWE Sept 2022	MWE Dec 2022	MWE March 2023	MWE June 2023	MWE Sept 2023
IONS	Calcium	mg/L	NA	57	88	180	130	130
	Alkalinity	mg/L	NA	1000	1700	1300	1200	1100
	Chloride	mg/L	NA	260	490	960	940	1300
	Fluoride	mg/L	NA	0.3	0.4	0.4	0.5	0.4
	Potassium¹	mg/L	410	2	0.8	140	0.9	1
	Magnesium	mg/L	NA	54	93	250	130	140
	Sulphate	mg/L	NA	18	110	210	180	240
HEAVY METALS	Iron	mg/L	0.3	2.2	0.71	2.1	<LOR	0.02
	Manganese	mg/L	1.9	1	0.59	0.88	0.66	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	7.1	7.2	7.3	7.2	7.4
	Sodium	mg/L	NA	380	590	1300	730	760
	Ammonia²	mg/L	0.9	0.068	0.018	0.034	0.039	0.12
	Nitrate	mg/L	0.7	<LOR	<LOR	0.02	0.007	0.01
	Total Organic C	mg/L	4	150	7	6	5	5
	EC	µS/c	NA	2300	4200	5000	5100	5500

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 Sept 2022-Sept 2023 (MWE)

Sampling Parameter	Units	Threshold Criteria (mg/L)	MWE Sept 2022	MWE Sept 2023
Total dissolved solids	mg/L	NA	1800	3200
Biochemical Oxygen Demand	mg/L	NA	26	11
Phosphate	mg/L	0.015	<LOR	0.05
Arsenic III & V	mg/L	0.024 (III), 0.013	0.003	0.008
Aluminium	mg/L	0.055 (pH > 6.5)	<LOR	<LOR
Barium	mg/L	NA	0.069	0.094
Cadmium	mg/L	0.0002	<LOR	<LOR
Copper	mg/L	0.0014	<LOR	0.004
Chromium VI	mg/L	0.004	<LOR	<LOR
Chromium (total)	mg/L	0.004	<LOR	<LOR
Cobalt	mg/L	0.09		0.006
Lead	mg/L	0.0034	<LOR	<LOR
Mercury	mg/L	0.0006	<LOR	<LOR
Zinc	mg/L	0.008	0.005	0.011
TRH	mg/L	0.26 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 (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 September 2023 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 0.071mg/L (September 2022) to 0.076mg/L in September 2023, above the criteria of 0.015mg/L.
- Copper has increased from 0.002mg/L (September 2022) to 0.010mg/L in September 2023, above the criteria of 0.0014mg/L.
- Zinc has increased from 0.013mg/L (September 2022) to 0.025 mg/L in September 2023, above the site criteria of 0.008mg/.
- Total Organic Carbon has fluctuated between 3mg/L (March and June 2023) below the site criteria to 8mg/L (December 2022 8mg/L) above the site criteria of 4mg/L over the course of the year. TOC is currently 5mg/L in September 2023.
- The pH result in September 2022 was below the criteria of 6.5-8. pH results between December 2022 and September 2023 have remained between pH6.6-6.9.
- Manganese has increased from 0.012mg/L in June to 0.070mg/L in September 2023.
- Magnesium has increased from 950mg/L in September 2022 to 1100mg/L in September 2023.
- Mercury has decreased from 0.0002mg/L in September 2022 to 0.00006mg/L in September 2023.

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.

- Total Organic Carbon has increased from 5mg/L (September 2022) to 9mg/L (June and September 2023), above the site criteria of 4mg/L.
- Ammonia has decreased from 0.073mg/L in June to 0.037 mg/ in September 2023.
- Phosphate has remained constant between September 2022 and 2023 with a concentration of 0.02mg/L above the site criteria of 0.015mg/L.
- Zinc concentration increased from 0.009mg/L in September 2022 to 0.034mg/L in September 2023, above site criteria of 0.008mg/L.
- Total Chromium has increased from 0.004mg/L in September 2022 equal to the criteria to 0.005mg/L in September 2023.
- Copper concentration has increased from 0.002 mg/L in September 2022 to 0.009mg/L in September 2023 above the criteria of 0.0014mg/L.
- Mercury concentrations have decreased from 0.00007 mg/L in September 2022 to below the limit of reporting 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. There were 4 concentrations which exceeded the site criteria. The following changes have occurred in the water quality of MWC:

- The concentration of Manganese has fluctuated throughout the last 5 sampling periods with the December 2022 concentration being above site criteria (1.9mg/L). The concentration of the September 2023 sampling event (1.9mg/L) is higher than the June 2023 sampling event (1.4mg/L).
- Concentration of TOC has fluctuated throughout the last 5 sampling periods with all concentrations above site criteria (4mg/L).
- Concentration of Phosphate was 0.02mg/L in September 2023 which is below the previous concentration of 0.04mg/L in September 2022, and still above the site criteria of 0.015mg/L.
- Calcium concentration increased from 380mg/L in June 2023 to 390mg/L in September 2023.

- Chloride concentration increased from 4000mg/L in June to 550mg/L in September 2023.
- Magnesium concentration increased from 500mg/L in June to 550mg/L in September 2023.
- Zinc concentration increased from 0.005mg/L in September 2022 to 0.026mg/L in September 2023, above the site criteria of 0.008mg/L.
- Nitrate concentrations have increased from 0.05mg/L in June to 0.068mg/L in September 2023.
- BOD has increased from below limit of reporting in September 2022 to 16mg/L in September 2023.
- Arsenic concentrations have increased from 0.002 in September 2022 to below limit of reporting in September 2023.
- Copper concentrations have increased from 0.003mg/L in September 2022 to 0.007mg/L in September 2023.

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 220 mg/L in June 2023, compared to 200mg/L in September 2023. Currently there is a downward trend in the concentration of Ammonia.
- Iron concentrations have fluctuated throughout the year with samples ranging from 0.75mg/L in September 2022 to 3.2mg/L in June 2023.
- TOC has increased from 220 mg/L in June 2023 to a concentration of 240 mg/L in September 2023.
- Phosphate has increased from 0.042mg/L in September 2022 to 0.69mg/L, in September 2023.
- Zinc has increased from 0.01 mg/L in September 2022 to 0.03 mg/L in September 2023.
- Total dissolved solids have increased from 4800mg/L in September 2022 to 6800mg/L in September 2023.

- Copper has increased from below the limit of reporting in September 2022 to 0.005mg/L in September 2023.
- 1,4-dichlorobenzene was detected at a concentration of 6µg/L reduced from 8µg/L in September 2022
- F1 hydrocarbon fraction was detected at a concentration of 73 and increased from 44µg/L in September 2022
- Benzene was detected at a concentration of 5µg/L was a minor increase from 4µg/L in September 2022
- Naphthalene was detected at a concentration of 9µg/L and 7µg/L (PAH) a decrease from September 2022 of 11µg/L and 12µg/L in the PAHs
- F2 hydrocarbon fraction was detected at a concentration of 1500µg/L an increase from 460µg/L in September 2022
- F3 hydrocarbon fraction was detected at a concentration of 4200 µg/L an increase from 1600µg/L in September 2022.
- F4 hydrocarbon fraction was detected at a concentration of 430µg/L an increase from a non-detection 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 reduced from 150 mg/L (September 2022) to 5mg/L (June and September 2023).
- Zinc has increased from 0.05 mg/L in September 2022 to 0.011 mg/L in September 2023.
- Sulphate concentration increased from 180mg/L in June to 240mg/L in September 2023.
- Magnesium concentration increased from 130mg/L in June to 140mg/L in September 2023.
- Chloride concentration increased from 940mg/L in June to 1300mg/L in September 2023.

