



**PROJECT NUMBER – E04-0323**  
**MARCH 2023**

Document Control Number - C02250

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**QUARTERLY  
GROUNDWATER  
MONITORING**

**SCONE WASTE  
FACILITY  
NOBLET ROAD  
SCONE NSW**



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**DOCUMENT CONTROL INFORMATION**

**Project Name** – Groundwater Monitoring – Scone Waste Facility –Quarterly Monitoring Round

**Client** - Upper Hunter Shire Council

**Project Number** – E04-0323

**Prepared** – DB

**Reviewed By and Approved for Release By** – STC

**Document Control Number** – C02250

**Comments** – Final Copy

**Date** – 27/3/2023

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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 Quarterly Groundwater Monitoring Report provides a snapshot 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 15<sup>th</sup> March 2023.

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). 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 are 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	Sampling Frequency
			2013 and ANZW 2018 Fresh Water 95%	
<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>PHENOLS</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>MISC. INORGANICS</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

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 March 2023 sampling event, results are detailed in **Tables 2 to 6**. Comparisons have been made to the previous rounds of monitoring (March – September 2022). Refer to **Attachment 1** – NATA Accredited Laboratory Results and **Attachment 3** – Data Log.

There were no exceedances of the site criteria for March 2023 in MWA.

**Table 2 – Quarterly Groundwater Results and Comparison March 2022 – March 2023 (MWA)**

	Analytes	Units	Site Criteria (mg/L)	MWA March 2022	MWA June 2022	MWA Sept 2022	MWA Dec 2022	MWA March 2023
<b>IONS</b>	<b>Calcium</b>	mg/L	NA	66	520	550	500	500
	<b>Alkalinity (total)</b>	mg/L	NA	610	510	510	510	510
	<b>Chloride</b>	mg/L	NA	250	7000	6900	5800	7100
	<b>Fluoride</b>	mg/L	NA	0.7	0.2	0.1	0.1	0.1
	<b>Potassium<sup>1</sup></b>	mg/L	410	1	3	3	3	3
	<b>Magnesium</b>	mg/L	NA	100	1100	950	960	1000
	<b>Sulphate</b>	mg/L	NA	29	48	50	52	56
<b>HEAVY METALS</b>	<b>Iron</b>	mg/L	0.3	<LOR	<LOR	<LOR	<b>0.68</b>	0.180
	<b>Manganese</b>	mg/L	1.9	0.009	0.03	<LOR	0.037	0.010
<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	0.0000	<LOR	<LOR	<LOR	<LOR	<LOR
<b>MISC. INORGANICS</b>	<b>pH</b>	pH	6.5 – 8	7.6	6.9	6.2	6.7	6.8
	<b>Sodium</b>	mg/L	NA	350	1800	1800	1900	1800
	<b>Ammonia<sup>2</sup></b>	mg/L	0.9	0.031	0.037	0.049	<LOR	0.17
	<b>Nitrate</b>	mg/L	0.7	0.058	0.55	0.51	0.47	0.49
	<b>Total Organic</b>	mg/L	4	<b>20</b>	<b>5</b>	<b>5</b>	<b>8</b>	3
	<b>EC</b>	µS/cm	NA	1600	20000	17000	20000	20000

Highlighted results exceed site criteria

<LOR = No Detection. Analyte is below the Laboratory Limit of reporting.

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.

There was one exceedance of the site criteria for March in MWB, TOC at a concentration of 7mg/L.

