



nhulunbuy corporation

EPL 236 – Annual monitoring report  
2 September 2023 – 1 September 2024  
Gove Peninsula Waste Management Facility  
Nhulunbuy Corporation  
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# 1 EXECUTIVE SUMMARY

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Nhulunbuy Corporation operate the Gove Peninsula Waste Management Facility (GPWMF) located 3km southeast of the town of Nhulunbuy. The facility is operated under Environmental Protection license 236 (EPL236) which requires environmental monitoring of landfill gas, surface water, groundwater and leachate and submission of an annual report to the Northern Territory Environmental Protection Authority (NTEPA) on the anniversary of the license issue date.

EcOz environmental consultants were engaged by Landroc on behalf of Nhulunbuy Corporation to conduct monitoring at the GPWMF as required by EPL 236. This monitoring report covers the period of 2<sup>nd</sup> September 2023 to 1<sup>st</sup> September 2024. Monitoring at the GPWMF is governed by the Gove Peninsula Waste Management Facility – *Leachate, Surface Water, Groundwater and Landfill Gas Monitoring Plan* (WGMP) which stipulates bi-annual monitoring of seven groundwater bores, three leachate bores, two dedicated landfill gas bores and any surface water present on site. In 2024, two additional groundwater bores and three additional leachate bores were drilled on site. These bores were sampled for the first time during the July monitoring event and are included in this report also. This and previous reporting periods included one round of sampling. As requested by the Department, and in full compliance with EPL 236, all future annual returns will include two rounds of sampling (one wet season, one dry season).

The 2023-24 reporting period saw higher than average rainfall in the Nhulunbuy region which resulted in shallower standing water level (SWL) recordings across the sites during July sampling. Physical water parameters measured during July sampling recording results consistent with historic data with no trends visible within groundwater or leachate bores. Variations in EC and TDS can be observed between bores based on their relative location and proximity to the landfill cells with nearby downgradient bores (GW01, GW02, LL01 and LL02) displaying higher values than upgradient bores located further away.

Dissolved metals Zinc and Manganese were the most prevalent metals recorded on site however these results are consistent with historic data presented in table 10 and no increasing trends are visible. All other metals recorded results consistent with historic data with results commonly close to or below the LOR at all sites.

Nutrient concentrations continue to support the expected hydraulic gradient on site with bores to the west of the landfill recording higher values than those to the east. Nutrients concentrations were also consistent with historic data across the site with exception of GW01 which recorded significantly lower ammonia levels than previous years, and GW05 which recorded the highest total nitrogen concentrations across all bores to date. Total nitrogen at GW05 is a significant outlier and may be due to localised contamination within the bore.

Total Petroleum Hydrocarbons, BETXN and Polynuclear Aromatic Hydrocarbons were not recorded in any leachate or groundwater bores across the site during July sampling. This confirms a decreasing trend in localised hydrocarbon contamination around GW01, LL01 and LL02 as these bores have recorded elevated hydrocarbon levels until this year.

No Organophosphate and Organochlorine Pesticides or Polychlorinated Biphenyls were recorded on site during July sampling. This remains consistent with historic data.

Monitoring of dedicated landfill gas bores LG02 and LG02 confirmed the landfills are continuing to produce high levels of methane with a very slight increasing trend visible. Methan does however appear to be contain within the landfill cells with all other bores tested for landfill gas recording little to no methane.

## 2 INTRODUCTION

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The Gove Peninsula Waste Management Facility (GPWMF) is a municipal waste resource recovery and disposal site operated by Nhulunbuy Corporation (NC). EcOz Environmental Consultants (EcOz) were engaged by Landroc on behalf of NC to conduct the annual Leachate, Surface Water, Groundwater and Landfill Gas Monitoring for the at the facility.

The current Environmental Protection Licence (EPL) covering the GPWMF (ie. EPL 236) was issue by the Northern Territory Environmental Protection Authority to Nhulunbuy Corporation of the 2<sup>nd</sup> September 2022 and I valid until 1<sup>st</sup> September 2027.

### 2.1 Purpose and Scope

This monitoring report is required as per EPL236 conditions 49 and 50 as outlined below:

*49. The licensee must complete and provide to the NT EPA a Monitoring Report, as prescribed by this licence, within 10 business days after each anniversary date of this licence.*

*50. The licensee must ensure that each Monitoring Report:*

*50.1 is prepared in accordance with the requirements of the NT EPA 'Guideline for Reporting on Environmental Monitoring'.*

*50.2 includes a tabulation of all monitoring data required as a condition of this licence for 12-month period preceding the anniversary date provided electronically in Microsoft Excel format;*

*50.3 includes long term trend analysis of monitoring data to demonstrate any environmental impact associated with the activity over a minimum period of three years (where the data is available). Data used in this analysis must be provided electronically in Microsoft Excel format; and*

*50.4 includes an assessment of environmental impact from the activity.*

The monitoring report will cover the period starting 2<sup>nd</sup> September 2023 and ending 1<sup>st</sup> September 2024. EcOz environmental Consultants (EcOz) have prepared this report on behalf of Landroc for the Nhulunbuy Corporation.

### 3 SITE CONTEXT

The site is located approximately 3 km southeast of the Nhulunbuy Post Office, approximately 4.3 km by road. The site is situated within the current Mineral Reserve RO238 and is adjacent to the Nhulunbuy Speedway on Melville Bay Road.



Figure 1. Locality plan of Gove Peninsula Waste Management Facility. Image taken from the WGMP.



## 3.1 Site Hydrology and Hydrogeology

### 3.1.1 Hydrology

No surface water was encountered during the 2003 or 2016 site investigations. There are no observed natural incised drainage channels or creeks through the site. Evidence of channelised flow has only been found along roadsides and constructed drainage channels, emanating from table drains from the internal access roads and hardstand areas.

Water flow is expected to occur during the wet season as either sheet flow or subsurface water flow, and due to the lack of erosional features or channels is expected to slow, with high percentage of infiltration. The surface water flow direction has been inferred using recent Digital Surface Mapping (East Cost Environmental 2016) undertaken during the drilling program and baseline groundwater sampling conducted in July 2016. The inferred surface water flow direction is expected to travel in an east to west direction as shown by the direction of surface flows and the DSM is shown in Figure 2.

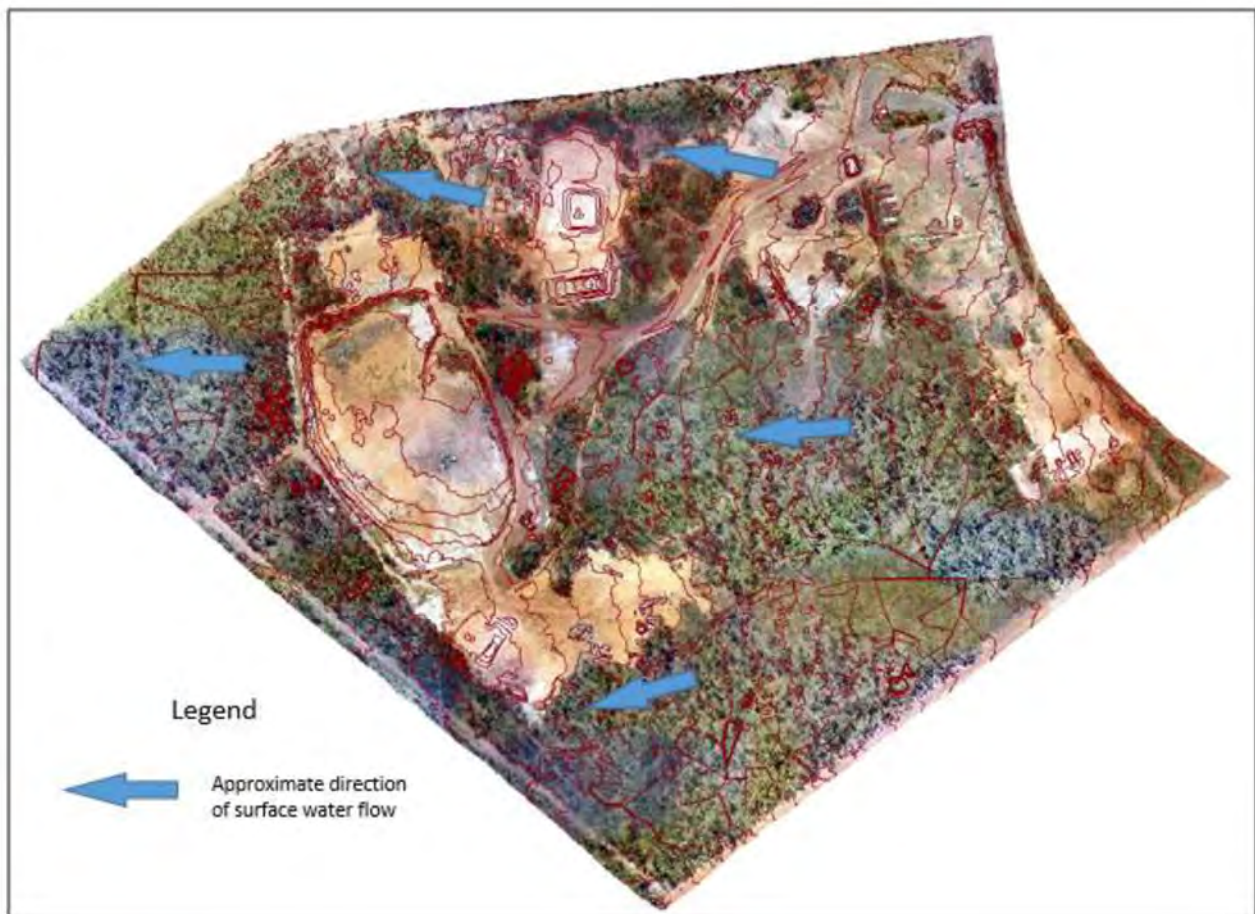


Figure 2. Inferred direction of surface flows and DSM at Gove Peninsula Waste Management Facility

### 3.1.2 Groundwater and Hydrogeology

Groundwater was encountered at boreholes deeper than 6m below ground level during the 2003 drilling program. The groundwater depth was identified by the “balling” of returned cuttings during the drilling program, as the standing water level was only recorded in one borehole during the program. Therefore, a piezometric surface could not be determined across the site.

### 3.2 Weather and Climate

#### 3.2.1 Northern Territory Wet Season (October to April 2023-2024)

The 2023-24 wet season mean seasonal maximum temperatures were above, to very much above averages for the Top End and Southern NT regions, whilst parts of the Tanami and Barkley districts recorded below average temperatures. Territory-wide, the mean maximum temperature for the season was 0.23 °C above the 1961–1990 average. Mean seasonal minimum temperatures were above to very much above average for the north and south of the NT and the highest on record for the Tiwi Islands and parts of the Daly and Arnhem districts. Territory-wide, the mean minimum temperature for the season was 0.57 °C above the 1961–1990 average.

The wet season 2023–2024 rainfall was above, to very much above average for most of the NT. Parts of the Gregory and Barkly districts recorded their highest wet season rainfall on record. Territory-wide the 2023-24 wet season was 57% above the 1961-1990 average, and was the sixth highest on record, and the wettest since 2011.

#### 3.2.2 Nhulunbuy

The 2023-24 wet season (October-April) saw Gove Airport receive 1534mm of rainfall, recorded at the new Gove Airport Bureau of Meteorology (BOM) Station # 14412. This was 18% higher than the long-term annual average for this period, which was taken at the old Gove Airport Met Office (Station #14508) of 1290.6mm. The highest total for a single day was 162.8mm recorded on 20<sup>th</sup> April 2024.

The 2023 calendar year saw 1666.1mm at the old Gove Airport Met office up until 20<sup>th</sup> August 2023 and the new Gove Airport station from 21<sup>st</sup> August onward. This is 15% higher than the long term yearly average of 1444.7mm. 1505mm of Rainfall has been recorded at the Gove Airport in 2024 to date.

The recent climate averages for Gove Airport are shown in Table 1, below, and the rainfall for 2023 and 2024 to date are included in Figures 3 and 4.

**Table 1. Climate Averages for Recent years at Gove Airport**

Years	Maximum temperatures (°C)		Minimum temperatures (°C)		Rainfall (mm)			
	Mean	Diff From Avg.	Mean	Diff from Avg.	Total	Annual Average Total	Rank	Fraction of Average
2019	31.2	+0.4	22.7	+0.1	1373.8	1444.5	Average	95%
2020	31.7	+0.9	23.7	+1.1	933.8	1431.8	V low	65%
2021	31.7	+0.9	23.8	+1.2	1566.0	1435.1	Average	109%
2022	31.6	+0.8	23.8	+1.2	1838.8	1444.7	High	127%
2023	30.9	+0.1	23.2	+0.4	1661.2	1449.6	High	114%
2024 to date	30.7	-0.1	24.3	+1.5	1505			

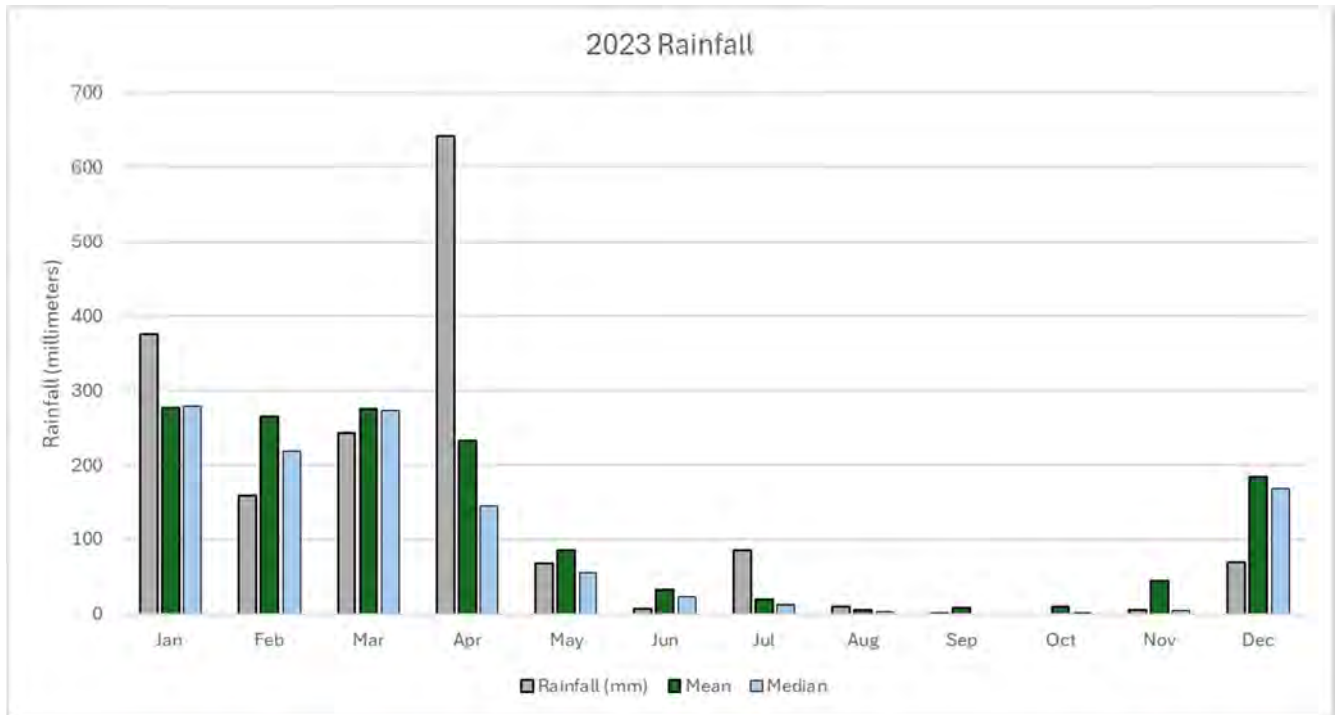


Figure 3. 2023 Rainfall data recorded at BOM weather stations # 14508 and #14412 compared with Historic data collected at Station #14508

