

## Memorandum

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To:	Kempsey Shire Council	Date:	2 Aug 2024
Attention:	Jason Magill	Project No.:	89781.24
Email:	jason.magill@kempsey.nsw.gov.au	Reference:	R.005.Rev0 Q4 July 2024 - Memo
CC:	Sarah Krebs; Chris Bozinovski		
Subject:	Quarterly Monitoring Memo - Q4 July 2024 Kempsey Landfill- Groundwater, Surface water and Gas Monitoring 2023 - 2024 638 Crescent Head Road, Kempsey		

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### 1. Introduction

This memo presents the July 2024 (Q4) 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 1 July 2024 (Q4) and comprised;

- Assessment of methane gas concentrations within existing buildings and capped landfill areas on 1 July 2024;
- Collection of surface water samples at Locations S4, S5, S6 S7 and L8 on 1 July 2024, and
- Gas monitoring using landfill gas analyser at Wells BH1-02, BH1, BH2, BH3 and BH4 on 1 July 2024.

### 3. Field Work Results

#### 3.1 Discussions with Site Personnel

It is understood that there was a discharge event since the previous April 2024 (Q3) monitoring round. It is understood that these events were directly reported to the EPA by KSC.

It is further understood that KSC have undertaken and are undertaking works relating to stormwater and leachate controls on-site, including:

- Decommissioning of the perimeter drain along the southern portion of the landfill formerly containing leachate;
- Additional material placed on Cell 3 stockpile from perimeter drain excavations (drain formerly containing leachate);
- Installation of a new leachate treatment plant near the leachate pond; and
- Commencement of remediation works along the southern boundary of Cell 3, including excavation and repairs to the current Cell 3 cap liner (ie area containing observed leachate seepage).

Refer to Jason Magill (Waste Manager) of KSC for details.

### 3.2 **Surface Water**

Refer to attached laboratory testing results (355417-[R00]) and summary tables as follows:

- Table F6: Field and Laboratory Results for Surface water - July 2024 – Q4;
- Table A2: Surface water field parameters – Q4 July 2024.

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.

### 3.3 **Gas**

The methane walkover was conducted on 1 July 2024 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 groundwater monitoring bores (see results in Table A1 attached).

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

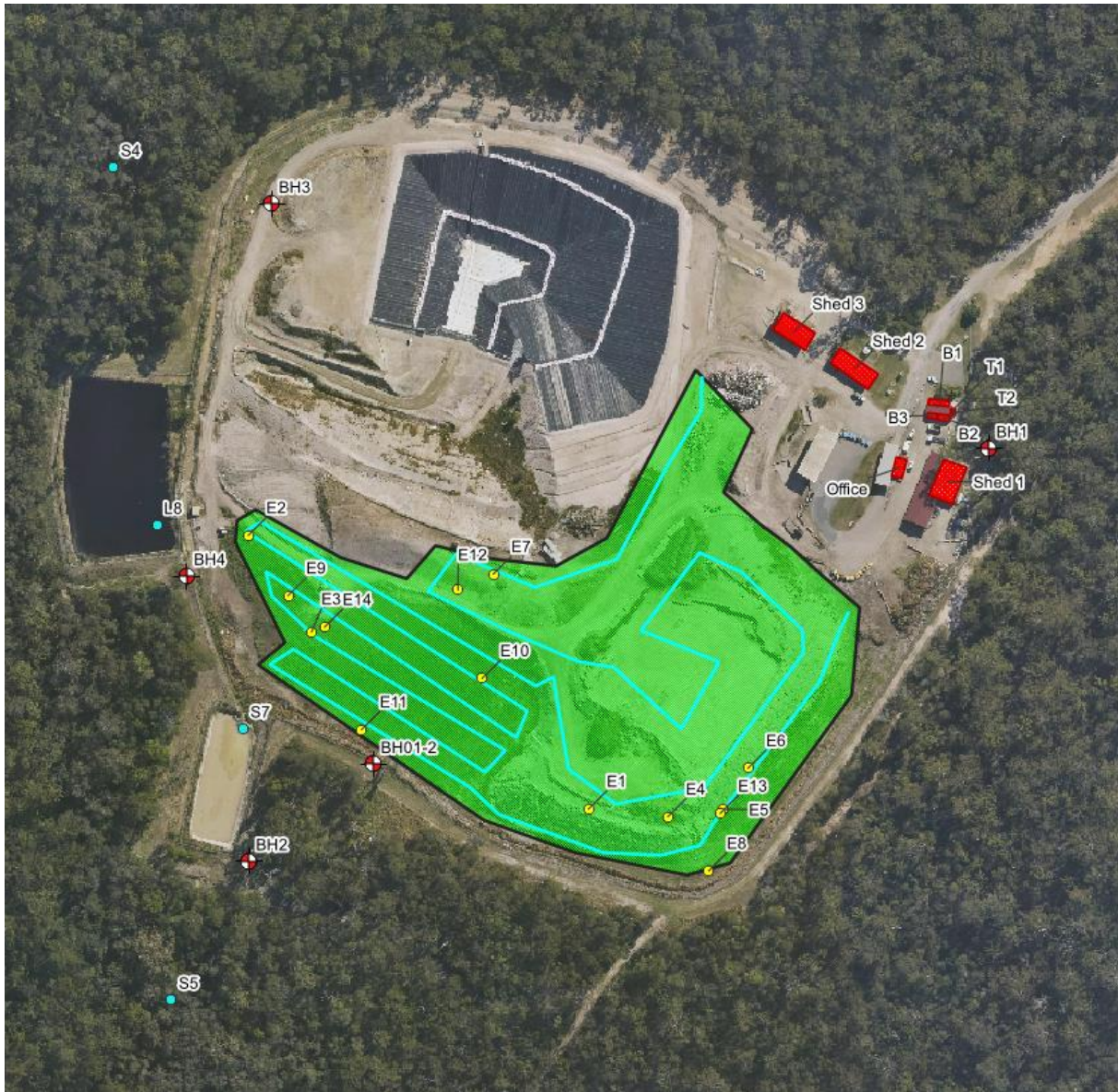
**Table 1: Summary of Surface Methane Monitoring – 1 July 2024 (Q4)**