**Table 3 – Quarterly Groundwater Results and Comparison March 2022 – March 2023  
(MWB)**

	Analytes	Units	Site Criteria (mg/L)	MWB March 2022	MWB June 2022	MWB Sept 2022	MWB Dec 2022	MWB March 2023
<b>IONS</b>	<b>Calcium</b>	mg/L	NA	420	460	470	440	420
	<b>Alkalinity (total)</b>	mg/L	NA	430	430	440	430	440
	<b>Chloride</b>	mg/L	NA	4600	4800	4700	3400	4800
	<b>Fluoride</b>	mg/L	NA	0.2	0.3	0.2	0.3	0.3
	<b>Potassium<sup>1</sup></b>	mg/L	410	2	2	3	3	3
	<b>Magnesium</b>	mg/L	NA	620	650	570	580	600
	<b>Sulphate</b>	mg/L	NA	85	81	77	60	82
<b>HEAVY METALS</b>	<b>Iron</b>	mg/L	0.3	0.04	0.06	<LOR	0.07	0.14
	<b>Manganese</b>	mg/L	1.9	0.01	0.01	0.014	0.01	0.012
<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	6.8	7.0	6.8	6.9	6.9
	<b>Sodium</b>	mg/L	NA	1000	1300	1400	1300	1300
	<b>Ammonia<sup>2</sup></b>	mg/L	0.9	0.011	0.017	0.065	<LOR	<LOR
	<b>Nitrate</b>	mg/L	0.7	0.38	0.36	0.32	0.31	0.30
	<b>Total Organic Carbon</b>	mg/L	4	<b>6</b>	<b>5</b>	<b>5</b>	<b>7</b>	<b>7</b>
	<b>EC</b>	µS/cm	NA	13000	14000	13000	14000	14000

Highlighted results exceed site criteria

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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.

There were three exceedances of the site criteria for March in MWC; Iron and TOC at concentrations of 1.4 and 7mg/L respectively.

**Table 4 – Quarterly Groundwater Results and Comparison March 2022 – March 2023  
(MWC)**

	Analytes	Units	Site Criteria (mg/L)	MWC March 2022	MWC June 2022	MWC Sept 2022	MWC Dec 2022	MWC March 2023
<b>IONS</b>	<b>Calcium</b>	mg/L	NA	370	300	61	300	310
	<b>Alkalinity (total)</b>	mg/L	NA	930	940	600	950	910
	<b>Chloride</b>	mg/L	NA	4000	3800	840	3100	4200
	<b>Fluoride</b>	mg/L	NA	0.2	0.2	0.3	0.2	0.2
	<b>Potassium<sup>1</sup></b>	mg/L	410	2	2	1	2	2
	<b>Magnesium</b>	mg/L	NA	440	440	110	410	450
	<b>Sulphate</b>	mg/L	NA	120	88	170	71	82
<b>HEAVY METALS</b>	<b>Iron</b>	mg/L	0.3	<LOR	0.01	0.05	1.4	1.4
	<b>Manganese</b>	mg/L	1.9	2.2	2.1	0.68	2.1	1.6
<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	6.9	6.9	7.2	6.7	6.9
	<b>Sodium</b>	mg/L	NA	2000	1400	500	1500	1600
	<b>Ammonia<sup>2</sup></b>	mg/L	0.9	0.048	0.073	0.05	0.016	0.010
	<b>Nitrate</b>	mg/L	0.7	0.11	0.092	1.2	0.11	0.11
	<b>Total Organic</b>	mg/L	4	8	8	75	10	7
	<b>EC</b>	µS/c	NA	11000	13000	3600	13000	13000

Highlighted results exceed site criteria

<LOR = No Detection. Analyte is below the Laboratory Limit of reporting.

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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.

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 5 – Quarterly Groundwater Results and Comparison March 2022 – March 2023  
(MWD) Leachate Well**

	Analytes	Unit	Site Criteria (mg/L)	MWD March 2022	MWD June 2022	MWD Sept 2022	MWD Dec 2022	MWD March 2023
<b>IONS</b>	<b>Calcium</b>	mg/L	NA	220	190	190	220	110
	<b>Alkalinity (total)</b>	mg/L	NA	1700	1500	1500	1900	2200
	<b>Chloride</b>	mg/L	NA	1700	1800	1400	2000	2800
	<b>Fluoride</b>	mg/L	NA	0.3	0.3	0.3	0.3	0.2
	<b>Potassium<sup>1</sup></b>	mg/L	410	79	91	82	100	1
	<b>Magnesium</b>	mg/L	NA	140	170	150	220	120
	<b>Sulphate</b>	mg/L	NA	49	38	85	200	95
<b>HEAVY METALS</b>	<b>Iron</b>	mg/L	0.3	0.65	0.87	0.75	2.6	3.1
	<b>Manganese</b>	mg/L	1.9	0.59	0.45	0.61	0.49	0.38
<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	0.0000	<LOR	<LOR	<LOR	<LOR	<LOR
<b>MISC. INORGANICS</b>	<b>pH</b>	pH	6.5 – 8	7.4	7.4	7.5	7.5	7.6
	<b>Sodium</b>	mg/L	NA	840	1100	810	1300	790
	<b>Ammonia<sup>2</sup></b>	mg/L	0.9	130	130	140	180	230
	<b>Nitrate</b>	mg/L	0.7	0.02	<LOR	0.056	<LOR	<LOR
	<b>Total Organic</b>	mg/L	4	140	130	220	190	440
	<b>EC</b>	µS/c	NA	7300	8100	6400	11000	12000