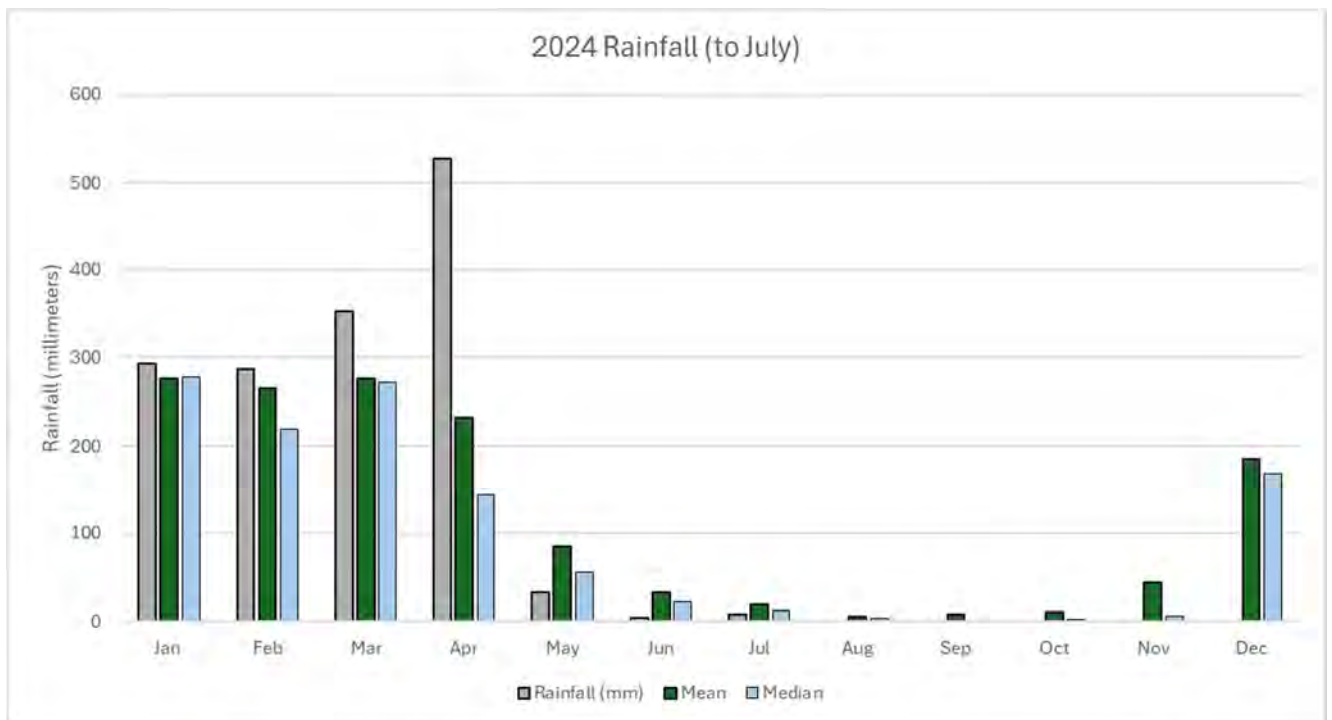


Figure 4. 2023 Rainfall data recorded at BOM weather stations #14508 and #14412 compared with Historic data collected at Station #14508

## 4 SAMPLING SITES AND METHODS

All monitoring conducted in 2024 was in accordance with the standards and operating procedures outlined in the Gove Peninsula Waste Management Facility – *Leachate, Surface Water, Groundwater and Landfill Gas Monitoring Plan*, hereafter referred to as the Water and Gas Monitoring Plan (WGMP), East Cost Environmental 2016. The following section provides the details and methods employed for Leachate, Surface Water, Groundwater and Landfill Gas Monitoring.

This and previous reporting periods included one round of sampling, during time periods in line with previous monitoring surveys. As requested by the Department, and in full compliance with EPL 236, all future annual returns will include two rounds of sampling, within time periods outlined in the WGMP (i.e. one wet season, one dry season), and include all parameters outlined in the WGMP. In addition, the WGMP will be reviewed in detail and updated if required.

Table 2 below provides detail on all Landfill Gas, Leachate and Groundwater monitoring bores on site at the Gove Peninsula Waste Management Facility, whilst Figure 5 shows a map of their respective locations.

All monitoring for the reporting period was undertaken at the correct locations, as approved in the WGMP.

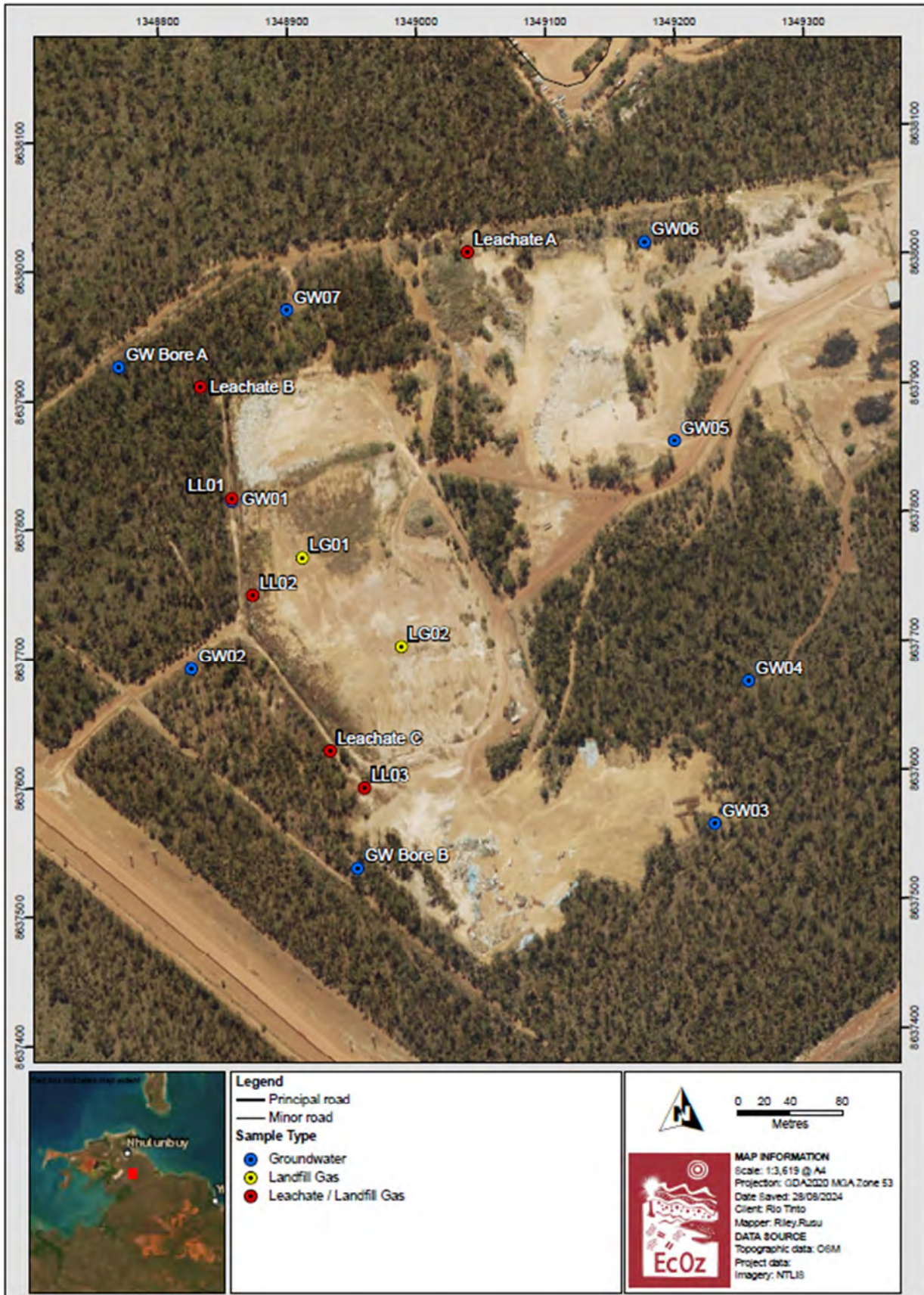
All samples were taken in accordance with *Australian/New Zealand Standard on Water Quality Sampling - Part 1: Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples* (AS/NZS 5667.1:1998), and standard operating procedures outlined in the WGMP.

All sampling was undertaken by suitably qualified senior environmental consultant Andrew Lewis and submitted to NATA accredited laboratory ALS for analysis within recommended holding times.

**Table 2: Details of all leachate, landfill gas and groundwater monitoring bores on site at the Gove Peninsula Waste Management Facility**

Monitoring Bore Name	Monitoring Bore Type	Depth	Notes	Eastings/Northings
LL01	Leachate and Landfill Gas Migration Bore	Approximately 5.5m Below ground surface	Within 10 m of landfill, Ex -cap fitted to existing bore installed in 2003	693842, 8649432
LL02	Leachate and Landfill Gas Migration Bore	Approximately 5.5m Below ground surface	Ex -cap fitted to existing bore installed in 2003	693858, 8649358
LL03	Leachate and Landfill Gas Migration Bore	Approximately 5.5m Below ground surface	Ex -cap fitted to existing bore installed in 2003	693944, 8649210
LG01	Landfill Gas Bore	Approximately 6.0m into landfill waste	Installed 2016 – slotted pipe grouted to surface	693896, 8649386
LG02	Landfill Gas Bore	Approximately 6.0m into landfill waste	Installed 2016 – slotted pipe grouted to surface	693972, 8649318
GW01	Groundwater Monitoring Bore	20.2		693842, 8649430
GW02	Groundwater Monitoring Bore	16.1		693811, 8649301
GW03	Groundwater Monitoring Bore	25.10		694213, 8649183
GW04	Groundwater Monitoring Bore	20.7		694239, 8649292
GW05	Groundwater Monitoring Bore	18.32		694182, 8649477

GW06	Groundwater Monitoring Bore	19.10		694159, 8649629
GW07	Groundwater Monitoring Bore		Pump tubing stuck down bore, could not sample	693884, 8649577
GW Bore A	Groundwater Monitoring Bore	20.4	Installed in 2024, normal capping	693755, 8649533
GW Bore B	Groundwater Monitoring Bore	20.84	Installed in 2024, normal capping	693938, 8649148
Leachate A	Leachate and Landfill Gas Migration Bore	10.2	Installed in 2024, normal capping	694022, 8649621
Leachate B	Leachate and Landfill Gas Migration Bore	11.31	Installed in 2024, normal capping	693817, 864951
Leachate C	Leachate and Landfill Gas Migration Bore	11.21	Installed in 2024, normal capping	693917, 8649238



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Figure 5. Location Leachate, Landfill Gas and Groundwater monitoring bores at the Gove Peninsula Waste Management Facility

## 4.1 Landfill Gas

### 4.1.1 Objective

Monitoring of landfill gas (LFG) is to identify concentrations within the landfill cells and whether any vertical or horizontal LFG migration is occurring at detectable levels. Specific objectives for monitoring include the identification and tracking of baseline conditions of landfill gas over time.

### 4.1.2 Sites and Methodology

Landfill Gas Monitoring was conducted on 31<sup>st</sup> July and 13<sup>th</sup> August at a total of 8 bores including; the 2 dedicated landfill gas monitoring bores in the centre of each landfill cell (LG01 and LG02), the three existing leachate monitoring bores at the base of the cells (LL01, LL02 and LL03) as well as three new leachate monitoring bores installed in 2024 around the boundary of the site (Figure 5).

All bores were fitted with an Ex-Cap Vapour extraction 2" Locking Monitoring Well Expansion Plug, with Air Sampling Ports and analysed using a Landtec GA5000 Portable Landfill Gas Analyser. Ambient air was also analysed for landfill gasses at LG01 and LG02 using the GA5000 as well as a site walkover using a Huber Laser Spectrometer.

Detailed gas composition sampling was undertaken at the two LFG bores (LFG 01 and LFG02) using soil gas canisters as per the WGMP.

## 4.2 Groundwater and Leachate Monitoring

### 4.2.1 Objective

Monitoring of groundwater and leachate is to identify any impact from the landfill on groundwater systems, and if so, the extent of any leachate impact. Specific objectives for monitoring include:

- characterisation of the groundwater regime including pressures, flows and quality;
- identification and tracking of baseline conditions over time;
- characterisation and tracking of effects of the landfill on groundwater;
- characterisation of the interactions of groundwater with surface waters; and
- characterisation of the interactions of leachate components with groundwater, migration pathways.

### 4.2.2 Sites and Methodology

All groundwater and leachate monitoring was carried out on the 30<sup>th</sup> and 31<sup>st</sup> of July 2024. Sampling followed methods outlined in the SOP for bailing bores located Appendix C of the WGMP. Detail for bores sampled can be seen in table 3 and figure 5. Bores were sampled using bailers following collection of standing water levels and purging of 3x the bore volume. Field readings were recorded using a YSI Pro DSS while lab samples were collected into laboratory supplied sample containers and sent to NATA accredited laboratory ALS for analysis of parameters listed in Table 3 below.

There are three existing leachate bores to 6m depth and 3 new leachate bores to 12m all located within very close proximity to the landfill cells. Sampling of these bores is aimed at identifying shallow horizontal migration of leachate from the landfill cells into the surrounding environment. Monitoring occurred at a total of five bores including, two of three existing leachate monitoring bores and all three new leachate monitoring bores drilled in 2024. LL03 was the only leachate bore that was dry and unable to be sampled.

There are seven existing leachate bores to 25m depth and two new leachate bores to 20m. These bores are located away from the immediate vicinity of the landfill cells and aid assessment of broader and more vertical migration of landfill contaminates into the local groundwater aquifer. Groundwater monitoring was conducted at a total of eight bores including 6 of 7 existing bores on site and both new bores drilled in 2024. GW07 was not able to be sampled due to HDPE tubing being stuck down the bore. A single QA/AC sample, Dup 1 was collected at GW06.

**Table 3. Groundwater and Leachate laboratory analysis.**

Laboratory analysis
Total Suspended Solids (TSS)
Nutrients – Ammonia, Nitrate, Nitrite, Total Phosphorus, Reactive Phosphorus
Dissolved Organic Carbon
Chemical Oxygen Demand
Cations and Anions – Calcium, Magnesium, Sodium, Chloride, Potassium, Sulphate, Alkalinity
Dissolved Metals – Aluminium, Arsenic, Cadmium, Chromium, Copper, Lead, Nickel, Zinc, Manganese, Mercury, Selenium, Iron
Hydrocarbons – TRH, BTEXN, PAH
Organochlorine Organophosphate Pesticides and Ploychlorinated Biphenyls (PCBs)

## 4.3 Surface water monitoring

### 4.3.1 Objective

Monitoring of surface water is to identify any impact from the landfill on surface water systems.

### 4.3.2 Sites and Methodology

The site contains only ephemeral water channels and no permanent standing water bodies. During July 2024 monitoring, no surface water was encountered, and no surface water samples were collected.



## 5 RESULTS

The following section outlines the results of the 2024 sampling. All raw laboratory data and documentation is provided in Appendix A.

### 5.1 Landfill Gas

Table 4 and 5 below detail landfill gas results collected in August 2023 and July 2024.

**Table 4. Gas Composition measured August 2023**

Monitoring Bore	CH4 (%)	CO2 (%)	O2 (%)	CO (ppm)	H2S (ppm)	Balance Gases (%)
LL01	0.6	0.5	19.4	1	2	76.3
LL02	0	0.3	19.5	0	2	79.4
LL03	3.1	6.0	13.5	1	2	79.0
LG01	68.6	13.5	0.3	3	3	17.5
LG02	84	37.2	0.1	14	2	0

**Table 5. Gas Composition measure on 30<sup>th</sup> and 31<sup>st</sup> July 2024**

Monitoring Bore	CH4 (%)	CO2 (%)	O2 (%)	CO (ppm)	H2S (ppm)	Balance Gases (%)
LL01	0	5.6	15.3	0	2	80.1
LL02	0	3.8	16.4	0	1	79.8
LL03	1.8	5.1	13.9	1	2	79.2
LG01	55.3	10.7	0.3	8	1	33.7
LG02	72.9	28.7	.4	3	3	0
LG01 laboratory analysed	59.7	10.6	0.73			
LG02 laboratory analysed	75	26.8	<0.26			
LG01 (Ambient)	0	0.2	20.1	0	0	79.7
LG02 (Ambient)	0	0.1	20	0	0	79.9
Leachate A	0	0.2	20.1	0	0	79.7
Leachate B	0	1.3	18.9	0	0	79.8
Leachate C	0.4	4.8	15.1	1	1	79.7

Results show significant levels of Methane within the landfill with LG01 and LG02 recording 55% and 72% respectively. Methane levels in all bores, however, was lower than 2023 concentrations. Minor levels of methane were detected at leachate bores LL03 and newly installed bore leachate C.

LG01, LG02 and LL03 recorded lower CO2 concentrations than the previous year while slightly higher results were seen in LL01 and LL02. Relatively low levels of CO and H2S were detected across all bores with LG01 recording the highest value of CO at 8ppm.

The site walkover using the Huber Intraspecter laser recorded very minor levels of methane, up to 12.7ppm in the ambient atmosphere at -12.212288, 136.782800.

Concentrations of Methane and Carbon Dioxide (CO2) within laboratory analysed soil gas cannisters collected from LG01 and LG02 were consistent with in-situ samples collected using the Landtech GA5000. LG01

recorded 59% Methane and 10.6% C02 while LG02 recorded 75% methane and 26.8% C02. Full laboratory reports can be seen in Appendix A.

## 5.2 Groundwater and Leachate

### 5.2.1 Physical parameters, cations and anions

Table 4 and 5 below show historic standing water levels and physiochemical parameters for all groundwater and leachate bores sampled in July 2024. The standing water level across site was higher than last year at all bores except GW01.

