Annual Environmental Monitoring Report (AEMR) 2022-2023

Address: **Dunmore Recycling & Waste Depot**
44 Buckleys Road,
Dunmore, NSW, 2529

Project No.: **ENRS0033**

Date: **November 2023**

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Record of Distribution:

Copies	Status	Document	Date	Prepared For
PDF	Rev.1	ENRS0033_SCC Dunmore Landfill_AEMR 2022-2023	28/11/2023	SCC

Executive Summary

Environment & Natural Resource Solutions (ENRS Pty Ltd) were commissioned as independent environmental consultants by ALS Environmental (Wollongong) on behalf of Shellharbour City Council (SCC) to prepare the Annual Environmental Monitoring Report (AEMR) for the Dunmore Recycling and Waste Depot (herein referred to as the Site).

This (AEMR) summarises the results of field testing and laboratory analysis conducted by ALS for the 2022-2023 monitoring period, and provides the necessary data assessment and analysis to meet requirements of the Site's Environment Protection Licence/s (EPL's); No.5984 and No.12903.

The Site was established in 1945 and has been managed by Shellharbour City Council (SSC) since 1983. The Site accepts putrescible and non-putrescible waste within its managed landfill cell. Recycling activities conducted at the site include Resource Recovery Centre, Revolve Centre and Food Organics and garden Organics (FOGO) processing.

In late 2020 to July 2021 Shellharbour City Council moved away from sole reliance on traditional onsite leachate management techniques through initiating a secondary leachate treatment option in which leachate was transported from site for processing at a contractor facility.

In early 2021 Shellharbour City Council constructed a new Leachate Treatment Plant (LTP) on site, which was commissioned in July/August 2021. The LTP is comprised of three primary biological treatment units, including an anoxic reactor, nitrifying reactor, and sequencing batch reactor. The treated stream meets Sydney Water requirements for discharge into Sydney Water sewer, under a trade waste agreement. On average the LTP discharges 60kL/day of treated water, equating to approximately 22ML of leachate removal from site per annum.

Waste regulation in NSW is administered by the EPA under the Protection of the Environment Operations (POEO) Act (1997); the Waste Avoidance and Resource Recovery Act (2001).

The Site operates under the conditions of two (2) EPLs:

- EPL No. 5984. Landfill activities. Consisting of; extractive activities, waste disposal and composting.
- EPL No. 12903. Resource recovery activities. Consisting of; composting and waste storage within the FOGO Facilities and Resource Recovery Centre.

A copy of the relevant EPL sections outlining the sampling requirements is provided in Appendix A (EPL No. 5984). ENRS note that EPL No. 12903 does not specify sample points.

The objectives of this AEMR are to:

- Meet the environmental monitoring requirements of Sites EPLs; No. 5984 and 12903;
- Assess and analyse the environmental monitoring data for the Site against NSW EPA endorsed criteria;
- Identify trends of the environmental monitoring data over the reporting period;
- Identify any on-site or off-site impacts associated with operation of the Site;
- Advise SCC if the current environmental monitoring program is providing adequate information to identify potential environmental impacts from existing operations (if any) and provide recommendations on improvement to the monitoring program if required; and
- Document monitoring results in an Annual Environmental Monitoring Report.

The scope of work for this AEMR comprised the collation, assessment and reporting of Site data made available to ENRS from the 2022-2023 monitoring period in regard to the following tasks:

- Review previous reports and document the hydrogeological setting;
- Tabulate results of all monitoring data for both water and dust samples, collected and provided by ALS as required by the EPLs for the respective reporting period.
- Analysis and interpretation of all monitoring data (water, dust and landfill surface gas);
- Review all quarterly environmental monitoring reports from the 2020 reporting period and available data from the last three (3) years;
- Identification of any deficiencies in environmental performance identified by the monitoring data, trends or environmental incidents, and identification of remedial actions taken or proposed to be taken to address these deficiencies; and
- Recommendations on improving the environmental performance of the facility including improvement to the monitoring program.

Based on the findings obtained during the 2022-2023 monitoring program the following conclusions and recommendations are provided:

- Shallow groundwater flow is expected to mimic topography with low hydraulic gradients flowing towards the south and southeast towards Rocklow Creek. The nearest sensitive receptors are likely to include; recreational users of the Minnamurra River estuary environs; down gradient stakeholders; and downgradient alluvial aquifers, swamps, Rocklow Creek, Minnamurra River and Groundwater Dependent Ecosystems near discharge zones;
- Groundwater throughout the monitoring period reported exceedances of the assessment criteria for; ammonia, heavy metals, nitrate and salinity (EC) within multiple groundwater bores. These exceedances were considered to be within historical values with no significant change in site conditions;
- Offsite sample locations within Rocklow Creek generally reported satisfactory results. However, exceedances for ammonia were above the ecological stressor value.
- Surface gas methane monitoring reported satisfactory results all within the adopted assessment criteria;
- Methane levels of enclosed structures on or withing 250m of deposited waste or leachate storage were tested and found to be below the acceptable threshold for 1% (volume/volume) in all cases;
- Dust deposition gauges recorded satisfactory results below the guidelines provided in AS3580.10.1. Monitoring should continue in accordance with EPL 5984 requirements;
- Based on this review of the 2022-2023 annual monitoring period, contaminants associated with the landfill cell, leachate dam/s and general site uses are considered to be relatively consistent with the range of historical results;
- Flare temperatures fell below the required KPI of 760 degrees Celsius on many occasions over the 2022-2023 monitoring period. Further detail relating to root causes and current works are available in the attached Flare Reports in **Appendix J** of this report;
- Should any change in Site conditions or incident occur which causes a potential environmental impact, a suitable environmental professional should be engaged to further assess the Site and consider requirements for any additional monitoring; and
- This report must be read in conjunction with the attached Statement of Limitations.

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1 Introduction

Environment & Natural Resource Solutions (ENRS Pty Ltd) were commissioned as independent environmental consultants by ALS Environmental (Wollongong) on behalf of Shellharbour City Council (SCC) to prepare the Annual Environmental Monitoring Report (AEMR) for the Dunmore Recycling and Waste Depot (herein referred to as the Site).

This (AEMR) summarises the results of field testing and laboratory analysis conducted by ALS for the 2022-2023 monitoring period, and provides the necessary data assessment and analysis to meet requirements of the Site's Environment Protection Licence/s (EPL's); No.5984 and No.12903.

1.1 Project Background

1.1.1 Site History

The Site was established in 1945 and has been managed by Shellharbour City Council (SSC) since 1983. The Site accepts putrescible and non-putrescible waste within its managed landfill cell. Recycling activities conducted at the site include Resource Recovery Centre, Revolve Centre and Food Organics and garden Organics (FOGO) processing.

In late 2020 to July 2021 Shellharbour City Council moved away from sole reliance on traditional onsite leachate management techniques through initiating a secondary leachate treatment option in which leachate was transported from site for processing at a contractor facility.

In early 2021 Shellharbour City Council constructed a new Leachate Treatment Plant (LTP) on site, which was commissioned in July/August 2021. The LTP is comprised of three primary biological treatment units, including an anoxic reactor, nitrifying reactor, and sequencing batch reactor. The treated stream meets Sydney Water requirements for discharge into Sydney Water sewer, under a trade waste agreement. On average the LTP discharges 60kL/day of treated water, equating to approximately 22ML of leachate removal from site per annum.

1.2 EPL Requirements

Waste regulation in NSW is administered by the EPA under the Protection of the Environment Operations (POEO) Act (1997); the Waste Avoidance and Resource Recovery Act (2001).

The Site operates under the conditions of two (2) EPLs:

- EPL No. 5984. Landfill activities. Consisting of; extractive activities, waste disposal and composting.
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A copy of the relevant EPL sections outlining the sampling requirements is provided in Appendix A (EPL No. 5984). ENRS note that EPL No. 12903 does not specify sample points.

1.3 Objectives

The objectives of this AEMR are to:

- Meet the environmental monitoring requirements of Sites EPLs; No. 5984 and 12903;
- Assess and analyse the environmental monitoring data for the Site against NSW EPA endorsed criteria;
- Identify trends of the environmental monitoring data over the reporting period;
- Identify any on-site or off-site impacts associated with operation of the Site;
- Advise SCC if the current environmental monitoring program is providing adequate information to identify potential environmental impacts from existing operations (if any) and provide recommendations on improvement to the monitoring program if required; and
- Document monitoring results in an Annual Environmental Monitoring Report.

1.4 Scope of Work

The scope of work for this AEMR comprised the collation, assessment and reporting of Site data made available to ENRS from the 2022-2023 monitoring period in regard to the following tasks:

- Review previous reports and document the hydrogeological setting;
- Tabulate results of all monitoring data for both water and dust samples, collected and provided by ALS as required by the EPLs for the respective reporting period.
- Analysis and interpretation of all monitoring data (water, dust and landfill surface gas);
- Review all quarterly environmental monitoring reports from the 2020 reporting period and available data from the last three (3) years;
- Identification of any deficiencies in environmental performance identified by the monitoring data, trends or environmental incidents, and identification of remedial actions taken or proposed to be taken to address these deficiencies; and
- Recommendations on improving the environmental performance of the facility including improvement to the monitoring program.

2 Site Identification

2.1 Site Identification

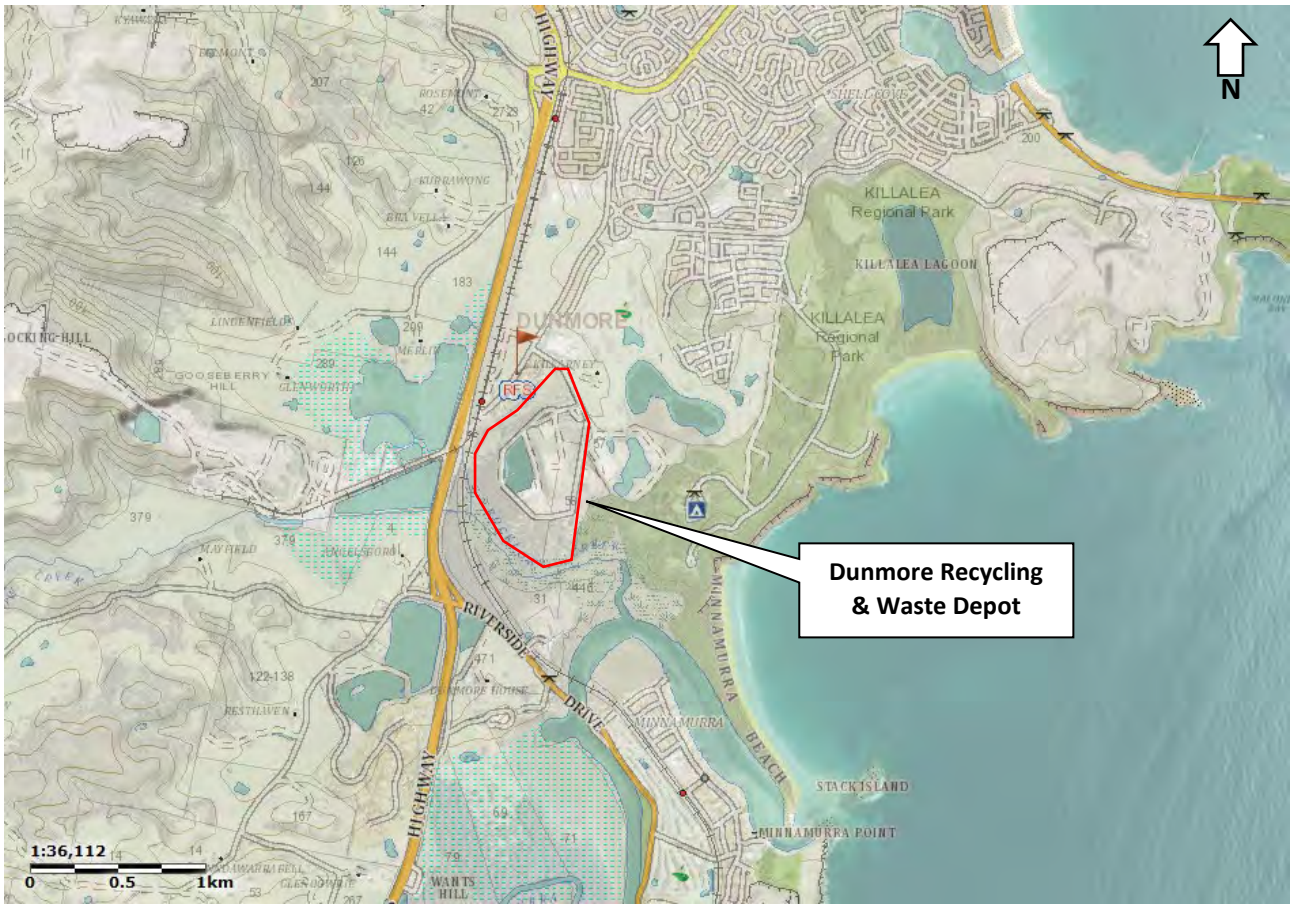
The Site is located at 44 Buckleys Road, Dunmore, NSW, 2529, legally defined as Lot 21 in Deposited Plan 653009 and Lot 1 Deposited Plan 419907. The Site is situated approximately three and a half (3.5) kilometres southwest of the Shellharbour town centre. The area's regional location is defined in **Figure 2-1** below. Details of the Site boundary and sampling points are provided in the Site Plan as **Figure 14-1**. The key features required to identify the Site are summarised in **Table 2-1**.