Location ID	Methane (ppm)	Description of Location
E1	-	Not accessible (under clay stockpile)
E2	20 – 50	Grassed area
E3	15 – 25	Grassed area
E4	-	Not accessible (under clay stockpile)
E5	-	Not accessible (under clay stockpile)
E6	-	Not accessible (under clay stockpile)
E7	2 – 5	Stockpiled area
E8	20 – 40	Edge of capping area
E9	2 – 3	Grassed area
E10	2 – 3	Grassed area
E11	2 – 5	Dead grass, edge of batter
E12	2 – 5	Edge of stockpile on access road
E13	15 - 25	Grassed area
E14	15 – 25	Grassed area

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

No 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 historic methane exceedances**

Historic surface methane monitoring has indicated some elevated results and localised exceedances. Further assessment was recommended to confirm subsurface conditions and capping within areas identified to contain methane exceedance in order to confirm possible capping rehabilitation requirements. Further details will be provided in the annual report.

#### 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.

**Douglas Partners Pty Ltd**



**Sarah Krebs**

Environmental Scientist

Reviewed by



**Chris Bozinovski**

Principal

### Attachments:

Table A1 – Gas monitoring results – Q4 July 2024

Table A2 – Surface water field parameters – Q4 July 2024.

Table F6 – Field and Laboratory Results for Surface Water – July 2024 – Q4

Laboratory Test Results - (355417-[R00])

Drawing – 89781.00.D.001.Rev0

**Table A1: Gas monitoring Results - Q4 July 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	1/07/2024	0	0.0	21.2	1	1	1016	0.1
BH1-2	1/07/2024	0	0.1	20.4	0	1	1020	0.2
BH2	1/07/2024	0	0.1	20.5	0	0	1019	0.1
BH3	1/07/2024	0	0.0	21.0	1	1	1019	0.1
BH4	1/07/2024	0	0.1	20.8	1	1	1019	0.2

Notes to Table A1:

