Douglas PARTNERS | GROUNDED EXPERTISE

Memorandum

To:	Kempsey Shire Council	Date:	28 Jan 2025
Attention:	Jason Magill	Project No.:	89781.25
Email:	jason.magill@kempsey.nsw.gov.au	Reference:	R.002.Q2 Memo
CC:	Sarah Krebs		
Subject:	2024 - 2025 Groundwater, Surface Water and Gas Monitoring - Q2 638 Crescent Head Road, Kempsey		

1. Introduction

This memo presents the January 2025 (Q2) 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 (KSC).

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 7 January 2025 (Q2) and comprised;

- Assessment of methane gas concentrations within existing buildings and capped landfill areas on 7 January 2025;
- Gas monitoring using landfill gas analyser at pre-existing Wells BH1-02, BH1, BH2, BH3 and BH4 and new monitoring Wells BH15 and BH16 on 7 January 2025.;
- Collection of surface water samples at Locations S4, S5, S6, S7 and L8 on 7 January 2025.

3. Field Work Results

3.1 Discussions with Site Personnel

- It is understood that there has been one discharge event since the previous October 2024 (Q1) monitoring round. It is understood that this event was directly reported to the EPA by KSC;
- It is understood that Cell 4 was opened on the 29 December 2024 and has started receiving waste;
- There has been ongoing perimeter drain works, including the new construction of culverts along the haulage road (northwest); and

- It is understood that there have been some changes to the current monitoring network, including the reinstallation of BH1 and the installation of two new groundwater wells BH15 and BH16 (please note that Douglas was not involved with the location or installation of BH1 or the new groundwater monitoring wells).

3.2 Field Work Observations

The following observations were noted during fieldwork on 7 January 2025;

- It is noted that the site received minimal amount of rainfall in the week prior to monitoring (i.e. 8.6 mm of rainfall was recorded over the seven days prior to monitoring); and
- Construction works on the site's stormwater perimeter drain are ongoing.

3.3 Surface Water

Refer to attached laboratory testing results (370069-[R00]) and summary tables as follows:

- Table F3: Field and Laboratory Results for Surface water– January 2025 – Q2;
- Table A2: Groundwater and Surface water field parameters – Q2 January 2025.

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.

3.4 Gas

The methane walkover was conducted on 7 January 2025 with reference to EPA Environmental Guidelines for Solid Waste Landfills (2016).

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

No new methane exceedances (i.e. at existing or new locations) were found in the current round of monitoring.

