

Memorandum

To	Kempsey Shire Council	Mr Aaron Ferrell
Email	aaron.ferrell@kempsey.nsw.gov.au	
From	Chris Bozinovski	Date 19 October 2023
Subject	Quarterly Monitoring Memo – Q1 September 2023 Kempsey Landfill - Groundwater, Surface water and Gas Monitoring 2023 - 2024 638 Crescent Head Road, Kempsey	Project No. 89781.24

1. Introduction

This memo presents the September 2023 (Q1) results of groundwater, surface water and gas monitoring at the Kempsey Landfill site located at 638 Crescent Head Road, South Kempsey New South Wales (NSW). Monitoring was commissioned by Kempsey Shire Council.

The site is licensed by the Environmental Protection Authority under Environmental Protection Licence (EPL) 6269. The EPL notice specifies requirements for surface water, groundwater, and gas monitoring including test locations, analytes, and threshold concentration. Monitoring was conducted with reference to EPL 6269 requirements.

2. Scope of Works

The current round of monitoring was undertaken on 26 and 27 September (Q1) and comprised;

- Assessment of methane gas concentrations within existing buildings and capped landfill areas on 26 September 2023;
- Gas monitoring using landfill gas analyser at Wells BH1-02, BH1, BH2, BH3 and BH4 on 26 September 2023;
- Collection of surface water samples at Locations S5, and L8 on 27 September 2023, and
- Collection of groundwater samples at Wells BH1-02, BH1, BH2, BH3 and BH4 on 27 September 2023.

3. Field Work Results

3.1 Groundwater

Refer to attached laboratory testing results (334150-[R00]) and summary tables as follows:

- Table F1: Field and Laboratory Results for Groundwater - September 2023 - Q1;
- Table A2: Groundwater and Surface Water Field Parameters – Q1 September 2023.

With reference to Kempsey Landfill EPL there were some exceedances reported within the lab samples as indicated by the highlighted cells in the attached summary tables.

The reported exceedances from groundwater quality were generally within the historical ranges for these analytes at these locations. As such the exceedance results are generally not considered to be significant. Further information and limitations will be provided in the annual report.

It is noted that sampling in BH1 was blocked by an obstruction.

3.2 Surface water

Refer to attached laboratory testing results (334150-[R00]) and summary tables as follows:

- Table F2: Field and Laboratory Results for Surface water - September 2023 - Q1
- Table A2: Groundwater and Surface water field parameters – Q1 September 2023

With reference to Kempsey Landfill EPL there were some exceedances reported within the lab samples as indicated by the highlighted cells in the attached summary tables.

The reported exceedances from surface water quality were generally within the historical ranges for these analytes at these locations. As such the exceedance results are generally not considered to be significant. Further information and limitations will be provided in the annual report.

It is noted that no water could be collected from surface water locations S4, S6 and S7 as the locations were dry at the time of sampling.

3.3 Gas

The methane walkover was conducted on 26 September 2023 with reference to EPA Environmental Guidelines for Solid Waste Landfills (2016).

No methane exceedances were recorded within on-site structures (former EPL monitored structures) or within the monitoring bores (see results in Table A1 attached).

Past exceedance locations (E1 to E14) were accessed where possible. Results of methane monitoring at these locations are outlined in Table 1 below:

Table 1: Summary of Surface Methane Monitoring – 26 September 2023 (Q1)

Location ID	Methane (ppm)	Description of Location
E1	-	Not accessible (under clay stockpile)
E2	4 – 6	Grassed area
E3	6- 10	Grassed area
E4	-	Not accessible (under clay stockpile)
E5	-	Not accessible (under clay stockpile)
E6	675 - 990	Dead grass, edge of stockpile batter
E7	2 – 6	Grassed area
E8	670 – 1110	Dead grass, edge of stockpile batter
E9	5 – 8	Grassed area
E10	5 – 10	Grassed area
E11	1000 – 1100	Dead grass, edge of stockpile batter
E12	5 – 10	Grassed area
E13	545 – 3290	Edge of clay stockpile batter
E14	5 - 10	Grassed area

Coordinates of surface methane monitoring locations can be provided as required.