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

**Table A2: Surface water field parameters - Q4 July 2024**

Location ID	Gauging Date	PID	pH	EC (uS/cm)	mV	DO (ppm)	Temp (°C)	Turbidity (NTU)	Comments
S4	1/07/2024	<1	6.1	114	187	3.08	13.1	228	slightly turbid, pale brown
S5	1/07/2024	<1	6.2	446	116	0.92	12.6	69	slightly turbid, pale brown
S6	1/07/2024	<1	5.9	345	96	3.46	13.7	47	slightly turbid, pale brown
S7	1/07/2024	<1	8.1	583	123	1.72	12.8	282	slightly turbid, pale brown
L8	1/07/2024	<1	7.2	3060	121	5.70	15.7	7	slightly turbid, 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<sub>2</sub>S Hydrogen Sulfide  
 uS/cm microsiemens

**Table F6 - Field and Laboratory Results for Surface water - July 2024 - Q4**

Analytes		Units	ANZECC 2000 FW 95%	EPL Groundwater Trigger Levels Licence 6269	S4	S5	S6	S7	L8
					MP4 1/07/2024	MP5 1/07/2024	MP6 1/07/2024	MP7 1/07/2024	MP8 1/07/2024
Field	Dissolved Oxygen (Filtered)	mg/L		12.057	3.08	0.92	3.46	1.72	5.7
	EC (field)	µS/cm		1065	114	446	345	583	3060
	pH (Field)	pH_Units		6.5 - 8.0	6.1	6.2	5.9	8.1	7.2
	Temp	°C			13.06	12.63	13.7	12.75	15.66
HM in water - dissolved	Iron (Filtered)	mg/L		1.84	0.45	0.45	0.81	0.02	0.05
	Manganese (Filtered)	mg/L	1.9	1.9	0.006	0.064	0.028	0.071	0.27
HM in water - total	Iron	mg/L		1.84	0.51	2.8	1.9	3.1	0.4
	Manganese	mg/L	1.9	1.9	0.009	0.079	0.033	0.12	0.4
Ion Balance	Alkalinity (Carbonate)	mg/L			<5	<5	<5	<5	<5
	Alkalinity (Hydroxide) as	mg/L			<5	<5	<5	<5	<5
	Alkalinity (total) as CaCO3	mg/L		12.283	10	30	26	66	480
	Alkalinity (Bicarbonate as	mg/L			10	30	26	66	480
	Calcium (Filtered)	mg/L		2.05	0.5	9.1	5.3	29	27
	Chloride	mg/L		54.49	26	70	54	97	590
	Ionic Balance	%			-11	-12	-12	-6	-10
	Magnesium (Filtered)	mg/L		10.05	1	5.3	4	8.5	20
	Potassium (Filtered)	mg/L		2.282	1	4	3	8.2	76
	Sodium (Filtered)	mg/L		34	14	30	24	47	380
Sulphate	mg/L		3.1	1	17	5	45	15	
Miscellaneous Inorganics	Ammonia as N	mg/L	0.9	0.9	<0.005	0.044	0.011	0.079	51
	Fluoride	mg/L			<0.1	<0.1	<0.1	<0.1	0.1
	Nitrate (as N)	mg/L	0.7	0.7	<0.005	0.054	0.02	0.74	2.3
	TOC	mg/L		33.1	15	13	17	14	72
	TSS	mg/L		33.415	<5	33	14	62	22
Total Phenolics	Phenolics Total	mg/L	0.32	0.32	<0.04	<0.05	<0.05	<0.05	<0.05

Notes

Only EPL Trigger Level Exceedances highlighted



## **CERTIFICATE OF ANALYSIS 355417**

### **Client Details**

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

### **Sample Details**

<b>Your Reference</b>	<b>89781.24, Kempsey</b>
<b>Number of Samples</b>	6 Water
<b>Date samples received</b>	02/07/2024
<b>Date completed instructions received</b>	02/07/2024

### **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**

<b>Date results requested by</b>	09/07/2024
<b>Date of Issue</b>	11/07/2024

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#### **Results Approved By**

Diego Bigolin, Inorganics Supervisor  
Giovanni Agosti, Group Technical Manager  
Jenny He, Senior Chemist  
Nick Sarlamis, Assistant Operation Manager

#### **Authorised By**

Nancy Zhang, Laboratory Manager



Total Phenolics in Water						
Our Reference		355417-1	355417-2	355417-3	355417-4	355417-5
Your Reference	UNITS	S4	S5	S6	S7	L8
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	04/07/2024	04/07/2024	04/07/2024	04/07/2024	04/07/2024
Date analysed	-	04/07/2024	04/07/2024	04/07/2024	04/07/2024	04/07/2024
Total Phenolics (as Phenol)	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05