All other analytes reported concentrations consistent with previous monitoring data.

The following analytes exceeded the Threshold Criteria during the September 2023 sampling event, excluding the Leachate Monitoring well (MWD); Total Organic Carbon, Copper, Phosphate and Zinc in MWA, MWB and MWC. 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 Copper, Zinc, 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.

6.0 CONCLUSIONS

There are seasonal fluctuations observed with regional groundwater conditions. The recent weather conditions of increased rainfall throughout 2022-2023 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 2023 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, Phosphate, Copper and Zinc in MWA, MWB, MWC and MWE, and Total Chromium in MWB. 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 2023.

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	
				Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	pH	mg/L	
				Analytes	Calcium	Alkalinity	Chloride	Fluoride	Iron	Magnesium	Manganese	Organochlorine pesticides (OCP)	Potassium	pH	Sodium
				Monitoring frequency	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly
MWA	333359	18/09/2022	Annual	570	540	8000	0.1	0.01	1100	0.007	<0.0002	4	6.9	2000	
MWB	333359	18/09/2022	Annual	470	440	5200	0.2	<0.01	630	0.016	<0.0002	4	6.9	1400	
MWC	333359	18/09/2022	Annual	390	880	5500	0.2	<0.01	550	1.9	<0.0002	3	6.9	1800	
MWD	333359	18/09/2022	Annual	160	1900	3400	0.2	0.88	280	0.39	<0.0002	110	7.8	1500	
MWE	333359	18/09/2022	Annual	130	1100	1300	0.4	0.02	140	1.1	<0.0002	1	7.4	760	

ENGAGE ENVIRONMENTAL SERVICES				Threshold Criteria	0.9	0.7	NA	4	0.32	NA	NA	NA	0.015	0.024 (III) 0.013 (V)	0.00002
				Units	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L
				Analytes	Ammonia	Nitrate	Sulfate	Total organic carbon	Total phenolics	Electrical conductivity (EC)	Total dissolved solids	Biochemical oxygen demand	Phosphate	Arsenic III & V	OPPs
				Monitoring frequency	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Yearly	Yearly	Yearly	Yearly	Yearly
MWA	333359	18/09/2022	Annual	0.043	0.59	62	5	<0.05	20000	14000	<10	0.076	0.001	<0.0002	
MWB	333359	18/09/2022	Annual	0.037	0.26	110	9	<0.05	14000	10000	<10	0.02	0.001	<0.0002	
MWC	333359	18/09/2022	Annual	<0.005	0.068	91	8	<0.05	15000	9900	16	0.02	<0.01	<0.0002	
MWD	333359	18/09/2022	Annual	200	<0.05	51	240	<0.05	3600	6800	62	0.069	0.008	<0.0002	
MWE	333359	18/09/2022	Annual	0.12	0.01	240	5	<0.05	5500	3200	11	0.05	0.008	<0.0002	

ENGAGE ENVIRONMENTAL SERVICES			Threshold Criteria	0.055 (pH>6.5)	NA	0.0002	0.09	0.0014	0.001	NA	0.0034	0.0006	0.008	0.016
			Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
			Analytes	Aluminum	Barium	Cadmium	Cobalt	Copper	Chromium VI	Chromium (total)	Lead	Mercury	Zinc	PAHs
			Monitoring frequency	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly
MWA	333359	18/09/2022	Annual	<0.01	0.57	<0.0001	0.001	0.01	<0.005	0.004	<0.001	0.0006	0.025	ND
MWB	333359	18/09/2022	Annual	<0.01	0.41	<0.0001	0.001	0.009	<0.005	0.005	<0.001	<0.00005	0.034	ND
MWC	333359	18/09/2022	Annual	<0.01	0.4	<0.0001	0.008	0.007	<0.005	<0.001	<0.001	<0.00005	0.026	ND
MWD	333359	18/09/2022	Annual	<0.01	0.97	<0.0001	0.021	0.005	<0.005	0.027	<0.001	<0.00005	0.03	0.0072
MWE	333359	18/09/2022	Annual	<0.01	0.094	<0.0001	0.006	0.004	<0.005	<0.001	<0.001	<0.00005	0.011	ND

ENGAGE ENVIRONMENTAL SERVICES			Threshold Criteria	0.26	0.95	0.18	0.08	0.35	NA	6500	0.05	0.03	0.0003	0.00003
			Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
			Analytes	TRH	Benzene	Toluene	Ethylbenzene	total xylene	Tetrachlorethene (TCE)	1,1,1-Trichloroethane (TCA)	Tetrachlorethene (PCE)	1,2-Dichloroethene	Vinyl Chloride	PCBs
			Monitoring frequency	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly
MWA	333359	18/09/2022	Annual	<0.01	<0.001	<0.001	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001	<0.01	<0.002
MWB	333359	18/09/2022	Annual	<0.01	<0.001	<0.001	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001	<0.01	<0.002
MWC	333359	18/09/2022	Annual	<0.01	<0.001	<0.001	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001	<0.01	<0.002
MWD	333359	18/09/2022	Annual	6.1	0.004	<0.001	<0.001	0.003	<0.001	<0.001	<0.001	<0.001	<0.01	<0.002
MWE	333359	18/09/2022	Annual	<0.01	<0.001	<0.001	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001	<0.01	<0.002

Attachment 2 NATA Accredited Laboratory Results

CERTIFICATE OF ANALYSIS 333359

Client Details

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

Sample Details

Your Reference	<u>E04-0923-UHSC</u>
Number of Samples	5 Water
Date samples received	19/09/2023
Date completed instructions received	19/09/2023

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	26/09/2023
Date of Issue	26/09/2023
NATA Accreditation Number 2901. This document shall not be reproduced except in full.	
Accredited for compliance with ISO/IEC 17025 - Testing. Tests not covered by NATA are denoted with *	

Results Approved By

Diego Bigolin, Inorganics Supervisor
 Dragana Tomas, Senior Chemist
 Loren Bardwell, Development Chemist
 Tim Toll, Chemist (FAS)

Authorised By

Nancy Zhang, Laboratory Manager

VHC's in water						
Our Reference		333359-1	333359-2	333359-3	333359-4	333359-5
Your Reference	UNITS	MWA	MWB	MWC	MWD	MWE
Date Sampled		18/09/2023	18/09/2023	18/09/2023	18/09/2023	18/09/2023
Type of sample		Water	Water	Water	Water	Water
Date Extracted	-	19/09/2023	19/09/2023	19/09/2023	25/09/2023	19/09/2023
Date Analysed	-	20/09/2023	20/09/2023	20/09/2023	26/09/2023	20/09/2023
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	20	<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		333359-1	333359-2	333359-3	333359-4	333359-5
Your Reference	UNITS	MWA	MWB	MWC	MWD	MWE
Date Sampled		18/09/2023	18/09/2023	18/09/2023	18/09/2023	18/09/2023
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	6	<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	%	104	104	105	107	100
Surrogate Toluene-d8	%	95	95	95	100	83
Surrogate 4-Bromofluorobenzene	%	104	103	106	102	123