No new locations of methane exceedances were found in the current round of monitoring.

Refer to Figure 1 below for approximate locations of E1 to E14.

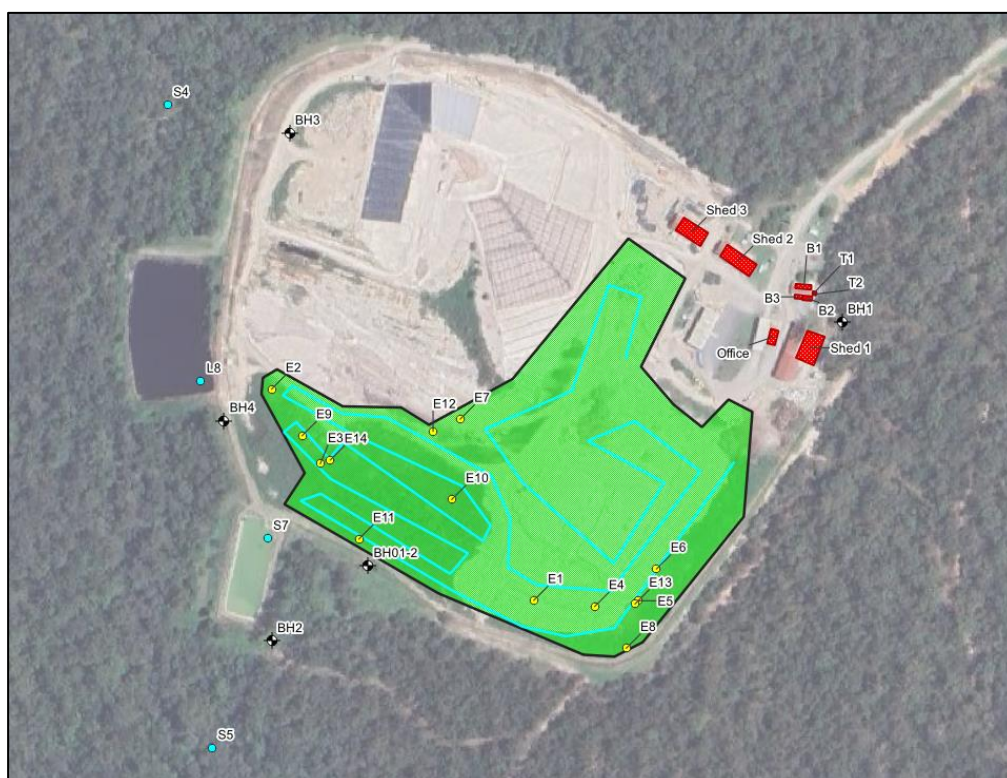


Figure 1: Approximate locations of methane exceedances (26 September 2023)

Surface methane monitoring has indicated some elevated results and localised exceedances. Further assessment is recommended to confirm subsurface conditions and capping within areas identified to contain methane exceedance in order to confirm possible capping rehabilitation requirements.

4. Limitations

The above interim results have been provided for the exclusive use of Kempsey Shire Council. Further details will be provided in the annual report.

5. References

CRC CARE. (2017). *Risk-based Management and Remediation Guidance for Benzo(a)pyrene*. Technical Report no. 39: Cooperative Research Centre for Contamination Assessment and Remediation of the Environment.

NEPC. (2013). *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM]*. Australian Government Publishing Services Canberra: National Environment Protection Council.

NSW EPA. (1995). *Contaminated Sites, Sampling Design Guidelines*. NSW Environment Protection Authority.

NSW EPA. (2016). *Environmental Guidelines, Solid Waste Landfills, Second Edition, 2016*. NSW Environment Protection Authority.

NSW EPA. (2020). *Assessment and Management of Hazardous Ground Gases*. NSW Environment Protection Authority.

NSW EPA. (2020). *Guidelines for Consultants Reporting on Contaminated Land*. Contaminated Land Guidelines: NSW Environment Protection Authority.

Please contact the undersigned if you have any questions on this matter.