Table 2-1: Site Identification

Site	Description
Site name	Dunmore Recycling and Waste Depot
Street address	44 Buckleys Road, Dunmore, NSW 2529

Site	Description
Property description	-
(Lot / Deposited Plan)	21 / 653009 and 1 / 419907
Easting/Northing (GDA2020) (approximate centre of Site)	Zone 56H Easting: 302280 Northing: 6168169 (Approximate centre of Site)
Current owners	Shellharbour City Council
Current occupiers	Shellharbour City Council
Site area (total)	72.36 hectares
Site dimensions	Irregular shaped block. Please refer to **Figure 14-1.**
Areas excluded or inaccessible	Assessment was limited to the available data for the sample points listed in the EPL
Local government area	Shellharbour City Council
Current zoning	RU1 Primary Production
Locality map	Albion Park 9028
Trigger for assessment	Reporting requirements of EPL 5984
State or Local government statutory controls	• EPL 5984; • EPL 12903; • Contaminated Land Management Act 1997; • Environment Protection Act 1997; • Environment Protection Regulation 2005. Resilience and Hazards SEPP; • Work Health and Safety Act 2011; • Work Health and Safety Regulations 2011; • Waste Avoidance and Resource Recovery Act (2001).
Legal permissions to access the Site obtained or required	N/A. ENRS did not access the Site.
Consent of adjoining landowners and/or occupiers to access land (if required)	N/A. Not required for this scope of work.

Figure 2-1 Project Location



Source: https://maps.six.nsw.gov.au/ (cited 1/11/2023)

2.2 Surrounding Land Use

The current activities and operations on adjacent properties and the surrounding area include:

Table 2-2: Summary of surrounding land use

Direction	Land Use
North	Buckleys Road, commercial infrastructure and open grassland. Residential dwellings along the northwest border of the Site. Golf course further to the northeast.
East	Dunmore Resources and Recycling facility immediately to the east, bushland to the southeast.
South	Bushland, Rocklow Creek (300m from landfill activities). Further to Kiama Community Recycling Centre and Riverside Drive.
West	Bushland to the southwest, scattered trees immediately to the west and further to the Princes Highway. Boral Quarries complex beyond the Highway. Residential dwellings to the Northwest.

2.2.1 Sensitive Receptors

The nearest sensitive receptors are likely to include:

- Recreational users of the Minnamurra River estuary environs;
- Neighbouring and down gradient stakeholders;
- Ecological receptors - flora and fauna.
- Shallow soil, groundwater and stormwater – vertical and lateral migration of contaminants (if any) and connectivity with shallow groundwater, drainage waterways and nearby tributaries; and
- Down gradient alluvial aquifers, swamps, Rocklow Creek, Minnamurra River and Groundwater Dependent Ecosystems (GDE) near discharge zones.

2.3 Topography

A review of the current series Albion Park (90281N) 1:25,000 topographic map sheet was conducted to assess the regional topography and to identify potential runoff and groundwater controls in the region. Topography provides a useful indicator for groundwater controls including gradient and flow path.

The Site presents low topographic relief, remaining between approximately 3-5 mAHD across the entirety of the Site. The regional topographic gradient trends south-southeast towards Rocklow Creek and Minnamurra River.

2.4 Soil Landscape

Review of the Sites soil landscape was conducted with reference to the Kiama 1:100,000 soil landscape map. The Site was mapped as underlain by organic, black, massive sandy loam topsoil overlying loose bleached light grey sand with iron staining in the subsoil.

Review of the online *Shellharbour City Council* Acid Sulphate Soil Risk Map indicates that the Site lies within a **Class 3** area, suggesting that works beyond 1 metre below the ground level (mbGL) have the potential to encounter Acid Sulphate Soils.

2.5 Geology

A review of the Site geology was undertaken with reference to the Wollongong 1:250,000 geological series sheet (Si56.9) and the Shellharbour-Kiama area coastal quaternary 1:50,000 geology sheet (See Figure 4). The Site is predominately underlain by the Quaternary alluvial deposits (Qal) characterised as Holocene backbarrier flat; marine sand, silt, clay, gravel and shell (Qhbf). The northern most corner of the site is intersected by the Gerringong Volcanics (Pbb) characterised by Latite. Based on the mapped geology, previous investigations and borehole logs, the Site infrastructure including the landfill cell is located within the alluvial deposits.

2.6 Hydrogeology

Groundwater resources in the area are expected to be associated with Shallow unconfined alluvial and unconsolidated systems, generally less than 20 m in depth with moderate to high transmissivity, variable water quality, and strongly controlled by rainfall recharge.

2.6.1 Existing Bores

A network of groundwater monitoring bores is installed at the Site to provide specific data on the quality and nature of groundwater. Given the spatial distribution of the bores and disturbed ground condition expected within the land fill cell, groundwater contours could not be accurately mapped.

A review of the NSW Office of Water (NOW) existing bore records was conducted to develop the conceptual understanding of regional groundwater conditions, including aquifer depths, yields, water quality, and distribution. A search of the Bureau of Meteorology Australian Groundwater Explorer groundwater database identified a total of eighty-eight (88) registered bores within one and a half (1.5) kilometres of the Site (see Figure 5). Registered bores in the area are predominantly associated with the Landfill Site and with the quarry complex (Boral Site) to the west of the EPL Site. The majority of bores are registered for monitoring purposes, excluding a single well (GW044447), which is registered for stock and domestic purposes. The stock bore is located approximately one (1) kilometre to the north of the Site, on the western side of the Princes Highway, which is considered to be up gradient of the Site and not in direct hydraulic connectivity. Registered bore depths are between 1.25 m and 22 m. Bore records indicate shallow unconsolidated aquifer systems.

2.6.2 Flow Regime

Previous reports (Environmental Earth Sciences, 2018) have identified that groundwater flows vary across the Site, but the general trend is south, towards Rocklow Creek.

Based on the unconfined nature of the aquifers, the shallow groundwater flow is inferred to mimic topography with low to moderate hydraulic gradients flowing towards the south.

The Site and adjoining land, was largely unsealed with potential for local recharge from rainfall infiltration. Likely discharge areas are predominantly to the south and east of the Site including swamps and Rocklow Creek. The waterbodies surrounding the Site are recognised as State Environmental Planning Policy No.14 (SEPP14) registered wetlands and Proximity Areas for Coastal Wetlands border the eastern, southern and western boundaries of the Site.

2.7 Surface Water

The Site topography indicates that surface water flow will generally trend to the east towards off Site wetlands and southeast towards Rocklow Creek. These present the primary regional drainage structures for natural surface water and runoff. A series of stormwater infrastructure is present at the Site which is expected to capture run off. Infrastructure includes but not limited to; stormwater drains; sedimentation ponds; levee banks; collection and diversion drains; and leachate dams.

3 Assessment Criteria

ENRS have adopted the most appropriate criteria in accordance with current state and national guidelines. Where available, Australian and NSW EPA endorsed guidelines have been referenced in preference to international standards.

3.1 Water Quality Guidelines

Nationally developed guidelines are provided in the National Water Quality Management Strategy (NWQMS): Guidelines for Groundwater Protection in Australia (ARMCANZ & ANZECC;2013). The relevant criteria to protect environmental values are provided in **Table 3-1**:

Table 3-1: Water Quality Assessment Criteria

Environmental Value	Relevant Guideline
Ecosystems / Health Screening Levels	• ANZG (2018) (Australian and New Zealand Guidelines for Fresh and Marine Water Quality); • ASC NEPM (2013); and • Health Screening Levels for Petroleum Hydrocarbons in Soil & Groundwater (CRC CARE, Sept. 2011)
Drinking Water	• Australian Drinking Water Guidelines (ADWG)

3.1 Groundwater & Surface water Assessment Criteria

The ANZG (2018) provide default guideline values (DGVs) for four (4) levels of protection categorised by the percent of species possibly affected, being 80%, 90%, 95% or 99% of species. Where DGVs are not available reference is made against the ANZECC (2000) Trigger Values (TV). The NSW Office of Water (DECCW;2007) endorsed groundwater management guidelines recommend assessment for aquatic ecosystems based on the 95 per cent of species level of protection. This assessment has adopted the assessment criteria considered most appropriate for the contaminants of concern based on the Site's EPL and results provided by ALS. The adopted TV for the Site Assessment Criteria (SAC) are summarised in **Table 3-2** below.

Table 3-2: Groundwater & Surface Water Assessment Criteria

Analyte	Units	Fresh Water[A]	Marine Water[A]	Drinking Water[B]	
				Health	Aesthetic
Chloride	mg/L	-	-	-	250
Calcium	mg/L	-	-	-	-
Magnesium	mg/L	-	-	-	-
Sodium	mg/L	-	-	-	180
Potassium	mg/L	-	-	-	-
Manganese	mg/L	1.9	-	0.5	0.1
Total iron	mg/L	-	-	-	0.3
Dissolved iron	mg/L	-	-	-	0.3
Fluoride	mg/L	-	-	1.5	-
Ammonia as N[C]	mg/L	0.91 (pH 8)	0.91 (pH 8)	-	0.5
Nitrate as N	mg/L	0.7	-	50	-
Nitrite as N	mg/L	-	-	3	-
Total Organic Carbon	mg/L	-	-	-	-
Bicarbonate alkalinity as CaCO3	mg/L	-	-	-	-
Total alkalinity as CaCO3	mg/L	-	-	-	-
Sulfate as SO4 - turbidimetric	mg/L	-	-	-	250
Dissolved Oxygen - % Saturation (surface water only)	%	85-110%	-	-	-
Suspended Solids (SS) (surface water only)	mg/L	-	-	-	-

Analyte	Units	Fresh Water[A]	Marine Water[A]	Drinking Water[B]	
				Health	Aesthetic
Turbidity (surface water only)	NTU	-	-	-	5
pH	pH	6.5-8.5		6.5-8.5	6.5-8.5
Electrical Conductivity	µS/cm	2200	-	-	-

Table notes:
Criteria is only provided for the analytes test by ALS and listed within EPL 5984.
A: Investigation levels apply to typical slightly-moderately disturbed systems. See ANZECC & ARMCANZ (2000) for guidance on applying these levels to different ecosystem conditions.
B: Investigation levels are taken from the health values of the Australian Drinking Water Guidelines (NHMRC 2011).
D. Criteria for ammonia. See Section 3.1.1:

3.1.1 Ammonia Assessment criteria

In addition to the default TV of 0.91mg/L (pH 8) for ammonia, Table 3.3.2 of the ANZECC (2000) also provides stressor values for physical and chemical stressors for south-east Australia for slightly disturbed ecosystems. The table provides a stressor guideline for ammonia of **0.2mg/L** at pH 8 for lowland rivers. For the purposes of this assessment, the value has been applied to all water samples, excluding the leachate tank.

pH specific ammonia TVs. Additional sample point specific pH dependant trigger values for total ammonia were also adopted when a sample was outside of 8 pH units. Sample specific values were based on Table 8.3.7 of the ANZECC (2000). The additional criteria and results are presented in **Table 14-5** - **Table 14-8** attached.

3.2 Dust Deposition Assessment Criteria

Criteria for collection and assessment of dust deposition concentrations are provided within the Australian standard AS3580.10.1 - Methods for sampling and analysis of ambient air; method 10.1-Determination of particulate matter - Deposited matter - Gravimetric method. AS3580.10.1 provides an acceptable level of 4 g/m2/month.

3.3 Surface Methane Gas Assessment Criteria

The NSW EPA Solid Waste Landfill Guidelines 2nd Edition (2016) provides sampling methodologies and threshold for surface methane gas concentrations at landfill sites. The acceptable threshold for capped landfills is 500 parts per million (ppm) at 5 cm above the capping surface.

3.4 Gas Accumulation Assessment Criteria within Enclosed Structures

The NSW EPA Solid Waste Landfill Guidelines 2nd Edition (2016) provides sampling methodologies and threshold gas levels to ensure that gas is not accumulating within enclosed structures on or within 250m of deposited waste or leachate storage. The acceptable threshold for 1% (volume/volume).

4 Data Quality Objectives (DQO)

If sampling is conducted, Data Quality Objectives (DQO) are required to define the quality and quantity of data needed to support management decisions. The process for establishing DQO's is documented in the National Environment Protection (Assessment of Site Contamination) Measure (NEPC;2013).

4.1 Step 1: State the problem

The Site is currently operating as an active landfill and requires regular environmental monitoring in accordance with the EPL 5984.

4.2 Step 2: Identify the decision/goal of the study

The primary goals / objectives of the investigation program were to:

- Meet the environmental monitoring requirements of Sites EPLs; No. 5984 and 12903;
- Assess and analyse the environmental monitoring data for the Site against NSW EPA endorsed criteria;
- Identify trends of the environmental monitoring data over the reporting period;
- Identify any on-site or off-site impacts associated with operation of the Site;
- Advise SCC if the current environmental monitoring program is providing adequate information to identify potential environmental impacts from existing operations (if any) and provide recommendations on improvement to the monitoring program if required; and
- Document monitoring results in an Annual Environmental Monitoring Report.