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

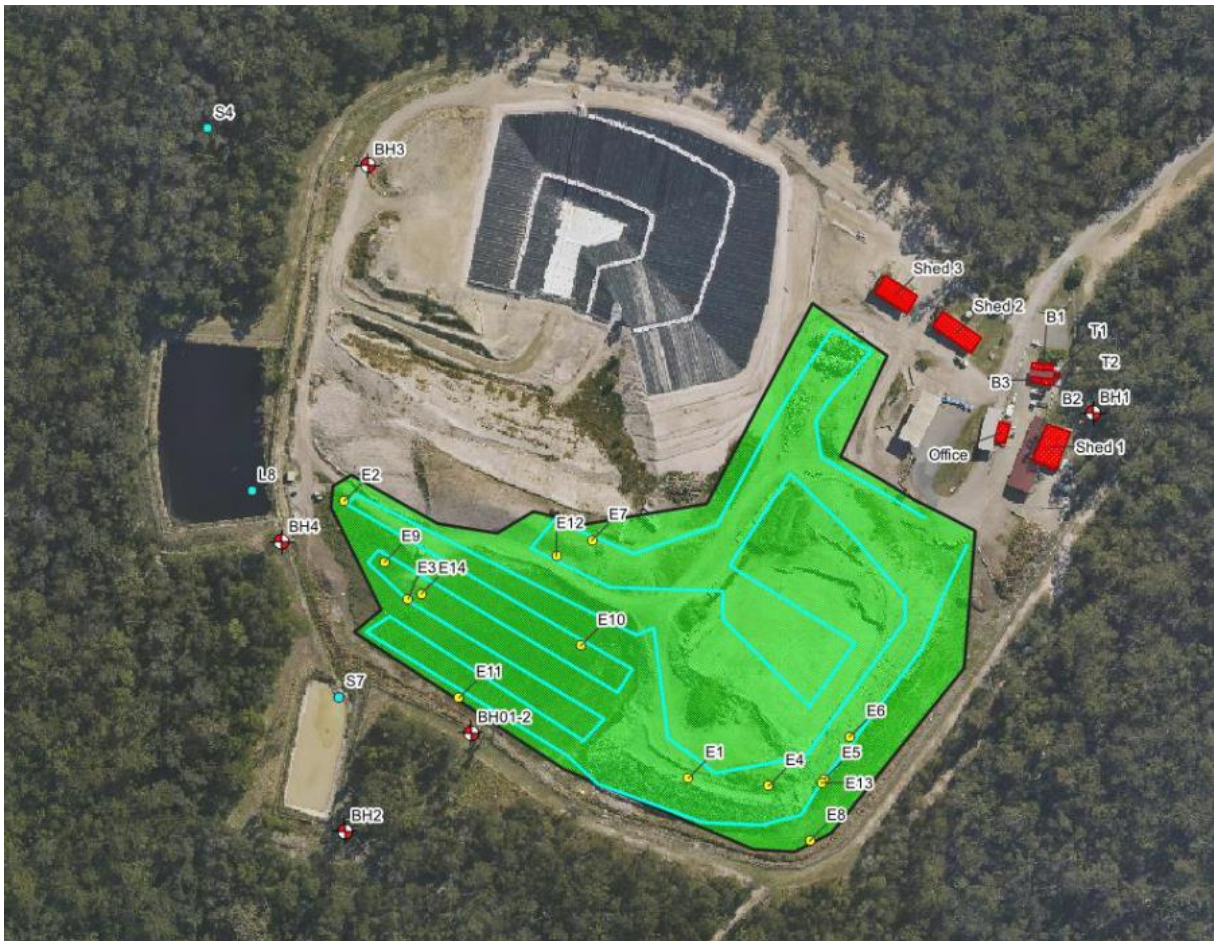

Figure 1: Approximate locations of historical surface methane exceedances shown in yellow, current accessible Q2 surface gas monitoring route shown in blue (7 January 2025)

Historical surface methane monitoring has indicated some elevated results and localised exceedances. Further details will be provided in the annual report.

4. Comments

Any discharges from the site should be conducted in accordance with the landfill EPL requirements.

It is recommended that grassed areas on site are maintained and slashed prior to the next monitoring event in April 2025 to facilitate surface gas monitoring.

It is recommended that access tracks to BH15 and BH16 are maintained to a driveable standard.

Further details will be provided in the annual report.

5. 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.

6. 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.

Douglas Partners Pty Ltd

Reviewed by

Sarah Krebs
Environmental Scientist

Chris Bozinovski
Principal

Attachments:
Table A1 – Gas monitoring results – Q2 January 2025
Table A2 –Surface water field parameters – Q2 January 2025
Table F3 - Field and Laboratory Results for Surface Water – January 2025 – Q2
Laboratory Test Results - (370069-[R00])
Drawing – 89781.00.D.001.Rev0

Table A1: Gas monitoring Results - Q2 January 2024

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	7/01/2025	0	0.7	19.3	3	1	1011	0.2
BH1-2	7/01/2025	0	0.0	20.0	1	1	1015	0.0
BH2	7/01/2025	0	0.0	20.7	2	1	1015	0.1
BH3	7/01/2025	0	0.0	20.8	3	1	1015	0.3
BH4	7/01/2025	0	0.0	20.2	2	2	1014	0.1
BH15	7/01/2025	0	0.1	20.1	1	1	1015	0.1
BH16	7/01/2025	0	0.0	20.7	3	1	1014	0.1

Notes to Table A1:

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

Table A2: Surface Water field parameters - Q2 January 2024

Location ID	Gauging Date	PID	pH	EC (uS/cm)	mV	DO (mg/L)	Temp (°C)	Turbidity (NTU)	Comments
S4	7/01/2025	<1	4.7	152	125	4.78	24.5	39	Clear / pale brown / stagnant
S5	7/01/2025	<1	5.4	337	122	1.35	21.7	6	Clear / pale brown
S6	7/01/2025	<1	4.9	315	-13	1.97	21.9	170	Clear / pale brown
S7	7/01/2025	<1	6.5	354	95	5.21	27.3	5	Clear / pale brown
L8	7/01/2025	<1	7.2	2310	68	2.70	28.9	40	Clear / pale brown