**Table 6. Historic SWLs in meters compared to July 2024**

Bore No.	Surface elevation (monument)	SWL (monument 2016)	SWL (from monument 2020)	SWL (from monument 2021)	SWL (from monument 2022)	SWL (from monument 2023)	SWL (from monument 2024)	Difference between 2016 to 2024
GW01	17.49	7.21	11.72	4.23	5.39	5.09	5.64	+1.57
GW02	17.22	7.53	11.19	5.42	6.39	6.46	6.47	+1.06
GW03	26.53	10.52	13.75	13.33	11.98	10.68	9.63	+0.89
GW04	28.05	11.83	15.08	14.83	14.03	12.18	10.51	+1.31
GW05	25.08	7.7	10.27	5.23	6.19	5.86	5.3	+2.4
GW06	24.07	11.25	10.80	6.59	7.24	6.78	6.32	+4.93
GW07	17.11	8.18	9.39	4.37	5.09	4.96		

**Table 7. Groundwater and leachate physical parameters**

Site ID	Total Depth	SWL	Purged Volume	Field parameters						
				pH	Temp	ORP	EC	TDS	Salinity	Turbidity
Units	m	m	L		°C	mV	µS/cm	mg/L	ppt	NTU
GW01	20.2	5.64	87L	6.17	32.1	274	348	226	0.16	56
GW02	16.1	6.47	56L	5.12	29.9	394	279	181	0.13	83
GW03	25.1	9.63	90L	5.01	29.9	271	1319	857	0.65	79.6
GW04	20.7	10.51	87L	5.55	30	214	196.9	129	0.09	191
GW05	18.32	5.3	69L	4.58	30.9	392	81.4	53	0.04	20
GW06	19.1	6.32	75L	4.97	30.2	387	163	107	0.08	39
GW Bore A	20.4	6.42	82L	5.74	29	298	295	192	0.034	97
GW Bore B	20.84	5.63	89L	6	29.6	123	690	448	0.33	274
LL01	5.6	3.3	13L	6.17	30.9	175	614	399	0.29	28
LL02	6.04	4.21	10L	6.36	30.7	254	1021	663	0.5	582
Leachate A	10.2	4.87	31L	6.02	29.78	127	227	148	0.11	630
Leachate B	11.31	5.22	35L	5.86	29.6	225	476	309	0.23	3592
Leachate C	11.21	5.34	34L	5.59	30	236	345	224	0.16	1572

Figures 6 to 9 below, shows graphs of physical parameters and major cations and anions at all groundwater and leachate bores sampled in July 2024.

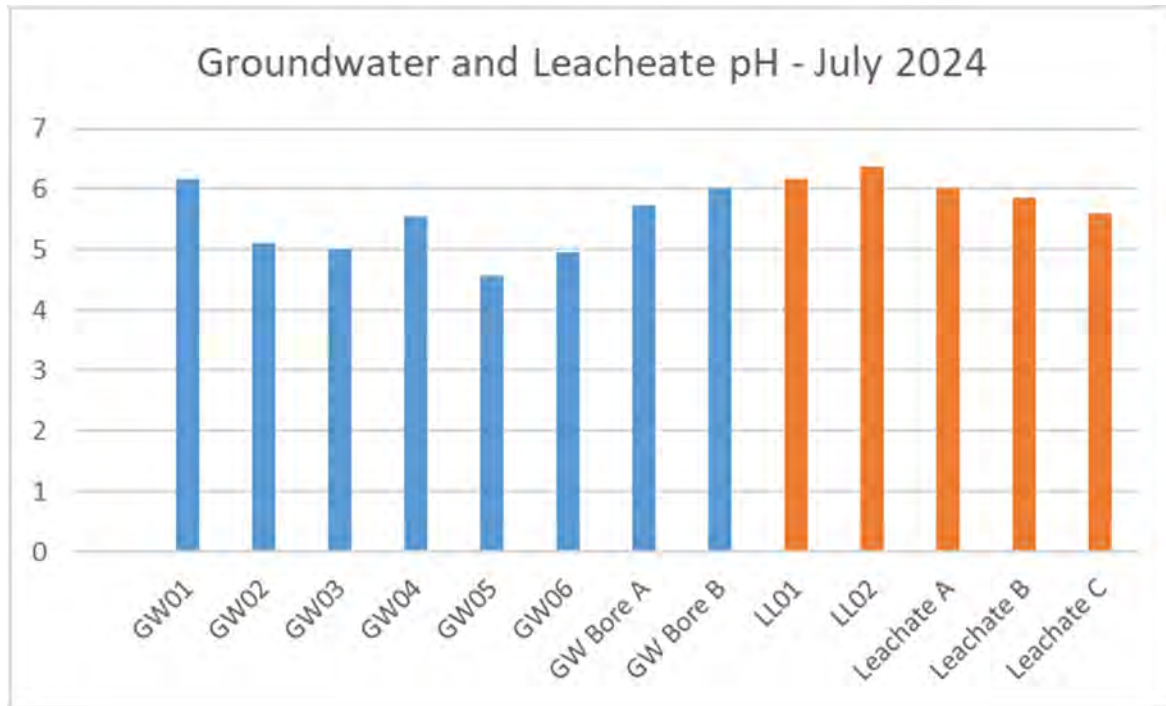


Figure 6. Graphed pH results July 2024

pH levels were consistent across all groundwater and leachate bores on site with leachate bores displaying slightly higher values on average.

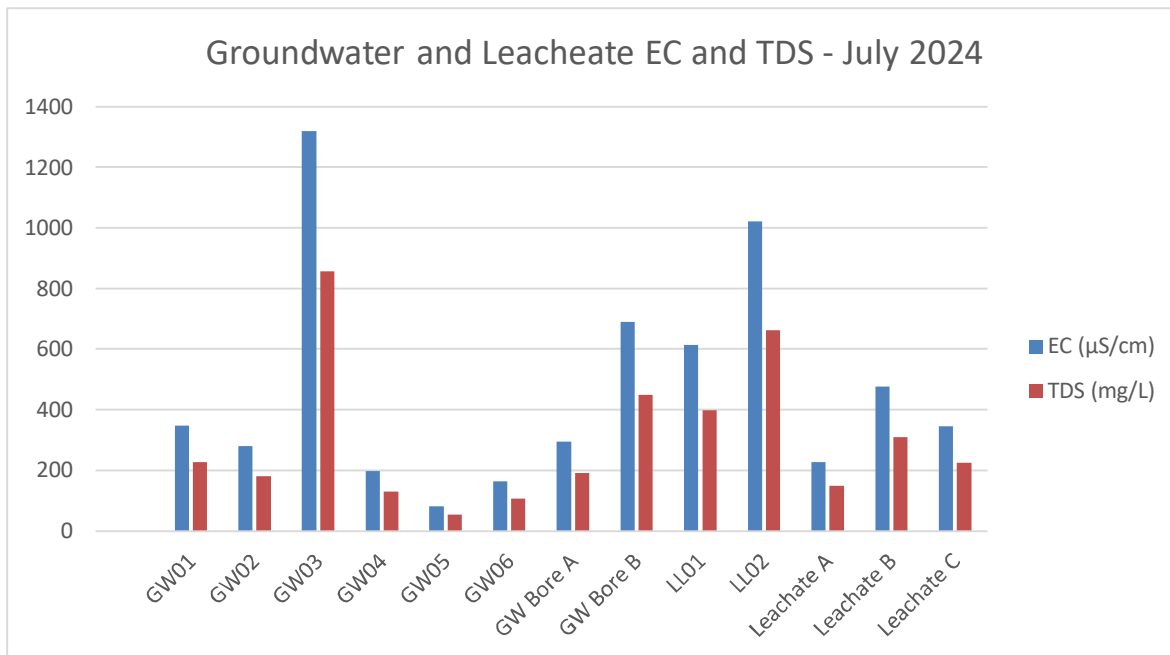


Figure 7. Graphed EC and TDS results July 2024

EC and TDS recorded in Groundwater bores displayed similar results to previous years with GW03 recording the highest value. Newly drilled bore GW Bore B recorded the second highest values. Upgradient bores GW04, 05 and 06 recorded the lowest values. Leachate bores recorded, on average, higher values than GW bores with closest downgradient bores LL01 and LL02 recording the highest values.

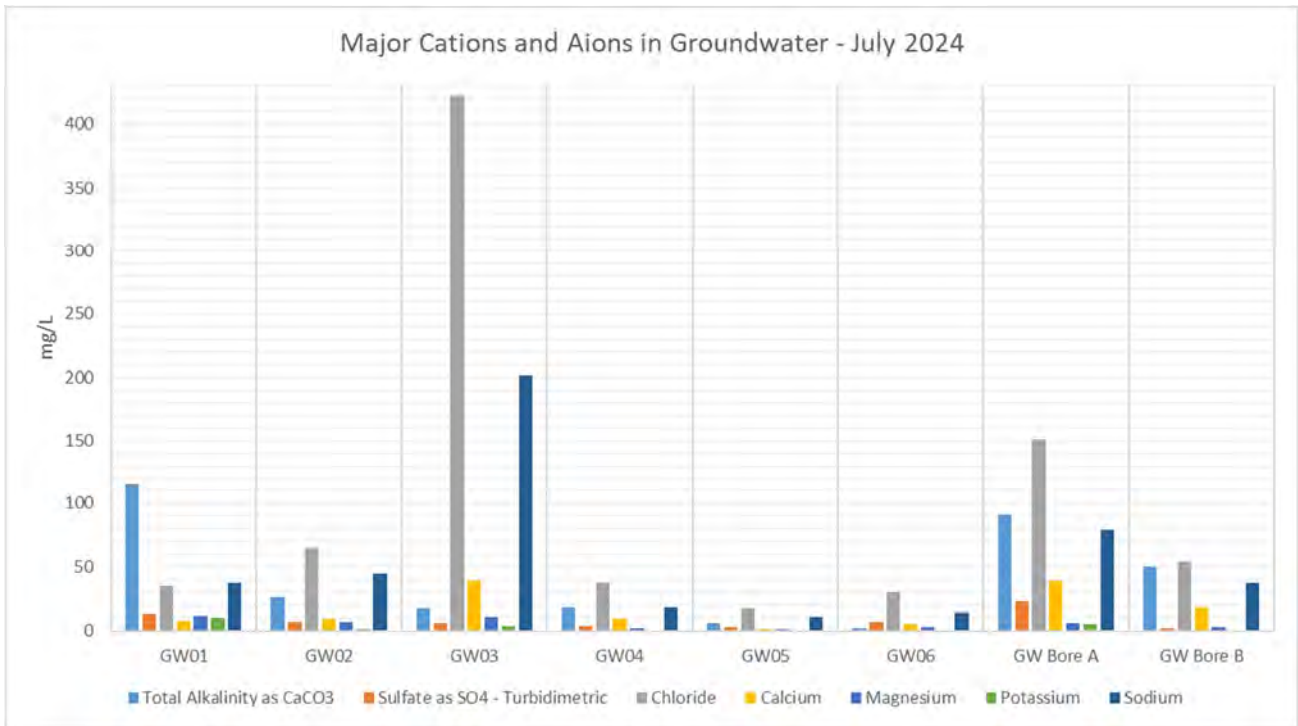


Figure 8. Graph showing cations and anions in Groundwater from July 2024.

Cations and Anions recorded in GW followed trends of EC and TDS with GW03 recording very high levels of chloride and sodium despite being upgradient of the landfill cells. Chloride levels have increased from the previous two years of reporting. New bore GW Bore A also recorded elevated levels of Chloride.

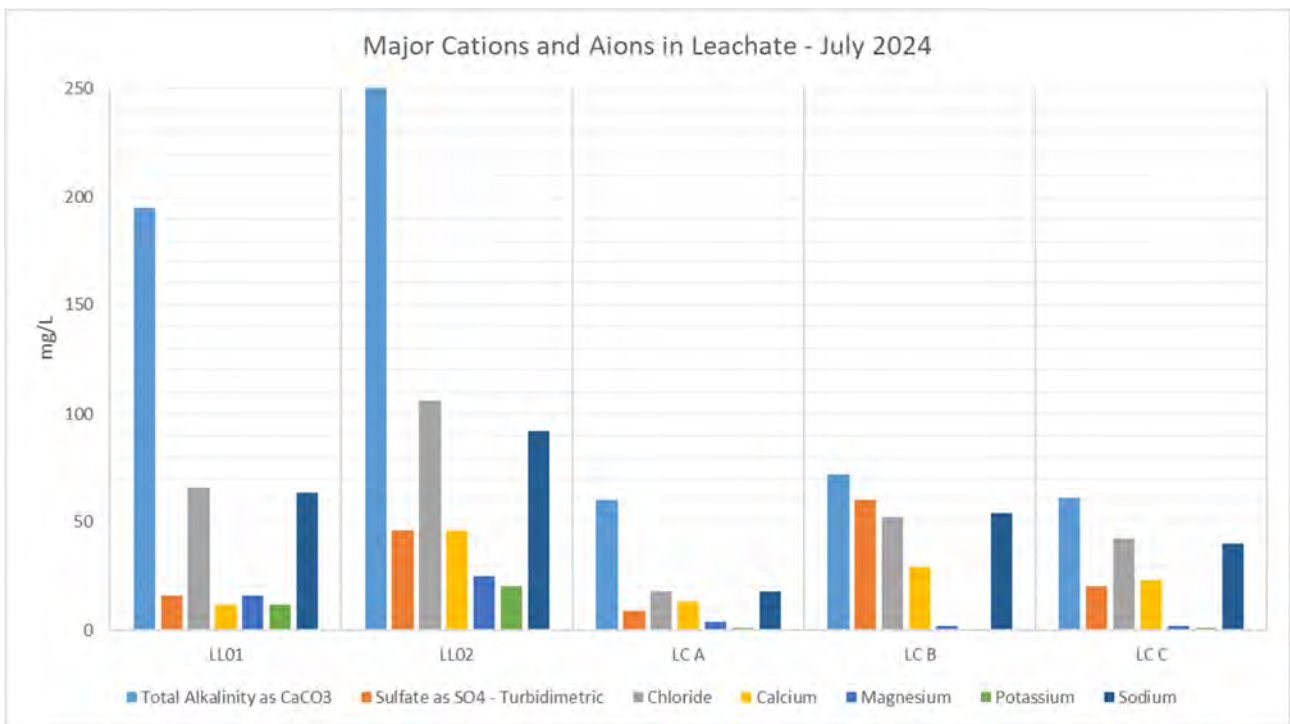


Figure 9. Graph showing cations and anions in leachate from July 2024.

Cations and Anions recorded in leachate also followed trends of EC and TDS with LL01 and LL02 recording the highest Total Alkalinity. Of the newly drilled bores, downgradient sites Leachate B and C recorded higher values than upgradient site Leachate A.

### 5.2.2 Metals

Dissolved metals Aluminium, Copper, Iron, Manganese, Nickel and Zinc were all detected above laboratory limits of reporting. All other metals recorded values below the LOR. Aluminium concentrations at GW02 were slightly elevated at 0.06mg/L. Copper was detected at GW06 however only just above the LOR. All other results are outlined below.

Figures 10 to 13 below show graphs of laboratory analysed dissolved metals where multiple bores recorded values above the LOR. All dissolved metals results can be seen in Table 6 and 7 below while all laboratory reports can be seen in Appendix A.

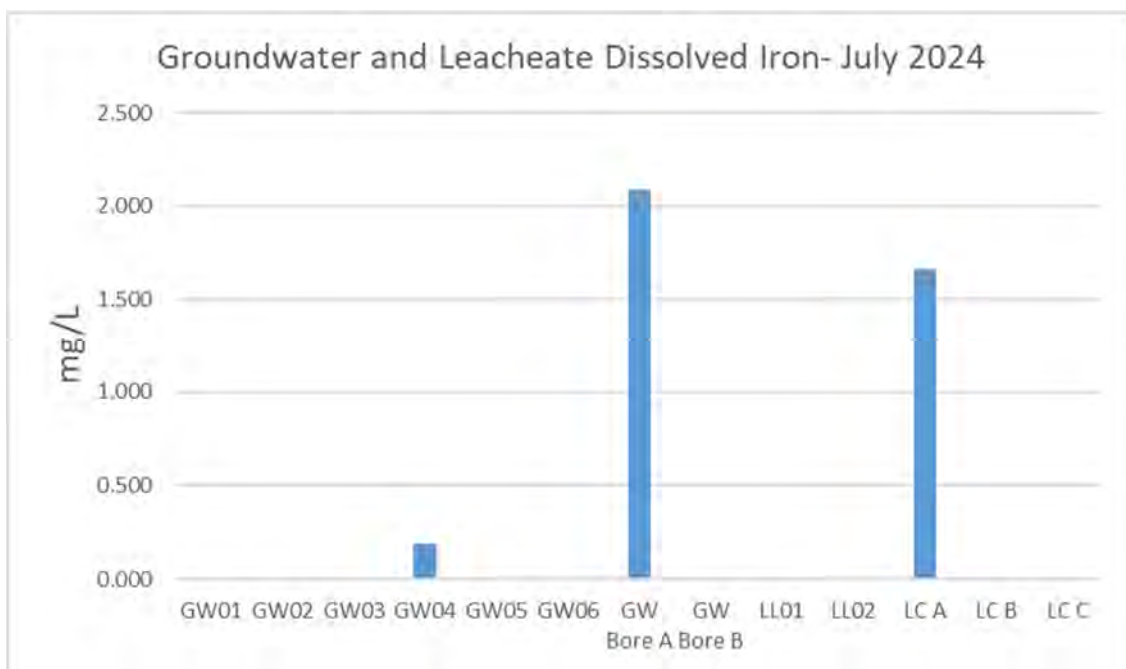


Figure 10. Dissolved Iron July 2024

Dissolved Iron was detected at highest concentrations at new site GW Bore A. Leachate A and GW04 also recorded values above the LOR.