Highlighted results exceed site criteria

<LOR = No Detection. Analyte is below the Laboratory Limit of reporting.

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.

There were two exceedances of the site criteria for March in MWE, Iron, and TOC at concentrations of, 2.1mg/L and 6mg/L respectively.

**Table 6 –Quarterly Groundwater Results and Comparison March 2022 – March 2023  
(MWE)**

	Analytes	Units	Threshold Criteria (mg/L)	MWE March 2022	MWE June 2022	MWE Sept 2022	MWE Dec 2022	MWE March 2023
<b>IONS</b>	<b>Calcium</b>	mg/L	NA	140	86	57	88	180
	<b>Alkalinity (total)</b>	mg/L	NA	1200	1300	1000	1700	1300
	<b>Chloride</b>	mg/L	NA	990	690	260	490	960
	<b>Fluoride</b>	mg/L	NA	1.1	0.5	0.3	0.4	0.4
	<b>Potassium<sup>1</sup></b>	mg/L	410	1	0.8	2	0.8	140
	<b>Magnesium</b>	mg/L	NA	130	100	54	93	250
	<b>Sulphate</b>	mg/L	NA	200	170	18	110	210
<b>HEAVY METALS</b>	<b>Iron</b>	mg/L	0.3	0.03	<b>0.48</b>	<b>2.2</b>	<b>0.71</b>	<b>2.1</b>
	<b>Manganese</b>	mg/L	1.9	1.3	0.6	1	0.59	0.88
<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	7.3	7.1	7.2	7.3
	<b>Sodium</b>	mg/L	NA	700	650	380	590	1300
	<b>Ammonia<sup>2</sup></b>	mg/L	0.9	0.036	0.23	0.068	0.018	0.034
	<b>Nitrate</b>	mg/L	0.7	<LOR	<LOR	<LOR	<LOR	0.02
	<b>Total Organic Carbon</b>	mg/L	4	<b>6</b>	<b>7</b>	<b>150</b>	<b>7</b>	<b>6</b>
	<b>EC</b>	µS/cm	NA	4900	4500	2300	4200	5000

Highlighted results exceed site criteria

<LOR = No Detection. Analyte is below the Laboratory Limit of reporting.

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

## 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 March 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. There were no exceedances of the site criteria:

The following changes have occurred in the water quality of MWA since the previous monitoring period:

- The TOC concentration has decreased from 8mg/L to 3mg/L, below the site criteria of 4mg/L
- Iron concentration decreased from 0.68 mg/L in December 2022 to 0.18 in March 2023, below the site criteria.
- Calcium concentration remained constant at 500 mg/L in December and March 2023;
- Chloride concentration increased from 5800mg/l to 7100mg/L;
- Magnesium concentration increased from 960mg/L to 1000 mg/L;
- Manganese concentration decreased from 0.037 mg/L to 0.01 mg/L;
- Nitrate concentration increased from 0.47 mg/L to 0.49 mg/L, remaining slightly below the site criteria.
- Sodium concentration decreased from 1900mg/L to 1800mg/L;
- The EC concentration remained constant at 20000  $\mu$ S/cm.

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. There is one exceedance of the site criteria:

- The TOC concentration remained constant at 7 mg/L between December 2022 and March 2023, remaining above site Criteria of 4 mg/L.