vTRH(C6-C10)/BTEXN in Water						
Our Reference		333359-1	333359-2	333359-3	333359-4	333359-5
Your Reference	UNITS	MWA	MWB	MWC	MWD	MWE
Date Sampled		18/09/2023	18/09/2023	18/09/2023	18/09/2023	18/09/2023
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	19/09/2023	19/09/2023	19/09/2023	25/09/2023	19/09/2023
Date analysed	-	20/09/2023	20/09/2023	20/09/2023	26/09/2023	20/09/2023
TRH C ₆ - C ₉	µg/L	<10	<10	<10	67	<10
TRH C ₆ - C ₁₀	µg/L	<10	<10	<10	79	<10
TRH C ₆ - C ₁₀ less BTEX (F1)	µg/L	<10	<10	<10	73	<10
Benzene	µg/L	<1	<1	<1	4	<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	3	<2
o-xylene	µg/L	<1	<1	<1	<1	<1
Naphthalene	µg/L	<1	<1	<1	9	<1
Surrogate Dibromofluoromethane	%	104	104	105	107	100
Surrogate Toluene-d8	%	95	95	95	100	83
Surrogate 4-Bromofluorobenzene	%	104	103	106	102	123

svTRH (C10-C40) in Water						
Our Reference		333359-1	333359-2	333359-3	333359-4	333359-5
Your Reference	UNITS	MWA	MWB	MWC	MWD	MWE
Date Sampled		18/09/2023	18/09/2023	18/09/2023	18/09/2023	18/09/2023
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	20/09/2023	20/09/2023	20/09/2023	20/09/2023	20/09/2023
Date analysed	-	21/09/2023	21/09/2023	21/09/2023	21/09/2023	26/09/2023
TRH C ₁₀ - C ₁₄	µg/L	<50	<50	<50	1,100	<50
TRH C ₁₅ - C ₂₈	µg/L	<100	<100	<100	4,000	<100
TRH C ₂₉ - C ₃₆	µg/L	<100	<100	<100	910	<100
Total +ve TRH (C10-C36)	µg/L	<50	<50	<50	5,900	<50
TRH >C ₁₀ - C ₁₆	µg/L	<50	<50	<50	1,500	<50
TRH >C ₁₀ - C ₁₆ less Naphthalene (F2)	µg/L	<50	<50	<50	1,500	<50
TRH >C ₁₆ - C ₃₄	µg/L	<100	<100	<100	4,200	<100
TRH >C ₃₄ - C ₄₀	µg/L	<100	<100	<100	430	<100
Total +ve TRH (>C10-C40)	µg/L	<50	<50	<50	6,100	<50
Surrogate o-Terphenyl	%	86	110	95	#	87

PAHs in Water						
Our Reference		333359-1	333359-2	333359-3	333359-4	333359-5
Your Reference	UNITS	MWA	MWB	MWC	MWD	MWE
Date Sampled		18/09/2023	18/09/2023	18/09/2023	18/09/2023	18/09/2023
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	20/09/2023	20/09/2023	20/09/2023	20/09/2023	22/09/2023
Date analysed	-	21/09/2023	21/09/2023	21/09/2023	21/09/2023	25/09/2023
Naphthalene	µg/L	<2	<2	<2	7	<2
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	7.2	NIL (+)VE
Surrogate p-Terphenyl-d14	%	86	88	111	89	103

Organochlorine Pesticides in Water						
Our Reference		333359-1	333359-2	333359-3	333359-4	333359-5
Your Reference	UNITS	MWA	MWB	MWC	MWD	MWE
Date Sampled		18/09/2023	18/09/2023	18/09/2023	18/09/2023	18/09/2023
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	20/09/2023	20/09/2023	20/09/2023	20/09/2023	22/09/2023
Date analysed	-	21/09/2023	21/09/2023	21/09/2023	21/09/2023	25/09/2023
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	%	95	104	108	100	98

OP Pesticides in Water						
Our Reference		333359-1	333359-2	333359-3	333359-4	333359-5
Your Reference	UNITS	MWA	MWB	MWC	MWD	MWE
Date Sampled		18/09/2023	18/09/2023	18/09/2023	18/09/2023	18/09/2023
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	20/09/2023	20/09/2023	20/09/2023	20/09/2023	22/09/2023
Date analysed	-	21/09/2023	21/09/2023	21/09/2023	21/09/2023	25/09/2023
Dichlorvos	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Mevinphos	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Phorate	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
Disulfoton	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
Parathion-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
Fenthion	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
Methidathion	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Fenamiphos	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
Phosalone	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
Coumaphos	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Surrogate TCMX	%	95	104	108	100	98

PCBs in Water						
Our Reference		333359-1	333359-2	333359-3	333359-4	333359-5
Your Reference	UNITS	MWA	MWB	MWC	MWD	MWE
Date Sampled		18/09/2023	18/09/2023	18/09/2023	18/09/2023	18/09/2023
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	20/09/2023	20/09/2023	20/09/2023	20/09/2023	22/09/2023
Date analysed	-	21/09/2023	21/09/2023	21/09/2023	21/09/2023	25/09/2023
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	%	95	104	108	100	98

Total Phenolics in Water						
Our Reference		333359-1	333359-2	333359-3	333359-4	333359-5
Your Reference	UNITS	MWA	MWB	MWC	MWD	MWE
Date Sampled		18/09/2023	18/09/2023	18/09/2023	18/09/2023	18/09/2023
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	20/09/2023	20/09/2023	20/09/2023	20/09/2023	20/09/2023
Date analysed	-	20/09/2023	20/09/2023	20/09/2023	20/09/2023	20/09/2023
Total Phenolics (as Phenol)	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05

HM in water - dissolved						
Our Reference		333359-1	333359-2	333359-3	333359-4	333359-5
Your Reference	UNITS	MWA	MWB	MWC	MWD	MWE
Date Sampled		18/09/2023	18/09/2023	18/09/2023	18/09/2023	18/09/2023
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	20/09/2023	20/09/2023	20/09/2023	20/09/2023	20/09/2023
Date analysed	-	20/09/2023	20/09/2023	20/09/2023	20/09/2023	20/09/2023
Arsenic-Dissolved	µg/L	1	1	<1	8	8
Cadmium-Dissolved	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium-Dissolved	µg/L	4	5	<1	27	<1
Copper-Dissolved	µg/L	10	9	7	5	4
Lead-Dissolved	µg/L	<1	<1	<1	<1	<1
Mercury-Dissolved	µg/L	0.06	<0.05	<0.05	<0.05	<0.05
Nickel-Dissolved	µg/L	7	6	17	24	27
Zinc-Dissolved	µg/L	25	34	26	30	11
Iron-Dissolved	µg/L	10	<10	<10	880	20
Manganese-Dissolved	µg/L	7	16	1,900	390	1,100
Aluminium-Dissolved	µg/L	<10	<10	<10	<10	<10
Barium-Dissolved	µg/L	570	410	400	970	94
Cobalt-Dissolved	µg/L	<1	<1	8	21	6