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
H_2S	Hydrogen Sulfide
uS/cm	microsiemens

Table F3: Field and Laboratory Results for Surface water - January 2025 - Q2

				Field ID	S4	S5	S6	S7	L8	D1/7.1.25
				Date	07 Jan 2025	07 Jan 2025	07 Jan 2025	07 Jan 2025	07 Jan 2025	07 Jan 2025
Analyte		Unit	ANZECC 2000 FW 95%	EPL Groundwater Trigger Levels	MP4	MP5	MP6	MP7	MP8	S7 DUPLICATE
Field	Dissolved Oxygen	mg/L		12.057	4.78	1.35	1.97	5.21	2.70	N/A
	EC (Field)	µs/cm		1065	152	337	315	354	2310	N/A
	pH (Field)	pH_Units		6.5 - 8.0	4.7	5.4	4.9	6.5	7.2	N/A
	Temp	°C			24.5	21.7	21.9	27.3	28.9	N/A
HM in water - dissolved	Cadmium (filtered)	mg/L	0.0002	0.0002	<0.0001	<0.0001	<0.0001	N/A	<0.0001	N/A
	Iron (filtered)	mg/L		1.84	0.73	0.27	0.29	0.01	0.09	0.01
	Manganese (filtered)	mg/L	1.900	1.9	0.016	0.065	0.046	0.02	0.17	0.021
HM in water - total	Cadmium	mg/L	0.0002		<0.0001	<0.0001	<0.0001	N/A	<0.0001	N/A
	Iron	mg/L		1.84	2.1	2.6	1.1	0.47	0.54	0.46
	Manganese	mg/L	1.900	1.9	0.039	0.26	0.058	0.033	0.18	0.032
Ion Balance	Chloride	mg/L		54.49	29	56	57	50	470	50
	Sulphate	mg/L		3.1	<1	12	13	22	16	22
	Alkalinity (Hydroxide) as CaCO3	mg/L			<5	<5	<5	<5	<5	<5
	Alkalinity (Carbonate as CaCO3)	mg/L			<5	<5	<5	<5	<5	<5
	Alkalinity (total) as CaCO3	mg/L		12.28	16	53	38	66	420	61
	Alkalinity (Bicarbonate as CaCO3)	mg/L			16	53	38	66	420	61
	Calcium (filtered)	mg/L		2.05	1	12	8.3	19	34	19
	Ionic Balance	%			-1	-2	-2	-5	-3	-3
	Magnesium (filtered)	mg/L		10.05	1	5.2	5	5	20	5
	Potassium (filtered)	mg/L		2.282	3	6.7	5.4	6.6	60	6.5
	Sodium (filtered)	mg/L		34	20	36	37	32	360	32
Miscellaneous Inorganics	Fluoride	mg/L			<0.1	0.1	<0.1	0.1	<0.1	0.1
	Ammonia as N (filtered)	mg/L	0.900	0.9	<0.005	0.012	<0.005	0.015	29	0.009
	Nitrate (as N) (filtered)	mg/L	0.158	0.7	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
	Nitrogen (Total)	mg/L			1	0.7	0.6	N/A	42	N/A
	Total Organic Carbon	mg/L		33.1	30	15	16	9	73	9
	Total Suspended Solids (Lab)	mg/L		33.42	19	100	44	16	47	12
	Total Phosphorus	mg/L			0.09	0.1	0.05	N/A	0.3	N/A
Total Phenolics in Water	Phenolics Total	mg/L		0.32	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
TRH (C10-C40)	>C10-C16 Fraction (F2)	mg/L			<0.05	<0.05	<0.05	N/A	<0.05	N/A
	>C16-C34 Fraction (F3)	mg/L			<0.1	<0.1	<0.1	N/A	<0.1	N/A
	>C34-C40 Fraction (F4)	mg/L			<0.1	<0.1	<0.1	N/A	<0.1	N/A
	>C10-C40 Fraction (Sum)	mg/L			<0.05	<0.05	<0.05	N/A	<0.05	N/A
	C10-C14 Fraction	mg/L			<0.05	<0.05	<0.05	N/A	<0.05	N/A
	C15-C28 Fraction	mg/L			<0.1	<0.1	<0.1	N/A	<0.1	N/A
	C29-C36 Fraction	mg/L			<0.1	<0.1	<0.1	N/A	<0.1	N/A
	C10-C36 Fraction (Sum)	mg/L			<0.05	<0.05	<0.05	N/A	<0.05	N/A
TRH (C6-C9) NEPM	C6-C10 Fraction (F1)	mg/L			<0.01	<0.01	<0.01	N/A	<0.01	N/A
	C6-C9 Fraction	mg/L			<0.01	<0.01	<0.01	N/A	<0.01	N/A