Total Phenolics in Water		
Our Reference		355417-6
Your Reference	UNITS	D1-1.7.24
Type of sample		Water
Date extracted	-	04/07/2024
Date analysed	-	04/07/2024
Total Phenolics (as Phenol)	mg/L	<0.05

Miscellaneous Inorganics						
Our Reference		355417-1	355417-2	355417-3	355417-4	355417-5
Your Reference	UNITS	S4	S5	S6	S7	L8
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	02/07/2024	02/07/2024	02/07/2024	02/07/2024	02/07/2024
Date analysed	-	02/07/2024	02/07/2024	02/07/2024	02/07/2024	02/07/2024
Ammonia as N in water	mg/L	<0.005	0.044	0.011	0.079	51
Nitrate as N in water	mg/L	<0.005	0.054	0.02	0.74	2.3
Fluoride, F	mg/L	<0.1	<0.1	<0.1	<0.1	0.1
Total Organic Carbon	mg/L	15	13	17	14	72
Total Suspended Solids	mg/L	<5	33	14	62	22

Miscellaneous Inorganics		
Our Reference		355417-6
Your Reference	UNITS	D1-1.7.24
Type of sample		Water
Date prepared	-	02/07/2024
Date analysed	-	02/07/2024
Ammonia as N in water	mg/L	<0.005
Nitrate as N in water	mg/L	<0.005
Fluoride, F	mg/L	<0.1
Total Organic Carbon	mg/L	13
Total Suspended Solids	mg/L	<5

Ion Balance						
Our Reference		355417-1	355417-2	355417-3	355417-4	355417-5
Your Reference	UNITS	S4	S5	S6	S7	L8
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	02/07/2024	02/07/2024	02/07/2024	02/07/2024	02/07/2024
Date analysed	-	02/07/2024	02/07/2024	02/07/2024	02/07/2024	02/07/2024
Calcium - Dissolved	mg/L	0.5	9.1	5.3	29	27
Potassium - Dissolved	mg/L	1	4	3	8.2	76
Sodium - Dissolved	mg/L	14	30	24	47	380
Magnesium - Dissolved	mg/L	1	5.3	4	8.5	20
Hydroxide Alkalinity (OH <sup>-</sup> ) as CaCO <sub>3</sub>	mg/L	<5	<5	<5	<5	<5
Bicarbonate Alkalinity as CaCO <sub>3</sub>	mg/L	10	30	26	66	480
Carbonate Alkalinity as CaCO <sub>3</sub>	mg/L	<5	<5	<5	<5	<5
Total Alkalinity as CaCO <sub>3</sub>	mg/L	10	30	26	66	480
Sulphate, SO <sub>4</sub>	mg/L	1	17	5	45	15
Chloride, Cl	mg/L	26	70	54	97	590
Ionic Balance	%	-11	-12	-12	-6.0	-10

Ion Balance		
Our Reference		355417-6
Your Reference	UNITS	D1-1.7.24
Type of sample		Water
Date prepared	-	02/07/2024
Date analysed	-	02/07/2024
Calcium - Dissolved	mg/L	0.7
Potassium - Dissolved	mg/L	1
Sodium - Dissolved	mg/L	15
Magnesium - Dissolved	mg/L	2
Hydroxide Alkalinity (OH <sup>-</sup> ) as CaCO <sub>3</sub>	mg/L	<5
Bicarbonate Alkalinity as CaCO <sub>3</sub>	mg/L	10
Carbonate Alkalinity as CaCO <sub>3</sub>	mg/L	<5
Total Alkalinity as CaCO <sub>3</sub>	mg/L	10
Sulphate, SO <sub>4</sub>	mg/L	<1
Chloride, Cl	mg/L	26
Ionic Balance	%	-5.0

HM in water - dissolved						
Our Reference		355417-1	355417-2	355417-3	355417-4	355417-5
Your Reference	UNITS	S4	S5	S6	S7	L8
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	03/07/2024	03/07/2024	03/07/2024	03/07/2024	03/07/2024
Date analysed	-	03/07/2024	03/07/2024	03/07/2024	03/07/2024	03/07/2024
Iron-Dissolved	µg/L	450	450	810	20	50
Manganese-Dissolved	µg/L	6	64	28	71	270