4.3 Step 3: Identify the information inputs

The provided results shall be used to identify any risks to the sensitive receptors or change in site conditions. The following inputs were required:

- Representative environmental samples;
- Measurements of environmental parameters;
- Comparison of the parameter results against the adopted Site Assessment Criteria (SAC);
- The completion of an Annual Environmental Monitoring Report.

4.4 Step 4: Define the study boundaries

The assessment was limited to sampling locations listed in EPL 5984. As listed in **Appendix A** and depicted in **Figure 14-1 - Figure 14-2**.

4.5 Step 5: Develop the analytical approach (decision rule)

The site information and results obtained from this assessment scope will be compared against the NSW EPA endorsed SAC documented in **Section 3** with considerations of the land use and nearby receptors. The decision rule process is defined by the following:

- QA/QC indicate the results are reliable;
- Laboratory Practical Quantitation Limits (PQL) or Limits of Reporting (LOR) are less than the SAC; and

- Results meet the adopted SAC and/or are within background levels and regulatory criteria.

4.6 Step 6: Specify performance or acceptance criteria

To ensure the quality of the environmental data collected during the assessment, detailed quality assurance and quality control (QA/QC) measures will be applied by ALS. The QA/QC measures will be followed from the inception of the project, during field sampling, laboratory analysis of samples and data reporting. The QAQC measures understood to have been adopted by ALS are documented in detail below within **Table 5-1**.

4.7 Step 7: Develop the plan for obtaining data

The seventh and final step involves identifying the most effective sampling and analysis design for generating the data that is required to satisfy the data quality objectives. The required sampling program is based on and accounts for the following key points:

- Requirements of Sites EPLs; No. 5984 and 12903;
- The results will be compared against the adopted SAC for the proposed land use.

The indicators (DQI) used to identify that data obtained and provided by ALS has been done so in a way which meets project data quality objectives (DQO) summarised below.

Table 4-1: Summary of Data Quality Objectives (DQO)

DQO	Evaluation Criteria
Documentation completeness	• Completion of field records, chain of custody documentation, laboratory test certificates from NATA-accredited laboratories.
Data comparability	• Use of appropriate techniques for the sampling, storage and transportation of samples. Use of NATA accredited laboratory using NEPM endorsed procedures.
Data representativeness	• Adequate sampling coverage of all required EPL sample points.
Precision and accuracy for sampling and analysis	• Use properly trained and qualified field personnel and achieve laboratory QC criteria. • Blind field duplicates to be collected at a minimum rate of 1 in 20 samples. • RPD's to be less than 30% for inorganic and 50% for organic analyses. • Rinsate samples not considered necessary as all PCoC measured by the lab were assumed to be present at the site. • Disposable single use items used for the collection of samples.

5 Sampling Methodology

Field sampling was conducted by ALS Environmental (Wollongong) as commissioned by SCC on quarterly basis. ENRS understands that sampling was conducted in accordance with ALS sampling protocols with reference to current industry standards and Code of Practices. The following sub-sections provide a summary of the sampling methodologies.

Monitoring frequency is defined by the EPL's and is designed to capture necessary site data to support assessment of Site conditions (quarterly and annual), any long-term trends or overflow events. Monitoring is conducted quarterly and annually for selected analytes with additional overflow and event-based sampling triggered by Site conditions.

5.1 Water Sampling

5.1.1 Location of Water Monitoring Points

Groundwater and surface water monitoring requirements are defined by the EPL No. 5984, as provided in Appendix A. The water sampling regime includes; five (5) surface waters, one (1) located onsite and four (4) located off-site; twelve (12) groundwater monitoring wells surrounding the landfill operations; and one (1) leachate point. Sampling locations are illustrated in Figure 2 attached.

5.1.2 Depth to Water

Prior to sampling, the depth to the groundwater table was measured from the top of casing (TOC) using a water dipper and clear disposable bailer. The bores were inspected for the presence of hydrocarbon and the thickness of any LNAPL was measured visually in clear disposable bailers. No LNAPL was reported on field sheets provided by ALS.

5.1.3 Sample Collection

Sampling is conducted independently by ALS Environmental under contract with SCC. Chain of Custody records and field sheets are provided in Appendix D. ENRS understand sampling was conducted in accordance with ALS sampling protocols.

5.1.4 Groundwater Sampling

Groundwater wells were sampled in order of distance from any areas of known contamination to ensure that lower contaminated wells are sampled before likely higher contaminated wells. Groundwater bores were purged prior to sampling by removing at least three (3) well volumes with samples being collected using clear disposal bailers or low flow parameter stabilisation methods applied with field sheets provided to document pumping volumes and field parameters. Post sampling all samples were sealed in laboratory-prepared sampling containers appropriate for the analysis.

Surface water samples were collected as 'grab samples' from the midpoint of the source at mid-depth.

Post flushing, leachate samples were sampled from a tap on the discharge line directly into purpose specific, pre preserved sample containers.

All samples were stored on ice immediately after their collection and transported to the laboratory under Chain of Custody (CoC) documentation.

Any loss of volatile compounds was kept to a minimum by employing the following sampling techniques:

- Minimal practical disturbance during sampling;
- Samples placed in sample containers as soon as possible;

- Sample containers contain zero headspace;
- Samples placed directly on ice and transported to the laboratory as soon as possible; and
- Employing the most appropriate analytical method to minimise volatile losses at the laboratory.

5.1.5 Field Testing

Field testing was conducted during bore purging and sampling to record physical water parameters. A multi-probe water quality meter was used to measure the following parameters:

- Oxygen Reduction Potential (ORP, representing redox).
- Electrical Conductivity (Salinity - EC);
- Temperature; and
- pH (Acidity).

5.2 Dust Deposition Sampling

Measurement of dust deposition was carried out in accordance with the Australian Standard AS3580.10.1 (2016). This Australian Standard provides a mean of determining the mean surface concentration of deposited matter from the atmosphere.

Dust collection gauges were set up for a one (1) month periods at during each quarterly sampling event. A total of four (4) dust monitoring locations were considered adequate to assess site conditions.

5.3 Surface Methane Gas Monitoring

The concentration of methane gas (in units of ppm) at the Site was carried out in accordance with EPA Guidelines Solid Waste Landfill 2nd Edition 2016. On the day of sampling the wind speed was below 10 km/hr. Testing was conducted using a calibrated LaserOne portable gas monitor specifically designed for landfill gas monitoring. A calibration Certificate is provided in Appendix F.

One field technician commenced data collection along transect lines in a grid pattern across the landfill surface at 25-metre spacings. A site plan depicting the sampled transect line is provide in Figure 3. Transects were recorded using a Magellan SporTrak GPS. The concentration of methane gas was measured at a height of 5 cm above the ground in areas with intermediate or final cover over the emplaced waste.

5.4 Gas Accumulation Monitoring in Enclosed Structures

The concentration of methane gas (in units of percent volume/volume) inside all enclosed structures within 250m of emplaced waste or leachate storage facility at the Site was carried out in accordance with EPA Guidelines Solid Waste Landfill 2nd Edition 2016. On the day of sampling testing was conducted using a calibrated LaserOne portable gas monitor specifically designed for landfill gas monitoring. A calibration Certificate is provided in Appendix F.

The internal methane concentrations for each enclosed structure were recorded by a field technician. A site plan depicting the location onsite of each structure provided in Figure 3. Any depressions or surface fissures away from the sampling grid were also investigated.

5.5 Laboratory Analysis

ALS, a NATA accredited laboratory, was contracted by SCC to undertake the sample analysis in accordance with current standards. Laboratory QA/QC results are detailed in the Laboratory reports contained in the appendices section of this report.

5.6 Flare Monitoring

Landfill gases (LFG) are formed through bacterial action on emplaced waste and are a normal by-product of Landfilling operations. Landfill gas is a mixture of many different gases, typically its major components include methane and carbon dioxide. Smaller concentrations of nitrogen, oxygen, ammonia, sulphides, hydrogen, carbon monoxide, and nonmethane organic compounds (NMOCs) and Volatile Organic Compounds (VOC's) may also be present.

When operated efficiently the use of a gas flare to burn landfill gas can significantly reduce emissions of methane, NMOCs and VOC's.

The flare was monitored, maintained and operated by LGI LTD. Copies of LFG reports for the relevant reporting period are included as Appendix G.

5.7 QAQC

The Quality Assurance and Quality Control (QA/QC) protocols for the sample program conducted by ALS are summarised in **Table 5-1**.

Table 5-1: Summary of QAQC for Sample Program

Protocol	Description
Sampling Team	Site personnel comprised only experienced and qualified environmental professionals trained in conducting site contamination investigations.
Sample Method	Samples obtained in laboratory prepared containers with preservatives appropriate for the required analysis.
Calibration	Equipment calibration certificates for each sampling event.
Sample Equipment	All sample equipment disposed or decontaminated between sample sites.
Field Screening	Visual and manual inspection of sample materials for potential contamination recorded on field sheets.
Chain of Custody Forms	All samples logged and transferred under appropriately completed Chain of Custody (COC) forms with Sample Receipts issued by the laboratory.
Blind Field Duplicate	At least one (1) blind field duplicate collected per 20 samples and submitted for analysis accompanied by COC forms.

6 Water Quality Results

Laboratory results for groundwater and surface water were provided to ENRS for tabulation and comparison with relevant EPL assessment criteria. A summary of results is provided in Table 9 with comparison against the relevant Site Assessment Criteria (SAC). The laboratory certificates of analysis are provided in Appendix B.

6.1 Overflow Results

A total of two (2) overflow samples were taken at SWP-1 during the 2022-2023 period and are displayed in Table 6-1 below. On both occasions samples results were compliant to the EPA trigger values for pH and Suspended Solids concentrations.

Table 6-1: Summary of Overflow Events

Sample Date	pH	TSS	Ambient Temperature	Rainfall (mm) Previous 24Hrs
13/03/2023	7.9	17	24.7	38.2
1/05/2023	7.6	9	19.5	Not recorded.

6.2 Physical Indicators

6.2.1 Groundwater Depth

The measured depth to groundwater remained relatively consistent through the monitoring period with a low degree of variance. The Site was charactered by a shallow water table of less than 5.0 mbgl. The depth to water was measured between:

- Quarter 1 December 2022: 0.73 mbgl (BH-15) and 4.53 mbgl (BH-14);
- Quarter 2 March 2023: 0.53 mbgl (BH-15) and 4.62 mbgl (BH-14);
- Quarter 3 June 2023: 0.68 mbgl (BH-15) to 4.64 mbgl (BH-14); and
- Quarter 4 September 2023: 0.89 mbgl (BH-15) and 4.53 mbgl (BH-14).

6.2.2 Salinity

Salinity is reported by the laboratory as either Electrical Conductivity (EC) or Total Dissolved Solids (TDS). The ANZECC guidelines document a conversion ratio for of 0.68 mg/L = 0.68 EC (µS/cm). Table 3.3.3 of the ANZECC (2000) guidelines document default TV for EC in lowland freshwater rivers between 125 µS/cm - 2,200 µS/cm (~1,500 mg/L). Marine waters may be characterised by an EC between 35,000 µS/cm - 50,000 µS/cm.

Groundwater

During the annual monitoring period, salinity in groundwater samples reported a relatively low degree of variance between each sampling event. The Site was generally characterised freshwater EC values in the upgradient northern portions of the Sites, tending to become more saline towards Rocklow Creek, being a tidal river system. The results were all considered to be in range of historical values.

Surface Waters

Surface water samples collected from Rocklow Creek (SWP_UP, SWC_2, SWC_Down and SWC-Down 2) reported elevated EC values up to 32,600 µS/cm (SWC_Down, June 2023), considered to be characteristic of the tidal river system. The results were generally in range of historical values and considered satisfactory.

Results for onsite surface water location SWP1 were reported between 788 µS/cm (Sept. 2023) and 1,500 µS/cm (Dec. 2022) which were within the adapted TV. The results were generally in range of historical data and considered satisfactory.

Leachate

Leachate salinity for the annual monitoring period ranged between 7,380 µS/cm (June 2023) and 9,310 µS/cm (Dec. 2022) which were all above the TV.

Leachate Salinity has generally stabilised since the implementation of the Leachate Treatment Plant in July/August 2021.

6.2.3 Dissolved Oxygen

Levels of Dissolved Oxygen (DO) were measured in the field for surface waters only. DO reflects the equilibrium between oxygen-consuming processes and oxygen-releasing processes. DO can initiate redox reactions resulting in the uptake or release of nutrients. Low DO concentrations can result in adverse effects on many aquatic organisms which depend on oxygen for their efficient metabolism. At reduced DO concentrations many compounds become increasingly toxic, for example Zinc, Lead, Copper, phenols, cyanide, hydrogen sulphide and Ammonia.

The ANZG (2018) guidelines Table 3.3.2 outlines a range between 85% to 110% saturation for low land rivers. Assuming a water temperature of 18°C this is equivalent to approximately 7-11 mg/L or ppm. DO is reported by the laboratory in mg/L which be converted to a percentage.