Notes
Only EPL Trigger Level Exceedances highlighted
N/A - testing not required under EPL

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CERTIFICATE OF ANALYSIS 370069

Client Details

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

Sample Details

Your Reference	**89781.25, Kempsey**
Number of Samples	6 Water
Date samples received	08/01/2025
Date completed instructions received	08/01/2025

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	15/01/2025
Date of Issue	15/01/2025

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Results Approved By
Jack Wallis, Senior Chemist
Jenny He, Inorganic Team Leader
Loren Bardwell, Development Chemist
Timothy Toll, Senior Chemist

Authorised By
Nancy Zhang, Laboratory Manager

vTRH in Water (C6-C9) NEPM					
Our Reference	UNITS	370069-1	370069-2	370069-3	370069-5
Your Reference		S4	S5	S6	L8
Date Sampled		07/01/2025	07/01/2025	07/01/2025	07/01/2025
Type of sample		Water	Water	Water	Water
Date extracted	-	09/01/2025	09/01/2025	09/01/2025	09/01/2025
Date analysed	-	09/01/2025	09/01/2025	09/01/2025	09/01/2025
TRH C_6 - C_9	µg/L	<10	<10	<10	<10
TRH C_6 - C_{10}	µg/L	<10	<10	<10	<10
Surrogate Dibromofluoromethane	%	93	93	93	93
Surrogate Toluene-d8	%	98	98	97	97
Surrogate 4-Bromofluorobenzene	%	105	106	106	106

svTRH (C10-C40) in Water					
Our Reference		370069-1	370069-2	370069-3	370069-5
Your Reference	UNITS	S4	S5	S6	L8
Date Sampled		07/01/2025	07/01/2025	07/01/2025	07/01/2025
Type of sample		Water	Water	Water	Water
Date extracted	-	10/01/2025	10/01/2025	10/01/2025	10/01/2025
Date analysed	-	11/01/2025	11/01/2025	11/01/2025	11/01/2025
TRH C_{10} - C_{14}	µg/L	<50	<50	<50	<50
TRH C_{15} - C_{28}	µg/L	<100	<100	<100	<100
TRH C_{29} - C_{36}	µg/L	<100	<100	<100	<100
Total +ve TRH (C10-C36)	µg/L	<50	<50	<50	<50
TRH >C_{10} - C_{16}	µg/L	<50	<50	<50	<50
TRH >C_{16} - C_{34}	µg/L	<100	<100	<100	<100
TRH >C_{34} - C_{40}	µg/L	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	µg/L	<50	<50	<50	<50
Surrogate o-Terphenyl	%	104	118	79	80

HM in water - dissolved						
Our Reference		370069-1	370069-2	370069-3	370069-4	370069-5
Your Reference	UNITS	S4	S5	S6	S7	L8
Date Sampled		07/01/2025	07/01/2025	07/01/2025	07/01/2025	07/01/2025
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	09/01/2025	09/01/2025	09/01/2025	09/01/2025	09/01/2025
Date analysed	-	09/01/2025	09/01/2025	09/01/2025	09/01/2025	09/01/2025
Cadmium-Dissolved	µg/L	<0.1	<0.1	<0.1	[NA]	<0.1
Iron-Dissolved	µg/L	730	270	290	10	90
Manganese-Dissolved	µg/L	16	65	46	20	170

HM in water - dissolved		
Our Reference		370069-6
Your Reference	UNITS	D1/7.1.25
Date Sampled		07/01/2025
Type of sample		Water
Date prepared	-	09/01/2025
Date analysed	-	09/01/2025
Iron-Dissolved	µg/L	10
Manganese-Dissolved	µg/L	21