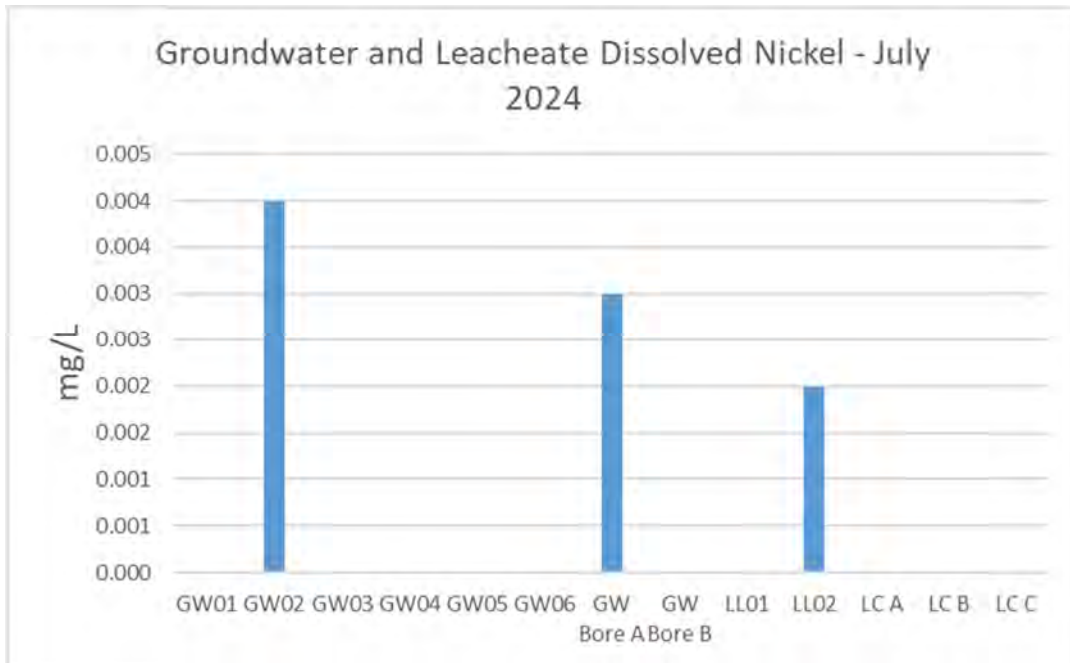


Figure 11. Dissolved Nickel July 2024

GW02 recorded the highest value for Dissolved Nickel with GW Bore A and LL02 also recording values above the LOR.

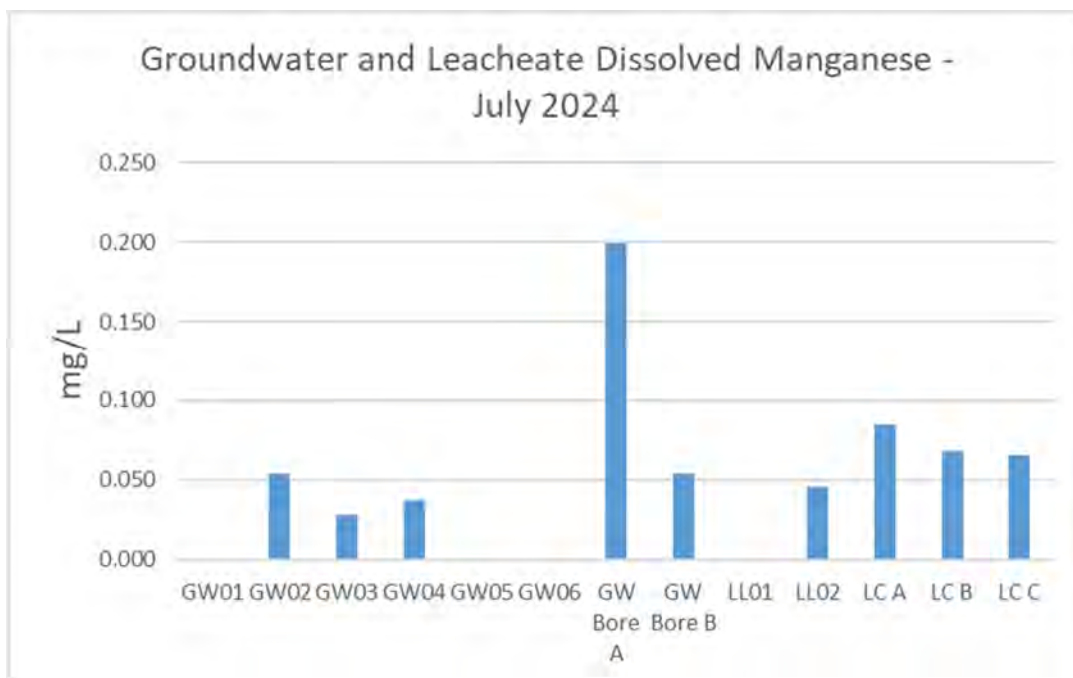
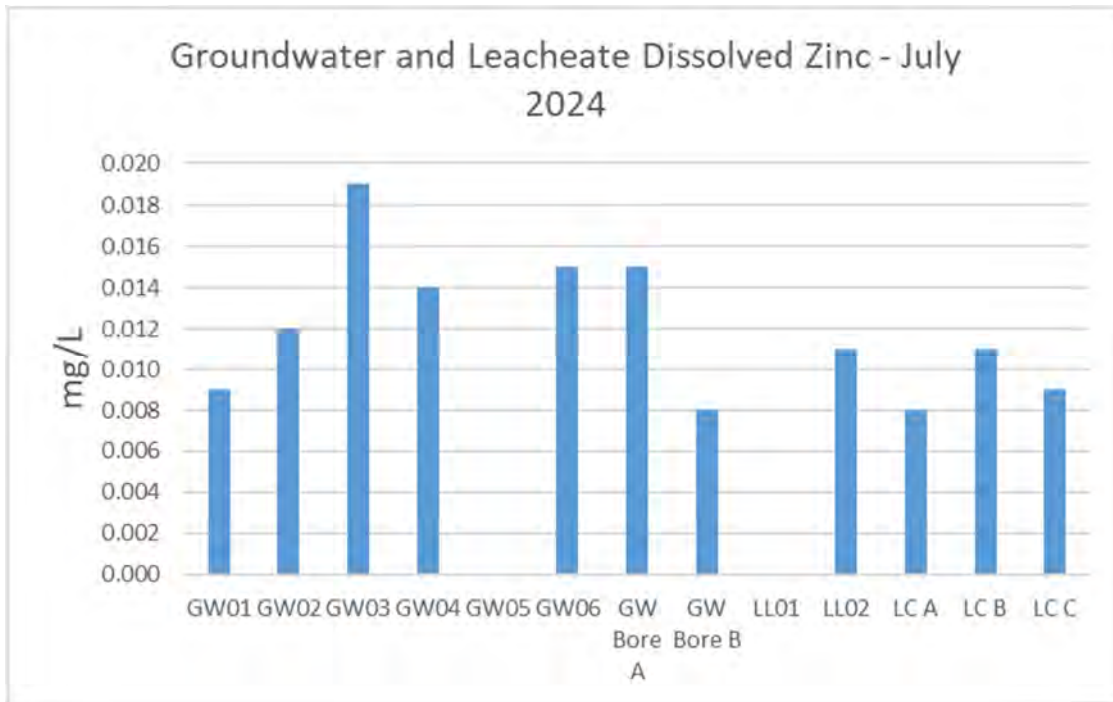


Figure 12. Dissolved Manganese July 2024

Dissolved manganese was recorded above the LOR at all sites except GW05 GW06 and LL01. Concentrations at existing bores GW02, GW03 and GW04 are similar to previous years. GW Bore A recorded the highest concentrations.



**Figure 13. Dissolved Zinc July 2024**

Dissolved Zinc was detected at all bores except for LL01 and GW05. GW03 like previous years recorded the highest concentrations.

**Table 8. Dissolved concentrations (mg/L) in Groundwater bores sampled July 2024**

Sample ID	GW01	GW02	GW03	GW04	GW05	GW06	Dup 1	GW Bore A	GW Bore B
Aluminium	<0.01	0.06	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Arsenic	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	<0.001	<0.001	<0.001
Iron	<0.05	<0.05	<0.05	0.19	<0.05	<0.05	<0.05	2.09	<0.05
Lead	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	0.003	0.054	0.028	0.037	0.003	<0.001	<0.001	0.199	0.054
Nickel	<0.001	0.004	<0.001	<0.001	<0.001	<0.001	<0.001	0.003	<0.001
Selenium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	0.009	0.012	0.019	0.014	<0.005	0.015	0.01	0.015	0.008
Mercury	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

**Table 9. Dissolved concentrations (mg/L) in Leachate bores sampled July 2024**

Sample ID	LL01	LL02	LC A	LC B	LC C
Aluminium	<0.01	<0.01	<0.01	<0.01	<0.01
Arsenic	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	<0.001	0.001	<0.001	<0.001	<0.001
Iron	<0.05	<0.05	1.66	<0.05	<0.05
Lead	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	0.003	0.046	0.085	0.068	0.066
Nickel	<0.001	0.002	<0.001	0.001	0.001
Selenium	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	<0.005	0.011	0.008	0.011	0.009
Mercury	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

\*Results highlighted red denote values above the LOR

### 5.2.3 Nutrients

Elevated ammonia was detected at Groundwater bore GW01 and both Leachate bores LL01 and was LL02. Ammonia at all other sites was very low or close to the LOR.

Total Phosphorus was below or very close to the LOR at all sites with the exception of new leachate bores Leachate B and Leachate C.

Elevated total nitrogen was recorded at groundwater bores GW01, GW Bore B with highest concentrations recorded at GW05 at 39mg/L. Both existing leachate bores recorded very high total nitrogen with the two new downgradient bores Leachate B and C recording higher values than the upgradient site Leachate A.



**Table 10. Nutrients concentrations at all groundwater and leachate bores during July 2024.**

Sample ID	Ammonia as N	Total Nitrogen as N	Total Phosphorus as P
	mg/L	mg/L	mg/L
<b>Groundwater</b>			
GW01	2.54	3.4	0.06
GW02	0.02	0.5	0.02
GW03	0.09	0.3	<0.01
GW04	0.05	0.3	<0.01
GW05	<0.01	39	0.04
GW06	0.02	0.8	<0.01
GW Bore A	0.02	0.3	<0.01
GW Bore B	0.05	2	<0.01
<b>Leachate</b>			
LL01	10.6	12.6	0.02
LL02	11.4	23.3	0.15
LC A	0.55	1.2	<0.05
LC B	0.03	4	1.13
LC C	0.05	4.4	1.03

### 5.2.4 Hydrocarbons

All leachate and groundwater bores recorded values below their respective laboratory limits of reporting for Total Petroleum Hydrocarbons, BETXN and Polynuclear Aromatic Hydrocarbons.

A full set of laboratory results can be seen in Appendix A.

### 5.2.5 Organophosphate and Organochlorine Pesticides and Polychlorinated Biphenyls

All leachate and groundwater bores recorded values below their respective laboratory limits of reporting for Organophosphate and Organochlorine Pesticides and Polychlorinated Biphenyls.



## 6 DISCUSSION AND RECOMMENDATIONS

### 6.1 Landfill Gas

The Landfill Gas results demonstrate that the landfill continues to generate significant percentages of Methane in the closed and capped landfill cells. Methane percentages appear to display a slight increasing trend from initial sampling in 2016 to current results of July 2024. Table 11 below shows methane concentrations from 2016 to present where available. More data is required to confirm these trends.

12.7 PPM methane was detected by the Intraspecter laser when walking over the landfill between LG01 and LG02 indicating some very minor levels of gas seepage from the landfill cell. These levels are not considered dangerous with methane requiring approximately 50,000 ppm for any sort of combustion (NSW EPA 2015).

Concentrations of all other gases appear to fluctuate from year to year and do not appear to be increasing or decreasing.

**Table 12. Historic Landfill Gas concentrations within dedicated landfill gas bores LG01 and LG02**

Site	Date	CH4 (%)	CO2 (%)	O2 (%)	CO (ppm)	H2S (ppm)	Balance Gases (%)
LG01	2016	49	15.8	0	182	7	35.2
	2022	38.4	8.1	5.7	8	1	47.5
	2023	68.6	13.5	0.3	3	3	17.5
	2024	55.3	10.7	0.3	8	1	33.7
LG02	2016	67.4	31.8	0.1	303	29	3.4
	2022	53.2	25	0.9	10	1	21.5
	2023	84	37.2	0.1	14	2	0
	2024	72.9	28.7	0.4	3	3	0

### 6.2 Leachate and Groundwater

Table 11 above provides historic data of key contaminants in existing groundwater bores from 2016 to 2024.

#### *Physical parameters, Major Cations and Anions*

Limited leachate data exists for previous years as the existing bores to 6m are often dry. Standing water levels in groundwater bores across site were slightly higher than last year which led to two of these bores being sampled in July 2024 as well as 3 new leachate bores to 12 m.

pH remained consistent with previous years in existing GW bores with no visible trends. EC, TDS and Cations and Anions remained similar to previous years with downgradient groundwater and leachate bores recording higher values. This is with the exception of GW03 which recorded the highest EC, TDS, Chloride, Alkalinity and Sodium of all bores on site. This is also consistent with previous years, it contradicts the expected hydraulic gradient on site as it is technically upgradient of any contamination. It is possible that this bore has experienced some localised contamination close to the bore. Further investigation would be required to confirm this. Newly drilled GW Bore B, and to a lesser extent, GW Bore A exhibited slightly elevated physical parameters. This is likely due to their downgradient orientation to the landfill cells.

### ***Metals***

Dissolved metals results from all leachate and groundwater bores did not show any concerning increasing trends. Manganese was the most common metal detected in all bores whilst very minor levels of Zinc were also detected at all sites except GW05 and LL01. These concentrations are consistent with previous year's results with the exception of manganese levels in GW03 and GW04 which recorded significantly higher values than previous years.

High concentrations of dissolved Iron were detected at new bores GW Bore A and Leachate A. These bores are in line with the proposed hydraulic gradient and may be within the same geological lithology. Given GW07 has not recorded iron levels this high in previous years these levels could be attributed to the natural lithology and recent drilling of these bores. Further investigation is required to confirm natural levels.

Concentrations of Nickel, Lead and Aluminium in existing bores have all reduced from previous years. Nickel and Aluminium were only recorded above the LOR at GW02, while no lead was detected anywhere. New site GW Bore A and 3 of 5 leachate bores also recorded very low levels on Nickel. No historic data is present for these sites.

No visible increasing trends were observed in historic data across all existing groundwater bores bores.

### ***Nutrients***

High levels of Total Nitrogen and Ammonia were observed at the two existing leachate bores, LL01 and LL02. This is not unexpected as these bores immediately downgradient off the landfill cells. Newly drilled leachate bores Leachate B and C also showed elevated results for these parameters while upgradient bore Leachate A, recorded lower values. This supports the suspected hydraulic gradient on site and suggests potential minor levels of leachate seepage away from the landfill cells.

Groundwater bores GW01 and GW Bore B displayed slightly elevated levels of ammonia and total nitrogen. Again, this is not unexpected as these sites lie directly downgradient of the landfills. Extremely high levels of total nitrogen were recorded at GW05. While this site is in close proximity to the northern landfill cell, nitrogen levels this high have never been recorded and these results may be due to some localised contamination on site.

Nutrient concentrations at site GW02, GW03 and leachate bores LL01 and LL02 do not appear to display any increasing or decreasing trends with significant variation year to year. GW01 recorded significantly lower Ammonia levels than previous years indication a possible decreasing trend in that bore. Bores GW04, GW05, GW06 and GW07 appear to display a minor increasing trend for ammonia and total nitrogen with earlier years results recording values close to or below the LOR and more recent results consistently recording values above the LOR.