Yours faithfully

Douglas Partners Pty Ltd

Reviewed by



Sarah Krebs
Environmental Scientist

Chris Bozinovski
Principal

Attachments: Table A1 – Field and Laboratory Results for Groundwater - September 2023 - Q1
Table A2 – Q1 September 2023 – Groundwater and Surface Water Field Parameters
Table F1 – Field and Laboratory Results for Groundwater - September 2023 - Q1
Table F2 - Field and Laboratory Results for Surface Water - September 2023 - Q1
Laboratory Test Results - (334150-[R00])
Drawing – 89781.00.D.001.Rev0

Table A1: Gas monitoring Results - Q1 September 2023

Well ID	Gauging Date	Max Methane (ppm)	Max Carbon Dioxide (%)	Oxygen(%)	Max Hydrogen Sulfide (ppm)	Max Carbon Monoxide (ppm)	Atmospheric Pressure (mb)	Flow (l/hr)
BH1	26/09/2023	0	0.7	19.9	1	0	1015	0.0
BH1-2	26/09/2023	0	0.4	20.4	2	1	1018	0.0
BH2	26/09/2023	0	0.0	20.2	2	1	1017	0.1
BH3	26/09/2023	0	0.1	21.0	2	1	1017	0.1
BH4	26/09/2023	0	0.1	21.2	2	2	1017	0.0

Notes to Table A1:

ppm parts per million
 mb millibars
 l/hr litres per hour

Table A2: Groundwater and Surface water field parameters - Q1 September 2023

	Well ID	Gauging Date	TOC Elevation (mAHD)	Total Depth (mbTOC)	Depth to Water (mbTOC)	Corrected Water Elevation (mAHD)	PID	pH	EC (uS/cm)	mV	DO (ppm)	Temp (°C)	Turbidity (NTU)	Comments
Groundwater	BH1	27/09/2023	50.165	25.13	14.94	35.225	<1	-	-	-	-	-	-	Well obstructed
	BH1-2	27/09/2023	29.637	25.3	5.576	24.061	<1	5.7	1460	69	0.33	20.83	118	clear, grey, no odour
	BH2	27/09/2023	25.716	25.63	1.906	23.81	<1	6.6	1510	-16	6.97	19.07	11.1	clear, pale brown, no odour
	BH3	27/09/2023	29.779	25.88	6.111	23.668	<1	6.1	1840	25	1.82	25.67	17.2	clear, pale brown, no odour
	BH4	27/09/2023	26.348	21.77	3.085	23.263	<1	6.2	1810	17	1.31	29.32	155	slightly turbid, pale brown, no odour
Surface Water	S4	27/09/2023	-	-	-	-	*	*	*	*	*	*	*	Dry
	S5	27/09/2023	-	-	-	-	<1	6.6	2630	95	2.63	15.09	40	slightly turbid, pale brown, no odour, stagnant
	S6	27/09/2023	-	-	-	-	*	*	*	*	*	*	*	Dry
	S7	27/09/2023	-	-	-	-	*	*	*	*	*	*	*	Dry
	L8	27/09/2023	-	-	-	-	<1	8.4	660	-66	0.66	23.3	70.3	slightly turbid, brown, no odour

Notes to Table A2:

AHD Australian Height Datum
 mbTOC metres below top of PVC casing
 PID photo-ionisation detector
 EC electrical conductivity
 ppm parts per million
 ORP oxidation reduction potential
 DO Dissolved Oxygen
 NTU nephelometric turbidity unit
 H₂S Hydrogen Sulfide
 uS/cm microsiemens

Table F1 - Field and Laboratory Results for Groundwater - September 2023 - Q1

Analyte	Units	ANZECC 2000 FW 95%	EPL Groundwater Trigger Levels Licence 6269	BH1	BH2	BH3	BH4	BH1-2
				MP1	MP2	MP3	MP12	MP14
				27/09/2023	27/09/2023	27/09/2023	27/09/2023	27/09/2023
Field	Dissolved Oxygen (Filtered)	mg/L		*	6.97	1.82	1.31	0.33
	EC (Field)	µS/cm		*	1510	1840	1810	1460
	pH (Field)	pH_Units		*	6.60	6.10	6.20	5.70
	PID (Top of Well)	ppm		*	<1	<1	<1	<1
	Temp	°C		*	19.07	25.67	29.32	20.83
Ion Balance	Magnesium (Filtered)	mg/L		*	15	35	27	17
Miscellaneous Inorganics	Ammonia as N	mg/L	0.9	*	0.086	0.10	0.13	0.044
	Nitrate (as N)	mg/L	0.7	*	<0.005	0.008	<0.005	<0.005