HM in water - total						
Our Reference		370069-1	370069-2	370069-3	370069-4	370069-5
Your Reference	UNITS	S4	S5	S6	S7	L8
Date Sampled		07/01/2025	07/01/2025	07/01/2025	07/01/2025	07/01/2025
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	09/01/2025	09/01/2025	09/01/2025	09/01/2025	09/01/2025
Date analysed	-	09/01/2025	09/01/2025	09/01/2025	09/01/2025	09/01/2025
Cadmium-Total	µg/L	<0.1	<0.1	<0.1	[NA]	<0.1
Iron-Total	µg/L	2,100	2,600	1,100	470	540
Manganese-Total	µg/L	39	260	58	33	180

HM in water - total		
Our Reference		370069-6
Your Reference	UNITS	D1/7.1.25
Date Sampled		07/01/2025
Type of sample		Water
Date prepared	-	09/01/2025
Date analysed	-	09/01/2025
Iron-Total	µg/L	460
Manganese-Total	µg/L	32

Metals in Waters - Acid extractable					
Our Reference		370069-1	370069-2	370069-3	370069-5
Your Reference	UNITS	S4	S5	S6	L8
Date Sampled		07/01/2025	07/01/2025	07/01/2025	07/01/2025
Type of sample		Water	Water	Water	Water
Date prepared	-	09/01/2025	09/01/2025	09/01/2025	09/01/2025
Date analysed	-	09/01/2025	09/01/2025	09/01/2025	09/01/2025
Phosphorus - Total	mg/L	0.09	0.1	0.05	0.3

Total Phenolics in Water						
Our Reference		370069-1	370069-2	370069-3	370069-4	370069-5
Your Reference	UNITS	S4	S5	S6	S7	L8
Date Sampled		07/01/2025	07/01/2025	07/01/2025	07/01/2025	07/01/2025
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	14/01/2025	14/01/2025	14/01/2025	14/01/2025	14/01/2025
Date analysed	-	14/01/2025	14/01/2025	14/01/2025	14/01/2025	14/01/2025
Total Phenolics (as Phenol)	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05

Total Phenolics in Water		
Our Reference		370069-6
Your Reference	UNITS	D1/7.1.25
Date Sampled		07/01/2025
Type of sample		Water
Date extracted	-	14/01/2025
Date analysed	-	14/01/2025
Total Phenolics (as Phenol)	mg/L	<0.05

Miscellaneous Inorganics						
Our Reference		370069-1	370069-2	370069-3	370069-4	370069-5
Your Reference	UNITS	S4	S5	S6	S7	L8
Date Sampled		07/01/2025	07/01/2025	07/01/2025	07/01/2025	07/01/2025
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	09/01/2025	09/01/2025	09/01/2025	09/01/2025	09/01/2025
Date analysed	-	09/01/2025	09/01/2025	09/01/2025	09/01/2025	09/01/2025
Ammonia as N in water	mg/L	<0.005	0.012	<0.005	0.015	29
Nitrate as N in water	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005
Fluoride, F	mg/L	<0.1	0.1	<0.1	0.1	<0.1
Total Suspended Solids	mg/L	19	100	44	16	47
Total Organic Carbon	mg/L	30	15	16	9	73
Total Nitrogen in water	mg/L	1.0	0.7	0.6	[NA]	42

Miscellaneous Inorganics		
Our Reference		370069-6
Your Reference	UNITS	D1/7.1.25
Date Sampled		07/01/2025
Type of sample		Water
Date prepared	-	09/01/2025
Date analysed	-	09/01/2025
Ammonia as N in water	mg/L	0.009
Nitrate as N in water	mg/L	<0.005
Fluoride, F	mg/L	0.1
Total Suspended Solids	mg/L	12
Total Organic Carbon	mg/L	9