The following significant changes have occurred in the water quality of MWB since the previous monitoring period:

- Calcium concentration decreased from 440 mg/L to 420mg/L;
- Chloride concentration increased from 3400mg/L to 4800mg/L;
- Iron concentration increased from 0.07mg/L to 0.14mg/L, remaining below site criteria.
- Sodium concentration was consistent at 1300mg/L;
- Sulphate concentration increased from 60mg/L to 82mg/L;

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. There were two concentrations which exceeded the site criteria:

- A concentration of TOC (7 mg/L) was reported in MWC exceeding the Site Criteria (4 mg/L), this has decreased since the previous reported concentration in December 2022 (10 mg/L).
- The Iron concentration remained constant between the December 2022 and March 2023 monitoring periods at 1.4 mg/L, exceeding the site criteria of 0.3mg/L.

The following changes have occurred in the water quality of MWC the previous monitoring period in December:

- A concentration of Manganese (1.6mg/L) was reported in MWC, a decrease compared to the previous concentrations reported in December 2022 (2.1 mg/L);
- There was an increase in concentrations of Calcium from 300mg/L to 310mg/L,
- An increase in Sulphate from 71mg/L to 82mg/L,
- Increase in Sodium from 1500mg/L to 1600mg/L

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 the previous monitoring period:

- Iron concentration increased from 2.6 mg/L in December to 3.1 mg/L in March 2023 results;
- Ammonia concentration increased from 180 mg/L in December to 230 mg/L in March 2023 monitoring period.
- The TOC concentration has increased from 190mg/L to 440 mg/L in comparison to December;
- Chloride concentration increases from 2000 mg/L to 2800 mg/L.
- Potassium decreased from 100mg/L to 1 mg/L.
- Magnesium decreased from 220 mg/L to 120 mg/L
- Sodium decreased from 1300 mg/L to 790 mg/L;
- Sulphate concentration decreased from 200mg/L to 95 mg/L;
- Manganese concentration decreased from 0.49mg/L to 0.38mg/L;
- The EC has increased from 11000  $\mu\text{S}/\text{cm}$  to 12000  $\mu\text{S}/\text{cm}$ .

### **MWE**

MWE is located on the eastern boundary of the site and is considered to be an up-gradient groundwater monitoring well. There are a series of dams to the east of the well. There were two concentration which exceeded the site criteria. The following changes have occurred in the water quality of MWE the previous monitoring period:

- The TOC concentration decreased from 7mg/L to 6 mg/L, remaining above the site criteria of 4mg/L;
- The Iron concentration increased from 0.71 mg/L to 2.1 mg/L, exceeding the site criteria of 0.3mg/L.

The following changes have occurred in the water quality of MWE:

- There was an increase in concentrations of Calcium, from 88 mg/L to 180 mg/L.
- Chloride increased from 490 mg/L to 960 mg/L.
- Magnesium increased from 93 mg/L to 250 mg/L.
- Sulphate increased from 110mg/L to 210 mg/L.
- Sodium increased from 590 mg/L to 1300 mg/L;
- Ammonia concentration decreased from 0.018 mg/L to 0.034 mg/L;
- The EC has increased from 4200  $\mu\text{S}/\text{cm}$  to 5000  $\mu\text{S}/\text{cm}$ ;
- Potassium increased from 0.8 mg/L to 140 mg/L.

All other analytes reported concentrations consistent with previous monitoring data.



The following analytes exceeded the Threshold Criteria during the March 2023 sampling event, excluding the Leachate Monitoring well (MWD); TOC in MWB, MWC and MWE and Iron in MWC and MWE. Refer to **Attachment 3** – Data Log.

#### **Site Maintenance**

The leachate well remains broken off at the ground level. No immediate maintenance is required on the other wells.

## 6.0 CONCLUSIONS

There are seasonal fluctuations and flooding events in the last 2 years which would have impacted the regional groundwater conditions. The recent weather conditions of heavy rain and flooding during 2022 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 March 2023 quarterly sampling event displayed several ongoing exceedances of the Site Criteria from the previous monitoring period.

The following analytes exceeded the Site Criteria for the March 2023 sampling event; TOC in MWB, MWC and MWE, and Iron in MWC and MWE.

Continued sampling and data collection will allow robust trending and statistical analysis of data to occur.