Ion Balance						
Our Reference		333359-1	333359-2	333359-3	333359-4	333359-5
Your Reference	UNITS	MWA	MWB	MWC	MWD	MWE
Date Sampled		18/09/2023	18/09/2023	18/09/2023	18/09/2023	18/09/2023
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	19/09/2023	19/09/2023	19/09/2023	19/09/2023	19/09/2023
Date analysed	-	19/09/2023	19/09/2023	19/09/2023	19/09/2023	19/09/2023
Calcium - Dissolved	mg/L	570	470	390	160	130
Potassium - Dissolved	mg/L	4	4	3	110	1
Sodium - Dissolved	mg/L	2,000	1,400	1,800	1,500	760
Magnesium - Dissolved	mg/L	1,100	630	550	280	140
Hardness	mgCaCO ₃ /L	6,100	3,800	3,200	1,500	880
Hydroxide Alkalinity (OH ⁻) as CaCO ₃	mg/L	<5	<5	<5	<5	<5
Bicarbonate Alkalinity as CaCO ₃	mg/L	540	440	880	1,900	1,100
Carbonate Alkalinity as CaCO ₃	mg/L	<5	<5	<5	<5	<5
Total Alkalinity as CaCO ₃	mg/L	540	440	880	1,900	1,100
Sulphate, SO ₄	mg/L	62	110	91	51	240
Chloride, Cl	mg/L	8,000	5,200	5,500	3,400	1,300
Ionic Balance	%	-6.0	-8.0	-9.0	-16	-10

Miscellaneous Inorganics						
Our Reference		333359-1	333359-2	333359-3	333359-4	333359-5
Your Reference	UNITS	MWA	MWB	MWC	MWD	MWE
Date Sampled		18/09/2023	18/09/2023	18/09/2023	18/09/2023	18/09/2023
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	19/09/2023	19/09/2023	19/09/2023	19/09/2023	19/09/2023
Date analysed	-	19/09/2023	19/09/2023	19/09/2023	19/09/2023	19/09/2023
Hexavalent Chromium, Cr ⁶⁺ (dissolved)	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005
Ammonia as N in water	mg/L	0.043	0.037	<0.005	200	0.12
BOD	mg/L	<10	<10	16	62	11
Fluoride, F	mg/L	0.1	0.2	0.2	0.2	0.4
Total Organic Carbon	mg/L	5	9	8	240	5
Total Dissolved Solids (grav)	mg/L	14,000	10,000	9,900	6,800	3,200
pH	pH Units	6.9	6.9	6.9	7.8	7.4
Electrical Conductivity	µS/cm	20,000	14,000	15,000	3,600	5,500
Nitrate as N in water	mg/L	0.59	0.26	0.068	<0.050	0.01
Phosphate as P in water	mg/L	0.076	0.02	0.02	0.69	0.05

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. NOTE: Where the EC of the sample is <100µS/cm, the TDS will typically be below 70mg/L (as the sample is very likely to be at least drinking water quality). Therefore to ensure data quality for TDS, the TDS is typically calculated as per the equation below:- TDS = EC * 0.6
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.

Method ID	Methodology Summary
Inorg-118	<p>Hexavalent Chromium (Cr6+) - determined firstly by separation using ion chromatography followed by the colourimetric analytical finish.</p> <p>Water samples are ideally field filtered into alkali preserved containers prior to receipt for dissolved Cr6+ analysis. Unfiltered water samples into alkali preserved containers (or pH adjusted to pH 8-9 on receipt) can be classified as Total (unfiltered) Cr6+.</p> <p>Please note, for 'Total/Unfiltered' Trivalent Chromium in waters [calculated], these results may be exaggerated due to the digestive limitation of 'Total/Unfiltered' Hexavalent Chromium in NaOH at pH 8-9 compared to more comprehensive digestion for Total Chromium using the mineral acids HNO3 and HCl.</p> <p>Solid (includes soils, filters, paints, swabs for example) samples are extracted in a buffered catalysed solution prior to the analytical finish above. Water extractable options are available (e.g. as an option for filters) on request.</p> <p>Impingers may need pH adjusting to pH 8-9 prior to IC-colourimetric analytical finish.</p>
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Metals-022	<p>Determination of various metals by ICP-MS.</p> <p>Please note for Bromine and Iodine, any forms of these elements that are present are included together in the one result reported for each of these two elements.</p> <p>Salt forms (e.g. FeO, PbO, ZnO) are determined stoichiometrically from the base metal concentration.</p>
Org-020	<p>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.</p>
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.
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: E04-0923-UHSC

QUALITY CONTROL: VHC's in water				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date Extracted	-			19/09/2023	3	19/09/2023	25/09/2023		19/09/2023	[NT]
Date Analysed	-			20/09/2023	3	20/09/2023	26/09/2023		20/09/2023	[NT]
Dichlorodifluoromethane	µg/L	10	Org-023	<10	3	<10	<10	0	[NT]	[NT]
Chloromethane	µg/L	10	Org-023	<10	3	<10	<10	0	[NT]	[NT]
Vinyl Chloride	µg/L	10	Org-023	<10	3	<10	<10	0	[NT]	[NT]
Bromomethane	µg/L	10	Org-023	<10	3	<10	<10	0	[NT]	[NT]
Chloroethane	µg/L	10	Org-023	<10	3	<10	<10	0	[NT]	[NT]
Trichlorofluoromethane	µg/L	10	Org-023	<10	3	<10	<10	0	[NT]	[NT]
1,1-Dichloroethene	µg/L	1	Org-023	<1	3	<1	<1	0	[NT]	[NT]
Trans-1,2-dichloroethene	µg/L	1	Org-023	<1	3	<1	<1	0	[NT]	[NT]
1,1-dichloroethane	µg/L	1	Org-023	<1	3	<1	<1	0	90	[NT]
Cis-1,2-dichloroethene	µg/L	1	Org-023	<1	3	<1	<1	0	[NT]	[NT]
Bromochloromethane	µg/L	1	Org-023	<1	3	<1	<1	0	[NT]	[NT]
Chloroform	µg/L	1	Org-023	<1	3	<1	<1	0	90	[NT]
2,2-dichloropropane	µg/L	1	Org-023	<1	3	<1	<1	0	[NT]	[NT]
1,2-dichloroethane	µg/L	1	Org-023	<1	3	<1	<1	0	90	[NT]
1,1,1-trichloroethane	µg/L	1	Org-023	<1	3	<1	<1	0	90	[NT]
1,1-dichloropropene	µg/L	1	Org-023	<1	3	<1	<1	0	[NT]	[NT]
Carbon tetrachloride	µg/L	1	Org-023	<1	3	<1	<1	0	[NT]	[NT]
Dibromomethane	µg/L	1	Org-023	<1	3	<1	<1	0	[NT]	[NT]
1,2-dichloropropane	µg/L	1	Org-023	<1	3	<1	<1	0	[NT]	[NT]
Trichloroethene	µg/L	1	Org-023	<1	3	<1	<1	0	92	[NT]
Bromodichloromethane	µg/L	1	Org-023	<1	3	<1	<1	0	89	[NT]
trans-1,3-dichloropropene	µg/L	1	Org-023	<1	3	<1	<1	0	[NT]	[NT]
cis-1,3-dichloropropene	µg/L	1	Org-023	<1	3	<1	<1	0	[NT]	[NT]
1,1,2-trichloroethane	µg/L	1	Org-023	<1	3	<1	<1	0	[NT]	[NT]
1,3-dichloropropane	µg/L	1	Org-023	<1	3	<1	<1	0	[NT]	[NT]
Dibromochloromethane	µg/L	1	Org-023	<1	3	<1	<1	0	87	[NT]
1,2-dibromoethane	µg/L	1	Org-023	<1	3	<1	<1	0	[NT]	[NT]
Tetrachloroethene	µg/L	1	Org-023	<1	3	<1	<1	0	91	[NT]
1,1,1,2-tetrachloroethane	µg/L	1	Org-023	<1	3	<1	<1	0	[NT]	[NT]
Chlorobenzene	µg/L	1	Org-023	<1	3	<1	<1	0	[NT]	[NT]
Bromoform	µg/L	1	Org-023	<1	3	<1	<1	0	[NT]	[NT]
1,1,2,2-tetrachloroethane	µg/L	1	Org-023	<1	3	<1	<1	0	[NT]	[NT]
1,2,3-trichloropropane	µg/L	1	Org-023	<1	3	<1	<1	0	[NT]	[NT]
Bromobenzene	µg/L	1	Org-023	<1	3	<1	<1	0	[NT]	[NT]
2-chlorotoluene	µg/L	1	Org-023	<1	3	<1	<1	0	[NT]	[NT]
4-chlorotoluene	µg/L	1	Org-023	<1	3	<1	<1	0	[NT]	[NT]
1,3-dichlorobenzene	µg/L	1	Org-023	<1	3	<1	<1	0	[NT]	[NT]
1,4-dichlorobenzene	µg/L	1	Org-023	<1	3	<1	<1	0	[NT]	[NT]

