



PROJECT NUMBER – E04-0622
JUNE 2022

Document Control Number - Co1830

E: admin@engage-es.com.au

M: 0478 362 005

**ENGAGE
ENVIRONMENTAL
SERVICES**

ABN 13 629 353 662

**GROUNDWATER
MONITORING**

**SCONE WASTE
FACILITY
NOBLET ROAD
SCONE NSW**



DOCUMENT CONTROL INFORMATION

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

Client - Upper Hunter Shire Council

Project Number – E04-0622

Prepared – CL

Reviewed By and Approved for Release By – STC

Document Control Number – C01830

Comments – Final Copy

Date – 18/07/2022

OFFICE

1/545 Main Road
Glendale NSW 2285

Ph: 0478 362 005

Email: admin@engage-es.com.au

FIELD OFFICE

Unit 1, 104 George St
Singleton NSW 2330

Ph: 0478 364 588

Engage Environmental Services Pty Limited: ABN 13 629 353 662



WAIVER/DISCLAIMER/LIMITATION

The information contained in these documents is confidential, privileged and only for the information of the intended recipient and may not be used, published or redistributed without the prior written consent of Engage Environmental Services Pty Limited (Engage). Engage undertakes all exercises with reasonable skill and professional attention in the provision of services, including advice to the Client.

The opinions expressed are in good faith and while every care has been taken in preparing these documents, Engage makes no representations and gives no warranties of whatever nature in respect of these documents, including but not limited to the accuracy or completeness of any information, facts and/or opinions contained therein.

Engage, the directors, employees and agents cannot be held liable for the use of and reliance of the opinions, estimates, assumptions and findings in these documents.

Responsibility and any liability arising from misinterpretation or misuse by third parties as to the contents of the reports are not Engage's responsibility and will not be liable.

Information supplied, in electronic form, print form or verbally expressed to Engage is not verified for accuracy, validity, completeness or comprehensiveness unless part of the project being undertaken is a third-party view. Information supplied is deemed to be complete and accurate.

Where site inspections, monitoring, or other fieldwork have taken place, the report is based on the information supplied by the client, observations, laboratory results and any discussions with regulatory authorities.



ABBREVIATIONS

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

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



TABLE OF CONTENTS

1.0 INTRODUCTION..... 1

General..... 1

Briefing..... 1

2.0 SITE CRITERIA AND SAMPLING FREQUENCY..... 2

3.0 SAMPLING METHODOLOGY 3

Groundwater Sampling..... 3

4.0 RESULTS 4

5.0 DISCUSSION 9

MWA..... 9

MWB..... 9

MWC..... 10

MWD 10

MWE..... 11

Site and Maintenance 11

6.0 CONCLUSIONS..... 12

REFERENCES 13

FIGURES

Figure 1 Site layout with sample locations

ATTACHMENTS

Attachment 1 NATA Accredited Laboratory Results

Attachment 2 YSI water quality meter calibration certificate

Attachment 3 Data log

Attachment 4 Field Data Sheets

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 30th June 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). 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%	
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
PHENOLS	Total phenolics	mg/L	0.32	Quarterly
OCP	Organochlorine Pesticide³ (OCP)	mg/L	0.00001	Quarterly
MISC. INORGANICS	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

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

There was one exceedance of the site criteria for June in MWA, TOC at a concentration of 5mg/L.

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

	Analytes	Units	Site Criteria (mg/L)	MWA March 2022	MWA June 2022
IONS	Calcium	mg/L	NA	66	520
	Alkalinity (total)	mg/L	NA	610	510
	Chloride	mg/L	NA	250	7000
	Fluoride	mg/L	NA	0.7	0.2
	Potassium¹	mg/L	410	1	3
	Magnesium	mg/L	NA	100	1100
	Sulphate	mg/L	NA	29	48
HEAVY METALS	Iron	mg/L	0.3	<LOR	<LOR
	Manganese	mg/L	1.9	0.009	0.03
PHENOLS	Total phenolics	mg/L	0.32	<LOR	<LOR
OCP	OCP³	mg/L	0.00001	<LOR	<LOR
MISC. INORGANICS	pH	pH	6.5 – 8	7.6	6.9
	Sodium	mg/L	NA	350	1800
	Ammonia²	mg/L	0.9	0.031	0.037
	Nitrate	mg/L	0.7	0.058	0.55
	Total Organic Carbon	mg/L	4	20	5
	EC	µS/cm	NA	1600	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 June in MWB, TOC at a concentration of 5mg/L.