### ***Hydrocarbon, BTEX, PCB and Pesticide contamination.***

No Hydrocarbons, Organophosphate and Organochlorine pesticides or Polychlorinated Biphenyls were recorded at any groundwater or leachate sites in 2024. This is an improvement on previous years and indicates 2022 and 2023 recordings of hydrocarbons at GW01 have naturally attenuated and continued contamination of these parameters from the landfill cells into local groundwater is not occurring.

## **6.3 Surface Water**

No surface water samples were taken as outlined in the methodology.

## 6.4 Conclusion

The Landfill Gas sampling results determined that the landfill gas is, for the most part, contained within the landfill cells with only very minor recorded migration from the cells. As such the risks of explosion and other human health or environmental impacts from the site are considered low (NSW EPA 2015).

No surface water was encountered during this round of monitoring.

The Groundwater and leachate monitoring results demonstrate very minor localised impacts from the landfill with higher EC, alkalinity and Total Nitrogen recorded at downgradient bores GW01 and GW02 and leachate bores. These results are not unexpected due to their downgradient orientation and close proximity to the landfill cells. This, supported by low concentrations of dissolved metals results and no hydrocarbons presence, present very low contamination risk to local groundwater sources. Continued monitoring of new groundwater and leachate bores will provide useful data to support current low risk results.

## 7 REFERENCES

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- Standards Australia, New South Wales (1998) *Australian/New Zealand Standard on Water Quality Sampling - Part 1: Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples* (AS/NZS 5667.1:1998)

## APPENDIX A    LABORATORY REPORTS



## CERTIFICATE OF ANALYSIS

**Work Order** : **ES2425172**  
**Client** : **ECOZ ENVIRONMENTAL SERVICES**  
**Contact** : ANDREW LEWIS  
**Address** : Level 1, 70 Cavenagh Street, Darwin  
Darwin 0800  
**Telephone** : +61 08 89811100  
**Project** : EZ24114 - Gove Nhulunbuy Landfill Monitoring  
**Order number** : EZ24114  
**C-O-C number** : ----  
**Sampler** : ANDREW LEWIS  
**Site** : Nhulunbuy Landfill  
**Quote number** : ES24ECOZENV0008  
**No. of samples received** : 4  
**No. of samples analysed** : 4

**Page** : 1 of 9  
**Laboratory** : Environmental Division Sydney  
**Contact** : Andrew Wotherspoon  
**Address** : 277-289 Woodpark Road Smithfield NSW Australia 2164  
**Telephone** : +61-2-8784 8555  
**Date Samples Received** : 01-Aug-2024 13:15  
**Date Analysis Commenced** : 02-Aug-2024  
**Issue Date** : 07-Aug-2024 14:35



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

**Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.**

### Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW





## General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.  
LOR = Limit of reporting  
^ = This result is computed from individual analyte detections at or above the level of reporting  
ø = ALS is not NATA accredited for these tests.  
~ = Indicates an estimated value.

- EP075 (SIM): Where reported, Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a,h)anthracene (1.0), Benzo(g,h,i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.
- EP068: Where reported, Total Chlordane (sum) is the sum of the reported concentrations of cis-Chlordane and trans-Chlordane at or above the LOR.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP075(SIM): Where reported, Total Cresol is the sum of the reported concentrations of 2-Methylphenol and 3- & 4-Methylphenol at or above the LOR.
- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO<sub>2</sub> and Fluoride to the Anions.
- Unless otherwise stated, analytical work for this work order will be conducted at ALS Sydney, NATA accreditation no. 825, site no. 10911.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- ED045G: The presence of Thiocyanate, Thiosulfate and Sulfite can positively contribute to the chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	GW05	GW01	GW02	LL01	----
Sampling date / time				30-Jul-2024 00:00	30-Jul-2024 00:00	30-Jul-2024 00:00	30-Jul-2024 00:00	----	
Compound	CAS Number	LOR	Unit	ES2425172-001	ES2425172-002	ES2425172-003	ES2425172-004	-----	
				Result	Result	Result	Result	----	
<b>EA025: Total Suspended Solids dried at 104 ± 2°C</b>									
Suspended Solids (SS)	----	5	mg/L	<5	20	13	38	----	
<b>ED037P: Alkalinity by PC Titrator</b>									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	----	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	----	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	6	116	26	195	----	
Total Alkalinity as CaCO3	----	1	mg/L	6	116	26	195	----	
<b>ED041G: Sulfate (Turbidimetric) as SO4 2- by DA</b>									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	3	13	7	16	----	
<b>ED045G: Chloride by Discrete Analyser</b>									
Chloride	16887-00-6	1	mg/L	17	35	65	66	----	
<b>ED093F: Dissolved Major Cations</b>									
Calcium	7440-70-2	1	mg/L	1	8	9	12	----	
Magnesium	7439-95-4	1	mg/L	1	12	7	16	----	
Sodium	7440-23-5	1	mg/L	11	37	45	63	----	
Potassium	7440-09-7	1	mg/L	<1	10	1	12	----	
<b>EG020F: Dissolved Metals by ICP-MS</b>									
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.06	<0.01	----	
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	----	
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----	
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----	
Manganese	7439-96-5	0.001	mg/L	0.003	0.003	0.054	0.003	----	
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.004	<0.001	----	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	----	
Zinc	7440-66-6	0.005	mg/L	<0.005	0.009	0.012	<0.005	----	
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	----	



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	GW05	GW01	GW02	LL01	----
Sampling date / time				30-Jul-2024 00:00	30-Jul-2024 00:00	30-Jul-2024 00:00	30-Jul-2024 00:00	----	
Compound	CAS Number	LOR	Unit	ES2425172-001	ES2425172-002	ES2425172-003	ES2425172-004	-----	
				Result	Result	Result	Result	----	
<b>EG035F: Dissolved Mercury by FIMS</b>									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	----	
<b>EK055G: Ammonia as N by Discrete Analyser</b>									
Ammonia as N	7664-41-7	0.01	mg/L	<0.01	2.54	0.02	10.6	----	
<b>EK057G: Nitrite as N by Discrete Analyser</b>									
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.01	<0.01	0.02	----	
<b>EK058G: Nitrate as N by Discrete Analyser</b>									
Nitrate as N	14797-55-8	0.01	mg/L	0.25	0.19	0.16	0.36	----	
<b>EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser</b>									
Nitrite + Nitrate as N	----	0.01	mg/L	0.25	0.20	0.16	0.38	----	
<b>EK061G: Total Kjeldahl Nitrogen By Discrete Analyser</b>									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	38.7	3.2	0.3	12.2	----	
<b>EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser</b>									
Total Nitrogen as N	----	0.1	mg/L	39.0	3.4	0.5	12.6	----	
<b>EK067G: Total Phosphorus as P by Discrete Analyser</b>									
Total Phosphorus as P	----	0.01	mg/L	0.04	0.06	0.02	0.02	----	
<b>EK071G: Reactive Phosphorus as P by discrete analyser</b>									
Reactive Phosphate	14625-44-2	0.10	mg/L	<0.10	<0.10	<0.10	<0.10	----	
<b>EN055: Ionic Balance</b>									
∅ Total Anions	----	0.01	meq/L	0.66	3.58	2.50	6.09	----	
∅ Total Cations	----	0.01	meq/L	----	----	----	5.72	----	
∅ Total Cations	----	0.01	meq/L	0.61	3.25	3.01	----	----	
∅ Ionic Balance	----	0.01	%	----	----	----	3.17	----	
∅ Ionic Balance	----	0.01	%	----	4.74	9.25	----	----	
<b>EP002: Dissolved Organic Carbon (DOC)</b>									
Dissolved Organic Carbon	----	1	mg/L	<1	2	<1	4	----	
<b>EP026SP: Chemical Oxygen Demand (Spectrophotometric)</b>									
Chemical Oxygen Demand	----	10	mg/L	<10	<10	13	13	----	
<b>EP066: Polychlorinated Biphenyls (PCB)</b>									



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	GW05	GW01	GW02	LL01	----
Sampling date / time					30-Jul-2024 00:00	30-Jul-2024 00:00	30-Jul-2024 00:00	30-Jul-2024 00:00	----
Compound	CAS Number	LOR	Unit	ES2425172-001	ES2425172-002	ES2425172-003	ES2425172-004	-----	
				Result	Result	Result	Result	----	
<b>EP066: Polychlorinated Biphenyls (PCB) - Continued</b>									
^ Total Polychlorinated biphenyls ----- 1 µg/L <1 <1 <1 <1 ----									
<b>EP068A: Organochlorine Pesticides (OC)</b>									
alpha-BHC	319-84-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
beta-BHC	319-85-7	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
gamma-BHC - (Lindane)	58-89-9	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
delta-BHC	319-86-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
Heptachlor	76-44-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
Aldrin	309-00-2	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
Heptachlor epoxide	1024-57-3	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
trans-Chlordane	5103-74-2	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
alpha-Endosulfan	959-98-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
cis-Chlordane	5103-71-9	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
Dieldrin	60-57-1	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
4,4'-DDE	72-55-9	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
Endrin	72-20-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
beta-Endosulfan	33213-65-9	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
4,4'-DDD	72-54-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
Endrin aldehyde	7421-93-4	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
Endosulfan sulfate	1031-07-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
4,4'-DDT	50-29-3	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	----	
Endrin ketone	53494-70-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
Methoxychlor	72-43-5	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	----	
^ Total Chlordane (sum) ----- 0.5 µg/L <0.5 <0.5 <0.5 <0.5 ----									
^ Sum of DDD + DDE + DDT 72-54-8/72-55-9/5 0-2 0.5 µg/L <0.5 <0.5 <0.5 <0.5 ----									
^ Sum of Aldrin + Dieldrin 309-00-2/60-57-1 0.5 µg/L <0.5 <0.5 <0.5 <0.5 ----									



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	GW05	GW01	GW02	LL01	----
Sampling date / time					30-Jul-2024 00:00	30-Jul-2024 00:00	30-Jul-2024 00:00	30-Jul-2024 00:00	----
Compound	CAS Number	LOR	Unit	ES2425172-001	ES2425172-002	ES2425172-003	ES2425172-004	-----	
				Result	Result	Result	Result	----	
<b>EP068B: Organophosphorus Pesticides (OP)</b>									
Dichlorvos	62-73-7	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
Monocrotophos	6923-22-4	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	----	
Dimethoate	60-51-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
Diazinon	333-41-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
Parathion-methyl	298-00-0	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	----	
Malathion	121-75-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
Fenthion	55-38-9	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
Parathion	56-38-2	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	----	
Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
Fenamiphos	22224-92-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
Prothiofos	34643-46-4	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
Ethion	563-12-2	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
Carbophenothion	786-19-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons</b>									
Naphthalene	91-20-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
Acenaphthene	83-32-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
Fluorene	86-73-7	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
Phenanthrene	85-01-8	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
Anthracene	120-12-7	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
Fluoranthene	206-44-0	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	GW05	GW01	GW02	LL01	----
Sampling date / time				30-Jul-2024 00:00	30-Jul-2024 00:00	30-Jul-2024 00:00	30-Jul-2024 00:00	----	
Compound	CAS Number	LOR	Unit	ES2425172-001	ES2425172-002	ES2425172-003	ES2425172-004	-----	
				Result	Result	Result	Result	----	
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued</b>									
Pyrene	129-00-0	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
Chrysene	218-01-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
Dibenz(a,h)anthracene	53-70-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
Benzo(g,h,i)perylene	191-24-2	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
<b>EP080/071: Total Petroleum Hydrocarbons</b>									
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	----	
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	<50	----	
C15 - C28 Fraction	----	100	µg/L	<100	<100	<100	<100	----	
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	----	
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	<50	<50	----	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions</b>									
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	<20	----	
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	<20	<20	----	
>C10 - C16 Fraction	----	100	µg/L	<100	<100	<100	<100	----	
>C16 - C34 Fraction	----	100	µg/L	<100	<100	<100	<100	----	
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	----	
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	<100	<100	<100	----	
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	<100	<100	<100	----	
<b>EP080: BTEXN</b>									



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	GW05	GW01	GW02	LL01	----
Sampling date / time				30-Jul-2024 00:00	30-Jul-2024 00:00	30-Jul-2024 00:00	30-Jul-2024 00:00	----	
Compound	CAS Number	LOR	Unit	ES2425172-001	ES2425172-002	ES2425172-003	ES2425172-004	-----	
				Result	Result	Result	Result	----	
<b>EP080: BTEXN - Continued</b>									
Benzene	71-43-2	1	µg/L	<1	<1	<1	<1	----	
Toluene	108-88-3	2	µg/L	<2	<2	<2	<2	----	
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	<2	----	
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	<2	----	
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	<2	----	
^ Total Xylenes	----	2	µg/L	<2	<2	<2	<2	----	
^ Sum of BTEX	----	1	µg/L	<1	<1	<1	<1	----	
Naphthalene	91-20-3	5	µg/L	<5	<5	<5	<5	----	
<b>EP066S: PCB Surrogate</b>									
Decachlorobiphenyl	2051-24-3	1	%	95.4	105	94.6	80.6	----	
<b>EP068S: Organochlorine Pesticide Surrogate</b>									
Dibromo-DDE	21655-73-2	0.5	%	93.0	104	94.8	80.7	----	
<b>EP068T: Organophosphorus Pesticide Surrogate</b>									
DEF	78-48-8	0.5	%	80.0	101	83.5	97.2	----	
<b>EP075(SIM)S: Phenolic Compound Surrogates</b>									
Phenol-d6	13127-88-3	1.0	%	26.9	29.4	29.2	29.2	----	
2-Chlorophenol-D4	93951-73-6	1.0	%	58.4	68.6	60.1	59.5	----	
2,4,6-Tribromophenol	118-79-6	1.0	%	41.4	65.5	51.1	56.2	----	
<b>EP075(SIM)T: PAH Surrogates</b>									
2-Fluorobiphenyl	321-60-8	1.0	%	79.4	87.9	75.4	71.2	----	
Anthracene-d10	1719-06-8	1.0	%	86.7	92.9	83.7	77.0	----	
4-Terphenyl-d14	1718-51-0	1.0	%	87.6	89.4	88.2	76.2	----	
<b>EP080S: TPH(V)/BTEX Surrogates</b>									
1,2-Dichloroethane-D4	17060-07-0	2	%	91.1	98.9	102	101	----	
Toluene-D8	2037-26-5	2	%	87.9	92.0	103	93.6	----	
4-Bromofluorobenzene	460-00-4	2	%	99.1	107	114	106	----	



## Surrogate Control Limits

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
<b>EP066S: PCB Surrogate</b>			
Decachlorobiphenyl	2051-24-3	45	134
<b>EP068S: Organochlorine Pesticide Surrogate</b>			
Dibromo-DDE	21655-73-2	50	150
<b>EP068T: Organophosphorus Pesticide Surrogate</b>			
DEF	78-48-8	50	150
<b>EP075(SIM)S: Phenolic Compound Surrogates</b>			
Phenol-d6	13127-88-3	10	44
2-Chlorophenol-D4	93951-73-6	14	94
2,4,6-Tribromophenol	118-79-6	17	125
<b>EP075(SIM)T: PAH Surrogates</b>			
2-Fluorobiphenyl	321-60-8	20	104
Anthracene-d10	1719-06-8	27	113
4-Terphenyl-d14	1718-51-0	32	112
<b>EP080S: TPH(V)/BTEX Surrogates</b>			
1,2-Dichloroethane-D4	17060-07-0	72	143
Toluene-D8	2037-26-5	75	131
4-Bromofluorobenzene	460-00-4	73	137





## CERTIFICATE OF ANALYSIS

Work Order	: <b>ES2425258</b>	Page	: 1 of 15
Client	: <b>ECOZ ENVIRONMENTAL SERVICES</b>	Laboratory	: Environmental Division Sydney
Contact	: ANDREW LEWIS	Contact	: Andrew Wotherspoon
Address	: Level 1, 70 Cavenagh Street, Darwin Darwin 0800	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 08 89811100	Telephone	: +61-2-8784 8555
Project	: EZ24114 - Gove Nhulunbuy Landfill Monitoring	Date Samples Received	: 02-Aug-2024 12:15
Order number	: EZ24114	Date Analysis Commenced	: 02-Aug-2024
C-O-C number	: ----	Issue Date	: 08-Aug-2024 11:22
Sampler	: ANDREW LEWIS		
Site	: Nhulunbuy Landfill		
Quote number	: ES24ECOZENV0008		
No. of samples received	: 10		
No. of samples analysed	: 10		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

**Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.**

### *Signatories*

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW



## General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.  
LOR = Limit of reporting  
^ = This result is computed from individual analyte detections at or above the level of reporting  
ø = ALS is not NATA accredited for these tests.  
~ = Indicates an estimated value.