QUALITY CONTROL: VHC's in water						Duplicate		Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
1,2-dichlorobenzene	µg/L	1	Org-023	<1	3	<1	<1	0	[NT]	[NT]
1,2-dibromo-3-chloropropane	µg/L	1	Org-023	<1	3	<1	<1	0	[NT]	[NT]
1,2,4-trichlorobenzene	µg/L	1	Org-023	<1	3	<1	<1	0	[NT]	[NT]
Hexachlorobutadiene	µg/L	1	Org-023	<1	3	<1	<1	0	[NT]	[NT]
1,2,3-trichlorobenzene	µg/L	1	Org-023	<1	3	<1	<1	0	[NT]	[NT]
<i>Surrogate</i> Dibromofluoromethane	%		Org-023	102	3	105	104	1	100	[NT]
<i>Surrogate</i> Toluene-d8	%		Org-023	96	3	95	97	2	99	[NT]
<i>Surrogate</i> 4-Bromofluorobenzene	%		Org-023	103	3	106	107	1	101	[NT]

Client Reference: E04-0923-UHSC

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Water							Duplicate		Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date extracted	-			19/09/2023	3	19/09/2023	25/09/2023		19/09/2023	[NT]
Date analysed	-			20/09/2023	3	20/09/2023	26/09/2023		20/09/2023	[NT]
TRH C ₆ - C ₉	µg/L	10	Org-023	<10	3	<10	<10	0	91	[NT]
TRH C ₆ - C ₁₀	µg/L	10	Org-023	<10	3	<10	<10	0	91	[NT]
Benzene	µg/L	1	Org-023	<1	3	<1	<1	0	90	[NT]
Toluene	µg/L	1	Org-023	<1	3	<1	<1	0	90	[NT]
Ethylbenzene	µg/L	1	Org-023	<1	3	<1	<1	0	91	[NT]
m+p-xylene	µg/L	2	Org-023	<2	3	<2	<2	0	92	[NT]
o-xylene	µg/L	1	Org-023	<1	3	<1	<1	0	91	[NT]
Naphthalene	µg/L	1	Org-023	<1	3	<1	<1	0	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-023	102	3	105	104	1	100	[NT]
Surrogate Toluene-d8	%		Org-023	96	3	95	97	2	99	[NT]
Surrogate 4-Bromofluorobenzene	%		Org-023	103	3	106	107	1	101	[NT]

Client Reference: E04-0923-UHSC

QUALITY CONTROL: svTRH (C10-C40) in Water					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date extracted	-			20/09/2023	[NT]	[NT]	[NT]	[NT]	20/09/2023	[NT]
Date analysed	-			21/09/2023	[NT]	[NT]	[NT]	[NT]	21/09/2023	[NT]
TRH C ₁₀ - C ₁₄	µg/L	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	102	[NT]
TRH C ₁₅ - C ₂₈	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	104	[NT]
TRH C ₂₉ - C ₃₆	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	129	[NT]
TRH >C ₁₀ - C ₁₆	µg/L	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	102	[NT]
TRH >C ₁₆ - C ₃₄	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	104	[NT]
TRH >C ₃₄ - C ₄₀	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	129	[NT]
Surrogate o-Terphenyl	%		Org-020	121	[NT]	[NT]	[NT]	[NT]	86	[NT]

Client Reference: E04-0923-UHSC

QUALITY CONTROL: PAHs in Water				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date extracted	-			20/09/2023	[NT]	[NT]	[NT]	[NT]	20/09/2023	[NT]
Date analysed	-			21/09/2023	[NT]	[NT]	[NT]	[NT]	21/09/2023	[NT]
Naphthalene	µg/L	2	Org-022/025	<2	[NT]	[NT]	[NT]	[NT]	69	[NT]
Acenaphthylene	µg/L	1	Org-022/025	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Acenaphthene	µg/L	1	Org-022/025	<1	[NT]	[NT]	[NT]	[NT]	73	[NT]
Fluorene	µg/L	1	Org-022/025	<1	[NT]	[NT]	[NT]	[NT]	68	[NT]
Phenanthrene	µg/L	1	Org-022/025	<1	[NT]	[NT]	[NT]	[NT]	79	[NT]
Anthracene	µg/L	1	Org-022/025	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluoranthene	µg/L	1	Org-022/025	<1	[NT]	[NT]	[NT]	[NT]	68	[NT]
Pyrene	µg/L	1	Org-022/025	<1	[NT]	[NT]	[NT]	[NT]	71	[NT]
Benzo(a)anthracene	µg/L	1	Org-022/025	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chrysene	µg/L	1	Org-022/025	<1	[NT]	[NT]	[NT]	[NT]	71	[NT]
Benzo(b,j+k)fluoranthene	µg/L	2	Org-022/025	<2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(a)pyrene	µg/L	1	Org-022/025	<1	[NT]	[NT]	[NT]	[NT]	60	[NT]
Indeno(1,2,3-c,d)pyrene	µg/L	1	Org-022/025	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibenzo(a,h)anthracene	µg/L	1	Org-022/025	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(g,h,i)perylene	µg/L	1	Org-022/025	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-022/025	107	[NT]	[NT]	[NT]	[NT]	80	[NT]

Client Reference: E04-0923-UHSC

QUALITY CONTROL: Organochlorine Pesticides in Water				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date extracted	-			20/09/2023	[NT]	[NT]	[NT]	[NT]	20/09/2023	[NT]
Date analysed	-			21/09/2023	[NT]	[NT]	[NT]	[NT]	21/09/2023	[NT]
alpha-BHC	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	70	[NT]
HCB	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
beta-BHC	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	68	[NT]
gamma-BHC	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Heptachlor	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	82	[NT]
delta-BHC	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aldrin	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	86	[NT]
Heptachlor Epoxide	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	85	[NT]
gamma-Chlordane	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
alpha-Chlordane	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan I	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDE	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	85	[NT]
Dieldrin	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	94	[NT]
Endrin	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	73	[NT]
Endosulfan II	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDD	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	64	[NT]
Endrin Aldehyde	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDT	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan Sulphate	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	67	[NT]
Methoxychlor	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	96	[NT]	[NT]	[NT]	[NT]	87	[NT]