Notes

Only EPL Trigger Levels exceedances highlighted

* Location not sampled due to obstruction

Table F2 - Field and Laboratory Results for Surface water - September 2023 - Q1

Analytes	Units	ANZECC 2000 FW 95%	EPL Groundwater Trigger Levels Licence 6269	S4	S5	S6	S7	L8	
				MP4	MP5	MP6	MP7	MP8	
				27/09/2023	27/09/2023	27/09/2023	27/09/2023	27/09/2023	
Field	Dissolved Oxygen (Filtered)	mg/L		12.057	*	2.63	*	*	0.66
	EC (field)	µS/cm		1065	*	2630	*	*	660
	pH (Field)	pH_Units		6.5 - 8.0	*	6.6	*	*	8.4
	Temp	°C			*	15.09	*	*	23.3
HM in water - dissolved	Iron (Filtered)	mg/L		1.84	*	0.15	*	*	7.9
	Manganese (Filtered)	mg/L	1.9	1.9	*	0.15	*	*	0.59
HM in water - total	Iron	mg/L		1.84	*	1.4	*	*	9.4
	Manganese	mg/L	1.9	1.9	*	0.17	*	*	0.63
Ion Balance	Alkalinity (Carbonate)	mg/L			*	<5	*	*	<5
	Alkalinity (Hydroxide) as CaCO3	mg/L			*	<5	*	*	<5
	Alkalinity (total) as CaCO3	mg/L		12.283	*	31	*	*	950
	Alkalinity (Bicarbonate as	mg/L			*	31	*	*	950
	Calcium (Filtered)	mg/L		2.05	*	37	*	*	58
	Chloride	mg/L		54.49	*	530	*	*	1300
	Ionic Balance	%			*	-3.0	*	*	-18
	Magnesium (Filtered)	mg/L		10.05	*	23	*	*	33
	Potassium (Filtered)	mg/L		2.282	*	20	*	*	150
	Sodium (Filtered)	mg/L		34	*	290	*	*	650
Miscellaneous Inorganics	Sulphate	mg/L		3.1	*	110	*	*	14
	Ammonia as N	mg/L	0.9	0.9	*	0.15	*	*	97
	Fluoride	mg/L			*	<0.1	*	*	0.2
	Nitrate (as N)	mg/L	0.7	0.7	*	0.04	*	*	<0.050
	TOC	mg/L		33.1	*	24	*	*	190
Total Phenolics	TSS	mg/L		33.415	*	22	*	*	120
	Phenolics Total	mg/L	0.32	0.32	*	<0.05	*	*	<0.05

Notes

Only EPL Trigger Level Exceedances highlighted

CERTIFICATE OF ANALYSIS 334150

Client Details

Client	Douglas Partners Pty Ltd (Port Macquarie)
Attention	Joel Cowan
Address	PO Box 5463, Port Macquarie, NSW, 2444

Sample Details

Your Reference	<u>89781.24, Kempsey</u>
Number of Samples	8 Water
Date samples received	28/09/2023
Date completed instructions received	28/09/2023

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
 Samples were analysed as received from the client. Results relate specifically to the samples as received.
 Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

Report Details

Date results requested by	06/10/2023
Date of Issue	06/10/2023
NATA Accreditation Number 2901. This document shall not be reproduced except in full.	
Accredited for compliance with ISO/IEC 17025 - Testing. Tests not covered by NATA are denoted with *	

Results Approved By

Diego Bigolin, Inorganics Supervisor
 Loren Bardwell, Development Chemist
 Priya Samarawickrama, Senior Chemist