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

	Analytes	Units	Site Criteria (mg/L)	MWB March 2022	MWB June 2022
IONS	Calcium	mg/L	NA	420	460
	Alkalinity (total)	mg/L	NA	430	430
	Chloride	mg/L	NA	4600	4800
	Fluoride	mg/L	NA	0.2	0.3
	Potassium ¹	mg/L	410	2	2
	Magnesium	mg/L	NA	620	650
	Sulphate	mg/L	NA	85	81
HEAVY METALS	Iron	mg/L	0.3	0.04	0.06
	Manganese	mg/L	1.9	0.01	0.01
PHENOLS	Total phenolics	mg/L	0.32	<LOR	<LOR
OCP	OCP ³	mg/L	0.00001	<LOR	<LOR
MISC. INORGANICS	pH	pH	6.5 – 8	6.8	7.0
	Sodium	mg/L	NA	1000	1300
	Ammonia ²	mg/L	0.9	0.011	0.017
	Nitrate	mg/L	0.7	0.38	0.36
	Total Organic Carbon (TOC)	mg/L	4	6	5
	EC	µS/cm	NA	13000	14000

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 June in MWC; Manganese, and TOC at concentrations of, 2.1mg/L and 8mg/L respectively.

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

	Analytes	Units	Site Criteria (mg/L)	MWC March 2022	MWC June 2022
IONS	Calcium	mg/L	NA	370	300
	Alkalinity (total)	mg/L	NA	930	940
	Chloride	mg/L	NA	4000	3800
	Fluoride	mg/L	NA	0.2	0.2
	Potassium¹	mg/L	410	2	2
	Magnesium	mg/L	NA	440	440
	Sulphate	mg/L	NA	120	88
HEAVY METALS	Iron	mg/L	0.3	<LOR	0.01
	Manganese	mg/L	1.9	2.2	2.1
PHENOLS	Total phenolics	mg/L	0.32	<LOR	<LOR
OCP	OCP³	mg/L	0.00001	<LOR	<LOR
MISC. INORGANICS	pH	pH	6.5 – 8	6.9	6.9
	Sodium	mg/L	NA	2000	1400
	Ammonia²	mg/L	0.9	0.048	0.073
	Nitrate	mg/L	0.7	0.11	0.092
	Total Organic Carbon (TOC)	mg/L	4	8	8
	EC	µS/cm	NA	11000	13000

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.

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 – June 2022
(MWD)**

	Analytes	Units	Site Criteria (mg/L)	MWD (leachate) March 2022	MWD (leachate) June 2022
IONS	Calcium	mg/L	NA	220	190
	Alkalinity (total)	mg/L	NA	1700	1500
	Chloride	mg/L	NA	1700	1800
	Fluoride	mg/L	NA	0.3	0.3
	Potassium¹	mg/L	410	79	91
	Magnesium	mg/L	NA	140	170
	Sulphate	mg/L	NA	49	38
HEAVY METALS	Iron	mg/L	0.3	0.65	0.87
	Manganese	mg/L	1.9	0.59	0.45
PHENOLS	Total phenolics	mg/L	0.32	<LOR	<LOR
OCP	OCP³	mg/L	0.00001	<LOR	<LOR
MISC. INORGANICS	pH	pH	6.5 – 8	7.4	7.4
	Sodium	mg/L	NA	840	1100
	Ammonia²	mg/L	0.9	130	130
	Nitrate	mg/L	0.7	0.02	<LOR
	Total Organic Carbon (TOC)	mg/L	4	140	130
	EC	µS/cm	NA	7300	8100

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 June in MWE, Iron, and TOC at concentrations of, 0.48mg/L and 7mg/L respectively.