Ion Balance						
Our Reference		370069-1	370069-2	370069-3	370069-4	370069-5
Your Reference	UNITS	S4	S5	S6	S7	L8
Date Sampled		07/01/2025	07/01/2025	07/01/2025	07/01/2025	07/01/2025
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	08/01/2025	08/01/2025	08/01/2025	08/01/2025	08/01/2025
Date analysed	-	08/01/2025	08/01/2025	08/01/2025	08/01/2025	08/01/2025
Calcium - Dissolved	mg/L	1	12	8.3	19	34
Potassium - Dissolved	mg/L	3	6.7	5.4	6.6	60
Sodium - Dissolved	mg/L	20	36	37	32	360
Magnesium - Dissolved	mg/L	1	5.2	5	5	20
Hydroxide Alkalinity (OH^-) as $CaCO_3$	mg/L	<5	<5	<5	<5	<5
Bicarbonate Alkalinity as $CaCO_3$	mg/L	16	53	38	66	420
Carbonate Alkalinity as $CaCO_3$	mg/L	<5	<5	<5	<5	<5
Total Alkalinity as $CaCO_3$	mg/L	16	53	38	66	420
Sulphate, SO4	mg/L	<1	12	13	22	16
Chloride, Cl	mg/L	29	56	57	50	470
Ionic Balance	%	-1.0	-2.0	-2.0	-5.0	-3.0

Ion Balance		
Our Reference		370069-6
Your Reference	UNITS	D1/7.1.25
Date Sampled		07/01/2025
Type of sample		Water
Date prepared	-	08/01/2025
Date analysed	-	08/01/2025
Calcium - Dissolved	mg/L	19
Potassium - Dissolved	mg/L	6.5
Sodium - Dissolved	mg/L	32
Magnesium - Dissolved	mg/L	5
Hydroxide Alkalinity (OH^-) as $CaCO_3$	mg/L	<5
Bicarbonate Alkalinity as $CaCO_3$	mg/L	61
Carbonate Alkalinity as $CaCO_3$	mg/L	<5
Total Alkalinity as $CaCO_3$	mg/L	61
Sulphate, SO4	mg/L	22
Chloride, Cl	mg/L	50
Ionic Balance	%	-3.0

Method ID	Methodology Summary
Inorg-006	Alkalinity - determined titrimetrically in accordance with APHA latest edition, 2320-B.
Inorg-019	Suspended Solids - determined gravimetricially 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-055/062/127	Total Nitrogen - Calculation sum of TKN and oxidised Nitrogen. Alternatively analysed by combustion and chemiluminescence.
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.
Org-020	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
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 in Water (C6-C9) NEPM						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			09/01/2025	[NT]	[NT]	[NT]	[NT]	09/01/2025	[NT]
Date analysed	-			09/01/2025	[NT]	[NT]	[NT]	[NT]	09/01/2025	[NT]
TRH C_6 - C_9	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	88	[NT]
TRH C_6 - C_{10}	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	88	[NT]
Surrogate Dibromofluoromethane	%		Org-023	96	[NT]	[NT]	[NT]	[NT]	94	[NT]
Surrogate Toluene-d8	%		Org-023	99	[NT]	[NT]	[NT]	[NT]	98	[NT]
Surrogate 4-Bromofluorobenzene	%		Org-023	105	[NT]	[NT]	[NT]	[NT]	108	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W4	370069-1
Date extracted	-			10/01/2025	[NT]	[NT]	[NT]	[NT]	10/01/2025	10/01/2025
Date analysed	-			11/01/2025	[NT]	[NT]	[NT]	[NT]	11/01/2025	11/01/2025
TRH C_{10} - C_{14}	µg/L	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	83	75
TRH C_{15} - C_{28}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	77	74
TRH C_{29} - C_{36}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	72	68
TRH >C_{10} - C_{16}	µg/L	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	83	75
TRH >C_{16} - C_{34}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	77	74
TRH >C_{34} - C_{40}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	72	68
Surrogate o-Terphenyl	%		Org-020	125	[NT]	[NT]	[NT]	[NT]	118	104

QUALITY CONTROL: HM in water - dissolved						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W4	370069-4
Date prepared	-			09/01/2025	3	09/01/2025	09/01/2025		09/01/2025	09/01/2025
Date analysed	-			09/01/2025	3	09/01/2025	09/01/2025		09/01/2025	09/01/2025
Cadmium-Dissolved	µg/L	0.1	Metals-022	<0.1	3	<0.1	<0.1	0	108	110
Iron-Dissolved	µg/L	10	Metals-022	<10	3	290	290	0	105	102
Manganese-Dissolved	µg/L	5	Metals-022	<5	3	46	45	2	105	106