Authorised By

Nancy Zhang, Laboratory Manager

Total Phenolics in Water				
Our Reference		334150-5	334150-6	334150-7
Your Reference	UNITS	S5	L8	D1-27/9
Date Sampled		27/09/2023	27/09/2023	27/09/2023
Type of sample		Water	Water	Water
Date extracted	-	29/09/2023	29/09/2023	29/09/2023
Date analysed	-	29/09/2023	29/09/2023	29/09/2023
Total Phenolics (as Phenol)	mg/L	<0.05	<0.05	<0.05

Miscellaneous Inorganics						
Our Reference		334150-1	334150-2	334150-3	334150-4	334150-5
Your Reference	UNITS	BH01-2	BH2	BH3	BH4	S5
Date Sampled		27/09/2023	27/09/2023	27/09/2023	27/09/2023	27/09/2023
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	28/09/2023	28/09/2023	28/09/2023	28/09/2023	28/09/2023
Date analysed	-	28/09/2023	28/09/2023	28/09/2023	28/09/2023	28/09/2023
Ammonia as N in water	mg/L	0.044	0.086	0.10	0.13	0.15
Nitrate as N in water	mg/L	<0.005	<0.005	0.008	<0.005	0.04
Fluoride, F	mg/L	[NA]	[NA]	[NA]	[NA]	<0.1
Total Organic Carbon	mg/L	[NA]	[NA]	[NA]	[NA]	24
Total Suspended Solids	mg/L	[NA]	[NA]	[NA]	[NA]	22

Miscellaneous Inorganics				
Our Reference		334150-6	334150-7	334150-8
Your Reference	UNITS	L8	D1-27/9	D2-27/9
Date Sampled		27/09/2023	27/09/2023	27/09/2023
Type of sample		Water	Water	Water
Date prepared	-	28/09/2023	28/09/2023	28/09/2023
Date analysed	-	28/09/2023	28/09/2023	28/09/2023
Ammonia as N in water	mg/L	97	0.16	0.11
Nitrate as N in water	mg/L	<0.050	0.072	0.01
Fluoride, F	mg/L	0.2	<0.1	[NA]
Total Organic Carbon	mg/L	190	25	[NA]
Total Suspended Solids	mg/L	120	22	[NA]

Ion Balance						
Our Reference		334150-1	334150-2	334150-3	334150-4	334150-5
Your Reference	UNITS	BH01-2	BH2	BH3	BH4	S5
Date Sampled		27/09/2023	27/09/2023	27/09/2023	27/09/2023	27/09/2023
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	28/09/2023	28/09/2023	28/09/2023	28/09/2023	28/09/2023
Date analysed	-	28/09/2023	28/09/2023	28/09/2023	28/09/2023	28/09/2023
Calcium - Dissolved	mg/L	[NA]	[NA]	[NA]	[NA]	37
Potassium - Dissolved	mg/L	[NA]	[NA]	[NA]	[NA]	20
Sodium - Dissolved	mg/L	[NA]	[NA]	[NA]	[NA]	290
Magnesium - Dissolved	mg/L	17	15	35	27	23
Hydroxide Alkalinity (OH ⁻) as CaCO ₃	mg/L	[NA]	[NA]	[NA]	[NA]	<5
Bicarbonate Alkalinity as CaCO ₃	mg/L	[NA]	[NA]	[NA]	[NA]	31
Carbonate Alkalinity as CaCO ₃	mg/L	[NA]	[NA]	[NA]	[NA]	<5
Total Alkalinity as CaCO ₃	mg/L	[NA]	[NA]	[NA]	[NA]	31
Sulphate, SO ₄	mg/L	[NA]	[NA]	[NA]	[NA]	110
Chloride, Cl	mg/L	[NA]	[NA]	[NA]	[NA]	530
Ionic Balance	%	[NA]	[NA]	[NA]	[NA]	-3.0