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

	Analytes	Units	Threshold Criteria (mg/L)	MWE March 2022	MWE June 2022
IONS	Calcium	mg/L	NA	140	86
	Alkalinity (total)	mg/L	NA	1200	1300
	Chloride	mg/L	NA	990	690
	Fluoride	mg/L	NA	1.1	0.5
	Potassium¹	mg/L	410	1	0.8
	Magnesium	mg/L	NA	130	100
	Sulphate	mg/L	NA	200	170
HEAVY METALS	Iron	mg/L	0.3	0.03	0.48
	Manganese	mg/L	1.9	1.3	0.6
PHENOLS	Total phenolics	mg/L	0.32	<LOR	<LOR
OCP	OCP³	mg/L	0.00001	<LOR	<LOR
MISC. INORGANICS	pH	pH	6.5 – 8	7.2	7.3
	Sodium	mg/L	NA	700	650
	Ammonia²	mg/L	0.9	0.036	0.23
	Nitrate	mg/L	0.7	<LOR	<LOR
	Total Organic Carbon (TOC)	mg/L	4	6	7
	EC	µS/c	NA	4900	4500

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 June 2022 in relation to the Site Criteria. Key increasing trends, decreasing trends and exceedances of the threshold criteria are indicated.

MWA

MWA is located in the northwest section of the site and is considered to be a down-hydraulic gradient monitoring well. There is farmland adjoining to the north and west of this location. There was one exceedance of the site criteria:

- The TOC concentration has decreased from 20mg/L to 5mg/L, remaining slightly above the site criteria of 4mg/L.

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

- Calcium concentration increased from 66 mg/L to 520 mg/L;
- Chloride concentration increased from 250mg/l to 7000mg/L;
- Magnesium concentration increased from 100mg/L to 1100 mg/L;
- Nitrate concentration increased from 0.058 mg/L to 0.55 mg/L, remaining slightly below the site criteria.
- Sodium concentration increased from 350mg/L to 1800mg/L;
- The EC increased from 1600 μ S/cm to 20000 μ 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 decreased from 6mg/L to 5 mg/L, remaining above site Criteria of 4 mg/L.

The following significant changes have occurred in the water quality of MWB:

- Calcium concentration increased from 420 mg/L to 460mg/L;
- Chloride concentration increased 4600mg/L to 4800mg/L;

- Iron concentration increased from 0.04/L to 0.06mg/L, remaining below site criteria.
- Sodium concentration increased from 1000mg/L to 1300mg/L;
- Sulphate concentration decreased from 85mg/L to 81mg/L;
- The EC has increased from 13000 $\mu\text{S}/\text{cm}$ to 14000 $\mu\text{S}/\text{cm}$.

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 Manganese (2.1mg/L) was reported in MWC, a slight decrease compared to the previous concentrations reported in March 2022 (2.2 mg/L);
- A concentration of TOC (8 mg/L) was reported in MWC exceeding the Site Criteria (4 mg/L), remains steady from the previous reported concentration in March 2022 (8 mg/L).

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

- There was a decrease in concentrations of Calcium, from 370mg/L to 300mg/L, Sulphate from 120mg/L to 88mg/L, Sodium from 2000mg/L to 1400mg/L and Nitrate from 0.11mg/L to 0.092mg/L;
- The EC has increased from 11000 $\mu\text{S}/\text{cm}$ to 13000 $\mu\text{S}/\text{cm}$.

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:

- Iron concentration increased from 0.65 mg/L in March 2022 to 0.87 mg/L in the June 2022 results;
- A concentration of Ammonia (130 mg/L) remained steady from the previous reported concentration in March 2022;

- The TOC concentration has decreased from 140mg/L to 130 mg/L in comparison to March;
- There was an increased in Chloride concentration from 1700 mg/L to 1800 mg/L, Potassium from 79mg/L to 91 mg/L, Magnesium from 140 mg/L to 170 mg/L and Sodium from 840 mg/L to 1100 mg/L;
- Sulphate concentration decreased from 49mg/L to a concentration of 38 mg/L;
- Manganese concentration decreased from 0.59mg/L to 0.45mg/L;
- The EC has increased from 7300 μ S/cm to 8100 μ S/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 MWC:

- The TOC concentration slightly decreased from 6mg/L to 7 mg/L in comparison to March report, remaining above the site criteria of 4mg/L;
- The Iron concentration increased from 0.03 mg/L to 0.48 mg/L in comparison to March, exceeding the site criteria of 0.3mg/L.