Client Reference: E04-0923-UHSC

QUALITY CONTROL: OP Pesticides in Water				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	
Date extracted	-			20/09/2023	[NT]	[NT]	[NT]	[NT]	20/09/2023	[NT]
Date analysed	-			21/09/2023	[NT]	[NT]	[NT]	[NT]	21/09/2023	[NT]
Dichlorvos	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	94	[NT]
Mevinphos	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Phorate	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dimethoate	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Diazinon	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Disulfoton	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chlorpyrifos-methyl	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Parathion-Methyl	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Ronnel	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	77	[NT]
Fenitrothion	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	88	[NT]
Malathion	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	94	[NT]
Chlorpyrifos	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	81	[NT]
Fenthion	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	86	[NT]
Parathion	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Bromophos ethyl	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Methidathion	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fenamiphos	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Ethion	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	72	[NT]
Phosalone	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Azinphos-methyl (Guthion)	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Coumaphos	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	96	[NT]	[NT]	[NT]	[NT]	87	[NT]

Client Reference: E04-0923-UHSC

QUALITY CONTROL: PCBs in Water							Duplicate		Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date extracted	-			20/09/2023	[NT]	[NT]	[NT]	[NT]	20/09/2023	[NT]
Date analysed	-			21/09/2023	[NT]	[NT]	[NT]	[NT]	21/09/2023	[NT]
Aroclor 1016	µg/L	2	Org-021	<2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1221	µg/L	2	Org-021	<2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1232	µg/L	2	Org-021	<2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1242	µg/L	2	Org-021	<2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1248	µg/L	2	Org-021	<2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1254	µg/L	2	Org-021	<2	[NT]	[NT]	[NT]	[NT]	108	[NT]
Aroclor 1260	µg/L	2	Org-021	<2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate TCMX	%		Org-021	96	[NT]	[NT]	[NT]	[NT]	87	[NT]

Client Reference: E04-0923-UHSC

QUALITY CONTROL: Total Phenolics in Water					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			20/09/2023	1	20/09/2023	20/09/2023		20/09/2023	[NT]
Date analysed	-			20/09/2023	1	20/09/2023	20/09/2023		20/09/2023	[NT]
Total Phenolics (as Phenol)	mg/L	0.05	Inorg-031	<0.05	1	<0.05	<0.05	0	101	[NT]

Client Reference: E04-0923-UHSC

QUALITY CONTROL: HM in water - dissolved				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	333359-2
Date prepared	-			20/09/2023	1	20/09/2023	20/09/2023		20/09/2023	20/09/2023
Date analysed	-			20/09/2023	1	20/09/2023	20/09/2023		20/09/2023	20/09/2023
Arsenic-Dissolved	µg/L	1	Metals-022	<1	1	1	1	0	93	98
Cadmium-Dissolved	µg/L	0.1	Metals-022	<0.1	1	<0.1	<0.1	0	95	101
Chromium-Dissolved	µg/L	1	Metals-022	<1	1	4	4	0	92	106
Copper-Dissolved	µg/L	1	Metals-022	<1	1	10	11	10	98	95
Lead-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	98	86
Mercury-Dissolved	µg/L	0.05	Metals-021	<0.05	1	0.06	0.05	18	101	84
Nickel-Dissolved	µg/L	1	Metals-022	<1	1	7	7	0	95	102
Zinc-Dissolved	µg/L	1	Metals-022	<1	1	25	25	0	96	102
Iron-Dissolved	µg/L	10	Metals-022	<10	1	10	<10	0	95	102
Manganese-Dissolved	µg/L	5	Metals-022	<5	1	7	6	15	98	113
Aluminium-Dissolved	µg/L	10	Metals-022	<10	1	<10	<10	0	98	89
Barium-Dissolved	µg/L	1	Metals-022	<1	1	570	570	0	99	#
Cobalt-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	97	100

Client Reference: E04-0923-UHSC

QUALITY CONTROL: Ion Balance				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	333359-2
Date prepared	-			19/09/2023	1	19/09/2023	19/09/2023		19/09/2023	19/09/2023
Date analysed	-			19/09/2023	1	19/09/2023	19/09/2023		19/09/2023	19/09/2023
Calcium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	570	550	4	97	#
Potassium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	4	4	0	95	105
Sodium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	2000	1900	5	92	#
Magnesium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	1100	1100	0	100	#
Hardness	mgCaCO ₃ /L	3	Metals-020	[NT]	1	6100	6000	2	[NT]	[NT]
Hydroxide Alkalinity (OH ⁻) as CaCO ₃	mg/L	5	Inorg-006	<5	1	<5	[NT]		[NT]	[NT]
Bicarbonate Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	1	540	[NT]		[NT]	[NT]
Carbonate Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	1	<5	[NT]		[NT]	[NT]
Total Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	1	540	[NT]		107	[NT]
Sulphate, SO ₄	mg/L	1	Inorg-081	<1	1	62	63	2	114	119
Chloride, Cl	mg/L	1	Inorg-081	<1	1	8000	8200	2	109	#
Ionic Balance	%		Inorg-040	[NT]	1	-6.0	[NT]		[NT]	[NT]

Client Reference: E04-0923-UHSC

QUALITY CONTROL: Miscellaneous Inorganics				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	333359-2
Date prepared	-			19/09/2023	1	19/09/2023	19/09/2023		19/09/2023	19/09/2023
Date analysed	-			19/09/2023	1	19/09/2023	19/09/2023		19/09/2023	19/09/2023
Hexavalent Chromium, Cr ⁶⁺ (dissolved)	mg/L	0.005	Inorg-118	<0.005	1	<0.005	<0.005	0	100	110
Ammonia as N in water	mg/L	0.005	Inorg-057	<0.005	1	0.043	0.038	12	91	[NT]
BOD	mg/L	5	Inorg-091	<5	1	<10	[NT]		81	[NT]
Fluoride, F	mg/L	0.1	Inorg-026	<0.1	1	0.1	0.1	0	99	[NT]
Total Organic Carbon	mg/L	1	Inorg-079	<1	1	5	5	0	87	80
Total Dissolved Solids (grav)	mg/L	5	Inorg-018	<5	1	14000	15000	7	84	[NT]
pH	pH Units		Inorg-001	[NT]	1	6.9	[NT]		102	[NT]
Electrical Conductivity	µS/cm	1	Inorg-002	<1	1	20000	[NT]		107	[NT]
Nitrate as N in water	mg/L	0.005	Inorg-055	<0.005	1	0.59	0.59	0	97	[NT]
Phosphate as P in water	mg/L	0.005	Inorg-060	<0.005	1	0.076	0.076	0	92	[NT]

QUALITY CONTROL: Miscellaneous Inorganics				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	333359-3
Date prepared	-			[NT]	[NT]	[NT]	[NT]	[NT]	[NT]	19/09/2023
Date analysed	-			[NT]	[NT]	[NT]	[NT]	[NT]	[NT]	19/09/2023
Ammonia as N in water	mg/L	0.005	Inorg-057	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]	125
Nitrate as N in water	mg/L	0.005	Inorg-055	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]	81
Phosphate as P in water	mg/L	0.005	Inorg-060	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]	99

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.

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

Nitrate #4 - PQL raised due to matrix interference.

8 HM in water - dissolved - # Percent recovery is not applicable due to the high concentration of the element/s in the sample/s. However an acceptable recovery was obtained for the LCS.

Ion Balance - # Percent recovery is not applicable due to the high concentration of the element/s in the sample/s. However an acceptable recovery was obtained for the LCS.

BOD:PQL has been raised due to the small volume of sample supplied.

The mass imbalance may be caused by other ions that have not been measured.

TRH_W_NEPM:

Percent recovery for the surrogate/matrix spike is not possible to report as the high concentration of analytes in sample/s 333359-4 have caused interference.