Ion Balance				
Our Reference		334150-6	334150-7	334150-8
Your Reference	UNITS	L8	D1-27/9	D2-27/9
Date Sampled		27/09/2023	27/09/2023	27/09/2023
Type of sample		Water	Water	Water
Date prepared	-	28/09/2023	28/09/2023	28/09/2023
Date analysed	-	28/09/2023	28/09/2023	28/09/2023
Calcium - Dissolved	mg/L	58	37	[NA]
Potassium - Dissolved	mg/L	150	19	[NA]
Sodium - Dissolved	mg/L	650	280	[NA]
Magnesium - Dissolved	mg/L	33	23	35
Hydroxide Alkalinity (OH ⁻) as CaCO ₃	mg/L	<5	<5	[NA]
Bicarbonate Alkalinity as CaCO ₃	mg/L	950	33	[NA]
Carbonate Alkalinity as CaCO ₃	mg/L	<5	<5	[NA]
Total Alkalinity as CaCO ₃	mg/L	950	33	[NA]
Sulphate, SO ₄	mg/L	14	110	[NA]
Chloride, Cl	mg/L	1,300	530	[NA]
Ionic Balance	%	-18	-4.0	[NA]

HM in water - dissolved				
Our Reference		334150-5	334150-6	334150-7
Your Reference	UNITS	S5	L8	D1-27/9
Date Sampled		27/09/2023	27/09/2023	27/09/2023
Type of sample		Water	Water	Water
Date prepared	-	29/09/2023	29/09/2023	29/09/2023
Date analysed	-	29/09/2023	29/09/2023	29/09/2023
Iron-Dissolved	µg/L	150	7,900	160
Manganese-Dissolved	µg/L	150	590	160

HM in water - total				
Our Reference		334150-5	334150-6	334150-7
Your Reference	UNITS	S5	L8	D1-27/9
Date Sampled		27/09/2023	27/09/2023	27/09/2023
Type of sample		Water	Water	Water
Date prepared	-	29/09/2023	29/09/2023	29/09/2023
Date analysed	-	29/09/2023	29/09/2023	29/09/2023
Iron-Total	µg/L	1,400	9,400	1,300
Manganese-Total	µg/L	170	630	170

Method ID	Methodology Summary
Inorg-006	Alkalinity - determined titrimetrically in accordance with APHA latest edition, 2320-B.
Inorg-019	Suspended Solids - determined gravimetrically by filtration of the sample. The samples are dried at 104+/-5°C.
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. Please note for Bromine and Iodine, any forms of these elements that are present are included together in the one result reported for each of these two elements. Salt forms (e.g. FeO, PbO, ZnO) are determined stoichiometrically from the base metal concentration.

Client Reference: 89781.24, Kempsey

QUALITY CONTROL: Total Phenolics in Water					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			29/09/2023	5	29/09/2023	29/09/2023		29/09/2023	[NT]
Date analysed	-			29/09/2023	5	29/09/2023	29/09/2023		29/09/2023	[NT]
Total Phenolics (as Phenol)	mg/L	0.05	Inorg-031	<0.05	5	<0.05	<0.05	0	107	[NT]

Client Reference: 89781.24, Kempsey

QUALITY CONTROL: Miscellaneous Inorganics				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			29/09/2023	1	28/09/2023	28/09/2023		29/09/2023	[NT]
Date analysed	-			29/09/2023	1	28/09/2023	28/09/2023		29/09/2023	[NT]
Ammonia as N in water	mg/L	0.005	Inorg-057	<0.005	1	0.044	0.053	19	112	[NT]
Nitrate as N in water	mg/L	0.005	Inorg-055	<0.005	1	<0.005	<0.005	0	102	[NT]
Fluoride, F	mg/L	0.1	Inorg-026	<0.1	[NT]	[NT]	[NT]	[NT]	103	[NT]
Total Organic Carbon	mg/L	1	Inorg-079	<1	[NT]	[NT]	[NT]	[NT]	95	[NT]
Total Suspended Solids	mg/L	5	Inorg-019	<5	[NT]	[NT]	[NT]	[NT]	93	[NT]