Surface Waters

Dissolved Oxygen within onsite surface water location SWP-1 reported results between 3.43mg/L / 37.72% (Dec.2022) and 8.53 mg/L / 93.8% (Mar. 2023). Results were generally below the TV and were consistent with historical data.

Results for DO within offsite surface water locations within Rocklow Creek ranged from 4.16 mg/L / 45.74% (SWC-2, Mar. 2023) and to 6.71 mg/L / 74.1% (SWC-Up, June 6.742023). The results were generally consistent with the historical data.

Leachate

Dissolved oxygen at leachate tank LP1 ranged between 5.25 mg/L / 60.3% (Sept. 2023) and 6.22 mg/L / 60% (June 2023). The results were generally in range of the historical data.

6.2.4 pH

pH is a measure of hydrogen activity. pH determines the balance between positive hydrogen ions (H+) and negative hydroxyl ions (OH-) and provides a test of water acidity (low pH) or alkalinity (high pH). Most natural freshwaters have a pH in the range 6.5 to 8.0. Changes in pH may affect the physiological functioning of biota and affect the toxicity of contaminants. Both increases and decreases in pH can result in adverse effects, although decreases are likely to cause more significant problems. Low pH indicates acidic conditions which may increase the mobility of heavy metals, whilst high pH indicates alkaline conditions which may also generate Ammonia. Previous investigations of other regional Landfill Sites in the Illawarra-Shoalhaven (Forbes Rigby;1996) report regionally acidic groundwater with low readings in the range of 4.3 pH associated with silica saturation and oxidation of accessory marcasites grains (iron sulphide).

Groundwater

Results pH for the annual monitoring period for all groundwater samples were reported within the SAC. No exceedances were recorded. Groundwater was therefore measured to be generally neutral and satisfactory.

Surface Water

Results for pH in surface waters were all reported within the SAC and considered satisfactory.

Leachate

The leachate tank LP1 generally reported alkaline conditions above the SAC. The pH of LP1 ranged between 8.5 (Dec. 2022) and 9.4 (Mar. 2023). The results were considered to be within range of historical values.

6.2.5 Total Suspended Solids (TSS)

TSS provides a measure of turbidity reported as the mass of fine inorganic particles suspended in the water. Measurement of TSS provides a valuable indication of the sediment and potential nutrient load. Elevated TSS decreases light penetration whilst phosphorus is absorbed onto sediment surfaces. TSS was measured for surface water sample points only.

Results for TSS in Rocklow Creek samples were generally reported below the laboratory lower limit of reporting. A maximum result of 7 mg/L (SWC_2, June 2023) was reported. However, it was considered to be relatively minor. The results were considered satisfactory.

Results for TSS in onsite SWP1 were generally reported below the laboratory lower limit of reporting. A single detection of 99 mg/L was reported in March 2023. However, it was considered to be relatively minor. The results were considered satisfactory.

6.3 Inorganic Analytes

Water samples were analysed for select nutrients including Ammonia, Ammonium, Nitrate and Nitrite. The most bio-available forms of Nitrogen are Ammonium (NH_4^+) and Nitrate (NO_3^-). Ammonia is an oxygen-consuming compound and is toxic to aquatic biota at elevated concentrations. Ammonia toxicity increases under low oxygen levels and higher pH.

6.3.1 Ammonia

Groundwater

Results for ammonia in groundwater over the annual monitoring period reported exceedances above the ecological stressor value of 0.2 mg/L, 95% TV of 0.91 mg/L and pH modified TV's (see Table 14-5 - Table 14-8) in all samples. Results were considered to be significantly above the SAC and within range of the previous values.

Surface Water

Ammonia in onsite surface water at SWP-1 was reported between 0.03 mg/L (Mar. 2023) and 8.52 mg/L (Dec. 2022). Results exceeded the SAC in two (2) out of the four (4) sampling events. The results were considered to be generally consistent with previous routine monitoring samples.

Ammonia concentrations in Rocklow Creek ranged between 0.07 mg/L (SWC_Up, 05/09/2022) to 0.76 mg/L (SWC_2, Sept. 2023). Multiple results were report above the ecological stressor value of 0.2 mg/L. All results were below the 95% TV and pH modified TVs. Results are generally consistent with the historical data.

Leachate

Ammonia in leachate tank LP1 reported elevated results above the SAC between 773 mg/L (Dec. 2022) and 344 mg/L (June 2023). The results may be considered characteric of leachate. Results were within range of historical values.

6.3.2 Nitrate

Groundwater

Results for Nitrate in groundwater samples were generally reported satisfactory results below the SAC. However, exceedances were reported above the 95% TV during each quarter. The December 2022 quarter reported exceedances in BH3 of 2.39 mg/L and BH14 of 1.59 mg/L. The March 2023 quarter reported exceedances in BH3 of 3.2 mg/L and BH21 of 9.68 mg/L. The June 2023 quarter reported exceedances in BH3 of 1.37 mg/L and BH14 of 5.95 mg/L. The September 2023 quarter reported exceedances in BH13 of 4.43 mg/L, BH14 of 1.03 mg/L and BH21 of 23.7 mg/L.

Surface Water

Nitrate concentrations for all surface water were reported below the SAC and considered satisfactory.

Leachate

Nitrate concentrations for leachate tank LP1 during the annual monitoring period were reported below the SAC and considered satisfactory.

6.3.3 Nitrite

Results for nitrate in all groundwater, surface water and leachate tank LP1 were all reported below the SAC and were considered to satisfactory.

6.4 Anions

6.4.1 Chloride

The results for chloride in groundwater, surface waters and leachate were reported between 13 mg/L (BH18 Sept. 2023) and 12,100 mg/L (SWC-down Jun. 2023). In general, elevated chloride results were measured in Rocklow Creek, characteristic of the tidal river system. In comparison, upgradient groundwater results reported lower chloride concentrations. Results were generally consistent with historical data.

6.4.2 Fluoride

The results for fluoride in groundwater, surface water and leachate tank were all reported below the SAC and were generally consistent with the historical data.

6.4.3 Sulphate

Results for sulphate in groundwater generally reported satisfactory results that were in range of the historical data. Higher sulphate results were reported in Rock low Creek, which may be characteristic of the tidal river system.

6.4.4 Total Alkalinity

Surface Water

Results for total alkalinity were consistent with historical data and considered to be satisfactory.

6.4.5 Bicarbonate Alkalinity

Bicarbonate alkalinity in groundwaters were consistent with historical data and considered to be satisfactory.

6.5 Metals

6.5.1 Manganese (Total Mn)

Groundwater

Results for manganese in all groundwater, surface water and leachate tanks samples for the annual monitoring period were all reported below the 95% TV of 1.9 mg/L. The results were generally consistent with historical data.

6.5.2 Iron (total Fe)

Total iron was measured in surface water and leachate tank LP1 only. Results for total iron were reported between laboratory LOR of <1.0 mg/L and 1.67 mb/L (LP1, Sept. 2023). The results were generally consistent with historical data.

6.5.3 Iron (Dissolved Fe)

Concentrations of dissolved iron in groundwater reported results consistent with historical data and were satisfactory.

6.5.4 Calcium

Results for calcium in groundwater, surface water and leachate tank LP1 were reported below the SAC and within range of historical data. The results were therefore considered satisfactory.

6.5.5 Potassium

Results for potassium in groundwater, surface water and leachate tank LP1 were reported below the SAC and within range of historical data. The results were therefore considered satisfactory.

6.6 Organic Analytes

6.6.1 Total Organic Carbon

Total Organic Carbon (TOC) provides a measure of the total concentration of organic material in a water sample. TOC is typically higher in surface water than groundwater. However, high TOC is also characteristic of leachate from landfill. TOC provides a marker for biological activity associated with contaminant degradation and can be used to delineate contaminant plumes. TOC influences geochemical processes by:

- acting as proton donors/acceptors;
- providing pH buffering;
- participating in mineral dissolution/precipitation reactions; and
- providing carbon substrate for microbe-based biodegradation.

Results for TOC in groundwater samples were generally low and consistent with historical data. BH1c reported elevated results in comparison against the other sites. Results for BH1c ranged between 180mg/L (Mar. 2023) and 22 mg/L (Sept. 2023). However, the results for BH1c were within range of historical data.

TOC in surface water samples reported satisfactory results over the annual monitoring period.

TOC in leachate tank LP1 reported elevated results over the annual monitoring period. This may be expected of leachate water and was generally consistent with historical data.

7 Dust Gauge Results

The below table provides the results of the dust depositions results. A total of four (4) dust collectors were onsite for one (1) month for each quarterly sampling round, in general accordance with AS3580.10.1. A summary of the September 2022 results is provided in Table 7-1 below.

Table 7-1: Summary of Dust Gauge Results

Quarter	Sample ID	Guideline Criteria (g/m2/month)	Total Insolvable Matter (g/m2/month)	Comment
Quarter 1 4/11/2022 – 7/12/2022	DDG1	4	**1.2**	Below SAC
	DDG2		**0.8**	Below SAC
	DDG3		**1.7**	Below SAC
	DDG4		**2.1**	Below SAC
Quarter 2 1/02/2023 – 1/03/2023	DDG1		**1.5**	Below SAC
	DDG2		**0.8**	Below SAC
	DDG3		**1.5**	Below SAC
	DDG4		**2.4**	Below SAC
Quarter 3 4/05/2023 – 1/06/2023	DDG1		**0.6**	Below SAC
	DDG2		**0.4**	Below SAC
	DDG3		**0.3**	Below SAC

Quarter	Sample ID	Guideline Criteria (g/m2/month)	Total Insolvable Matter (g/m2/month)	Comment
	DDG4		**1.3**	Below SAC
Quarter 4	DDG1		**0.7**	Below SAC
	DDG2		**1.5**	Below SAC
	DDG3		**1.2**	Below SAC
	DDG4		**9.5**	**Above SAC**

Results for depositional dust during the 2022-2023 annual monitoring period generally reported levels of dust below the adopted assessment criteria of 4 g/m2/month. A single exceedance was report for Quarter 4 of 9.5 g/m2/month. Dust gauge locations are provided in Figure 2 attached. It is recommended that monitoring is continued in accordance with EPL 5984.

8 Methane Monitoring Results

8.1 Surface Gas Methane

The surface gas monitoring for the 2022-2023 annual monitoring period DID NOT detect any levels of methane above the EPA license limits of 500 ppm. The results were considered satisfactory. A table of results is provided in **Appendix G**.

8.2 Gas Accumulation Monitoring in Enclosed Structures

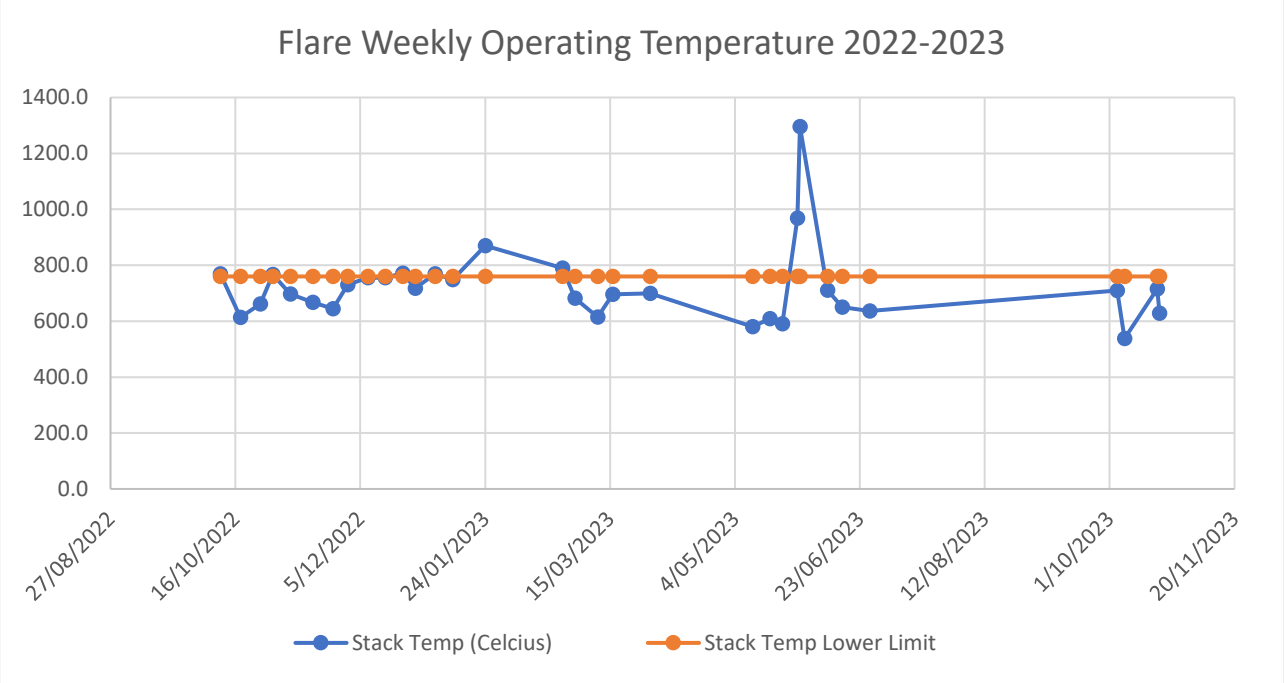
The internal methane testing for enclosed structures within 250m of the landfill during the 2022-2023 annual monitoring period DID NOT detect any levels of methane above the EPA license limits of 1% V/V. The results were considered satisfactory.