The next water sampling event will be a quarterly monitoring event which will be undertaken in June 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 A**  
**DATALOG**

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	318743	15/03/2023	500	510	7100	0.1	0.18	1000	0.01	<0.0002	3	6.8	1800	0.17	0.49	56	3	<0.05	20000		
MWB	318743	15/03/2023	420	440	4800	0.3	0.14	600	0.012	<0.0002	3	6.9	1300	<0.005	0.3	82	7	<0.05	14000		
MWC	318743	15/03/2023	310	910	4200	0.2	1.4	450	1.6	<0.0002	2	6.9	1600	0.01	0.11	82	7	<0.05	13000		
MWD	318743	15/03/2023	110	2200	2800	0.2	3.1	120	0.38	<0.0002	1	7.6	790	230	<0.005	95	440	<0.05	12000		
MWE	318743	15/03/2023	180	1300	960	0.4	2.1	250	0.88	<0.0002	140	7.3	1300	0.034	0.02	210	6	<0.05	5000		

**ATTACHMENT B**  
**NATA ACCREDITED LABORATORY RESULTS**





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## **CERTIFICATE OF ANALYSIS 318743**

### **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>	<b><u>E04-0323- UHSC</u></b>
<b>Number of Samples</b>	5 Water
<b>Date samples received</b>	16/03/2023
<b>Date completed instructions received</b>	16/03/2023

### **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** 23/03/2023

**Date of Issue** 23/03/2023

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

#### **Results Approved By**

Diego Bigolin, Inorganics Supervisor  
Greta Petzold, Assistant Operation Manager  
Kyle Gavrily, Senior Chemist

#### **Authorised By**

Nancy Zhang, Laboratory Manager

Organochlorine Pesticides in Water						
Our Reference		318743-1	318743-2	318743-3	318743-4	318743-5
Your Reference	UNITS	MWA	MWB	MWC	MWD	MWE
Date Sampled		15/03/2023	15/03/2023	15/03/2023	15/03/2023	15/03/2023
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	20/03/2023	20/03/2023	20/03/2023	20/03/2023	20/03/2023
Date analysed	-	21/03/2023	21/03/2023	21/03/2023	21/03/2023	21/03/2023
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	%	93	104	95	92	98

Total Phenolics in Water						
Our Reference		318743-1	318743-2	318743-3	318743-4	318743-5
Your Reference	UNITS	MWA	MWB	MWC	MWD	MWE
Date Sampled		15/03/2023	15/03/2023	15/03/2023	15/03/2023	15/03/2023
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	17/03/2023	17/03/2023	17/03/2023	17/03/2023	17/03/2023
Date analysed	-	17/03/2023	17/03/2023	17/03/2023	17/03/2023	17/03/2023
Total Phenolics (as Phenol)	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05

Ion Balance						
Our Reference		318743-1	318743-2	318743-3	318743-4	318743-5
Your Reference	UNITS	MWA	MWB	MWC	MWD	MWE
Date Sampled		15/03/2023	15/03/2023	15/03/2023	15/03/2023	15/03/2023
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	16/03/2023	16/03/2023	16/03/2023	16/03/2023	16/03/2023
Date analysed	-	16/03/2023	16/03/2023	16/03/2023	16/03/2023	16/03/2023
Calcium - Dissolved	mg/L	500	420	310	110	180
Potassium - Dissolved	mg/L	3	3	2	1	140
Sodium - Dissolved	mg/L	1,800	1,300	1,600	790	1,300
Magnesium - Dissolved	mg/L	1,000	600	450	120	250
Hardness	mgCaCO <sub>3</sub> /L	5,400	3,500	2,600	790	1,500
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	910	2,200	1,300
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	910	2,200	1,300
Sulphate, SO <sub>4</sub>	mg/L	56	82	82	95	210
Chloride, Cl	mg/L	7,100	4,800	4,200	2,800	960
Ionic Balance	%	-6.0	-6.0	-6.0	-42	23

Miscellaneous Inorganics						
Our Reference		318743-1	318743-2	318743-3	318743-4	318743-5
Your Reference	UNITS	MWA	MWB	MWC	MWD	MWE
Date Sampled		15/03/2023	15/03/2023	15/03/2023	15/03/2023	15/03/2023
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	16/03/2023	16/03/2023	16/03/2023	16/03/2023	16/03/2023
Date analysed	-	16/03/2023	16/03/2023	16/03/2023	16/03/2023	16/03/2023
Ammonia as N in water	mg/L	0.17	<0.005	0.010	230	0.034
Fluoride, F	mg/L	0.1	0.3	0.2	0.2	0.4
Total Organic Carbon	mg/L	3	7	7	440	6
Nitrate as N in water	mg/L	0.49	0.30	0.11	<0.005	0.02
pH	pH Units	6.8	6.9	6.9	7.6	7.3
Electrical Conductivity	µS/cm	20,000	14,000	13,000	12,000	5,000