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

- There was a decrease in concentrations of Calcium, from 140 mg/L to 86 mg/L, Chloride from 990 mg/L to 690 mg/L, Fluoride from 1.1 mg/L to 0.5 mg/L, Magnesium from 130 mg/L to 100 mg/L, Sulphate from 200mg/L to 170 mg/L, Sodium from 700 mg/L to 650 mg/L;
- Ammonia concentration increased from 0.036 mg/L to 0.23 mg/L;
- The EC has decreased from 4900 μ S/cm to 4500 μ S/cm.

All other analytes reported concentrations consistent with previous monitoring data.

The following analytes exceeded the Threshold Criteria during the June 2022 sampling event, excluding the Leachate Monitoring well (MWD); TOC in MWA, MWB, MWC and MWE, Manganese in MWC and Iron in MWE. Refer to **Attachment 3** – Data Log.

There has been significant rainfall events and flooding throughout the region in the last 6 months. These events have had an impact on the analyte concentrations.

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 observed which would have impacted the regional groundwater conditions. The recent weather conditions of heavy rain and flooding during the summer and autumn/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 June 2022 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 June 2022 sampling event; TOC in MWA, MWB, MWC and MWE, Manganese in MWC and Iron in MWE.

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

The next water sampling event will be an annual monitoring event which will be undertaken in September 2022.

REFERENCES

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

FIGURE



Legend

● Monitoring Well Location

Image: Google Maps 2019



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

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

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

ATTACHMENT 1
NATA ACCREDITED LABORATORY RESULTS



Envirolab Services Pty Ltd

ABN 37 112 535 645

12 Ashley St Chatswood NSW 2067

ph 02 9910 6200 fax 02 9910 6201

customerservice@envirolab.com.au

www.envirolab.com.au

CERTIFICATE OF ANALYSIS 299585

Client Details

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

Sample Details

Your Reference	<u>E04-0622-UHSC</u>
Number of Samples	6 Water, 1 Water-Leachate
Date samples received	04/07/2022
Date completed instructions received	04/07/2022

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Please refer to the last page of this report for any comments relating to the results.

Report Details

Date results requested by 11/07/2022

Date of Issue 11/07/2022

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

Dragana Tomas, Senior Chemist
Giovanni Agosti, Group Technical Manager
Hannah Nguyen, Metals Supervisor
Kyle Gavrily, Senior Chemist
Priya Samarawickrama, Senior Chemist

Authorised By

Nancy Zhang, Laboratory Manager

vTRH(C6-C10)/BTEXN in Water			
Our Reference		299585-6	299585-7
Your Reference	UNITS	TS	TB
Date Sampled		30/06/2022	30/06/2022
Type of sample		Water	Water
Date extracted	-	06/07/2022	06/07/2022
Date analysed	-	07/07/2022	07/07/2022
Benzene	µg/L	103%	<1
Toluene	µg/L	101%	<1
Ethylbenzene	µg/L	115%	<1
m+p-xylene	µg/L	114%	<2
o-xylene	µg/L	113%	<1
Naphthalene	µg/L	[NT]	<1
Surrogate Dibromofluoromethane	%	101	96
Surrogate toluene-d8	%	97	98
Surrogate 4-BFB	%	97	95

Organochlorine Pesticides in Water						
Our Reference		299585-1	299585-2	299585-3	299585-4	299585-5
Your Reference	UNITS	MWA	MWB	MWC	MWD	MWE
Date Sampled		30/06/2022	30/06/2022	30/06/2022	30/06/2022	30/06/2022
Type of sample		Water	Water	Water	Water-Leachate	Water
Date extracted	-	08/07/2022	08/07/2022	08/07/2022	08/07/2022	08/07/2022
Date analysed	-	08/07/2022	08/07/2022	08/07/2022	08/07/2022	08/07/2022
alpha-BHC	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
HCB	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
beta-BHC	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
gamma-BHC	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Heptachlor	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
delta-BHC	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Aldrin	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Heptachlor Epoxide	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
gamma-Chlordane	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
alpha-Chlordane	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Endosulfan I	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
pp-DDE	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Dieldrin	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Endrin	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Endosulfan II	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
pp-DDD	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Endrin Aldehyde	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
pp-DDT	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Endosulfan Sulphate	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Methoxychlor	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Surrogate TCMX	%	96	77	80	91	103