9 Flare Operations Results

Weekly average operating temperatures for the flare were supplied by LGI and displayed typical variation associated with a continuous process. Results are summarised in Chart 1 below. LGI Gas Flare reports included as **Appendix J**.

Weekly average operating temperatures supplied by LGI displayed typical variation associated with a continuous process. Weekly operating temperatures at the Flare fell below the Operational temperature Limit of 760 degrees on more often than not. This is in line with the historical data. The actions taken throughout the annual period to address the root causes are outlined in the LGI Gas Flare reports included as **Appendix G.**

Chart 1: Weekly Flare Operating Temperatures 2022-2023



Notes: Data sourced form the LGI reports provided in Appendix J.

10 Quality Assurance/Quality Control Data Evaluation (QAQC)

10.1 Field Sampling QAQC

It was understood that the sample program was completed in general accordance with the ALS standard operation procedures (SOP) which references current industry guidelines.

The QAQC procedures and indicators for field sampling procedures are summarised in Table 10-1.

Table 10-1: Sampling QAQC Procedures

QAQC Indicator	Completeness	Comparability	Representativeness	Precision	Accuracy	Status: Yes	Status: No	Status: N/A	Procedures and performance
Details of sampling team	X	X				☒	☐	☐	Tertiary qualified, LAA, consistent team.
Reference to sampling plan/method, including any deviations from it – sampling and analysis quality plan	X					☒	☐	☐	Sampling in accordance with the SOP.

QAQC Indicator	Completeness	Comparability	Representativeness	Precision	Accuracy	Status: Yes	Status: No	Status: N/A	Procedures and performance
Any information that could be required to evaluate measurement uncertainty for subsequent testing (analysis)				X	X	☒	☐	☐	Field sampling records and chain of custody completed in full.
Decontamination procedures carried out between sampling events			X	X	X	☒	☐	☐	Equipment such as decontaminated between samples by washing with phosphate free detergent followed by rinsing with potable water. Re-use of sampling equipment was avoided, where possible. Single use deposable sampling equipment was the preferred method.
Logs for each sample collected, including date, time, location (with GPS coordinates if possible), sampler, duplicate samples, chemical analyses to be performed, site observations and weather/environmental (i.e. surroundings) conditions. Include any diagrams, maps, photos.		X	X			☒	☐	☐	Sampling field sheets were used as required.
Chain of custody fully identifying – for each sample – the sampler, nature of the sample, collection date, analyses to be performed, sample preservation method, departure time from the site and dispatch courier(s) (where applicable)	X	X				☒	☐	☐	COC's completed in full.
Field quality assurance/quality control results (e.g. field blank, rinsate blank, trip blank, laboratory prepared trip spike)				X	X	☒	☐	☐	Field QAQC analysed for chemical samples – field duplicate.

QAQC Indicator	Completeness	Comparability	Representativeness	Precision	Accuracy	Status Yes	Status No	Status N/A	Procedures and performance
Sample splitting techniques – subsampling, containers/preservation (ensure unique ID for subsequent samples provided)			X			☒	☐	☐	Samples obtained in laboratory prepared sample containers appropriate for the analytes.
Statement of duplicate frequency			X	X		☒	☐	☐	Blind field duplicates collected at 1/20 frequency
Background sample results	X	X				☒	☐	☐	Reviewed against previous investigation results.
Field instrument calibrations (when used)				X	X	☐	☐	☒	Yes field equipment was calibrated prior to use.
Sampling devices and equipment	X	X				☒	☐	☐	Manual sampling with decontamination procedures and disposable equipment.
A copy of signed chain-of-custody forms acknowledging receipt date, time and temperature and identity of samples included in shipments	X	X				☒	☐	☐	COC's completed in full, final records from NATA laboratory attached to CoAs.

10.2 Laboratory QAQC

The QAQC procedures and indicators for laboratory analysis procedures are summarised in Table 10-2.

Table 10-2: Laboratory QAQC procedures

QAQC Indicator	Completenes	Comparability	Representativ	Precision	Accuracy	Status Yes	Status No	Status N/A	Procedures and performance
A copy of signed chain-of-custody forms acknowledging receipt date, time and temperature and identity of samples included in shipments	X	X				☒	☐	☐	All samples were logged and transferred under appropriately completed Chain of Custody Forms.

QAQC Indicator	Completenes	Comparability	Representativ	Precision	Accuracy	Status: Yes	Status: No	Status: N/A	Procedures and performance
Record of holding times and a comparison with method specifications	X	X				☒	☐	☐	Records documented in the laboratory QAQC report attached to CoA.
Analytical methods used, including any deviations	X	X				☒	☐	☐	Recorded in the CoA.
Laboratory accreditation for analytical methods used, also noting any methods used which are not covered by accreditation	X			X		☒	☐	☐	Recorded in the CoA.
Laboratory performance for the analytical method using inter-laboratory duplicates		X			X	☒	☐	☐	Records documented in the laboratory QAQC report attached to CoA.
Surrogates and spikes used throughout the full method process, or only in parts. Results are corrected for the recovery	X	X				☒	☐	☐	Records documented in the laboratory QAQC report attached to CoA.
A list of what spikes and surrogates were run with their recoveries and acceptance criteria (tabulate)		X			X	☒	☐	☐	Records documented in the laboratory QAQC report attached to CoA.
Practical quantification limits (PQL)	X	X				☒	☐	☐	Recorded in the CoA. PQLs <SAC.
Reference laboratory control sample (LCS) and check results	X					☒	☐	☐	Records documented in the laboratory QAQC report attached to CoA.
Laboratory duplicate results (tabulate)	X				X	☒	☐	☐	Records documented in the laboratory QAQC report attached to CoA.
Laboratory blank results (tabulate)	X				X	☒	☐	☐	Records documented in the laboratory QAQC report attached to CoA.
Results are within control chart limits	X					☒	☐	☐	Records documented in the laboratory QAQC report attached to CoA.
Evaluation of all quality assurance/control information listed above against the stated data quality objectives, including a quality assurance/control data evaluation	X	X	X	X	X	☒	☐	☐	Records documented in the laboratory QAQC report attached to CoA.

10.3 QAQC Discussion

A summary of the Data Quality performance and evaluation is summarised in **Table 10-3** below:

Table 10-3: QAQC and Data Evaluation Summary

Objective	Performance	Status
Documentation completeness	• Completion of field records; • Chain of Custody (COC) documentation; • Calibration certificates for equipment; • NATA Laboratory Sample Receipt Notification (SRN); and • NATA laboratory Certificate of Analysis (COA). • Sample Location Plans. • Sample field sheets.	✓
Precision & accuracy for sampling & analysis	• Use only trained and qualified field personnel; • Calibration certificates for field equipment; • Appropriate sampling and field techniques; • Decontamination procedures; • Achieve laboratory QC criteria; and • Achieve QAQC requirements for RPDs and Recovery	✓
Identify Anomalies	• No elevated results not expected by the CSM; • No labelling or sample management errors; • No laboratory analyses or reporting errors	✓
DATA completeness	• Sampling density comparison meets NSW EPA (1995) 'Sampling Design Guidelines' for or all potential contaminants of concern at all areas of environmental concern; and • Systematic and judgemental sampling to provide sufficient data representative of all AECs.	✓
Data comparability	• Use of appropriate techniques for the sampling, storage and transportation of sample media; • Use of NATA certified laboratory using NEPM endorsed procedures; and • Comparison with previous site information, if any.	✓
Data representative ness	• Adequate sampling coverage at all points listed in the EPL. • Selection of representative samples from each sampling location; & • Analysis for PCoC. • Achieve laboratory QC criteria. • Achieve QAQC requirements for RPDs and Recovery.	✓

The laboratory was NATA accredited, and the Practical Quantitation Limits (PQL) also referred to as Limits of Reporting (LOR) were within the acceptable levels for the investigation criteria. Laboratory certificates of analysis provided in **Appendix F** indicate that for the samples collected during the scope of works, sampling techniques, transport procedures and laboratory analysis were satisfactory. Analysis of Relative Percent Differences (RPD) was conducted of duplicates for each quarterly sampling event. RPDs calculation tables are provided in **Table 14-10 - Table 14-16**. RPD results generally reported satisfactory differences within the criteria of 30% for organics and 50% for inorganics. Emissions of further QA/QC including rinsate samples, trip blank spikes and triplicate

were considered to me minor omissions, unlikely to impact the validity of the data. In summary, the QA/QC indicators all complied with the required standards or showed variations that would have no significant effect on the quality of the data or the conclusions of this assessment. Based on the following conclusions it is therefore determined that, for the purposes of this study, the QA/QC results are valid, and ***the quality of the data is acceptable for use in this assessment:***

- The data was representative of site conditions;
- The data was complete with comprehensive records available from all field work undertaken, and all areas of concern sampled and analysed;
- The data was comparable for samples analysed at different times, and consistent with field observations; and
- The data was precise and accurate based on the laboratory achievement of relevant quality control criteria.

11 Annual Environmental Assessment

11.1 Monitoring Point Summary

Field measurements and NATA laboratory results for dust and methane results from the annual 2023-2023 monitoring period reported satisfactory results. Water results including leachate, groundwater, onsite and offsite surface water reported concentrations of analytes within the range historical values. Water results from the last four (4) years have been tabulated and presented Charts 2-60 attached.

Groundwater monitoring wells continued to report elevated concentrations of key analytical indicators of leachate, most specifically ammonia. Concentration of ammonia in groundwater were reported in excess of the adopted site assessment criteria. Ammonia concentrations in offsite Rocklow Creek were reported below the 95% species protection trigger value. However, sampled water within Rocklow Creek contained levels of ammonia above the ecological stressor value 0.2mg/L.

The leachate tank also contained high concentrations of ammonia which is generally characterise of leachate.

Results of surface methane and gas accumulation monitoring recorded satisfactory results. The landfill surface cap was therefore considered intact and effective during the monitoring period.

Dust gauges across the Site largely reported satisfactory results over the 2022-2023 monitoring period.

11.2 Environmental Management

11.2.1 Landfill Operations

ENRS understand ‘solid’ waste (general solid waste putrescible and non-putrescible) landfill operations are ongoing at the Site. Landfill practices should be conducted in accordance with the Site’s Landfill Environmental Management Plan (LEMP) and the EPA Solid Waste Landfill Guidelines (EPA; 2016).

11.3 Environmental Safeguards

Appropriate management actions are required to continue to prevent and detect potential groundwater and surface water pollution. The nearest sensitive receptors for any uncontrolled Site water and leachate include; areas of adjoining bushland; recreational users of the Minnamurra River estuary environs, down gradient stakeholders; and down gradient alluvial aquifers, swamps, Rocklow Creek, Minnamurra River and Groundwater Dependent Ecosystems (GDE).

It is recommended that any drainage and detention structures are inspected annually by a suitably qualified environmental professional to assess their structural integrity and identify the need for any maintenance (such as removal of deep rooted vegetation, sediment, and re-lining).

Access tracks to sampling points should be inspected and maintained prior to each quarterly sampling events.

Continue to review annual surface and groundwater monitoring results from up and down gradient of the land fill cells and offsite sampling locations within Rocklow Creek. Continue to monitor surface methane gas in order to assess the capping integrity of the landfill cells.

11.4 Monitoring Program

The Site's EPL's and monitoring regime should be reviewed annually.

Review of the 2022-2023 monitoring results indicate no significant change in environmental conditions at the Site over the past three (3) years but did indicate. Future sampling events should continue to monitor the key indicators of leachate within ground and surface waters, especially concentration of ammonia and nitrate.

Should monitoring continue to report any significant changes in analyte concentrations the need for additional monitoring locations should be reviewed, including additional groundwater monitoring bores both up and down gradient locations of areas with analytical exceedances.

It is recommended that water quality results from future monitoring rounds continue be forwarded to a suitably qualified environmental professional for review within the laboratory holding time to compare against relevant guidelines and identify any irregularities so that additional testing may be conducted within the sample holding time.

12 Conclusions

Based on the findings obtained during the 2022-2023 monitoring program the following conclusions and recommendations are provided:

- Shallow groundwater flow is expected to mimic topography with low hydraulic gradients flowing towards the south and southeast towards Rocklow Creek. The nearest sensitive receptors are likely to include; recreational users of the Minnamurra River estuary environs; down gradient stakeholders; and downgradient alluvial aquifers, swamps, Rocklow Creek, Minnamurra River and Groundwater Dependent Ecosystems near discharge zones;
- Groundwater throughout the monitoring period reported exceedances of the assessment criteria for; ammonia, heavy metals, nitrate and salinity (EC) within multiple groundwater bores. These

exceedances were considered to be within historical values with no significant change in site conditions;

- Offsite sample locations within Rocklow Creek generally reported satisfactory results. However, exceedances for ammonia were above the ecological stressor value.
- Surface gas methane monitoring reported satisfactory results all within the adopted assessment criteria;
- Methane levels of enclosed structures on or withing 250m of deposited waste or leachate storage were tested and found to be below the acceptable threshold for 1% (volume/volume) in all cases;
- Dust deposition gauges recorded satisfactory results below the guidelines provided in AS3580.10.1. Monitoring should continue in accordance with EPL 5984 requirements;
- Based on this review of the 2022-2023 annual monitoring period, contaminants associated with the landfill cell, leachate dam/s and general site uses are considered to be relatively consistent with the range of historical results;
- Flare temperatures fell below the required KPI of 760 degrees Celsius on many occasions over the 2022-2023 monitoring period. Further detail relating to root causes and current works are available in the attached Flare Reports in **Appendix J** of this report;
- Should any change in Site conditions or incident occur which causes a potential environmental impact, a suitable environmental professional should be engaged to further assess the Site and consider requirements for any additional monitoring; and
- This report must be read in conjunction with the attached Statement of Limitations.