HM in water - total						
Our Reference		318743-1	318743-2	318743-3	318743-4	318743-5
Your Reference	UNITS	MWA	MWB	MWC	MWD	MWE
Date Sampled		15/03/2023	15/03/2023	15/03/2023	15/03/2023	15/03/2023
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	17/03/2023	17/03/2023	17/03/2023	17/03/2023	17/03/2023
Date analysed	-	17/03/2023	17/03/2023	17/03/2023	17/03/2023	17/03/2023
Iron-Total	µg/L	180	140	1,400	3,100	2,100
Manganese-Total	µg/L	10	12	1,600	380	880

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-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-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>Metals-020</b>	Determination of various metals by ICP-AES.
<b>Metals-022</b>	Determination of various metals by ICP-MS.
<b>Org-022/025</b>	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS/GC-MSMS.

Client Reference: E04-0323- UHSC

QUALITY CONTROL: Organochlorine Pesticides in Water				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date extracted	-			20/03/2023	[NT]	[NT]	[NT]	[NT]	20/03/2023	[NT]
Date analysed	-			21/03/2023	[NT]	[NT]	[NT]	[NT]	21/03/2023	[NT]
alpha-BHC	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	87	[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]	87	[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]	91	[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]	87	[NT]
Heptachlor Epoxide	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	86	[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]	93	[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]	84	[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]	87	[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]	87	[NT]
Methoxychlor	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	92	[NT]	[NT]	[NT]	[NT]	97	[NT]



Client Reference: E04-0323- UHSC

QUALITY CONTROL: Total Phenolics in Water					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			17/03/2023	1	17/03/2023	17/03/2023		17/03/2023	[NT]
Date analysed	-			17/03/2023	1	17/03/2023	17/03/2023		17/03/2023	[NT]
Total Phenolics (as Phenol)	mg/L	0.05	Inorg-031	<0.05	1	<0.05	<0.05	0	98	[NT]

Client Reference: E04-0323- UHSC

QUALITY CONTROL: Ion Balance				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	318743-2
Date prepared	-			16/03/2023	1	16/03/2023	16/03/2023		16/03/2023	16/03/2023
Date analysed	-			16/03/2023	1	16/03/2023	16/03/2023		16/03/2023	16/03/2023
Calcium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	500	490	2	100	#
Potassium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	3	3	0	94	94
Sodium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	1800	1800	0	97	#
Magnesium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	1000	970	3	104	#
Hardness	mgCaCO <sub>3</sub> /L	3	Metals-020	[NT]	1	5400	5200	4	[NT]	[NT]
Hydroxide Alkalinity (OH <sup>-</sup> ) as CaCO <sub>3</sub>	mg/L	5	Inorg-006	<5	1	<5	<5	0	[NT]	[NT]
Bicarbonate Alkalinity as CaCO <sub>3</sub>	mg/L	5	Inorg-006	<5	1	510	520	2	[NT]	[NT]
Carbonate Alkalinity as CaCO <sub>3</sub>	mg/L	5	Inorg-006	<5	1	<5	<5	0	[NT]	[NT]
Total Alkalinity as CaCO <sub>3</sub>	mg/L	5	Inorg-006	<5	1	510	520	2	102	[NT]
Sulphate, SO <sub>4</sub>	mg/L	1	Inorg-081	<1	1	56	56	0	115	112
Chloride, Cl	mg/L	1	Inorg-081	<1	1	7100	7300	3	114	#
Ionic Balance	%		Inorg-040	[NT]	1	-6.0	-8.0	-29	[NT]	[NT]