HM in water - dissolved		
Our Reference		355417-6
Your Reference	UNITS	D1-1.7.24
Type of sample		Water
Date prepared	-	03/07/2024
Date analysed	-	03/07/2024
Iron-Dissolved	µg/L	460
Manganese-Dissolved	µg/L	7

HM in water - total						
Our Reference		355417-1	355417-2	355417-3	355417-4	355417-5
Your Reference	UNITS	S4	S5	S6	S7	L8
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	08/07/2024	08/07/2024	08/07/2024	08/07/2024	08/07/2024
Date analysed	-	08/07/2024	08/07/2024	08/07/2024	08/07/2024	08/07/2024
Iron-Total	µg/L	510	2,800	1,900	3,100	400
Manganese-Total	µg/L	9	79	33	120	400

HM in water - total		
Our Reference		355417-6
Your Reference	UNITS	D1-1.7.24
Type of sample		Water
Date prepared	-	08/07/2024
Date analysed	-	08/07/2024
Iron-Total	µg/L	560
Manganese-Total	µg/L	10

Method ID	Methodology Summary
<b>Inorg-006</b>	Alkalinity - determined titrimetrically in accordance with APHA latest edition, 2320-B.
<b>Inorg-019</b>	Suspended Solids - determined gravimetrically by filtration of the sample. The samples are dried at 104+/-5°C.
<b>Inorg-026</b>	Fluoride determined by ion selective electrode (ISE) in accordance with APHA latest edition, 4500-F-C.
<b>Inorg-031</b>	Total Phenolics by segmented flow analyser (in line distillation with colourimetric finish). Solids are extracted in a caustic media prior to analysis.
<b>Inorg-040</b>	The concentrations of the major ions (mg/L) are converted to milliequivalents and summed. The ionic balance should be within +/- 15% ie total anions = total cations +/-15%.
<b>Inorg-055</b>	Nitrate - determined colourimetrically. Waters samples are filtered on receipt prior to analysis. Soils are analysed following a water extraction.
<b>Inorg-057</b>	Ammonia - determined colourimetrically, based on APHA latest edition 4500-NH3 F. Waters samples are filtered on receipt prior to analysis. Soils are analysed following a KCl extraction.
<b>Inorg-079</b>	TOC determined using a TOC analyser using the combustion method. Dissolved requires filtering prior to determination. Analysis using APHA latest edition 5310B.
<b>Inorg-081</b>	Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA latest edition, 4110-B. Waters samples are filtered on receipt prior to analysis. Alternatively determined by colourimetry/turbidity using Discrete Analyser.
<b>Metals-020</b>	Determination of various metals by ICP-AES.
<b>Metals-022</b>	Determination of various metals by ICP-MS.  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	355417-2
Date extracted	-			04/07/2024	1	04/07/2024	04/07/2024		04/07/2024	04/07/2024
Date analysed	-			04/07/2024	1	04/07/2024	04/07/2024		04/07/2024	04/07/2024
Total Phenolics (as Phenol)	mg/L	0.05	Inorg-031	<0.05	1	<0.05	<0.05	0	101	97

Client Reference: 89781.24, Kempsey

QUALITY CONTROL: Miscellaneous Inorganics				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	355417-2
Date prepared	-			02/07/2024	1	02/07/2024	02/07/2024		02/07/2024	02/07/2024
Date analysed	-			02/07/2024	1	02/07/2024	02/07/2024		02/07/2024	02/07/2024
Ammonia as N in water	mg/L	0.005	Inorg-057	<0.005	1	<0.005	<0.005	0	96	93
Nitrate as N in water	mg/L	0.005	Inorg-055	<0.005	1	<0.005	0.006	18	97	91
Fluoride, F	mg/L	0.1	Inorg-026	<0.1	1	<0.1	<0.1	0	96	98
Total Organic Carbon	mg/L	1	Inorg-079	<1	1	15	14	7	98	[NT]
Total Suspended Solids	mg/L	5	Inorg-019	<5	1	<5	[NT]		91	[NT]