13 References

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ANZECC (2000) Australian Water Quality Guidelines for Fresh and Marine Waters. Australian and New Zealand Environment & Conservation Council. ISBN 09578245 0 5 (set).

14 Limitations

This report and the associated services performed by ENRS are in accordance with the scope of services set out in the contract between ENRS and the Client. The scope of services was defined by the requests of the Client, by the time and budgetary constraints imposed by the Client, and by the availability of access to Site.

ENRS derived the data in this report primarily from visual inspections, and, limited sample collection and analysis made on the dates indicated. In preparing this report, ENRS has relied upon, and presumed accurate, certain information provided by government authorities, the Client and others identified herein. The report has been prepared on the basis that while ENRS believes all the information in it is deemed reliable and accurate at the time of preparing the report, it does not warrant its accuracy or completeness and to the full extent allowed by law excludes liability in contract, tort or otherwise, for any loss or damage sustained by the Client arising from or in connection with the supply or use of the whole or any part of the information in the report through any cause whatsoever.

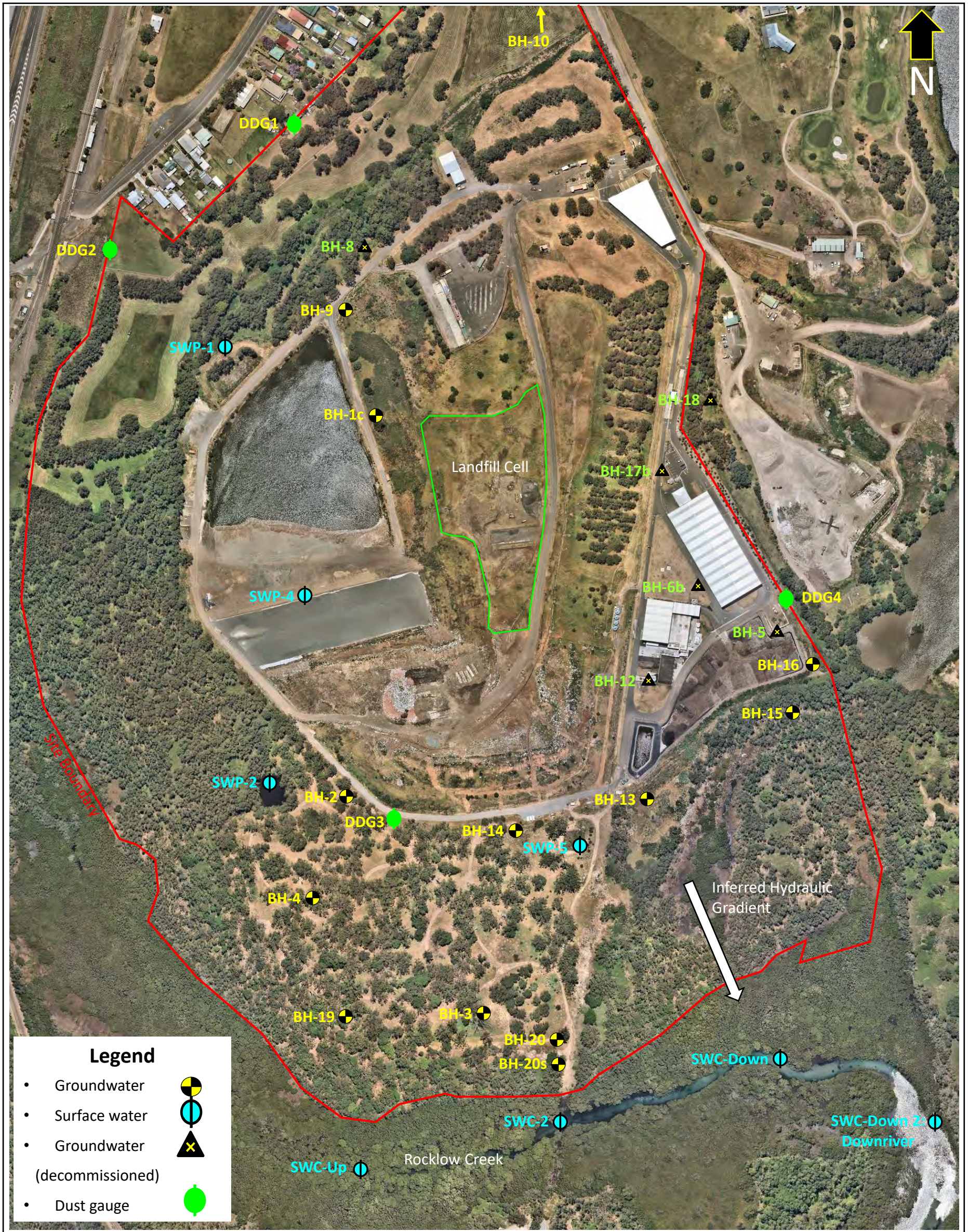
Limitations also apply to analytical methods used in the identification of substances (or parameters). These limitations may be due to non-homogenous material being sampled (i.e. the sample to be analysed may not be representative), low concentrations, the presence of 'masking' agents and the restrictions of the approved analytical technique. As such, non-statistically significant sampling results can only be interpreted as 'indicative' and not used for quantitative assessments.

The data, findings, observations, conclusions and recommendations in the report are based solely upon the state of Site at the time of the investigation. The passage of time, manifestation of latent conditions or impacts of future events (e.g. changes in legislation, scientific knowledge, land uses, etc) may render the report inaccurate. In those circumstances, ENRS shall not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance on, the contents of the report.

This report has been prepared on behalf of and for the exclusive use of the Client, and is subject to and issued in connection with the provisions of the agreement between ENRS and the Client. ENRS accepts no liability or responsibility whatsoever and expressly disclaims any responsibility for or in respect of any use of or reliance upon this report by any third party or parties.

It is the responsibility of the Client to accept if the Client so chooses any recommendations contained within and implement them in an appropriate, suitable and timely manner.

FIGURES



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Client:	**Shellharbour City Council**	Drawn:	**PL**	Figure:	**2**
Project:	**ENRS0033**	Source:	**NearMaps**	Date:	**4/02/2020**
Location:	Dunmore Recycling & Waste Depot 44 Buckleys Rd, Dunmore, NSW, 2529	Scale:	**NA**	Title:	**Site Plan**
		Status:	**Rev 1**		

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Client:	**Shellharbour City Council**	Drawn:	**PL**	Figure:	**3**
Project:	**ENRS0033**	Source:	**SixMaps**	Date:	**16/01/2020**
Location:	Dunmore Recycling & Waste Depot 44 Buckleys Rd, Dunmore, NSW, 2529	Scale:	**NA**	Title:	**Surface Gas Sample transects**
		Status:	**Rev 1**		

TABLES

TABLE 14-1: Total Concentration Results

Quarterly Water Monitoring Results - December 2022: Dunmore Recycling and Waste Depot

GILs -Trigger Values for Freshwater (Protection of 95% of Species) [A]					-	-	-	-	-	1.9	-	-	-	0.9 (pH 8)	-	0.7	-	-	-	-	-	-	-	-	6.5 - 8.5	2200	-	-	-	
GILs -Trigger Values for Marine Water (Protection of 95% of Species) [A]					-	-	-	-	-	-	-	-	-	0.91 (pH 8)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Australian Drinking Water Guidelines (2018)[C]				Health	-	-	-	-	-	0.5	-	-	1.5	-	3	50	-	-	-	-	-	-	-	-	6.5 - 8.5	-	-	-	-	
				Aesthetic	250	-	-	180	-	0.1	0.3	0.3	-	0.5	-	-	-	-	-	250	-	-	-	5	6.5 - 8.5	-	-	-	-	
Lab Report No.	Sample No.	Sample type	EPA No,	Date Sampled	Chloride	Calcium	Magnesium	Sodium	Potassium	Manganese	Total Iron	Dissolved Iron	Fluoride	Ammonia as N	Nitrite as N	Nitrate as N	Total Organic Carbon	Bicarbonate Alkalinity as CaCO3	Total Alkalinity as CaCO3	Sulfate as SO4 - Turbidimetric	Dissolved Oxygen	Dissolved Oxygen - % Saturation	Suspended Solids (SS)	Turbidity	pH	Electrical Conductivity (Non Compensated)	Temperature	Standing Water Level	Total Insoluble Matter	Comments
				Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	%	mg/L	NTU	pH	µS/cm	°C	mbgl	mbgl	
				Laboratory PQL	1	1	1	1	1	0.001	0.05	0.05	0.1	0.01	0.01	0.01	1	1	1	1	0.01	0.1	5	0.1	0.01	1	0.1	0.01	0.1	-
EW2205534001	BH1c	Groundwater	3	Dec 2022	904	133			219	0.11		8.16	0.5	345.00	< 0.01	< 0.01	203	2,780	2,780	< 10					7.00	7,160	25.2	3.00		-
EW2205534002	BH3	Groundwater	5	Dec 2022	140	126			44	0.02		< 0.05	0.2	8.51	0.27	2.39	17	330	330	158					8.10	1,160	17.6	3.01		-
EW2205534003	BH4	Groundwater	6	Dec 2022	50	86			16	0.09		1.70	0.1	1.62	0.01	0.01	14	297	297	61					8.20	692	17.6	4.24		-
EW2205534004	BH9	Groundwater	18	Dec 2022	392	180			69	0.68		0.32	0.4	124.00	< 0.01	< 0.01	79	1,820	1,820	< 10					7.30	3,580	18.7	2.94		-
EW2205534005	BH12r	Groundwater	17	Dec 2022	107	154			28	0.51		6.52	0.2	3.74	< 0.01	0.01	21	568	568	119					7.30	1,340	19.4	4.15		-
EW2205534006	BH13	Groundwater	10	Dec 2022	204	185			17	0.32		1.82	0.2	3.32	0.03	0.19	23	779	779	64					7.30	1,770	20.3	4.11		-
EW2205534007	BH14	Groundwater	11	Dec 2022	33	82			14	0.08		0.07	0.6	0.93	0.01	1.57	18	334	334	80					7.00	756	19.7	4.53		-
EW2205534008	BH15	Groundwater	7	Dec 2022	447	131			185	0.31		10.20	0.2	10.30	< 0.01	0.14	37	467	467	534					7.40	2,650	18.2	0.73		-
EW2205534010	BH18	Groundwater	25	Dec 2022	76	87			18	0.08		1.85	0.2	1.51	< 0.01	< 0.01	22	458	458	12					7.20	880	18.3	1.97		-
EW2205534009	BH19r	Groundwater	16	Dec 2022	52	75			37	0.07		0.97	0.2	2.35	0.01	< 0.01	19	287	287	53					8.40	724	17.6	4.53		-
EW2205534011	BH21	Groundwater	23	Dec 2022	429	131			18	0.56		0.13	0.4	4.92	< 0.01	< 0.01	41	834	834	149					7.30	2,560	20.9	2.98		-
EW2205534012	BH22	Groundwater	24	Dec 2022	235	94			43	0.02		0.12	0.4	55.80	< 0.01	0.01	34	606	606	283					8.10	1,910	17.3	2.77		-
EW2205529001	SWP1	Surfacewater	1	Dec 2022	225	65	41	213	20	0.84	0.14	0.06	0.4	8.52	0.04	0.02	30	464	464	96	3.43		14	2.70	7.50	1,500	19.5			-
EW2205529003	SWC_up	Surfacewater	20	Dec 2022	6,620	145	378	3,280	122	0.17	0.89	< 0.05	0.6	0.32	< 0.01	0.10	8	150	150	817	4.94		< 5	14.00	7.00	17,100	19.0			-
EW2205529002	SWC_2	Surfacewater	19	Dec 2022	5,380	124	308	2,680	101	0.17	1.20	< 0.05	0.6	0.53	0.01	0.11	9	141	141	680	5.80		10	19.70	7.00	14,100	18.7			-
EW2205529004	SWC_down	Surfacewater	21	Dec 2022	8,410	184	493	4,310	160	0.13	0.68	< 0.05	0.7	0.58	< 0.01	0.07	9	154	154	1,060	7.07		< 5	10.70	7.00	21,600	19.0			-
EW2205529005	SWC_down_2	Surfacewater	22	Dec 2022	11,200	242	678	5,920	216	0.11	0.48	< 0.05	0.8	0.32	< 0.01	0.04	7	142	142	1,500	4.49		< 5	6.30	7.00	29,100	18.7			-
EW2205533001	Leachate Storage Tank LP1	Leachate	2	Dec 2022	1,710	39			363	0.10	1.35		0.2	773.00	< 1.00	< 1.00	506	2,600	3,600	< 100	5.58	63.2			8.50	9,310	19.9			-