Client Reference: E04-0323- UHSC

QUALITY CONTROL: Miscellaneous Inorganics				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	318743-2
Date prepared	-			16/03/2023	1	16/03/2023	16/03/2023		16/03/2023	16/03/2023
Date analysed	-			16/03/2023	1	16/03/2023	16/03/2023		16/03/2023	16/03/2023
Ammonia as N in water	mg/L	0.005	Inorg-057	<0.005	1	0.17	0.20	16	98	116
Fluoride, F	mg/L	0.1	Inorg-026	<0.1	1	0.1	0.1	0	105	80
Total Organic Carbon	mg/L	1	Inorg-079	<1	1	3	3	0	105	72
Nitrate as N in water	mg/L	0.005	Inorg-055	<0.005	1	0.49	0.50	2	104	86
pH	pH Units		Inorg-001	[NT]	1	6.8	6.8	0	97	[NT]
Electrical Conductivity	µS/cm	1	Inorg-002	<1	1	20000	20000	0	103	[NT]

Client Reference: E04-0323- UHSC

QUALITY CONTROL: HM in water - total					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W3	318743-2
Date prepared	-			17/03/2023	1	17/03/2023	17/03/2023		17/03/2023	17/03/2023
Date analysed	-			17/03/2023	1	17/03/2023	17/03/2023		17/03/2023	17/03/2023
Iron-Total	µg/L	10	Metals-022	<10	1	180	170	6	105	125
Manganese-Total	µg/L	5	Metals-022	<5	1	10	10	0	100	98

**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

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

The mass imbalance may be caused different preservation of the samples for the cations the preservation of HNO<sub>3</sub> and filtration was used while for anions the non-preservation of the bottle was used.

**ATTACHMENT C**  
**CALIBRATION CERTIFICATE**





**airmet**

Air-Met Scientific Pty Ltd  
1300 137 067

Instrument **YSI Quatro Pro Plus**  
Serial No. **18J104341**

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

**Certificate of Calibration**

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

Sensor	Serial no	Standard Solutions	Certified	Solution Bottle Number	Instrument Reading
1. pH 7.00		pH 7.00		389364	7.01
2. pH 4.00		pH 4.00		399527	pH 4.11
3. ORP		236.04mV		395557/385763	236.16mV
4. SPC		2760uS/cm		396172	2751 uS/cm
5. D.O		0%		391223	99.2%
6. Temp		21.8°C		MultiTherm	21.9°C

**Calibrated by:** Kristyan Corrales

**Calibration date:** 10/03/2023

**Next calibration due:** 9/04/2023

**ATTACHMENT D**  
**FIELD DATA SHEETS**

## GROUNDWATER MONITORING FIELD DATA SHEET

<b>Project:</b> E104-0323 Scone	<b>Sample ID:</b> MWA
<b>Client:</b> UHSC	<b>Sampler:</b> DB
<b>Site Address:</b> Noblet Road Scone	<b>Date:</b> 15.3.23

<b>Well Information</b>			
Monument damaged: Rusty	YES / <b>NO</b> / N/A	Well ID visible:	YES / <b>NO</b> / 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: ..... 6.571.....	m bgl	Temperature >15 <input type="checkbox"/>	15-20 <input type="checkbox"/>
Total well depth: .....15.66 .....	m bgl	20-25 X	25-30 <input type="checkbox"/>
Initial well volume: .....	L	Clear <input type="checkbox"/>	Partly cloudy <input type="checkbox"/>
Water level after purging: .....7.632.....	m bgl		Overcast X
Volume of water purged: .....	L		
Water level at time of sampling: .....7.632.....	m bgl	Calm X	Slight breeze <input type="checkbox"/>
Well purged dry:	YES / <b>NO</b>		Moderate breeze <input type="checkbox"/>
Purging equipment:	Bailer		Windy <input type="checkbox"/>
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
9:52am	7.7	18024	6.79	168.4	20.5		Water clear no smell or sheen
9:56am	1.17	18212	6.37	162.9	20.2		
9:58am	1.29	18199	6.39	166.5	20.1		
10:00am	1.64	18220	6.40	171.9	20.2		

### 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> E104-0323 Scone	<b>Sample ID:</b> MWB
<b>Client:</b> UHSC	<b>Sampler:</b> DB
<b>Site Address:</b> Noblet Road Scone	<b>Date:</b> 15.03.23