QUALITY CONTROL: Miscellaneous Inorganics				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	3	02/07/2024	02/07/2024		[NT]	[NT]
Date analysed	-			[NT]	3	02/07/2024	02/07/2024		[NT]	[NT]
Ammonia as N in water	mg/L	0.005	Inorg-057	[NT]	3	0.011	[NT]		[NT]	[NT]
Nitrate as N in water	mg/L	0.005	Inorg-055	[NT]	3	0.02	[NT]		[NT]	[NT]
Fluoride, F	mg/L	0.1	Inorg-026	[NT]	3	<0.1	[NT]		[NT]	[NT]
Total Organic Carbon	mg/L	1	Inorg-079	[NT]	3	17	[NT]		[NT]	[NT]
Total Suspended Solids	mg/L	5	Inorg-019	[NT]	3	14	13	7	[NT]	[NT]



Client Reference: 89781.24, Kempsey

QUALITY CONTROL: Ion Balance				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	355417-2
Date prepared	-			02/07/2024	1	02/07/2024	02/07/2024		02/07/2024	02/07/2024
Date analysed	-			02/07/2024	1	02/07/2024	02/07/2024		02/07/2024	02/07/2024
Calcium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	0.5	0.5	0	107	107
Potassium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	1	1	0	98	96
Sodium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	14	14	0	91	95
Magnesium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	1	1	0	108	108
Hydroxide Alkalinity (OH <sup>-</sup> ) as CaCO <sub>3</sub>	mg/L	5	Inorg-006	<5	1	<5	<5	0	[NT]	[NT]
Bicarbonate Alkalinity as CaCO <sub>3</sub>	mg/L	5	Inorg-006	<5	1	10	9	11	[NT]	[NT]
Carbonate Alkalinity as CaCO <sub>3</sub>	mg/L	5	Inorg-006	<5	1	<5	<5	0	[NT]	[NT]
Total Alkalinity as CaCO <sub>3</sub>	mg/L	5	Inorg-006	<5	1	10	9	11	112	[NT]
Sulphate, SO <sub>4</sub>	mg/L	1	Inorg-081	<1	1	1	2	67	118	111
Chloride, Cl	mg/L	1	Inorg-081	<1	1	26	26	0	109	#
Ionic Balance	%		Inorg-040	[NT]	1	-11	-12	-9	[NT]	[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-W5	[NT]
Date prepared	-			03/07/2024	[NT]	[NT]	[NT]	[NT]	03/07/2024	[NT]
Date analysed	-			03/07/2024	[NT]	[NT]	[NT]	[NT]	03/07/2024	[NT]
Iron-Dissolved	µg/L	10	Metals-022	<10	[NT]	[NT]	[NT]	[NT]	96	[NT]
Manganese-Dissolved	µg/L	5	Metals-022	<5	[NT]	[NT]	[NT]	[NT]	97	[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-W3	[NT]
Date prepared	-			08/07/2024	1	08/07/2024	08/07/2024		08/07/2024	[NT]
Date analysed	-			08/07/2024	1	08/07/2024	08/07/2024		08/07/2024	[NT]
Iron-Total	µg/L	10	Metals-022	<10	1	510	550	8	99	[NT]
Manganese-Total	µg/L	5	Metals-022	<5	1	9	9	0	98	[NT]

**Result Definitions**

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

## Quality Control Definitions

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

## Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

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

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

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

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

## Report Comments

ION\_BALANCE:

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

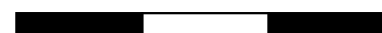


Site Location

Legend

- Approximate Surface Water Location
- ⊕ Approximate Well Location

0 50 100 150 m

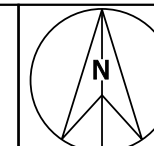


NOTE:  
1. Drawing adapted from Metromap Image dated 20.08.2023.



CLIENT: Kempsey Shire Council	
OFFICE: Port Macquarie	DRAWN BY: PLH
SCALE: 1:3000@A3	DATE: 29.September.2023

TITLE: <b>Test Location Plan</b> <b>Proposed Kempsey Landfill Water and Gas Monitoring</b> <b>638 Crescent Head Road, Kempsey, NSW</b>
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Project:	89781.24
DRAWING No:	1
REVISION:	0