QUALITY CONTROL: HM in water - total						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	370069-3
Date prepared	-			09/01/2025	2	09/01/2025	09/01/2025		09/01/2025	09/01/2025
Date analysed	-			09/01/2025	2	09/01/2025	09/01/2025		09/01/2025	09/01/2025
Cadmium-Total	µg/L	0.1	Metals-022	<0.1	2	<0.1	<0.1	0	98	100
Iron-Total	µg/L	10	Metals-022	<10	2	2600	2700	4	97	#
Manganese-Total	µg/L	5	Metals-022	<5	2	260	250	4	90	94

QUALITY CONTROL: Metals in Waters - Acid extractable						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			09/01/2025	2	09/01/2025	09/01/2025		09/01/2025	[NT]
Date analysed	-			09/01/2025	2	09/01/2025	09/01/2025		09/01/2025	[NT]
Phosphorus - Total	mg/L	0.05	Metals-020	<0.05	2	0.1	0.1	0	120	[NT]

QUALITY CONTROL: Total Phenolics in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			14/01/2025	1	14/01/2025	14/01/2025		14/01/2025	[NT]
Date analysed	-			14/01/2025	1	14/01/2025	14/01/2025		14/01/2025	[NT]
Total Phenolics (as Phenol)	mg/L	0.05	Inorg-031	<0.05	1	<0.05	<0.05	0	105	[NT]

QUALITY CONTROL: Miscellaneous Inorganics						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	370069-1
Date prepared	-			09/01/2025	3	09/01/2025	09/01/2025		09/01/2025	09/01/2025
Date analysed	-			09/01/2025	3	09/01/2025	09/01/2025		09/01/2025	09/01/2025
Ammonia as N in water	mg/L	0.005	Inorg-057	<0.005	3	<0.005	[NT]		100	[NT]
Nitrate as N in water	mg/L	0.005	Inorg-055	<0.005	3	<0.005	[NT]		108	[NT]
Fluoride, F	mg/L	0.1	Inorg-026	<0.1	3	<0.1	[NT]		100	93
Total Suspended Solids	mg/L	5	Inorg-019	<5	3	44	45	2	90	[NT]
Total Organic Carbon	mg/L	1	Inorg-079	<1	3	16	16	0	96	[NT]
Total Nitrogen in water	mg/L	0.1	Inorg-055/062/127	<0.1	3	0.6	0.6	0	107	[NT]

QUALITY CONTROL: Miscellaneous Inorganics						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	370069-4
Date prepared	-			[NT]	5	09/01/2025	09/01/2025		[NT]	09/01/2025
Date analysed	-			[NT]	5	09/01/2025	09/01/2025		[NT]	09/01/2025
Ammonia as N in water	mg/L	0.005	Inorg-057	[NT]	5	29	28	4	[NT]	[NT]
Nitrate as N in water	mg/L	0.005	Inorg-055	[NT]	5	<0.005	<0.005	0	[NT]	[NT]
Fluoride, F	mg/L	0.1	Inorg-026	[NT]	5	<0.1	[NT]		[NT]	[NT]
Total Suspended Solids	mg/L	5	Inorg-019	[NT]	5	47	[NT]		[NT]	[NT]
Total Organic Carbon	mg/L	1	Inorg-079	[NT]	5	73	[NT]		[NT]	94
Total Nitrogen in water	mg/L	0.1	Inorg-055/062/127	[NT]	5	42	[NT]		[NT]	[NT]

QUALITY CONTROL: Ion Balance						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	370069-2
Date prepared	-			08/01/2025	1	08/01/2025	08/01/2025		08/01/2025	08/01/2025
Date analysed	-			08/01/2025	1	08/01/2025	08/01/2025		08/01/2025	08/01/2025
Calcium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	1	0.9	11	108	106
Potassium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	3	3	0	106	99
Sodium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	20	20	0	116	98
Magnesium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	1	1	0	108	107
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	16	16	0	[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	16	16	0	113	[NT]
Sulphate, SO4	mg/L	1	Inorg-081	<1	1	<1	[NT]		88	[NT]
Chloride, Cl	mg/L	1	Inorg-081	<1	1	29	[NT]		87	[NT]
Ionic Balance	%		Inorg-040	[NT]	1	-1.0	[NT]		[NT]	[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.