<b>Well Information</b>			
Monument damaged: Rusty	YES / <b>NO</b> / N/A	Well ID visible:	YES / <b>NO</b> / 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: ..... 6.046.....	m bgl	Temperature >15 <input type="checkbox"/>	15-20 <input type="checkbox"/>
Total well depth: .....14.04 .....	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: .....6.616.....	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: .....6.616.....	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
10:35am	1.26	12925	6.46	182.5	20.6		Clear water
10:37am	0.97	12947	6.50	165.1	20.1		
10:39am	1.33	12280	6.53	139.3	20.0		
10:42am	1.21	12904	6.52	83.7	20.0		

### 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> E104-0323 Scone	<b>Sample ID:</b> MWC
<b>Client:</b> UHSC	<b>Sampler:</b> DB
<b>Site Address:</b> Noblet Road Scone	<b>Date:</b> 15.03.23

<b>Well Information</b>			
Monument damaged: Rusty	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: .....0.75.....	m agl	<b>Weather Conditions:</b>	
Standing water level: ..... 4.462.....	m bgl	Temperature >15 <input type="checkbox"/>	15-20 <input type="checkbox"/>
Total well depth: .....12.6 .....	m bgl	20-25 <input checked="" type="checkbox"/>	25-30 <input type="checkbox"/>
Initial well volume: .....	L	Clear <input type="checkbox"/>	Partly cloudy <input checked="" type="checkbox"/> Overcast <input checked="" type="checkbox"/>
Water level after purging: .....4.702.....	m bgl	Calm <input type="checkbox"/>	Slight breeze <input checked="" type="checkbox"/> Moderate breeze <input type="checkbox"/>
Volume of water purged: .....	L	Windy <input type="checkbox"/>	
Water level at time of sampling: .....4.702.....	m bgl	Fine <input checked="" type="checkbox"/>	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
11:15am	0.61	12346	6.41	-300.4	20.4		Clear water
11:17am	0.50	12380	6.44	-330.1	20.0		
11:19am	0.87	12390	6.46	-361.3	20.0		

### 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> E104-0323 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> 15.03.22

<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 / N/A	Cap on PVC casing:	YES / NO / N/A
Cement footing damaged:	YES / NO / N/A	Water in monument casing:	YES / <b>NO</b> / N/A
Standing water, vegetation around monument:	<b>YES</b> / NO / N/A	Internal obstruction in casing:	YES / <b>NO</b> / N/A
Well Damaged: Rusty	YES / NO / N/A	Odours from groundwater:	<b>YES</b> / NO / N/A
Casing above ground: .....N/A.....	m agl	<b>Weather Conditions:</b>	
Standing water level: ..... 9.717.....	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    Overcast <input type="checkbox"/>
Water level after purging: .....9.928.....	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: .....9.928.....	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
12:24pm	0.19	12987	7.05	-424.0	28.6		Methane odour, Dark green sediment in water
12:26pm	1.56	12583	7.06	-386.2	27.8		
12:28pm	0.10	11961	7.09	-275.2	27.6		
12:30pm	0.24	11339	7.09	-338.3	27.5		
12:48pm	0.78	5306	7.44	-286.9	25.6		

### Water Quality and General Comments:

Water was dark green tinged with some sediment, methane and rotten egg 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> E104-0323 Scone	<b>Sample ID:</b> MWE
<b>Client:</b> UHSC	<b>Sampler:</b> DB
<b>Site Address:</b> Noblet Road Scone	<b>Date:</b> 15.03.23

<b>Well Information</b>			
Monument damaged: Rusty	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: ..... 3.824.....	m bgl	Temperature >15 <input type="checkbox"/>	15-20 <input type="checkbox"/>
Total well depth: .....9.46 .....	m bgl	20-25 X <input checked="" type="checkbox"/>	25-30 <input type="checkbox"/>
Initial well volume: .....	L	Clear X	Partly cloudy <input type="checkbox"/> Overcast <input type="checkbox"/>
Water level after purging: .....3.958.....	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: .....3.958.....	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
11:45am	1.07	4469	6.72	-406.8	20.4		Clear water
11:47am	0.60	4458	6.71	-423.7	20.1		
11:49am	0.94	4467	6.74	-417.1	20.0		

### 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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