Total Phenolics in Water						
Our Reference		299585-1	299585-2	299585-3	299585-4	299585-5
Your Reference	UNITS	MWA	MWB	MWC	MWD	MWE
Date Sampled		30/06/2022	30/06/2022	30/06/2022	30/06/2022	30/06/2022
Type of sample		Water	Water	Water	Water-Leachate	Water
Date extracted	-	06/07/2022	06/07/2022	06/07/2022	06/07/2022	06/07/2022
Date analysed	-	06/07/2022	06/07/2022	06/07/2022	06/07/2022	06/07/2022
Total Phenolics (as Phenol)	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05

HM in water - dissolved						
Our Reference		299585-1	299585-2	299585-3	299585-4	299585-5
Your Reference	UNITS	MWA	MWB	MWC	MWD	MWE
Date Sampled		30/06/2022	30/06/2022	30/06/2022	30/06/2022	30/06/2022
Type of sample		Water	Water	Water	Water-Leachate	Water
Date prepared	-	07/07/2022	07/07/2022	07/07/2022	07/07/2022	07/07/2022
Date analysed	-	07/07/2022	07/07/2022	07/07/2022	07/07/2022	07/07/2022
Iron-Dissolved	µg/L	<10	60	10	870	480
Manganese-Dissolved	µg/L	35	16	2,100	450	600

Ion Balance						
Our Reference		299585-1	299585-2	299585-3	299585-4	299585-5
Your Reference	UNITS	MWA	MWB	MWC	MWD	MWE
Date Sampled		30/06/2022	30/06/2022	30/06/2022	30/06/2022	30/06/2022
Type of sample		Water	Water	Water	Water-Leachate	Water
Date prepared	-	04/07/2022	04/07/2022	04/07/2022	04/07/2022	04/07/2022
Date analysed	-	04/07/2022	04/07/2022	04/07/2022	04/07/2022	04/07/2022
Calcium - Dissolved	mg/L	520	460	300	190	86
Potassium - Dissolved	mg/L	3	2	2	91	0.8
Sodium - Dissolved	mg/L	1,800	1,300	1,400	1,100	650
Magnesium - Dissolved	mg/L	1,100	650	440	170	100
Hydroxide Alkalinity (OH ⁻) as CaCO ₃	mg/L	<5	<5	<5	<5	<5
Bicarbonate Alkalinity as CaCO ₃	mg/L	510	430	940	1,500	1,300
Carbonate Alkalinity as CaCO ₃	mg/L	<5	<5	<5	<5	<5
Total Alkalinity as CaCO ₃	mg/L	510	430	940	1,500	1,300
Sulphate, SO ₄	mg/L	48	81	88	38	170
Chloride, Cl	mg/L	7,000	4,800	3,800	1,800	690
Ionic Balance	%	-4.0	-4.0	-6.0	-6.0	-9.0

Miscellaneous Inorganics						
Our Reference		299585-1	299585-2	299585-3	299585-4	299585-5
Your Reference	UNITS	MWA	MWB	MWC	MWD	MWE
Date Sampled		30/06/2022	30/06/2022	30/06/2022	30/06/2022	30/06/2022
Type of sample		Water	Water	Water	Water-Leachate	Water
Date prepared	-	04/07/2022	04/07/2022	04/07/2022	04/07/2022	04/07/2022
Date analysed	-	04/07/2022	04/07/2022	04/07/2022	04/07/2022	04/07/2022
Ammonia as N in water	mg/L	0.037	0.017	0.073	130	0.23
Fluoride, F	mg/L	0.2	0.3	0.2	0.3	0.5
Total Organic Carbon	mg/L	5	5	8	130	7
Nitrate as N in water	mg/L	0.55	0.36	0.092	<0.005	<0.005
pH	pH Units	6.9	7.0	6.9	7.4	7.3
Electrical Conductivity	µS/cm	20,000	14,000	13,000	8,100	4,500