Client Reference: 89781.24, Kempsey

QUALITY CONTROL: Ion Balance					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			28/09/2023	[NT]	[NT]	[NT]	[NT]	28/09/2023	[NT]
Date analysed	-			28/09/2023	[NT]	[NT]	[NT]	[NT]	28/09/2023	[NT]
Calcium - Dissolved	mg/L	0.5	Metals-020	<0.5	[NT]	[NT]	[NT]	[NT]	85	[NT]
Potassium - Dissolved	mg/L	0.5	Metals-020	<0.5	[NT]	[NT]	[NT]	[NT]	80	[NT]
Sodium - Dissolved	mg/L	0.5	Metals-020	<0.5	[NT]	[NT]	[NT]	[NT]	92	[NT]
Magnesium - Dissolved	mg/L	0.5	Metals-020	<0.5	[NT]	[NT]	[NT]	[NT]	81	[NT]
Hydroxide Alkalinity (OH ⁻) as CaCO ₃	mg/L	5	Inorg-006	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Bicarbonate Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Carbonate Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Total Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	[NT]	[NT]	[NT]	[NT]	98	[NT]
Sulphate, SO ₄	mg/L	1	Inorg-081	<1	[NT]	[NT]	[NT]	[NT]	111	[NT]
Chloride, Cl	mg/L	1	Inorg-081	<1	[NT]	[NT]	[NT]	[NT]	114	[NT]

Client Reference: 89781.24, Kempsey

QUALITY CONTROL: HM in water - dissolved				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			29/09/2023	[NT]	[NT]	[NT]	[NT]	29/09/2023	[NT]
Date analysed	-			29/09/2023	[NT]	[NT]	[NT]	[NT]	29/09/2023	[NT]
Iron-Dissolved	µg/L	10	Metals-022	<10	[NT]	[NT]	[NT]	[NT]	97	[NT]
Manganese-Dissolved	µg/L	5	Metals-022	<5	[NT]	[NT]	[NT]	[NT]	95	[NT]

Client Reference: 89781.24, Kempsey

QUALITY CONTROL: HM in water - total					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W6	[NT]
Date prepared	-			29/09/2023	[NT]	[NT]	[NT]	[NT]	29/09/2023	[NT]
Date analysed	-			29/09/2023	[NT]	[NT]	[NT]	[NT]	29/09/2023	[NT]
Iron-Total	µg/L	10	Metals-022	<10	[NT]	[NT]	[NT]	[NT]	101	[NT]
Manganese-Total	µg/L	5	Metals-022	<5	[NT]	[NT]	[NT]	[NT]	100	[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.

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

Measurement Uncertainty estimates are available for most tests upon request.