Attachment 3 Groundwater Field Data Sheets

GROUNDWATER MONITORING FIELD DATA SHEET

Project: E04-0923 Scone	Sample ID: MWA
Client: UHSC	Sampler: DB
Site Address: Noblet Road Scone	Date: 18.9.23

Well Information			
Monument damaged: Rusty	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:0.77.....	m agl	Weather Conditions:	
Standing water level: 6.432.....	m bgl	Temperature >15 <input type="checkbox"/>	15-20 <input type="checkbox"/>
Total well depth:15.66	m bgl	20-25 <input type="checkbox"/>	25-30 <input checked="" type="checkbox"/>
Initial well volume:9.228.....	L	Clear <input checked="" type="checkbox"/>	Partly cloudy <input type="checkbox"/>
Water level after purging:7.992.....	m bgl		Overcast <input type="checkbox"/>
Volume of water purged:1.56.....	L		
Water level at time of sampling:8.572.....	m bgl	Calm <input checked="" type="checkbox"/>	Slight breeze <input type="checkbox"/>
Well purged dry:	YES / NO		Moderate breeze <input type="checkbox"/>
Purging equipment:	Bailer		Windy <input type="checkbox"/>
Sample equipment:	Bailer	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	Comments
10:29am	1.71	4950	6.60	367.7	20.77	2489	Water clear no smell or sheen
10:30am	1.86	7250	6.70	338.1	21.2	3597	
10:33am	1.58	7249	6.65	393.8	20.9	3628	
10:35am	1.60	7250	6.67	393.9	20.9	3628	

Water Quality and General Comments:

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

GROUNDWATER MONITORING FIELD DATA SHEET

Project: E04-0623 Scone	Sample ID: MWB
Client: UHSC	Sampler: DB
Site Address: Noblet Road Scone	Date: 18.09.23

Well Information			
Monument damaged: Rusty	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: Rusty	YES / NO / N/A	Odours from groundwater:	YES / NO / N/A
Casing above ground:0.8.....	m agl	Weather Conditions:	
Standing water level: 6.282.....	m bgl	Temperature >15 <input type="checkbox"/>	15-20 <input type="checkbox"/>
Total well depth:14.04	m bgl	20-25 <input type="checkbox"/>	25-30 <input checked="" type="checkbox"/>
Initial well volume:7.758.....	L	Clear <input checked="" type="checkbox"/>	Partly cloudy <input type="checkbox"/>
Water level after purging:6.402.....	m bgl	Overcast <input type="checkbox"/>	
Volume of water purged:	L	Calm <input checked="" type="checkbox"/>	Slight breeze <input type="checkbox"/>
Water level at time of sampling:6.562.....	m bgl	Moderate breeze <input type="checkbox"/>	
Well purged dry:	YES / NO	Windy <input type="checkbox"/>	
Purging equipment:	Bailer		
Sample equipment:	Bailer	Fine <input checked="" type="checkbox"/>	Showers <input type="checkbox"/>
		Rain <input type="checkbox"/>	<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	Comments
11:05am	1.68	6603	6.85	232.6	22.29	3324	Clear water, no sheen
11:07am	1.44	6714	6.80	233.8	20.78	3360	
11:10am	1.32	6722	6.83	234.5	20.9	3370	
11:12am	1.35	6728	6.83	234.5	20.9	3370	

Water Quality and General Comments:

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

GROUNDWATER MONITORING FIELD DATA SHEET

Project: E04-0623 Scone	Sample ID: MWC
Client: UHSC	Sampler: DB
Site Address: Noblet Road Scone	Date: 18.09.23

Well Information

Monument damaged: Rusty	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:0.75.....	m agl	Weather Conditions:	
Standing water level: 5.234.....	m bgl	Temperature >15 <input type="checkbox"/>	15-20 <input type="checkbox"/>
Total well depth:12.6	m bgl	20-25 <input type="checkbox"/>	25-30 X
Initial well volume:7.366.....	L	Clear X	Partly cloudy <input type="checkbox"/>
Water level after purging:5.413.....	m bgl	Overcast	X
Volume of water purged:	L	Calm X	Slight breeze <input type="checkbox"/>
Water level at time of sampling:5.513.....	m bgl	Moderate breeze <input type="checkbox"/>	Windy <input type="checkbox"/>
Well purged dry:	YES / NO		
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 ⁻¹)	EC (μS cm ⁻¹)	pH	Redox (mV)	Temp (°C)	Salinity	Comments
11:37am	1.18	9077	6.69	145.3	22.6	4568	Clear water
11:39am	1.15	9105	6.67	124.0	20.69	4554	
11:41am	1.13	9120	6.65	120.1	20.5	4543	

Water Quality and General Comments:

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

GROUNDWATER MONITORING FIELD DATA SHEET

Project: E04-0623 Scone	Sample ID: MWD Leachate well
Client: UHSC	Sampler: DB
Site Address: Noblet Road Scone	Date: 18.09.23

Well Information			
Monument damaged: Rusty	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: Rusty	YES / NO / N/A	Odours from groundwater:	YES / NO / N/A
Casing above ground:N/A.....	m agl	Weather Conditions:	
Standing water level: 9.863.....	m bgl	Temperature >15 <input type="checkbox"/>	15-20 <input type="checkbox"/>
Total well depth:12.96	m bgl	20-25 <input type="checkbox"/>	25-30 <input checked="" type="checkbox"/>
Initial well volume:3.097.....	L		
Water level after purging:10.275.....	m bgl	Clear <input checked="" type="checkbox"/>	Partly cloudy <input type="checkbox"/> Overcast <input type="checkbox"/>
Volume of water purged:	L		
Water level at time of sampling:10.152.....	m bgl	Calm <input type="checkbox"/>	Slight breeze <input checked="" type="checkbox"/> Moderate breeze <input type="checkbox"/>
Well purged dry:	YES / NO	Windy <input type="checkbox"/>	
Purging equipment:	Bailer		
Sample equipment:	Bailer	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	Comments
12:39pm	0.8	1250	7.26	-334.5	28.82	6025	Methane odour, green tinged water
12:41pm	1.13	1270	7.23	-260.9	27.83	6351	
12.43pm	1.22	1280	7.24	-250.8	27.6	6281	

Water Quality and General Comments:

Water was green tinged with strong methane odour, no sheen. Vegetation around monument and no standing water around monument. Monitoring well was cut to ground level. The well was surrounded by tyres to protect the well.

GROUND WATER MONITORING FIELD DATA SHEET

Project: E04-0923 Scone	Sample ID: MWE
Client: UHSC	Sampler: DB
Site Address: Noblet Road Scone	Date: 18.09.23

Well Information			
Monument damaged: Rusty	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: Rusty	YES / NO / N/A	Odours from groundwater:	YES / NO / N/A
Casing above ground:0.68.....	m agl	Weather Conditions:	
Standing water level: 5.004.....	m bgl	Temperature >15 <input type="checkbox"/>	15-20 <input type="checkbox"/>
Total well depth:9.46	m bgl	20-25 <input type="checkbox"/>	25-30 <input checked="" type="checkbox"/>
Initial well volume:4.45.....	L	Clear <input checked="" type="checkbox"/>	Partly cloudy <input type="checkbox"/>
Water level after purging:5.204.....	m bgl	Overcast <input type="checkbox"/>	
Volume of water purged:	L	Calm <input type="checkbox"/>	Slight breeze <input checked="" type="checkbox"/>
Water level at time of sampling:5.466.....	m bgl	Moderate breeze <input type="checkbox"/>	Windy <input type="checkbox"/>
Well purged dry:	YES / NO		
Purging equipment:	Bailer		
Sample equipment:	Bailer	Fine <input checked="" type="checkbox"/>	Showers <input type="checkbox"/>
		Rain <input type="checkbox"/>	<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	Comments
12:06m	1.25	3898	6.97	-4.8	19.93	1945	Clear water
12:09pm	0.79	3939	6.96	-10.7	19.48	1967	
12.11pm	0.70	3960	6.9	-11.9	19.43	1980	

Water Quality and General Comments:

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

Attachment 4 Water Quality Meter Calibration Certificate

Electrode Quality Certificate

Electrode: HI7698194-3 Parameter: EC SN: J88036 Recommended for: HI98194

Description: EC sensor with screw type connector

Hanna Instruments certifies that this electrode has been produced, calibrated and tested to meet all applicable Hanna Instruments Procedures, using standards and reference instruments, the accuracy of which is traceable to the National Institute of Standards (NIST) in the USA or to internationally acceptable national physical standards. The standards and reference instruments used in calibration and testing are supported by a calibration system which meets requirements of ISO 9001.