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

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	-			06/07/2022	[NT]	[NT]	[NT]	[NT]	06/07/2022	[NT]
Date analysed	-			07/07/2022	[NT]	[NT]	[NT]	[NT]	07/07/2022	[NT]
TRH C ₆ - C ₉	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	103	[NT]
TRH C ₆ - C ₁₀	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	103	[NT]
Benzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	104	[NT]
Toluene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	101	[NT]
Ethylbenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	103	[NT]
m+p-xylene	µg/L	2	Org-023	<2	[NT]	[NT]	[NT]	[NT]	104	[NT]
o-xylene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	103	[NT]
Naphthalene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-023	96	[NT]	[NT]	[NT]	[NT]	99	[NT]
Surrogate toluene-d8	%		Org-023	97	[NT]	[NT]	[NT]	[NT]	100	[NT]
Surrogate 4-BFB	%		Org-023	97	[NT]	[NT]	[NT]	[NT]	96	[NT]

Client Reference: E04-0622-UHSC

QUALITY CONTROL: Organochlorine Pesticides in Water				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W4	299585-2
Date extracted	-			08/07/2022	1	08/07/2022	08/07/2022		08/07/2022	08/07/2022
Date analysed	-			08/07/2022	1	08/07/2022	08/07/2022		08/07/2022	08/07/2022
alpha-BHC	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	96	98
HCB	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
beta-BHC	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	96	103
gamma-BHC	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Heptachlor	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	93	93
delta-BHC	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Aldrin	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	99	103
Heptachlor Epoxide	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	98	98
gamma-Chlordane	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
alpha-Chlordane	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Endosulfan I	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
pp-DDE	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	96	98
Dieldrin	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	102	102
Endrin	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	84	90
Endosulfan II	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
pp-DDD	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	94	98
Endrin Aldehyde	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
pp-DDT	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Endosulfan Sulphate	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	92	96
Methoxychlor	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	104	1	96	92	4	88	85

Client Reference: E04-0622-UHSC

QUALITY CONTROL: Total Phenolics in Water					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	299585-2
Date extracted	-			06/07/2022	1	06/07/2022	06/07/2022		06/07/2022	06/07/2022
Date analysed	-			06/07/2022	1	06/07/2022	06/07/2022		06/07/2022	06/07/2022
Total Phenolics (as Phenol)	mg/L	0.05	Inorg-031	<0.05	1	<0.05	<0.05	0	100	92

Client Reference: E04-0622-UHSC

QUALITY CONTROL: HM in water - dissolved				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			07/07/2022	[NT]	[NT]	[NT]	[NT]	07/07/2022	[NT]
Date analysed	-			07/07/2022	[NT]	[NT]	[NT]	[NT]	07/07/2022	[NT]
Iron-Dissolved	µg/L	10	Metals-022	<10	[NT]	[NT]	[NT]	[NT]	110	[NT]
Manganese-Dissolved	µg/L	5	Metals-022	<5	[NT]	[NT]	[NT]	[NT]	108	[NT]

Client Reference: E04-0622-UHSC

QUALITY CONTROL: Ion Balance				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	299585-2
Date prepared	-			04/07/2022	1	04/07/2022	04/07/2022		04/07/2022	04/07/2022
Date analysed	-			04/07/2022	1	04/07/2022	04/07/2022		04/07/2022	04/07/2022
Calcium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	520	540	4	93	[NT]
Potassium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	3	3	0	87	[NT]
Sodium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	1800	1700	6	89	[NT]
Magnesium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	1100	1100	0	100	[NT]
Hydroxide Alkalinity (OH ⁻) as CaCO ₃	mg/L	5	Inorg-006	<5	1	<5	<5	0	[NT]	[NT]
Bicarbonate Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	1	510	520	2	[NT]	[NT]
Carbonate Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	1	<5	<5	0	[NT]	[NT]
Total Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	1	510	520	2	104	[NT]
Sulphate, SO ₄	mg/L	1	Inorg-081	<1	1	48	45	6	95	#
Chloride, Cl	mg/L	1	Inorg-081	<1	1	7000	6900	1	102	#
Ionic Balance	%		Inorg-040	[NT]	1	-4.0	-3.0	-29	[NT]	[NT]