- EK067G: LOR raised for Total P on sample 7 due to sample matrix.
- EP075 (SIM): Where reported, Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a,h)anthracene (1.0), Benzo(g,h,i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.
- EP068: Where reported, Total Chlordane (sum) is the sum of the reported concentrations of cis-Chlordane and trans-Chlordane at or above the LOR.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP075(SIM): Where reported, Total Cresol is the sum of the reported concentrations of 2-Methylphenol and 3- & 4-Methylphenol at or above the LOR.
- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO<sub>2</sub> and Fluoride to the Anions.
- Unless otherwise stated, analytical work for this work order will be conducted at ALS Sydney, NATA accreditation no. 825, site no. 10911.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- ED045G: The presence of Thiocyanate, Thiosulfate and Sulfite can positively contribute to the chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	GW03	GW04	GW06	LL02	GW Bore A
Sampling date / time				31-Jul-2024 00:00	31-Jul-2024 00:00	31-Jul-2024 00:00	31-Jul-2024 00:00	31-Jul-2024 00:00	
Compound	CAS Number	LOR	Unit	ES2425258-001	ES2425258-002	ES2425258-003	ES2425258-004	ES2425258-005	
				Result	Result	Result	Result	Result	
<b>EA025: Total Suspended Solids dried at 104 ± 2°C</b>									
Suspended Solids (SS)	----	5	mg/L	26	99	46	2290	316	
<b>ED037P: Alkalinity by PC Titrator</b>									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	17	18	2	261	91	
Total Alkalinity as CaCO3	----	1	mg/L	17	18	2	261	91	
<b>ED041G: Sulfate (Turbidimetric) as SO4 2- by DA</b>									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	6	4	7	46	23	
<b>ED045G: Chloride by Discrete Analyser</b>									
Chloride	16887-00-6	1	mg/L	422	37	30	106	151	
<b>ED093F: Dissolved Major Cations</b>									
Calcium	7440-70-2	1	mg/L	39	9	5	46	39	
Magnesium	7439-95-4	1	mg/L	11	2	3	25	6	
Sodium	7440-23-5	1	mg/L	202	18	14	92	79	
Potassium	7440-09-7	1	mg/L	4	<1	<1	20	5	
<b>EG020F: Dissolved Metals by ICP-MS</b>									
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.01	<0.01	<0.01	
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.002	0.001	<0.001	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Manganese	7439-96-5	0.001	mg/L	0.028	0.037	<0.001	0.046	0.199	
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	<0.001	0.002	0.003	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	0.019	0.014	0.015	0.011	0.015	
Iron	7439-89-6	0.05	mg/L	<0.05	0.19	<0.05	<0.05	2.09	



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	GW03	GW04	GW06	LL02	GW Bore A
Sampling date / time				31-Jul-2024 00:00	31-Jul-2024 00:00	31-Jul-2024 00:00	31-Jul-2024 00:00	31-Jul-2024 00:00	
Compound	CAS Number	LOR	Unit	ES2425258-001	ES2425258-002	ES2425258-003	ES2425258-004	ES2425258-005	
				Result	Result	Result	Result	Result	
<b>EG035F: Dissolved Mercury by FIMS</b>									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
<b>EK055G: Ammonia as N by Discrete Analyser</b>									
Ammonia as N	7664-41-7	0.01	mg/L	0.09	0.05	0.02	11.4	0.02	
<b>EK057G: Nitrite as N by Discrete Analyser</b>									
Nitrite as N	14797-65-0	0.01	mg/L	0.01	0.01	<0.01	0.03	0.01	
<b>EK058G: Nitrate as N by Discrete Analyser</b>									
Nitrate as N	14797-55-8	0.01	mg/L	<0.01	0.01	0.45	9.14	0.01	
<b>EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser</b>									
Nitrite + Nitrate as N	----	0.01	mg/L	0.01	0.02	0.45	9.17	0.02	
<b>EK061G: Total Kjeldahl Nitrogen By Discrete Analyser</b>									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.3	0.3	0.3	14.1	0.3	
<b>EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser</b>									
Total Nitrogen as N	----	0.1	mg/L	0.3	0.3	0.8	23.3	0.3	
<b>EK067G: Total Phosphorus as P by Discrete Analyser</b>									
Total Phosphorus as P	----	0.01	mg/L	<0.01	<0.01	<0.01	0.15	<0.01	
<b>EK071G: Reactive Phosphorus as P by discrete analyser</b>									
Reactive Phosphate	14625-44-2	0.10	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	
<b>EN055: Ionic Balance</b>									
Total Anions	----	0.01	meq/L	12.4	1.49	1.03	9.16	6.56	
Total Cations	----	0.01	meq/L	11.7	1.40	1.10	8.87	6.00	
Ionic Balance	----	0.01	%	2.61	----	----	1.64	4.40	
<b>EP002: Dissolved Organic Carbon (DOC)</b>									
Dissolved Organic Carbon	----	1	mg/L	<1	<1	<1	5	1	
<b>EP026SP: Chemical Oxygen Demand (Spectrophotometric)</b>									
Chemical Oxygen Demand	----	10	mg/L	<10	14	<10	65	<10	
<b>EP066: Polychlorinated Biphenyls (PCB)</b>									
Total Polychlorinated biphenyls	----	1	µg/L	<1	<1	<1	<1	<1	
<b>EP068A: Organochlorine Pesticides (OC)</b>									









## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	GW03	GW04	GW06	LL02	GW Bore A
Sampling date / time				31-Jul-2024 00:00	31-Jul-2024 00:00	31-Jul-2024 00:00	31-Jul-2024 00:00	31-Jul-2024 00:00	31-Jul-2024 00:00
Compound	CAS Number	LOR	Unit	ES2425258-001	ES2425258-002	ES2425258-003	ES2425258-004	ES2425258-005	
				Result	Result	Result	Result	Result	
<b>EP080: BTEXN - Continued</b>									
Toluene	108-88-3	2	µg/L	<2	<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L	<2	<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L	<1	<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L	<5	<5	<5	<5	<5	<5
<b>EP066S: PCB Surrogate</b>									
Decachlorobiphenyl	2051-24-3	1	%	108	102	80.8	89.3	90.6	
<b>EP068S: Organochlorine Pesticide Surrogate</b>									
Dibromo-DDE	21655-73-2	0.5	%	96.8	109	83.2	94.4	96.1	
<b>EP068T: Organophosphorus Pesticide Surrogate</b>									
DEF	78-48-8	0.5	%	82.2	103	72.0	101	87.1	
<b>EP075(SIM)S: Phenolic Compound Surrogates</b>									
Phenol-d6	13127-88-3	1.0	%	31.8	29.6	25.3	25.4	23.7	
2-Chlorophenol-D4	93951-73-6	1.0	%	68.3	61.7	52.4	53.2	54.6	
2,4,6-Tribromophenol	118-79-6	1.0	%	81.9	76.5	59.6	66.5	63.9	
<b>EP075(SIM)T: PAH Surrogates</b>									
2-Fluorobiphenyl	321-60-8	1.0	%	86.1	84.2	75.0	73.1	80.8	
Anthracene-d10	1719-06-8	1.0	%	101	93.0	76.2	80.2	83.8	
4-Terphenyl-d14	1718-51-0	1.0	%	103	96.5	76.8	82.8	86.2	
<b>EP080S: TPH(V)/BTEX Surrogates</b>									
1,2-Dichloroethane-D4	17060-07-0	2	%	105	106	104	95.5	106	
Toluene-D8	2037-26-5	2	%	105	103	106	99.4	109	
4-Bromofluorobenzene	460-00-4	2	%	118	118	113	110	119	





## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	GW Bore B	LC A	LC B	LC C	Dup 1
Sampling date / time				31-Jul-2024 00:00	31-Jul-2024 00:00	31-Jul-2024 00:00	31-Jul-2024 00:00	31-Jul-2024 00:00	31-Jul-2024 00:00
Compound	CAS Number	LOR	Unit	ES2425258-006	ES2425258-007	ES2425258-008	ES2425258-009	ES2425258-010	
				Result	Result	Result	Result	Result	
<b>EA025: Total Suspended Solids dried at 104 ± 2°C</b>									
Suspended Solids (SS)	----	5	mg/L	26	902	6650	5890	45	
<b>ED037P: Alkalinity by PC Titrator</b>									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	50	60	72	61	3	
Total Alkalinity as CaCO3	----	1	mg/L	50	60	72	61	3	
<b>ED041G: Sulfate (Turbidimetric) as SO4 2- by DA</b>									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2	9	60	20	7	
<b>ED045G: Chloride by Discrete Analyser</b>									
Chloride	16887-00-6	1	mg/L	54	18	52	42	30	
<b>ED093F: Dissolved Major Cations</b>									
Calcium	7440-70-2	1	mg/L	18	13	29	23	4	
Magnesium	7439-95-4	1	mg/L	3	4	2	2	2	
Sodium	7440-23-5	1	mg/L	37	18	54	40	13	
Potassium	7440-09-7	1	mg/L	<1	1	<1	1	<1	
<b>EG020F: Dissolved Metals by ICP-MS</b>									
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Manganese	7439-96-5	0.001	mg/L	0.054	0.085	0.068	0.066	<0.001	
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.001	0.001	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	0.008	0.008	0.011	0.009	0.010	
Iron	7439-89-6	0.05	mg/L	<0.05	1.66	<0.05	<0.05	<0.05	



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	GW Bore B	LC A	LC B	LC C	Dup 1
Sampling date / time				31-Jul-2024 00:00	31-Jul-2024 00:00	31-Jul-2024 00:00	31-Jul-2024 00:00	31-Jul-2024 00:00	
Compound	CAS Number	LOR	Unit	ES2425258-006	ES2425258-007	ES2425258-008	ES2425258-009	ES2425258-010	
				Result	Result	Result	Result	Result	
<b>EG035F: Dissolved Mercury by FIMS</b>									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
<b>EK055G: Ammonia as N by Discrete Analyser</b>									
Ammonia as N	7664-41-7	0.01	mg/L	0.05	0.55	0.03	0.05	0.05	
<b>EK057G: Nitrite as N by Discrete Analyser</b>									
Nitrite as N	14797-65-0	0.01	mg/L	0.02	<0.01	0.14	0.03	<0.01	
<b>EK058G: Nitrate as N by Discrete Analyser</b>									
Nitrate as N	14797-55-8	0.01	mg/L	1.63	<0.01	2.51	3.24	0.47	
<b>EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser</b>									
Nitrite + Nitrate as N	----	0.01	mg/L	1.65	<0.01	2.65	3.27	0.47	
<b>EK061G: Total Kjeldahl Nitrogen By Discrete Analyser</b>									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.4	1.2	1.3	1.1	0.3	
<b>EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser</b>									
Total Nitrogen as N	----	0.1	mg/L	2.0	1.2	4.0	4.4	0.8	
<b>EK067G: Total Phosphorus as P by Discrete Analyser</b>									
Total Phosphorus as P	----	0.01	mg/L	<0.01	<0.05	1.13	1.03	<0.01	
<b>EK071G: Reactive Phosphorus as P by discrete analyser</b>									
Reactive Phosphate	14625-44-2	0.10	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	
<b>EN055: Ionic Balance</b>									
∅ Total Anions	----	0.01	meq/L	----	----	----	3.05	----	
∅ Total Anions	----	0.01	meq/L	2.56	1.89	4.15	----	1.05	
∅ Total Cations	----	0.01	meq/L	2.75	1.79	3.96	3.08	0.93	
∅ Ionic Balance	----	0.01	%	----	----	----	0.46	----	
∅ Ionic Balance	----	0.01	%	----	----	2.39	----	----	
<b>EP002: Dissolved Organic Carbon (DOC)</b>									
Dissolved Organic Carbon	----	1	mg/L	<1	1	2	2	<1	
<b>EP026SP: Chemical Oxygen Demand (Spectrophotometric)</b>									
Chemical Oxygen Demand	----	10	mg/L	<10	<10	43	40	<10	
<b>EP066: Polychlorinated Biphenyls (PCB)</b>									



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	GW Bore B	LC A	LC B	LC C	Dup 1	
Sampling date / time				31-Jul-2024 00:00	31-Jul-2024 00:00	31-Jul-2024 00:00	31-Jul-2024 00:00	31-Jul-2024 00:00		
Compound	CAS Number	LOR	Unit	ES2425258-006	ES2425258-007	ES2425258-008	ES2425258-009	ES2425258-010		
				Result	Result	Result	Result	Result		
<b>EP066: Polychlorinated Biphenyls (PCB) - Continued</b>										
^ Total Polychlorinated biphenyls				----	1	µg/L	<1	<1	<1	<1
<b>EP068A: Organochlorine Pesticides (OC)</b>										
alpha-BHC	319-84-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
beta-BHC	319-85-7	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
gamma-BHC - (Lindane)	58-89-9	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
delta-BHC	319-86-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Heptachlor	76-44-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Aldrin	309-00-2	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Heptachlor epoxide	1024-57-3	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
trans-Chlordane	5103-74-2	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
alpha-Endosulfan	959-98-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
cis-Chlordane	5103-71-9	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Dieldrin	60-57-1	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
4,4'-DDE	72-55-9	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Endrin	72-20-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
beta-Endosulfan	33213-65-9	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
4,4'-DDD	72-54-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Endrin aldehyde	7421-93-4	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Endosulfan sulfate	1031-07-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
4,4'-DDT	50-29-3	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	
Endrin ketone	53494-70-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Methoxychlor	72-43-5	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	
^ Total Chlordane (sum)				----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5
^ Sum of DDD + DDE + DDT				72-54-8/72-55-9/50-2	0.5	µg/L	<0.5	<0.5	<0.5	<0.5
^ Sum of Aldrin + Dieldrin				309-00-2/60-57-1	0.5	µg/L	<0.5	<0.5	<0.5	<0.5



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	GW Bore B	LC A	LC B	LC C	Dup 1
Sampling date / time					31-Jul-2024 00:00	31-Jul-2024 00:00	31-Jul-2024 00:00	31-Jul-2024 00:00	31-Jul-2024 00:00
Compound	CAS Number	LOR	Unit		ES2425258-006	ES2425258-007	ES2425258-008	ES2425258-009	ES2425258-010
					Result	Result	Result	Result	Result
<b>EP068B: Organophosphorus Pesticides (OP)</b>									
Dichlorvos	62-73-7	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Demeton-S-methyl	919-86-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Monocrotophos	6923-22-4	2.0	µg/L		<2.0	<2.0	<2.0	<2.0	<2.0
Dimethoate	60-51-5	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Diazinon	333-41-5	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Chlorpyrifos-methyl	5598-13-0	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Parathion-methyl	298-00-0	2.0	µg/L		<2.0	<2.0	<2.0	<2.0	<2.0
Malathion	121-75-5	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Fenthion	55-38-9	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Chlorpyrifos	2921-88-2	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Parathion	56-38-2	2.0	µg/L		<2.0	<2.0	<2.0	<2.0	<2.0
Pirimphos-ethyl	23505-41-1	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Chlorfenvinphos	470-90-6	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Bromophos-ethyl	4824-78-6	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Fenamiphos	22224-92-6	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Prothiofos	34643-46-4	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Ethion	563-12-2	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Carbophenothion	786-19-6	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Azinphos Methyl	86-50-0	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons</b>									
Naphthalene	91-20-3	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Acenaphthylene	208-96-8	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Acenaphthene	83-32-9	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Fluorene	86-73-7	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Phenanthrene	85-01-8	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Anthracene	120-12-7	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Fluoranthene	206-44-0	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	GW Bore B	LC A	LC B	LC C	Dup 1
Sampling date / time				31-Jul-2024 00:00	31-Jul-2024 00:00	31-Jul-2024 00:00	31-Jul-2024 00:00	31-Jul-2024 00:00	31-Jul-2024 00:00
Compound	CAS Number	LOR	Unit	ES2425258-006	ES2425258-007	ES2425258-008	ES2425258-009	ES2425258-010	
				Result	Result	Result	Result	Result	
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued</b>									
Pyrene	129-00-0	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chrysene	218-01-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Dibenz(a,h)anthracene	53-70-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(g,h,i)perylene	191-24-2	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
<b>EP080/071: Total Petroleum Hydrocarbons</b>									
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L	<100	<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	<50	<50	<50	<50
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions</b>									
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L	<100	<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L	<100	<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	<100	<100	<100	<100	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	<100	<100	<100	<100	<100
<b>EP080: BTEXN</b>									