TABLE 14-2: Total Concentration Results

Quarterly Water Monitoring Results - March 2023: Dunmore Recycling and Waste Depot

GILs -Trigger Values for Freshwater (Protection of 95% of Species) [A]					-	-	-	-	-	1.9	-	-	-	0.9 (pH 8)	-	0.7	-	-	-	-	-	-	-	-	6.5 - 8.5	2200	-	-	-	
GILs -Trigger Values for Marine Water (Protection of 95% of Species) [A]					-	-	-	-	-	-	-	-	-	0.91 (pH 8)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Australian Drinking Water Guidelines (2018)[C]				Health	-	-	-	-	-	0.5	-	-	1.5	-	3	50	-	-	-	-	-	-	-	-	6.5 - 8.5	-	-	-	-	
				Aesthetic	250	-	-	180	-	0.1	0.3	0.3	-	0.5	-	-	-	-	-	250	-	-	-	5	6.5 - 8.5	-	-	-	-	
Lab Report No.	Sample No.	Sample type	EPA No,	Date Sampled	Chloride	Calcium	Magnesium	Sodium	Potassium	Manganese	Total Iron	Dissolved Iron	Fluoride	Ammonia as N	Nitrite as N	Nitrate as N	Total Organic Carbon	Bicarbonate Alkalinity as CaCO3	Total Alkalinity as CaCO3	Sulfate as SO4 - Turbidimetric	Dissolved Oxygen	Dissolved Oxygen - % Saturation	Suspended Solids (SS)	Turbidity	pH	Electrical Conductivity (Non Compensated)	Temperature	Standing Water Level	Total Insoluble Matter	Comments
				Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	%	mg/L	NTU	pH	µS/cm	°C	mbgl	mbgl	
				Laboratory PQL	1	1	1	1	1	0.001	0.05	0.05	0.1	0.01	0.01	0.01	1	1	1	1	0.01	0.1	5	0.1	0.01	1	0.1	0.01	0.1	-
EW2300850001	BH1c	Groundwater	3	Mar 2023	1,060	148			240	0.11		12.40	0.4	285.00	< 0.01	< 0.01	180	2,650	2,650	< 10					7.10	7,960	24.8	3.02		-
EW2300850002	BH3	Groundwater	5	Mar 2023	140	134			36	0.07		0.18	0.2	10.60	0.14	3.20	17	318	318	143					7.30	1,230	18.5	3.10		-
EW2300850003	BH4	Groundwater	6	Mar 2023	51	92			16	0.10		2.19	0.1	2.00	0.01	< 0.01	11	261	261	51					7.40	688	18.3	4.32		-
EW2300850004	BH9	Groundwater	18	Mar 2023	382	183			88	0.66		0.81	0.4	122.00	< 0.01	0.02	64	1,760	1,760	< 10					7.20	3,690	18.8	3.09		-
EW2300850005	BH12r	Groundwater	17	Mar 2023	174	207			28	0.55		9.67	0.2	4.24	< 0.01	< 0.01	20	619	619	208					6.80	1,670	19.7	4.23		-
EW2300850006	BH13	Groundwater	10	Mar 2023	245	206			21	0.42		3.45	0.2	5.31	< 0.01	< 0.01	28	744	744	58					6.90	1,930	20.7	4.19		-
EW2300850007	BH14	Groundwater	11	Mar 2023	30	96			14	0.11		0.55	0.6	1.18	< 0.01	< 0.01	13	359	359	73					7.00	762	20.0	4.62		-
EW2300850008	BH15	Groundwater	7	Mar 2023	476	137			174	0.27		9.33	0.2	8.12	0.03	0.17	34	471	471	366					6.80	2,570	18.5	0.53		-
EW2300850010	BH18	Groundwater	25	Mar 2023	31	80			11	0.14		2.02	0.2	1.02	< 0.01	< 0.01	14	272	272	< 10					6.80	601	20.8	2.10		-
EW2300850009	BH19r	Groundwater	16	Mar 2023	29	73			41	0.06		0.89	0.2	2.28	0.02	< 0.01	6	339	339	26					7.50	638	18.3	4.52		-
EW2300850011	BH21	Groundwater	23	Mar 2023	339	169			23	0.51		0.26	0.4	2.64	0.32	9.68	33	851	851	145					7.20	2,480	21.7	2.97		-
EW2300850012	BH22	Groundwater	24	Mar 2023	240	113			39	0.04		0.06	0.4	35.00	< 0.01	< 0.01	29	651	651	223					7.50	2,250	18.5	2.60		-
EW2300849001	SWP1	Surfacewater	1	Mar 2023	147	67	33	161	13	0.57	1.45	0.20	0.3	0.03	< 0.01	< 0.01	24	397	397	53	8.53		99	40.00	7.50	1,210	21.9			-
EW2300849003	SWC_up	Surfacewater	20	Mar 2023	8,150	180	552	4,750	173	0.20	0.61	0.10	0.7	0.07	< 0.01	0.02	7	138	138	913	4.79		< 5	3.20	7.10	24,200	22.3			-
EW2300849002	SWC_2	Surfacewater	19	Mar 2023	9,180	201	633	5,460	194	0.18	0.46	0.08	0.8	0.19	0.01	< 0.01	7	114	114	1,390	4.16		< 5	2.20	7.30	27,500	22.9			-
EW2300849004	SWC_down	Surfacewater	21	Mar 2023	7,720	170	522	4,510	163	0.22	0.59	0.05	0.8	0.25	0.01	0.01	7	131	131	886	4.92		< 5	2.90	7.20	23,800	23.8			-
EW2300849005	SWC_down_2	Surfacewater	22	Mar 2023	7,640	170	513	4,340	159	0.22	0.58	< 0.05	0.7	0.12	0.01	0.01	< 1	127	127	835	5.26		< 5	2.90	7.30	23,300	23.7			-
EW2300847001	Leachate Storage Tank LP1	Leachate	2	Mar 2023	1,460	37			393	0.09	1.24		0.2	432.00	2.16	< 0.10	373	2,060	3,150	< 20	5.66	70.5			9.40	9,260	24.8			-

TABLE 14-3: Total Concentration Results

Quarterly Water Monitoring Results - June 2023: Dunmore Recycling and Waste Depot

GILs -Trigger Values for Freshwater (Protection of 95% of Species) [A]					-	-	-	-	-	1.9	-	-	-	0.9 (pH 8)	-	0.7	-	-	-	-	-	-	-	-	6.5 - 8.5	2200	-	-	-	
GILs -Trigger Values for Marine Water (Protection of 95% of Species) [A]					-	-	-	-	-	-	-	-	-	0.91 (pH 8)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Australian Drinking Water Guidelines (2018)[C]				Health	-	-	-	-	-	0.5	-	-	1.5	-	3	50	-	-	-	-	-	-	-	-	6.5 - 8.5	-	-	-	-	
				Aesthetic	250	-	-	180	-	0.1	0.3	0.3	-	0.5	-	-	-	-	-	250	-	-	-	5	6.5 - 8.5	-	-	-	-	
Lab Report No.	Sample No.	Sample type	EPA No,	Date Sampled	Chloride	Calcium	Magnesium	Sodium	Potassium	Manganese	Total Iron	Dissolved Iron	Fluoride	Ammonia as N	Nitrite as N	Nitrate as N	Total Organic Carbon	Bicarbonate Alkalinity as CaCO3	Total Alkalinity as CaCO3	Sulfate as SO4 - Turbidimetric	Dissolved Oxygen	Dissolved Oxygen - % Saturation	Suspended Solids (SS)	Turbidity	pH	Electrical Conductivity (Non Compensated)	Temperature	Standing Water Level	Total Insoluble Matter	Comments
				Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	%	mg/L	NTU	pH	µS/cm	°C	mbgl	mbgl	
				Laboratory PQL	1	1	1	1	1	0.001	0.05	0.05	0.1	0.01	0.01	0.01	1	1	1	1	0.01	0.1	5	0.1	0.01	1	0.1	0.01	0.1	-
EW2302416001	BH1c	Groundwater	3	Jun 2023	970	116			207	0.10		11.60	0.5	298.00	< 0.01	< 0.01	186	2,600	2,600	< 10					7.00	7,945		3.09		-
EW2302416002	BH3	Groundwater	5	Jun 2023	123	101			31	0.08		0.27	0.2	12.30	0.13	1.37	22	370	370	146					7.50	1,200	25.9	3.08		-
EW2302416003	BH4	Groundwater	6	Jun 2023	35	94			16	0.10		2.59	0.1	2.04	< 0.01	< 0.01	10	310	310	70					7.40	751	18.9	4.28		-
EW2302416004	BH9	Groundwater	18	Jun 2023	516	181			76	0.71		0.89	0.6	141.00	< 0.01	0.03	76	1,790	1,790	50					7.20	4,120	18.0	3.86		-
EW2302416005	BH12r	Groundwater	17	Jun 2023	246	185			27	0.53		9.38	0.3	3.59	0.07	0.39	24	571	571	178					6.80	1,930	21.1	4.25		-
EW2302416006	BH13	Groundwater	10	Jun 2023	308	213			29	0.41		3.40	0.2	9.59	0.02	0.37	38	812	812	67					6.80	2,260	21.9	4.22		-
EW2302416007	BH14	Groundwater	11	Jun 2023	36	106			12	0.12		0.05	0.7	1.40	0.06	5.94	12	422	422	50					6.90	958	21.1	4.64		-
EW2302416008	BH15	Groundwater	7	Jun 2023	340	112			138	0.26		9.12	0.2	8.74	< 0.01	0.01	39	507	507	366					7.00	2,250	17.1	0.68		-
EW2302416010	BH18	Groundwater	25	Jun 2023	16	60			10	0.07		1.31	0.2	1.05	< 0.01	< 0.01	14	267	267	< 10					6.80	511	20.7	2.26		-
EW2302416009	BH19r	Groundwater	16	Jun 2023	38	74			49	0.06		1.06	0.2	1.85	< 0.01	< 0.01	14	336	336	39					7.40	731	18.9	4.54		-
EW2302416011	BH21	Groundwater	23	Jun 2023	353	125			16	0.47		0.76	0.4	3.60	< 0.01	< 0.01	38	854	854	114					7.20	2,550	22.6	3.01		-
EW2302416012	BH22	Groundwater	24	Jun 2023	183	87			18	0.07		0.96	0.8	4.11	< 0.01	< 0.01	26	424	424	224					7.30	1,580	19.2	2.40		-
EW2302415001	SWP1	Surfacewater	1	Jun 2023	173	73	33	156	17	0.12	0.16	< 0.05	0.3	0.96	0.04	< 0.01	25	431	431	39	5.90		< 5	1.40	7.70	1,080	13.4			-
EW2302415003	SWC_up	Surfacewater	20	Jun 2023	7,090	180	465	3,840	145	0.07	0.79	< 0.05	0.7	0.20	0.02	0.14	9	139	139	968	6.71		5	7.40	7.20	18,800	15.4			-
EW2302415002	SWC_2	Surfacewater	19	Jun 2023	6,870	155	380	3,280	122	0.07	0.88	< 0.05	0.6	0.29	0.02	0.13	10	141	141	908	6.32		7	8.00	7.20	17,400	15.0			-
EW2302415004	SWC_down	Surfacewater	21	Jun 2023	12,100	288	765	6,440	244	0.05	0.34	< 0.10	0.9	0.69	0.02	0.05	7	151	151	2,000	6.05		< 5	4.00	7.20	32,600	16.9			-
EW2302415005	SWC_down_2	Surfacewater	22	Jun 2023	9,680	229	592	5,000	210	0.06	0.53	< 0.10	0.8	0.28	0.02	0.08	8	144	144	1,560	6.55		< 5	5.10	7.30	25,000	15.9			-
EW2302414001	Leachate Storage Tank LP1	Leachate	2	Jun 2023	1,810	39			375	0.10	1.29		0.3	344.00	6.96	< 0.10	407	1,840	2,780	< 50	6.22	60.0			9.30	7,380	13.8			-

TABLE 14-4: Total Concentration Results

Quarterly Water Monitoring Results - September 2023: Dunmore Recycling and Waste Depot