Client Reference: E04-0622-UHSC

QUALITY CONTROL: Miscellaneous Inorganics				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	299585-2
Date prepared	-			04/07/2022	1	04/07/2022	04/07/2022		04/07/2022	04/07/2022
Date analysed	-			04/07/2022	1	04/07/2022	04/07/2022		04/07/2022	04/07/2022
Ammonia as N in water	mg/L	0.005	Inorg-057	<0.005	1	0.037	0.037	0	108	107
Fluoride, F	mg/L	0.1	Inorg-026	<0.1	1	0.2	0.2	0	116	84
Total Organic Carbon	mg/L	1	Inorg-079	<1	1	5	5	0	92	98
Nitrate as N in water	mg/L	0.005	Inorg-055	<0.005	1	0.55	0.55	0	107	94
pH	pH Units		Inorg-001	[NT]	1	6.9	7.0	1	100	[NT]
Electrical Conductivity	µS/cm	1	Inorg-002	<1	1	20000	20000	0	101	[NT]

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

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.
Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.	
The recommended maximums for analytes in urine are taken from "2018 TLVs and BEIs", as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.	
Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2	

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

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

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

Report Comments

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

pH/Nitrate

Samples were out of the recommended holding time for this analysis.

ATTACHMENT 2
CALIBRATION CERTIFICATE

ATTACHMENT 3
DATALOG

ENGAGE ENVIRONMENTAL SERVICES			Threshold Criteria	NA	NA	NA	NA	0.3	NA	1.9	0.00001	NA	6.5–8	NA	0.9	0.7	NA	4	0.32	NA		
			Units	mg/L	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	299585	30/6/22	520	510	7000	0.2	<10	1100	0.035	<0.0002	3	6.9	1800	0.037	0.55	48	5	<0.05	20000			
MWB	299585	30/6/22	460	430	4800	0.3	0.06	650	0.016	<0.0002	2	7	1300	0.017	0.36	81	5	<0.05	14000			
MWC	299585	30/6/22	300	940	3800	0.2	0.01	440	2.1	<0.0002	2	6.9	1400	0.073	0.092	88	8	<0.05	13000			
MWD	299585	30/6/22	190	1500	1800	0.3	0.87	170	0.45	<0.0002	91	7.4	1100	130	0.01	38	130	<0.05	8100			
MWE	299585	30/6/22	86	1300	690	0.5	0.48	100	0.6	<0.0002	0.8	7.3	650	0.23	<0.005	170	7	<0.05	4500			

ATTACHMENT 4
FIELD DATA SHEETS

GROUNDWATER MONITORING FIELD DATA SHEET

Project: E104-0622 Scone	Sample ID: MWA
Client: UHSC	Sampler: DB
Site Address: Noblet Road Scone	Date: 30.6.22

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: 7.135.....	m bgl	Temperature >15 <input type="checkbox"/>	15-20 X
Total well depth:15.66	m bgl	20-25 <input type="checkbox"/>	25-30 <input type="checkbox"/>
Initial well volume:	L	Clear <input type="checkbox"/>	Partly cloudy X Overcast <input type="checkbox"/>
Water level after purging:8.137.....	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:8.137.....	m bgl	Fine X	Showers <input type="checkbox"/> Rain <input type="checkbox"/>
Well purged dry:	YES / NO		
Purging equipment:	Bailer		
Sample equipment:	Bailer		

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)	TDS	Comments
10:10am	15.3	11540	6.53	118.4	18.6	8599.6	
10:15am	16.2	13644	6.47	106.2	19.9	9834.5	
10:20am	2.18	14176	6.52	107.7	20	10179	
10:22am	0.8	14737	6.43	108.4	20.3		
10:24am	1.4	14736	6.46	108.6	20.3	10527	

Water Quality and General Comments:

Water from ground water monitoring well. Water was clear no odour or sheen or hydrocarbons. Vegetation around monument and no standing water around monument. Nearby works well located north of landfill.

GROUNDWATER MONITORING FIELD DATA SHEET

Project: E104-0622 Scone	Sample ID: MWB
Client: UHSC	Sampler: DB
Site Address: Noblet Road Scone	Date: 30.6.22

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: 6.618.....	m bgl	Temperature >15 <input type="checkbox"/>	15-20 X
Total well depth:14.04	m bgl	20-25 <input type="checkbox"/>	25-30 <input type="checkbox"/>
Initial well volume:	L	Clear <input type="checkbox"/>	Partly cloudy X Overcast <input type="checkbox"/>
Water level after purging:7.285.....	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:7.285.....	m bgl		
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)	TDS	Comments
11:12am	1.58	10563	6.64	59	19.8	7624.5	
11:14am	1.09	10594	6.62	70.8	19.9	7631	
11:15am	1.31	10610	6.62	77.1	19.9	7644	
11:17am	1.97	10625	6.63	90.6	19.90	7644	

Water Quality and General Comments:

Water from ground water monitoring well. Water was clear no odour or sheen or hydrocarbons. Vegetation around monument and no standing water around monument. Nearby works well located north of landfill.