Standard Reference Materials: EC: SRM 999 [NIST]

Tests performed using reference devices:

EC (@ 25 °C):	Offset (air) [$\mu\text{S}/\text{cm}$]:	0	
	Tolerance [$\mu\text{S}/\text{cm}$]:	+1	
	Reading [$\mu\text{S}/\text{cm}$]:	0	Passed
	EC (standard) [mS/cm]:	12.88	
	Tolerance [mS/cm]:	10.30 - 15.46	
EC response time (12.88 mS/cm – 5.00 mS/cm)*:	Reading [mS/cm]:	12.61	Passed
	Standard time [s]:	<5	Passed
	Tolerance [s]:	+1	

*) Evaluated for 90 % of step; NP = not performed.

Quality control and testing criteria have been met.

Date: 2023.06.26

QC Inspector: Szigyarto N. / Engineer

[Name / Title of Signatory]

Signature:

EQC_HI7698194-3_rev.0.1_December 2018

Instrument Quality Certificate

Instrument: HI98494 Serial Number: M04200028111 SW version, Meter: 1.05 Bluetooth version: 1.00

Description: Multiparameter Bluetooth Portable pH/ORP/EC/opdo Waterproof Meter

Hanna Instruments certifies that this instrument has been produced, calibrated and tested to meet all applicable Hanna Instruments procedures, using standards and reference instruments, the accuracy of which is traceable to the National Institute of Standards (NIST) in the USA or to internationally acceptable national physical standards. The standards and reference instruments used in calibration and testing are supported by a calibration system which meets requirements of ISO 9001. The following tests have been performed according with the reference from the QC Procedure of the meter.

The results are listed below:

A. Functionality tests	Reference	Result
A.1. Switch On/Off test	8.3	Passed
A.2. LCD test	8.3	Passed
A.3. Sound test	8.3	Passed
A.4. Keyboard test	8.3	Passed
A.5. Real time clock test	8.3	Passed
A.6. Eeprom test	8.3	Passed
A.7. Measurement test (pH, ORP, EC, opdo, T)	8.4	Passed
A.8. PC connection test USB	8.5	Passed
A.9. PC connection test Bluetooth	8.5	Passed
A.10. Log download test	8.5	Passed
A.11. Factory calibration test	8.5	Passed
B. Aesthetic Control	Reference	Result
B.1. Visual Inspection	8.1	Passed
B.2. Labeling and Marking	8.2	Passed

Calibration, functionality test, aesthetic control and packing have been met.

Date: 2023.06.29

QC Inspector: Tudor Coman / Engineer

[Name / Title of Signatory]

Signature:

IQC_HI98494_rev.0.1_September 2020

Smart Cap™ Quality Certificate

Membrane: HI764113-1 Factory Calibration: 5/16/2023
 Parameter: Dissolved Oxygen Compatibility: HI764113
 Serial No: 594A98DE HI7698494-5

Description: Smart Cap™ for Optical Dissolved Oxygen probe

Hanna Instruments certifies that this electrode has been produced, calibrated and tested to meet all applicable Hanna Procedures, using standards and reference instruments, the accuracy of which is traceable to the National Institute of Standards (NIST) in the USA or to internationally acceptable national physical standards. The standards and reference instruments used in calibration and testing are supported by a calibration system which meets requirements of ISO9001.

Reference Devices: HI764113 QC Probe

Test	Specification	Measured	Pass
Measurement @ 100% saturated *	100 ±3%	100.6	✓
Measurement in N ₂ (0% saturated)*	0.0 ±2%	-1.2	✓

**tested with "Master factory" HI764113

All references are periodically checked and are used only if certified

Mechanical Inspection ✓

RFID Communication ✓

Quality control and testing have been met.

Inspector: Kyle Willner

Approval: 
 Production Manager

Date: 5/18/2023

USCERT_ODO_7698494-5_rev. 1.

Probe Quality Certificate

Probe: HI7698494 Serial Number: 104250077121 Firmware: 1.01 Compatibility: HI98494

Description: Digital Probe with connections for pH(ORP), EC and Optical DO sensors with integral temp sensor

Hanna Instruments certifies that this instrument has been produced, calibrated and tested to meet all applicable Hanna Instruments procedures, using standards and reference instruments, the accuracy of which is traceable to the National Institute of Standards (NIST) in the USA or to internationally acceptable national physical standards. The standards and reference instruments used in calibration and testing are supported by a calibration system which meets requirements of ISO 9001. The following tests have been performed according to the test instruction WIO723_HI7698494_Rev0.64_2021-01-20

The results are listed below:

References devices*: mV: SN US36095802 [HP, 34401A]
 °C: Temperature Bath
 Factory calibration: mV[pH]: 2023.06.26 mV[ORP]: 2023.06.26
 EC: 2023.06.26 DO: 2023.06.28
 Temp[°C]: 2023.06.27

Tests performed using reference devices:

Temperature:	Bath Temperature:	0.00	50.00		
	Tolerance [°C]:	± 0.15	± 0.15		
	Reading [°C]:	0.02	50.05	Passed	
mV [pH input]:	Ref. mV*:	-177.5	0.0	177.5	
	Tolerance [mV]:	± 0.1	± 0.1	± 0.1	
	Reading [mV]:	-177.5	0.0	177.5	Passed
mV [ORP input]:	Ref. mV*:	-1900.0	0.0	1900.0	
	Tolerance [mV]:	± 1.0	± 0.1	± 1.0	
	Reading [mV]:	-1900.3	0.0	1900.1	Passed
EC [with simulator]:	EC [µS/cm]:	1403	2000	x	
	EC [mS/cm]:	x	x	12.80	
	Tolerance [µS/cm]:	± 4	± 4	x	
	Tolerance [mS/cm]:	x	x	± 0.04	
	Reading [µS/cm]:	1406	2002	x	Passed
	Reading [mS/cm]:	x	x	12.82	Passed
DO [with simulator]:	DO Phase check:			Passed	
	DO Intensity check:			Passed	
Mechanical Inspection				Passed	

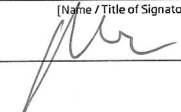
*) All references are periodically checked and are used only if are inside certification interval; NP = not performed; NA = not applicable; RES = Resistance value

Calibration and testing criteria have been met.

Date: 2023.06.28

QC Inspector: Coman Andrei / Engineer

(Name / Title of Signatory)

Signature: 

cQC_HI7698494.rev.0.1_February 2021