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	GW Bore B	LC A	LC B	LC C	Dup 1
Sampling date / time				31-Jul-2024 00:00	31-Jul-2024 00:00	31-Jul-2024 00:00	31-Jul-2024 00:00	31-Jul-2024 00:00	
Compound	CAS Number	LOR	Unit	ES2425258-006	ES2425258-007	ES2425258-008	ES2425258-009	ES2425258-010	
				Result	Result	Result	Result	Result	
<b>EP080: BTEXN - Continued</b>									
Benzene	71-43-2	1	µg/L	<1	<1	<1	<1	<1	
Toluene	108-88-3	2	µg/L	<2	<2	<2	<2	<2	
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	<2	<2	
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	<2	<2	
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	<2	<2	
^ Total Xylenes	----	2	µg/L	<2	<2	<2	<2	<2	
^ Sum of BTEX	----	1	µg/L	<1	<1	<1	<1	<1	
Naphthalene	91-20-3	5	µg/L	<5	<5	<5	<5	<5	
<b>EP066S: PCB Surrogate</b>									
Decachlorobiphenyl	2051-24-3	1	%	94.7	86.5	88.0	81.8	97.3	
<b>EP068S: Organochlorine Pesticide Surrogate</b>									
Dibromo-DDE	21655-73-2	0.5	%	96.2	85.3	87.0	84.3	101	
<b>EP068T: Organophosphorus Pesticide Surrogate</b>									
DEF	78-48-8	0.5	%	95.0	81.6	85.8	82.9	94.0	
<b>EP075(SIM)S: Phenolic Compound Surrogates</b>									
Phenol-d6	13127-88-3	1.0	%	25.3	27.8	25.4	25.0	30.4	
2-Chlorophenol-D4	93951-73-6	1.0	%	54.5	57.9	53.6	51.6	64.7	
2,4,6-Tribromophenol	118-79-6	1.0	%	61.6	65.5	61.5	56.5	73.6	
<b>EP075(SIM)T: PAH Surrogates</b>									
2-Fluorobiphenyl	321-60-8	1.0	%	76.2	74.6	73.3	72.1	87.5	
Anthracene-d10	1719-06-8	1.0	%	83.2	81.7	79.7	72.7	93.8	
4-Terphenyl-d14	1718-51-0	1.0	%	86.7	83.2	79.8	73.7	93.5	
<b>EP080S: TPH(V)/BTEX Surrogates</b>									
1,2-Dichloroethane-D4	17060-07-0	2	%	98.6	101	95.7	93.4	91.0	
Toluene-D8	2037-26-5	2	%	92.9	103	96.7	84.9	92.2	
4-Bromofluorobenzene	460-00-4	2	%	106	115	108	103	100	



## Surrogate Control Limits

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
<b>EP066S: PCB Surrogate</b>			
Decachlorobiphenyl	2051-24-3	45	134
<b>EP068S: Organochlorine Pesticide Surrogate</b>			
Dibromo-DDE	21655-73-2	50	150
<b>EP068T: Organophosphorus Pesticide Surrogate</b>			
DEF	78-48-8	50	150
<b>EP075(SIM)S: Phenolic Compound Surrogates</b>			
Phenol-d6	13127-88-3	10	44
2-Chlorophenol-D4	93951-73-6	14	94
2,4,6-Tribromophenol	118-79-6	17	125
<b>EP075(SIM)T: PAH Surrogates</b>			
2-Fluorobiphenyl	321-60-8	20	104
Anthracene-d10	1719-06-8	27	113
4-Terphenyl-d14	1718-51-0	32	112
<b>EP080S: TPH(V)/BTEX Surrogates</b>			
1,2-Dichloroethane-D4	17060-07-0	72	143
Toluene-D8	2037-26-5	75	131
4-Bromofluorobenzene	460-00-4	73	137



## CERTIFICATE OF ANALYSIS

**Work Order** : **EN2409364**  
**Client** : **ECOZ ENVIRONMENTAL SERVICES**  
**Contact** : **ANDREW LEWIS**  
**Address** : **Level 1, 70 Cavenagh Street, Darwin  
Darwin 0800**  
**Telephone** : **+61 08 89811100**  
**Project** : **EZ24114 - Gove landfill**  
**Order number** : **----**  
**C-O-C number** : **----**  
**Sampler** : **A L**  
**Site** : **----**  
**Quote number** : **NE24ECOZENV0002**  
**No. of samples received** : **2**  
**No. of samples analysed** : **2**

**Page** : 1 of 12  
**Laboratory** : Environmental Division Newcastle  
**Contact** : Danae Hambly  
**Address** : 5/585 Maitland Road Mayfield West NSW Australia 2304  
**Telephone** : +61 2 4014 2500  
**Date Samples Received** : 21-Aug-2024 09:00  
**Date Analysis Commenced** : 22-Aug-2024  
**Issue Date** : 05-Sep-2024 11:17



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

**Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.**

### *Signatories*

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Dale Semple	Analyst	Newcastle - Organics, Mayfield West, NSW
Dale Semple	Analyst	Newcastle, Mayfield West, NSW
Daniel Junek	Senior Organic Chemist	Newcastle - Organics, Mayfield West, NSW
Travis Allen	Senior Chemist	Brisbane Organics, Stafford, QLD





## General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.  
LOR = Limit of reporting  
^ = This result is computed from individual analyte detections at or above the level of reporting  
ø = ALS is not NATA accredited for these tests.  
~ = Indicates an estimated value.

- CAN-001: Results for Pressure - As Received are measured under controlled conditions using calibrated laboratory gauges. These results are expressed as an absolute pressure. Equivalent gauge pressures may be calculated by subtracting the Pressure - Laboratory Atmosphere.
- CAN-001: Results for Pressure - Gauge As Received are obtained from uncalibrated field gauges and are indicative only. These results may not precisely match calibrated gauge readings and may vary from field measurements due to changes in temperature and pressure.
- CAN-001: Results for Vacuum - As Received are calculated from the pressures of the canister and laboratory atmosphere at the time of receipt, and are expressed as a measure of the vacuum remaining. A positive value indicates that the canister was below atmospheric pressure upon receipt.
- EP101: Sample LG02 required dilution due to the presence of high level contaminants. Where applicable, LOR values have been adjusted accordingly.
- EP101: ALS quality procedures (QWI-EN/38) permit, for organic trace analysis, that the recoveries of 20% of target compounds may lie outside of established control limits as long as these remain within acceptable ranges defined within referenced USEPA methods.
- EP251 (Hydrogen Sulfide by GC/Sulfur Chemiluminescence), EP251-X (Sulfur Compounds by GC/Sulfur Chemiluminescence): Samples were received at low pressure and were pressurised with nitrogen prior to analysis. The LOR has been raised due to dilution from the pressurisation gas.
- EP101: Results reported in mg/m<sup>3</sup> are calculated from PPMV results based on a temperature of 25°C and atmospheric pressure of 101.3 kPa.
- EP104: Results reported in mg/m<sup>3</sup> are calculated from Mol% results based on a temperature of 25°C and atmospheric pressure of 101.3 kPa
- EP104: Sample canisters were received at sub-ambient pressures and required dilution in the laboratory prior to analysis. LOR values have been adjusted accordingly



### Analytical Results

Sub-Matrix: GAS (Matrix: GAS)				Sample ID		LG01 C12333_S321	LG02 C14227_S225	----	----	----
Sampling date / time				13-Aug-2024 00:00		13-Aug-2024 00:00		----	----	----
Compound	CAS Number	LOR	Unit	EN2409364-001	EN2409364-002	-----	-----	-----	-----	-----
				Result	Result	----	----	----	----	----
<b>EP251: Sulfur Compounds</b>										
Hydrogen Sulphide	7783-06-4	0.1	ppmv	<0.2	<0.2	----	----	----	----	----
o Carbonyl Sulfide	463-58-1	0.1	ppmv	<0.2	<0.2	----	----	----	----	----
o Methyl Mercaptan (Methanethiol)	74-93-1	0.1	ppmv	<0.2	<0.2	----	----	----	----	----
o Ethyl Mercaptan (Ethanethiol)	75-08-1	0.1	ppmv	<0.2	<0.2	----	----	----	----	----
o Dimethyl Sulfide	75-18-3	0.1	ppmv	<0.2	<0.2	----	----	----	----	----



## Analytical Results

Sub-Matrix: SOIL GAS  
 (Matrix: AIR)

Sample ID

				LG01 C12333_S321	LG02 C14227_S225	----	----	----
Sampling date / time				13-Aug-2024 00:00	13-Aug-2024 00:00	----	----	----
Compound	CAS Number	LOR	Unit	EN2409364-001	EN2409364-002	-----	-----	-----
				Result	Result	----	----	----
<b>EP101: VOCs by USEPA Method TO15 (Calculated Concentration)</b>								
Freon 12	75-71-8	0.250	mg/m <sup>3</sup>	<b>0.416</b>	<0.250	----	----	----
Chloromethane	74-87-3	0.100	mg/m <sup>3</sup>	<0.100	<0.100	----	----	----
Freon 114	76-14-2	0.350	mg/m <sup>3</sup>	<0.350	<0.350	----	----	----
Vinyl chloride	75-01-4	0.0051	mg/m <sup>3</sup>	<0.0051	<b>0.0197</b>	----	----	----
Bromomethane	74-83-9	0.190	mg/m <sup>3</sup>	<0.190	<0.190	----	----	----
Chloroethane	75-00-3	0.130	mg/m <sup>3</sup>	<0.130	<0.130	----	----	----
Freon 11	75-69-4	0.280	mg/m <sup>3</sup>	<0.280	<0.280	----	----	----
1.1-Dichloroethane	75-35-4	0.200	mg/m <sup>3</sup>	<0.200	<0.200	----	----	----
Dichloromethane	75-09-2	0.170	mg/m <sup>3</sup>	<0.170	<0.170	----	----	----
Freon 113	76-13-1	0.380	mg/m <sup>3</sup>	<0.380	<0.380	----	----	----
1.1-Dichloroethane	75-34-3	0.200	mg/m <sup>3</sup>	<0.200	<0.200	----	----	----
cis-1.2-Dichloroethane	156-59-2	0.0200	mg/m <sup>3</sup>	<b>0.145</b>	<b>0.0749</b>	----	----	----
Chloroform	67-66-3	0.240	mg/m <sup>3</sup>	<0.240	<0.240	----	----	----
1.2-Dichloroethane	107-06-2	0.200	mg/m <sup>3</sup>	<0.200	<0.200	----	----	----
1.1.1-Trichloroethane	71-55-6	0.270	mg/m <sup>3</sup>	<0.270	<0.270	----	----	----
Benzene	71-43-2	0.100	mg/m <sup>3</sup>	<b>0.524</b>	<b>1.30</b>	----	----	----
Carbon Tetrachloride	56-23-5	0.310	mg/m <sup>3</sup>	<0.310	<0.310	----	----	----
1.2-Dichloropropane	78-87-5	0.230	mg/m <sup>3</sup>	<0.230	<0.230	----	----	----
Trichloroethene	79-01-6	0.0054	mg/m <sup>3</sup>	<0.0054	<0.0270	----	----	----
cis-1.3-Dichloropropylene	10061-01-5	0.230	mg/m <sup>3</sup>	<0.230	<0.230	----	----	----
trans-1.3-Dichloropropene	10061-02-6	0.230	mg/m <sup>3</sup>	<0.230	<0.230	----	----	----
1.1.2-Trichloroethane	79-00-5	0.270	mg/m <sup>3</sup>	<0.270	<0.270	----	----	----
Toluene	108-88-3	0.190	mg/m <sup>3</sup>	<0.190	<b>0.986</b>	----	----	----
1.2-Dibromoethane (EDB)	106-93-4	0.380	mg/m <sup>3</sup>	<0.380	<0.380	----	----	----
Tetrachloroethene	127-18-4	0.340	mg/m <sup>3</sup>	<0.340	<0.340	----	----	----
Chlorobenzene	108-90-7	0.230	mg/m <sup>3</sup>	<0.230	<b>1.44</b>	----	----	----



## Analytical Results

Sub-Matrix: SOIL GAS  
 (Matrix: AIR)

Sample ID

				LG01 C12333_S321	LG02 C14227_S225	----	----	----
Sampling date / time				13-Aug-2024 00:00	13-Aug-2024 00:00	----	----	----
Compound	CAS Number	LOR	Unit	EN2409364-001	EN2409364-002	-----	-----	-----
				Result	Result	----	----	----

### EP101: VOCs by USEPA Method TO15 (Calculated Concentration) - Continued

Ethylbenzene	100-41-4	0.220	mg/m <sup>3</sup>	<0.220	<b>46.9</b>	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.430	mg/m <sup>3</sup>	<0.430	<b>66.8</b>	----	----	----
Styrene	100-42-5	0.210	mg/m <sup>3</sup>	<0.210	<0.210	----	----	----
1.1.2.2-Tetrachloroethane	79-34-5	0.340	mg/m <sup>3</sup>	<0.340	<0.340	----	----	----
ortho-Xylene	95-47-6	0.220	mg/m <sup>3</sup>	<0.220	<b>8.50</b>	----	----	----
4-Ethyltoluene	622-96-8	0.240	mg/m <sup>3</sup>	<0.240	<0.240	----	----	----
Total Xylenes	----	0.650	mg/m <sup>3</sup>	<0.650	<b>75.3</b>	----	----	----
1.3.5-Trimethylbenzene	108-67-8	0.240	mg/m <sup>3</sup>	<0.240	<0.240	----	----	----
1.2.4-Trimethylbenzene	95-63-6	0.240	mg/m <sup>3</sup>	<0.240	<0.240	----	----	----
1.3-Dichlorobenzene	541-73-1	0.300	mg/m <sup>3</sup>	<0.300	<0.300	----	----	----
Benzylchloride	100-44-7	0.260	mg/m <sup>3</sup>	<0.260	<0.260	----	----	----
1.4-Dichlorobenzene	106-46-7	0.300	mg/m <sup>3</sup>	<0.300	<0.300	----	----	----
1.2-Dichlorobenzene	95-50-1	0.300	mg/m <sup>3</sup>	<0.300	<0.300	----	----	----
1.2.4-Trichlorobenzene	120-82-1	0.370	mg/m <sup>3</sup>	<0.370	<0.370	----	----	----
Hexachlorobutadiene	87-68-3	0.530	mg/m <sup>3</sup>	<0.530	<0.530	----	----	----
Acetone	67-64-1	0.120	mg/m <sup>3</sup>	<0.120	<0.120	----	----	----
Bromodichloromethane	75-27-4	0.340	mg/m <sup>3</sup>	<0.340	<0.340	----	----	----
1.3-Butadiene	106-99-0	0.110	mg/m <sup>3</sup>	<0.110	<0.110	----	----	----
Carbon disulfide	75-15-0	0.160	mg/m <sup>3</sup>	<0.160	<0.160	----	----	----
2-Chlorotoluene	95-49-8	0.260	mg/m <sup>3</sup>	<0.260	<0.260	----	----	----
1-Chloro-2-propene (Allyl chloride)	107-05-1	0.160	mg/m <sup>3</sup>	<0.160	<0.160	----	----	----
Cyclohexane	110-82-7	0.170	mg/m <sup>3</sup>	<b>1.71</b>	<b>2.40</b>	----	----	----
Dibromochloromethane	124-48-1	0.430	mg/m <sup>3</sup>	<0.430	<0.430	----	----	----
1.4-Dioxane	123-91-1	0.180	mg/m <sup>3</sup>	<0.180	<0.180	----	----	----
Ethylacetate	9002-89-5	0.180	mg/m <sup>3</sup>	<0.180	<0.180	----	----	----
trans-1.2-Dichloroethene	156-60-5	0.200	mg/m <sup>3</sup>	<0.200	<0.200	----	----	----



## Analytical Results

Sub-Matrix: SOIL GAS  
 (Matrix: AIR)

Sample ID

				LG01 C12333_S321	LG02 C14227_S225	----	----	----
Sampling date / time				13-Aug-2024 00:00	13-Aug-2024 00:00	----	----	----
Compound	CAS Number	LOR	Unit	EN2409364-001	EN2409364-002	-----	-----	-----
				Result	Result	----	----	----