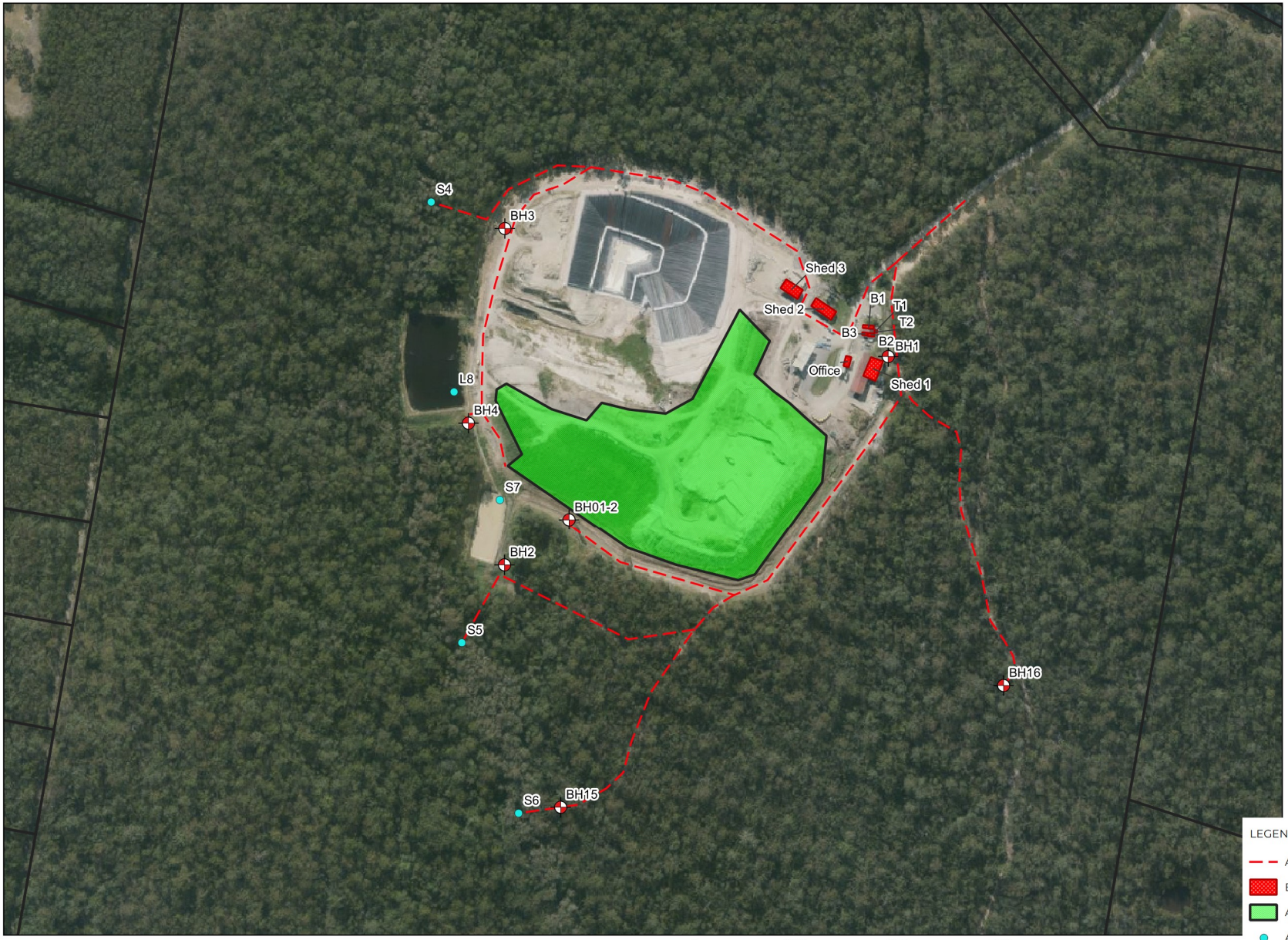
Measurement Uncertainty estimates are available for most tests upon request.

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

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



SITE LOCATION

LEGEND

- Access tracks
- Buildings
- Approximate Area of Surface Gas Monitoring
- Approximate Surface Water Location
- Approximate Well Location

NOTE:
1. Drawing projection in GDA94 / MGA zone 56

Douglas PARTNERS

CLIENT: Kempsey Shire Coucnil		
OFFICE: Newcastle	DRAWN BY: SBK	
SCALE: 1:3810 @A3	DATE: 22.January.2025	

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

N

PROJECT:	89781.25
DRAWING No:	1
REVISION:	0

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