GROUNDWATER MONITORING FIELD DATA SHEET

Project: E104-0622 Scone	Sample ID: MWC
Client: UHSC	Sampler: DB
Site Address: Noblet Road Scone	Date: 30.6.22

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:0.75.....	m agl	Weather Conditions:	
Standing water level: 4.967.....	m bgl	Temperature >15 <input type="checkbox"/>	15-20 X
Total well depth:12.6	m bgl	20-25 <input type="checkbox"/>	25-30 <input type="checkbox"/>
Initial well volume:	L	Clear <input type="checkbox"/>	Partly cloudy X Overcast X
Water level after purging:5.163.....	m bgl	Calm X	Slight breeze <input type="checkbox"/> Moderate breeze <input type="checkbox"/>
Volume of water purged:	L		Windy <input type="checkbox"/>
Water level at time of sampling:5.163.....	m bgl		
Well purged dry:	YES / 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)	TDS	Comments
11:50am	7.54	9217	6.72	53.3	19.5	6721	
11:52am	7.65	9267	6.72	53.1	19.4		
11:54am	1.43	9234	6.66	51.8	19.	6727.5	

Water Quality and General Comments:

Water from ground water monitoring well. Water was clear no odour or sheen or hydrocarbons.
Vegetation around monument and no standing water around monument.

GROUNDWATER MONITORING FIELD DATA SHEET

Project: E104-0622 Scone	Sample ID: MWD Leachate well
Client: UHSC	Sampler: DB
Site Address: Noblet Road Scone	Date: 30.6.22

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: 3.47.....	m bgl	Temperature >15	<input type="checkbox"/> 15-20 X
Total well depth:9.46	m bgl	20-25	<input type="checkbox"/> 25-30 <input type="checkbox"/>
Initial well volume:	L	Clear	<input type="checkbox"/> Partly cloudy X Overcast <input type="checkbox"/>
Water level after purging:4.12.....	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:4.12.....	m bgl	Fine X	Showers <input type="checkbox"/> Rain <input type="checkbox"/>
Well purged dry:	YES / NO		
Purging equipment:	Bailer		
Sample equipment:	Bailer		

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)	TDS	Comments
1:20pm	0.4	6648	7.13	-276	25.1	4316	
1:25pm	0.41	6816	7.11	-272.6	26.4	4309	
1:27pm	1.61	6816	7.14	-237.6	26.8	4290	

Water Quality and General Comments:

Water from ground water monitoring well. Water was clear tinged water, methane odour, no sheen or hydrocarbons. Vegetation around monument and no standing water around monument. Monitoring well was cut to ground level

GROUND WATER MONITORING FIELD DATA SHEET

Project: E104-0622 Scone	Sample ID: MWE
Client: UHSC	Sampler: DB
Site Address: Noblet Road Scone	Date: 30.6.22

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: 3.47.....	m bgl	Temperature >15 <input type="checkbox"/>	15-20 X
Total well depth:9.46	m bgl	20-25 <input type="checkbox"/>	25-30 <input type="checkbox"/>
Initial well volume:	L	Clear <input type="checkbox"/>	Partly cloudy X Overcast <input type="checkbox"/>
Water level after purging:4.12.....	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:4.12.....	m bgl	Fine X	Showers <input type="checkbox"/> Rain <input type="checkbox"/>
Well purged dry:	YES / NO		
Purging equipment:	Bailer		
Sample equipment:	Bailer		

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)	TDS	Comments
12:50pm	1.99	3181	7.02	-62.9	19.1	2377	
12:52pm	1.16	3128	6.97	-146	19.1	2294.5	
12:54pm	0.85	3124	6.95	-169.8	19.1	2294	

Water Quality and General Comments:

Water from ground water monitoring well. Water was clear slightly opaque, no odour or sheen or hydrocarbons. Vegetation around monument and no standing water around monument.