### EP101: VOCs by USEPA Method TO15 (Calculated Concentration) - Continued

Heptane	142-82-5	0.200	mg/m <sup>3</sup>	2.33	8.31	----	----	----
Hexane	110-54-3	0.180	mg/m <sup>3</sup>	0.637	1.16	----	----	----
Isooctane	540-84-1	0.230	mg/m <sup>3</sup>	0.915	2.02	----	----	----
Isopropyl Alcohol	67-63-0	0.120	mg/m <sup>3</sup>	<0.120	<0.120	----	----	----
2-Butanone (MEK)	78-93-3	0.150	mg/m <sup>3</sup>	<0.150	<0.150	----	----	----
Methyl iso-Butyl ketone	108-10-1	0.200	mg/m <sup>3</sup>	<0.200	<0.200	----	----	----
2-Hexanone (MBK)	591-78-6	0.200	mg/m <sup>3</sup>	<0.200	<0.200	----	----	----
Propene	115-07-1	0.0900	mg/m <sup>3</sup>	<0.0900	20.1	----	----	----
Methyl tert-Butyl Ether (MTBE)	1634-04-4	0.180	mg/m <sup>3</sup>	<0.180	<0.180	----	----	----
Tetrahydrofuran	109-99-9	0.150	mg/m <sup>3</sup>	<0.150	<0.150	----	----	----
Bromoform	75-25-2	0.520	mg/m <sup>3</sup>	<0.520	<0.520	----	----	----
Vinyl Acetate	108-05-4	0.180	mg/m <sup>3</sup>	<0.180	<0.180	----	----	----
Vinyl bromide	593-60-2	0.220	mg/m <sup>3</sup>	<0.220	<0.220	----	----	----
Ethanol	64-17-5	0.0900	mg/m <sup>3</sup>	<0.0900	<0.0900	----	----	----
Acetonitrile	75-05-8	0.0800	mg/m <sup>3</sup>	<0.0800	<0.0800	----	----	----
Acrolein	107-02-8	0.110	mg/m <sup>3</sup>	<0.110	<0.110	----	----	----
Acrylonitrile	107-13-1	0.110	mg/m <sup>3</sup>	<0.110	<0.110	----	----	----
tert-Butyl alcohol	75-65-0	0.150	mg/m <sup>3</sup>	<0.150	0.397	----	----	----
2-Chloro-1.3-butadiene	126-99-8	0.180	mg/m <sup>3</sup>	<0.180	<0.180	----	----	----
Di-isopropyl Ether	108-20-3	0.210	mg/m <sup>3</sup>	<0.210	<0.210	----	----	----
Ethyl tert-Butyl Ether (ETBE)	637-92-3	0.210	mg/m <sup>3</sup>	<0.210	<0.210	----	----	----
tert-Amyl Methyl Ether (TAME)	994-05-8	0.210	mg/m <sup>3</sup>	<0.210	<0.210	----	----	----
Methyl Methacrylate	80-62-6	0.210	mg/m <sup>3</sup>	<0.210	<0.210	----	----	----
1.1.1.2-Tetrachloroethane	630-20-6	0.340	mg/m <sup>3</sup>	<0.340	<0.340	----	----	----
Isopropylbenzene	98-82-8	0.250	mg/m <sup>3</sup>	0.342	1.19	----	----	----
n-Propylbenzene	103-65-1	0.250	mg/m <sup>3</sup>	<0.250	<0.250	----	----	----



## Analytical Results

Sub-Matrix: SOIL GAS  
 (Matrix: AIR)

Sample ID

				LG01 C12333_S321	LG02 C14227_S225	----	----	----
Sampling date / time				13-Aug-2024 00:00	13-Aug-2024 00:00	----	----	----
Compound	CAS Number	LOR	Unit	EN2409364-001	EN2409364-002	-----	-----	-----
				Result	Result	----	----	----
<b>EP101: VOCs by USEPA Method TO15 (Calculated Concentration) - Continued</b>								
tert-Butylbenzene	98-06-6	0.270	mg/m <sup>3</sup>	<0.270	<0.270	----	----	----
sec-Butylbenzene	135-98-8	0.270	mg/m <sup>3</sup>	<0.270	<0.270	----	----	----
2-isopropyltoluene	527-84-4	0.270	mg/m <sup>3</sup>	<0.270	<0.270	----	----	----
n-Butylbenzene	104-51-8	0.270	mg/m <sup>3</sup>	<0.270	<0.270	----	----	----
Naphthalene	91-20-3	0.100	mg/m <sup>3</sup>	<0.100	<0.100	----	----	----
<b>EP101: VOCs by USEPA Method TO15r</b>								
Freon 12	75-71-8	0.0500	ppmv	<b>0.0842</b>	<0.0500	----	----	----
Chloromethane	74-87-3	0.0500	ppmv	<0.0500	<0.0500	----	----	----
Freon 114	76-14-2	0.0500	ppmv	<0.0500	<0.0500	----	----	----
Vinyl chloride	75-01-4	0.0020	ppmv	<0.0020	<b>0.0077</b>	----	----	----
Bromomethane	74-83-9	0.0500	ppmv	<0.0500	<0.0500	----	----	----
Chloroethane	75-00-3	0.0500	ppmv	<0.0500	<0.0500	----	----	----
Freon 11	75-69-4	0.0500	ppmv	<0.0500	<0.0500	----	----	----
1.1-Dichloroethene	75-35-4	0.0500	ppmv	<0.0500	<0.0500	----	----	----
Dichloromethane	75-09-2	0.0500	ppmv	<0.0500	<0.0500	----	----	----
Freon 113	76-13-1	0.0500	ppmv	<0.0500	<0.0500	----	----	----
1.1-Dichloroethane	75-34-3	0.0500	ppmv	<0.0500	<0.0500	----	----	----
cis-1.2-Dichloroethene	156-59-2	0.0050	ppmv	<b>0.0365</b>	<b>0.0189</b>	----	----	----
Chloroform	67-66-3	0.0500	ppmv	<0.0500	<0.0500	----	----	----
1.2-Dichloroethane	107-06-2	0.0500	ppmv	<0.0500	<0.0500	----	----	----
1.1.1-Trichloroethane	71-55-6	0.0500	ppmv	<0.0500	<0.0500	----	----	----
Benzene	71-43-2	0.0300	ppmv	<b>0.164</b>	<b>0.409</b>	----	----	----
Carbon Tetrachloride	56-23-5	0.0500	ppmv	<0.0500	<0.0500	----	----	----
1.2-Dichloropropane	78-87-5	0.0500	ppmv	<0.0500	<0.0500	----	----	----
Trichloroethene	79-01-6	0.0010	ppmv	<0.0010	<0.0050	----	----	----
cis-1.3-Dichloropropylene	10061-01-5	0.0500	ppmv	<0.0500	<0.0500	----	----	----



## Analytical Results

Sub-Matrix: SOIL GAS  
 (Matrix: AIR)

Sample ID

				LG01 C12333_S321	LG02 C14227_S225	----	----	----
Sampling date / time				13-Aug-2024 00:00	13-Aug-2024 00:00	----	----	----
Compound	CAS Number	LOR	Unit	EN2409364-001	EN2409364-002	-----	-----	-----
				Result	Result	----	----	----
<b>EP101: VOCs by USEPA Method TO15r - Continued</b>								
trans-1.3-Dichloropropene	10061-02-6	0.0500	ppmv	<0.0500	<0.0500	----	----	----
1.1.2-Trichloroethane	79-00-5	0.0500	ppmv	<0.0500	<0.0500	----	----	----
Toluene	108-88-3	0.0500	ppmv	<0.0500	<b>0.262</b>	----	----	----
1.2-Dibromoethane (EDB)	106-93-4	0.0500	ppmv	<0.0500	<0.0500	----	----	----
Tetrachloroethene	127-18-4	0.0500	ppmv	<0.0500	<0.0500	----	----	----
Chlorobenzene	108-90-7	0.0500	ppmv	<0.0500	<b>0.312</b>	----	----	----
Ethylbenzene	100-41-4	0.0500	ppmv	<0.0500	<b>10.8</b>	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.100	ppmv	<0.100	<b>15.4</b>	----	----	----
Styrene	100-42-5	0.0500	ppmv	<0.0500	<0.0500	----	----	----
1.1.2.2-Tetrachloroethane	79-34-5	0.0500	ppmv	<0.0500	<0.0500	----	----	----
ortho-Xylene	95-47-6	0.0500	ppmv	<0.0500	<b>1.96</b>	----	----	----
4-Ethyltoluene	622-96-8	0.0500	ppmv	<0.0500	<0.0500	----	----	----
1.3.5-Trimethylbenzene	108-67-8	0.0500	ppmv	<0.0500	<0.0500	----	----	----
1.2.4-Trimethylbenzene	95-63-6	0.0500	ppmv	<0.0500	<0.0500	----	----	----
1.3-Dichlorobenzene	541-73-1	0.0500	ppmv	<0.0500	<0.0500	----	----	----
Benzylchloride	100-44-7	0.0500	ppmv	<0.0500	<0.0500	----	----	----
1.4-Dichlorobenzene	106-46-7	0.0500	ppmv	<0.0500	<0.0500	----	----	----
1.2-Dichlorobenzene	95-50-1	0.0500	ppmv	<0.0500	<0.0500	----	----	----
1.2.4-Trichlorobenzene	120-82-1	0.0500	ppmv	<0.0500	<0.0500	----	----	----
Hexachlorobutadiene	87-68-3	0.0500	ppmv	<0.0500	<0.0500	----	----	----
Acetone	67-64-1	0.0500	ppmv	<0.0500	<0.0500	----	----	----
Bromodichloromethane	75-27-4	0.0500	ppmv	<0.0500	<0.0500	----	----	----
1.3-Butadiene	106-99-0	0.0500	ppmv	<0.0500	<0.0500	----	----	----
Carbon disulfide	75-15-0	0.0500	ppmv	<0.0500	<0.0500	----	----	----
2-Chlorotoluene	95-49-8	0.0500	ppmv	<0.0500	<0.0500	----	----	----
1-Chloro-2-propene (Allyl chloride)	107-05-1	0.0500	ppmv	<0.0500	<0.0500	----	----	----



## Analytical Results

Sub-Matrix: SOIL GAS  
 (Matrix: AIR)

Sample ID

				LG01 C12333_S321	LG02 C14227_S225	----	----	----
Sampling date / time				13-Aug-2024 00:00	13-Aug-2024 00:00	----	----	----
Compound	CAS Number	LOR	Unit	EN2409364-001	EN2409364-002	-----	-----	-----
				Result	Result	----	----	----

### EP101: VOCs by USEPA Method TO15r - Continued

Cyclohexane	110-82-7	0.0500	ppmv	<b>0.496</b>	<b>0.697</b>	----	----	----
Dibromochloromethane	124-48-1	0.0500	ppmv	<0.0500	<0.0500	----	----	----
1,4-Dioxane	123-91-1	0.0500	ppmv	<0.0500	<0.0500	----	----	----
Ethylacetate	9002-89-5	0.0500	ppmv	<0.0500	<0.0500	----	----	----
trans-1,2-Dichloroethene	156-60-5	0.0500	ppmv	<0.0500	<0.0500	----	----	----
Heptane	142-82-5	0.0500	ppmv	<b>0.570</b>	<b>2.03</b>	----	----	----
Hexane	110-54-3	0.0500	ppmv	<b>0.181</b>	<b>0.331</b>	----	----	----
Isooctane	540-84-1	0.0500	ppmv	<b>0.196</b>	<b>0.432</b>	----	----	----
Isopropyl Alcohol	67-63-0	0.0500	ppmv	<0.0500	<0.0500	----	----	----
2-Butanone (MEK)	78-93-3	0.0500	ppmv	<0.0500	<0.0500	----	----	----
Methyl iso-Butyl ketone	108-10-1	0.0500	ppmv	<0.0500	<0.0500	----	----	----
2-Hexanone (MBK)	591-78-6	0.0500	ppmv	<0.0500	<0.0500	----	----	----
Propene	115-07-1	0.0500	ppmv	<0.0500	<b>11.7</b>	----	----	----
Methyl tert-Butyl Ether (MTBE)	1634-04-4	0.0500	ppmv	<0.0500	<0.0500	----	----	----
Tetrahydrofuran	109-99-9	0.0500	ppmv	<0.0500	<0.0500	----	----	----
Bromoform	75-25-2	0.0500	ppmv	<0.0500	<0.0500	----	----	----
Vinyl Acetate	108-05-4	0.0500	ppmv	<0.0500	<0.0500	----	----	----
Vinyl bromide	593-60-2	0.0500	ppmv	<0.0500	<0.0500	----	----	----
Ethanol	64-17-5	0.0500	ppmv	<0.0500	<0.0500	----	----	----
Acetonitrile	75-05-8	0.0500	ppmv	<0.0500	<0.0500	----	----	----
Acrolein	107-02-8	0.0500	ppmv	<0.0500	<0.0500	----	----	----
Acrylonitrile	107-13-1	0.0500	ppmv	<0.0500	<0.0500	----	----	----
tert-Butyl alcohol	75-65-0	0.0500	ppmv	<0.0500	<b>0.131</b>	----	----	----
2-Chloro-1,3-butadiene	126-99-8	0.0500	ppmv	<0.0500	<0.0500	----	----	----
Di-isopropyl Ether	108-20-3	0.0500	ppmv	<0.0500	<0.0500	----	----	----
Ethyl tert-Butyl Ether (ETBE)	637-92-3	0.0500	ppmv	<0.0500	<0.0500	----	----	----





## Analytical Results

Sub-Matrix: SOIL GAS  
 (Matrix: AIR)

Sample ID

				LG01 C12333_S321	LG02 C14227_S225	----	----	----
Sampling date / time				13-Aug-2024 00:00	13-Aug-2024 00:00	----	----	----
Compound	CAS Number	LOR	Unit	EN2409364-001	EN2409364-002	-----	-----	-----
				Result	Result	----	----	----
<b>EP101: VOCs by USEPA Method TO15r - Continued</b>								
tert-Amyl Methyl Ether (TAME)	994-05-8	0.0500	ppmv	<0.0500	<0.0500	----	----	----
Methyl Methacrylate	80-62-6	0.0500	ppmv	<0.0500	<0.0500	----	----	----
1.1.1.2-Tetrachloroethane	630-20-6	0.0500	ppmv	<0.0500	<0.0500	----	----	----
Isopropylbenzene	98-82-8	0.0500	ppmv	<b>0.0696</b>	<b>0.243</b>	----	----	----
n-Propylbenzene	103-65-1	0.0500	ppmv	<0.0500	<0.0500	----	----	----
tert-Butylbenzene	98-06-6	0.0500	ppmv	<0.0500	<0.0500	----	----	----
sec-Butylbenzene	135-98-8	0.0500	ppmv	<0.0500	<0.0500	----	----	----
2-isopropyltoluene	527-84-4	0.0500	ppmv	<0.0500	<0.0500	----	----	----
n-Butylbenzene	104-51-8	0.0500	ppmv	<0.0500	<0.0500	----	----	----
Naphthalene	91-20-3	0.0190	ppmv	<0.0190	<0.0190	----	----	----
<b>EP104: Light Hydrocarbons</b>								
Methane	74-82-8	0.005	Mol %	<b>59.7</b>	<b>75.0</b>	----	----	----
<b>EP104: Light Hydrocarbons (Calc Conc)</b>								
Methane	74-82-8	33	mg/m <sup>3</sup>	<b>390000</b>	<b>490000</b>	----	----	----
<b>EP104: Permanent Gases</b>								
Carbon Dioxide	124-38-9	0.005	Mol %	<b>10.6</b>	<b>26.8</b>	----	----	----
Helium	7440-59-7	0.005	Mol %	<0.010	<0.013	----	----	----
Oxygen	7782-44-7	0.10	Mol %	<b>0.73</b>	<0.26	----	----	----
<b>EP104: Permanent Gases (Calc Conc)</b>								
Carbon Dioxide	124-38-9	90	mg/m <sup>3</sup>	<b>191000</b>	<b>482000</b>	----	----	----
Helium	7440-59-7	8	mg/m <sup>3</sup>	<16	<20	----	----	----
Oxygen	7782-44-7	1310	mg/m <sup>3</sup>	<b>9570</b>	<3280	----	----	----
<b>Sampling Quality Assurance</b>								
Pressure - As received	PRESSURE	0.1	kPaa	<b>95.1</b>	<b>76.7</b>	----	----	----
Pressure - Laboratory Atmosphere	----	0.1	kPaa	<b>101</b>	<b>101</b>	----	----	----
Temperature as Received	----	0.1	°C	<b>21.0</b>	<b>21.0</b>	----	----	----
Vacuum - As received	----	0.03	Inches Hg	<b>1.62</b>	<b>7.06</b>	----	----	----



**Analytical Results**

Sub-Matrix: SOIL GAS  
 (Matrix: AIR)

Sample ID

				LG01	LG02	----	----	----
				C12333_S321	C14227_S225			
Sampling date / time				13-Aug-2024 00:00	13-Aug-2024 00:00	----	----	----
Compound	CAS Number	LOR	Unit	EN2409364-001	EN2409364-002	-----	-----	-----
				Result	Result	----	----	----
<b>USEPA Air Toxics Method TO15r Surrogates</b>								
<b>4-Bromofluorobenzene</b>	460-00-4	0.5	%	<b>82.2</b>	<b>84.9</b>	----	----	----



### Surrogate Control Limits

Sub-Matrix: SOIL GAS		Recovery Limits (%)	
Compound	CAS Number	Low	High
<b>USEPA Air Toxics Method TO15r Surrogates</b>			
4-Bromofluorobenzene	460-00-4	60	140

### Inter-Laboratory Testing

Analysis conducted by ALS Brisbane, NATA accreditation no. 825, site no. 818 (Chemistry / Biology).

(GAS) EP251: Sulfur Compounds



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