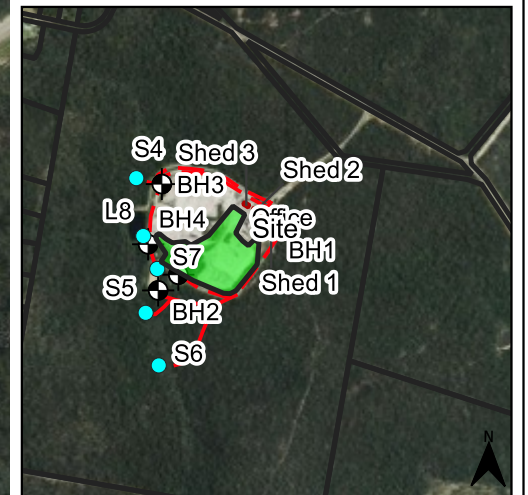
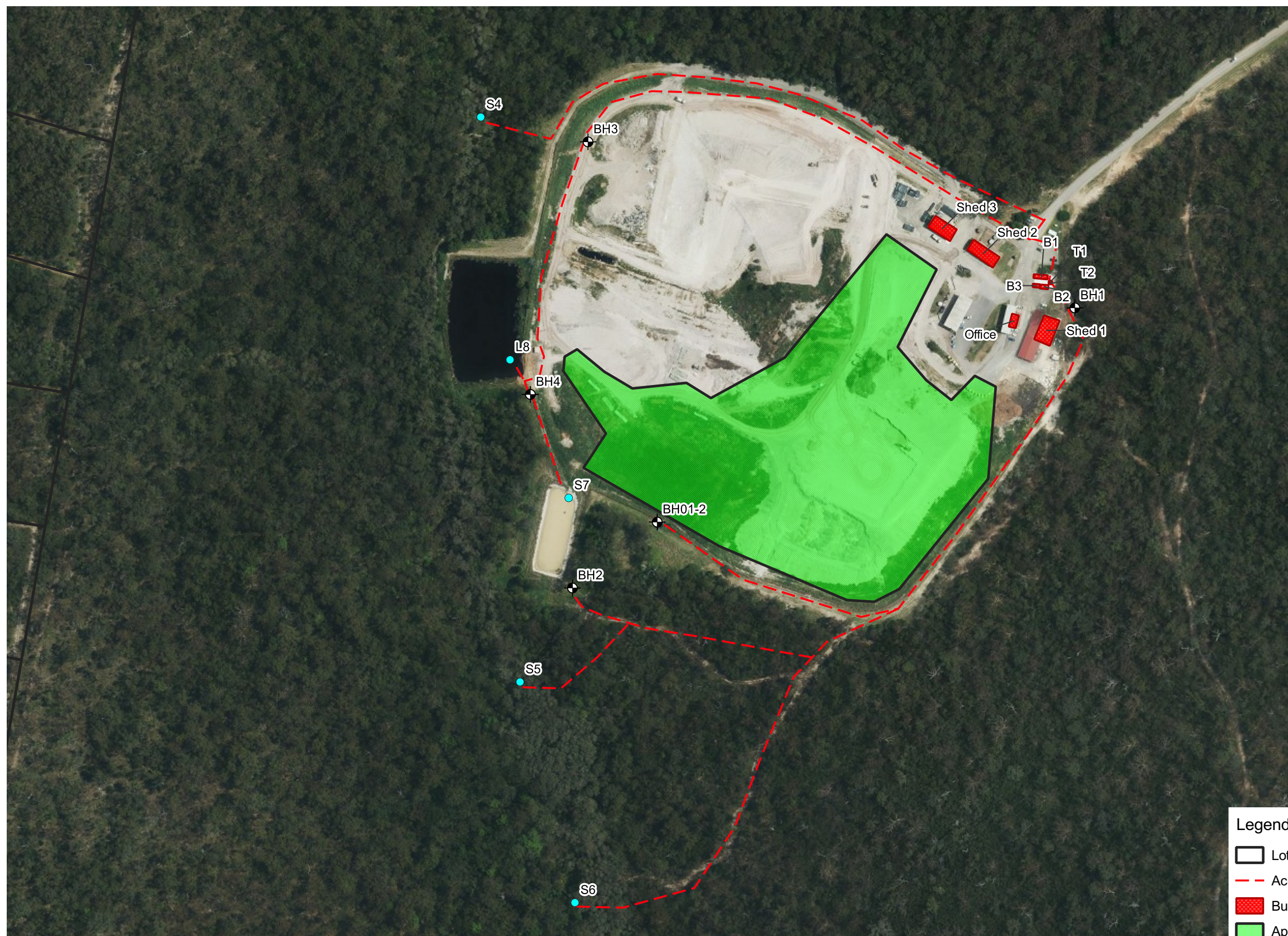
Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical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

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

Report Comments

Nitrate, #6 - PQL raised due to matrix interference

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



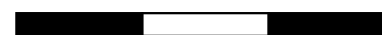
Site Location

Legend

- Lot Boundary
- Access Tracks
- Building Locations Monitored for Gas
- Approximate Area of Surface Gas Monitoring
- Approximate Surface Water Location
- Approximate Well Location

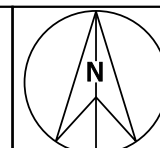
NOTE:
1. Drawing adapted from Metromap Image dated 22.11.2022.

0 50 100 150 m



CLIENT: Kempsey Shire Council
 OFFICE: Port Macquarie DRAWN BY: PLH
 SCALE: 1:3000@A3 DATE: 21.August.2023

TITLE: **Test Location Plan**
Proposed Kempsey Landfill Water and Gas Monitoring
638 Crescent Head Road, Kempsey, NSW



Project: 89781.00
 DRAWING No: 1
 REVISION: 0