GILs -Trigger Values for Freshwater (Protection of 95% of Species) [A]					-	-	-	-	-	1.9	-	-	-	0.9 (pH 8)	-	0.7	-	-	-	-	-	-	-	-	6.5 - 8.5	2200	-	-	-	
GILs -Trigger Values for Marine Water (Protection of 95% of Species) [A]					-	-	-	-	-	-	-	-	-	0.91 (pH 8)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Australian Drinking Water Guidelines (2018)[C]				Health	-	-	-	-	-	0.5	-	-	1.5	-	3	50	-	-	-	-	-	-	-	-	6.5 - 8.5	-	-	-	-	
				Aesthetic	250	-	-	180	-	0.1	0.3	0.3	-	0.5	-	-	-	-	-	250	-	-	-	5	6.5 - 8.5	-	-	-	-	
Lab Report No.	Sample No.	Sample type	EPA No,	Date Sampled	Chloride	Calcium	Magnesium	Sodium	Potassium	Manganese	Total Iron	Dissolved Iron	Fluoride	Ammonia as N	Nitrite as N	Nitrate as N	Total Organic Carbon	Bicarbonate Alkalinity as CaCO3	Total Alkalinity as CaCO3	Sulfate as SO4 - Turbidimetric	Dissolved Oxygen	Dissolved Oxygen - % Saturation	Suspended Solids (SS)	Turbidity	pH	Electrical Conductivity (Non Compensated)	Temperature	Standing Water Level	Total Insoluble Matter	Comments
				Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	%	mg/L	NTU	pH	µS/cm	°C	mbgl	mbgl	
				Laboratory PQL	1	1	1	1	1	0.001	0.05	0.05	0.1	0.01	0.01	0.01	1	1	1	1	0.01	0.1	5	0.1	0.01	1	0.1	0.01	0.1	-
EW2303854001	BH1c	Groundwater	3	Sep 2023	1,110	135			242	0.12		9.04	0.4	314.00	< 0.01	< 0.10	222	2,760	2,760	< 10					6.90	7,610	23.9	3.25		-
EW2303854002	BH3	Groundwater	5	Sep 2023	260	137			31	0.21		2.90	0.1	29.20	0.03	0.08	22	483	483	210					7.30	1,650	17.8	3.13		-
EW2303854003	BH4	Groundwater	6	Sep 2023	55	132			20	0.12		3.08	0.1	1.68	< 0.01	0.14	11	381	381	115					7.30	880	18.4	4.40		-
EW2303854004	BH9	Groundwater	18	Sep 2023	548	216			84	0.56		2.45	0.4	122.00	< 0.01	0.01	58	1,700	1,700	167					7.10	3,760	17.7	3.25		-
EW2303854005	BH12r	Groundwater	17	Sep 2023	223	183			27	0.54		9.62	0.2	3.37	0.01	0.15	21	516	516	184					6.80	1,610	20.6	4.38		-
EW2303854006	BH13	Groundwater	10	Sep 2023	330	219			29	0.45		3.34	0.2	8.64	< 0.01	4.43	36	872	872	93					6.70	2,210	21.5	4.39		-
EW2303854007	BH14	Groundwater	11	Sep 2023	36	154			16	0.14		0.15	0.5	1.42	< 0.01	1.03	12	563	563	37					6.80	1,020	21.0	4.83		-
EW2303854008	BH15	Groundwater	7	Sep 2023	459	133			153	0.30		10.40	0.2	6.24	0.03	< 0.01	37	519	519	391					7.00	2,180	14.3	0.89		-
EW2303854010	BH18	Groundwater	25	Sep 2023	13	70			9	0.24		2.43	0.2	1.44	< 0.01	< 0.01	14	283	283	4					6.60	470	18.6	2.28		-
EW2303854009	BH19r	Groundwater	16	Sep 2023	48	104			42	0.08		0.99	0.1	3.05	< 0.01	0.06	13	358	358	58					7.30	765	18.1	4.56		-
EW2303854011	BH21	Groundwater	23	Sep 2023	328	196			28	0.23		0.16	0.3	1.92	0.06	23.70	29	783	783	183					6.90	2,310	20.8	3.15		-
EW2303854012	BH22	Groundwater	24	Sep 2023	147	159			16	0.28		25.90	0.3	5.14	< 0.10	< 0.10	33	428	428	326					6.60	1,470	17.5	2.42		-
EW2303862001	SWP1	Surfacewater	1	Sep 2023	145	58	26	127	18	0.26	0.17	0.06	0.3	0.09	< 0.01	< 0.01	20	316	316	23	4.16		< 5	2.20	7.70	788	14.6			-
EW2303862003	SWC_up	Surfacewater	20	Sep 2023	8,240	253	608	5,060	190	0.11	0.63	0.08	0.7	0.54	0.02	0.09	8	169	169	922	5.02		< 5	4.60	7.20	22,000	15.4			-
EW2303862002	SWC_2	Surfacewater	19	Sep 2023	10,000	283	726	5,940	250	0.28	< 0.10	< 0.10	0.8	0.76	0.02	0.06	8	163	163	1,720	4.91		< 5	3.50	7.30	26,800	15.6			-
EW2303862004	SWC_down	Surfacewater	21	Sep 2023	11,300	315	843	6,970	247	0.03	0.36	< 0.10	0.8	0.51	0.01	0.06	6	160	160	1,840	5.37		< 5	3.00	7.40	30,300	15.7			-
EW2303862005	SWC_down_2	Surfacewater	22	Sep 2023	7,170	214	508	4,310	165	0.05	0.54	< 0.05	0.6	0.25	0.01	0.10	7	150	150	795	6.27		< 5	4.60	7.40	18,800	14.7			-
EW2303859001	Leachate Storage Tank LP1	Leachate	2	Sep 2023	2,030	45			349	0.11	1.67		0.2	391.00	12.20	< 2.00	405	1,970	2,710	< 100	5.25	60.3			8.90	8,180	19.9			-

TABLE 14-6: Ammonia Results
March 2023 Quarter: Dunmore Recycling and Waste Depot

Ammonia Results comapred against the pH Modified Trigger Values - ANZACC (2000) Table 8.3.7			pH	Assessment Criteria		Result	Comment
			pH (lab)	pH Modifed Trigger Values - 95% Freshwater	pH Modifed Trigger Values - 95% Marine Water	Ammonai As N	
		Total Concentrations - PQL	0.1	-	-	0.01	
Lab Report No.	Sample ID.	Date	pH	mg/L	mg/L	mg/L	
EW2300850001	BH1c	2/03/2023	7.1	2.26	3.56	285	> TV
EW2300850002	BH3	2/03/2023	7.3	1.88	2.84	10.6	> TV
EW2300850003	BH4	2/03/2023	7.4	1.75	2.49	2	> TV
EW2300850004	BH9	2/03/2023	7.2	1.99	3.2	122	> TV
EW2300850005	BH12r	2/03/2023	6.8	2.33	4.55	4.24	> TV
EW2300850006	BH13	2/03/2023	6.9	2.26	4.24	5.31	> TV
EW2300850007	BH14	2/03/2023	7	2.18	3.91	1.18	< TV
EW2300850008	BH15	2/03/2023	6.8	2.33	4.55	8.12	> TV
EW2300850010	BH18	2/03/2023	6.8	2.33	4.55	1.02	< TV
EW2300850009	BH19r	2/03/2023	7.5	1.61	2.15	2.28	> TV
EW2300850011	BH21	2/03/2023	7.2	1.99	3.2	2.64	> TV
EW2300850012	BH22	2/03/2023	7.5	1.61	2.15	35	> TV
EW2300849001	SWP1	2/03/2023	7.5	1.61	2.15	0.03	< TV
EW2300849003	SWC_up	2/03/2023	7.1	2.09	3.56	0.07	< TV
EW2300849002	SWC_2	2/03/2023	7.3	1.88	2.84	0.19	< TV
EW2300849004	SWC_down	2/03/2023	7.2	1.99	3.2	0.25	< TV
EW2300849005	SWC_down_2	2/03/2023	7.3	1.88	2.84	0.12	< TV
EW2300847001	Leachate Storage Tank LP1	2/03/2023	9.4	0.21*	1.7	432	> TV

* No guideline is provided for a pH of above 8.9. Therefore the TV for pH 8.9 was abdopted.

TABLE 14-7: Ammonia Results
March 2023 Quarter: Dunmore Recycling and Waste Depot

Ammonia Results comapred against the pH Modified Trigger Values - ANZACC (2000) Table 8.3.7				pH	Assessment Criteria		Result	Comment
				pH (lab)	pH Modified Trigger Values - 95% Freshwater	pH Modified Trigger Values - 95% Marine Water	Ammonai As N	
			Total Concentrations - PQL	0.1	-	-	0.01	
Lab Report No.		Sample ID.	Date	pH	mg/L	mg/L	mg/L	
EW2300850001	Groundwater	BH1c	2/03/2023	7.00	2.180	3.560	298	> TV
EW2300850002		BH3	2/03/2023	7.50	1.161	2.150	12	> TV
EW2300850003		BH4	2/03/2023	7.40	1.750	2.490	2	> TV
EW2300850004		BH9	2/03/2023	7.20	1.990	3.200	141	> TV
EW2300850005		BH12r	2/03/2023	6.80	2.330	4.550	4	> TV
EW2300850006		BH13	2/03/2023	6.80	2.330	4.550	10	> TV
EW2300850007		BH14	2/03/2023	6.90	2.260	4.240	1	< TV
EW2300850008		BH15	2/03/2023	7.00	2.180	3.560	9	> TV
EW2300850010		BH18	2/03/2023	6.80	2.330	4.550	1	< TV
EW2300850009		BH19r	2/03/2023	7.40	1.750	2.490	2	> TV
EW2300850011		BH21	2/03/2023	7.20	1.990	3.200	4	> TV
EW2300850012		BH22	2/03/2023	7.30	1.880	2.840	4	> TV
EW2300849001	Rocklow Creek Surface Water	SWP1	2/03/2023	7.70	1.320	1.560	1	< TV
EW2300849003		SWC_up	2/03/2023	7.20	1.990	3.200	0	< TV
EW2300849002		SWC_2	2/03/2023	7.20	1.990	3.200	0	< TV
EW2300849004		SWC_down	2/03/2023	7.20	1.990	3.200	1	< TV
EW2300849005		SWC_down_2	2/03/2023	7.30	1.880	2.840	0	< TV

TABLE 14-8: Ammonia Results
March 2023 Quarter: Dunmore Recycling and Waste Depot

Ammonia Results comapred against the pH Modified Trigger Values - ANZACC (2000) Table 8.3.7				pH	Assessment Criteria		Result	Comment
				pH (lab)	pH Modifed Trigger Values - 95% Freshwater	pH Modifed Trigger Values - 95% Marine Water	Ammonia As N	
			Total Concentrations - PQL	0.1	-	-	0.01	
Lab Report No.		Sample ID.	Date	pH	mg/L	mg/L	mg/L	
EW2300850001	Groundwater	BH1c	2/03/2023	6.90	2.260	4.424	314	> TV
EW2300850002		BH3	2/03/2023	7.30	1.880	2.840	29.2	> TV
EW2300850003		BH4	2/03/2023	7.30	1.880	2.840	1.68	< TV
EW2300850004		BH9	2/03/2023	7.10	2.090	3.560	122	> TV
EW2300850005		BH12r	2/03/2023	6.80	2.330	4.550	3.37	> TV
EW2300850006		BH13	2/03/2023	6.70	2.380	4.830	8.64	> TV
EW2300850007		BH14	2/03/2023	6.80	2.330	4.550	1.42	< TV
EW2300850008		BH15	2/03/2023	7.00	2.180	3.910	6.24	> TV
EW2300850010		BH18	2/03/2023	6.60	2.430	5.070	1.44	< TV
EW2300850009		BH19r	2/03/2023	7.30	1.880	2.840	3.05	> TV
EW2300850011		BH21	2/03/2023	6.90	2.260	4.240	1.92	< TV
EW2300850012		BH22	2/03/2023	6.60	2.430	5.070	5.14	> TV
EW2300849001	Rocklow Creek Surface Water	SWP1	2/03/2023	7.70	1.320	1.560	0.09	< TV
EW2300849003		SWC_up	2/03/2023	7.20	1.990	3.200	0.54	< TV
EW2300849002		SWC_2	2/03/2023	7.30	1.880	2.840	0.76	< TV
EW2300849004		SWC_down	2/03/2023	7.40	1.750	2.490	0.51	< TV
EW2300849005		SWC_down_2	2/03/2023	7.40	1.750	2.490	0.25	< TV

TABLE 14-9: Duplicate Groundwater Sample Results and QC Data

Lab Report No.				EW2205534004	EW2205534013	RPD
Sample No.				BH9	GWDuplicate	
Sample type				Groundwater	GWQC	
EPA No,				18	QC1	
Date Sampled				5/12/2022	5/12/2022	
Analyte	Units	PQL	5 x PQL	Result	Result	
Chloride	mg/L	1	5	392	390	0.51
Calcium	mg/L	1	5	180	177	1.68
Potassium	mg/L	1	5	69	68	1.46
Manganese	mg/L	0.001	0.005	0.679	0.670	1.33
Dissolved Iron	mg/L	0.05	0.25	0.32	0.31	3.17
Fluoride	mg/L	0.1	0.5	0.40	0.30	28.57
Ammonia as N	mg/L	0.01	0.05	124.00	119.00	4.12
Nitrite as N	mg/L	0.01	0.05	< 0.01	< 0.01	0.00
Nitrate as N	mg/L	0.01	0.05	< 0.01	< 0.01	0.00
Nitrite + Nitrate as N	mg/L	0.01	0.05	< 0.01	< 0.01	0.00
Total Organic Carbon	mg/L	1	5	79	80	1.26
Bicarbonate Alkalinity as CaCO3	mg/L	1	5	1,820	1,820	0.00
Total Alkalinity as CaCO3	mg/L	1	5	1,820	1,820	0.00
Sulfate as SO4 - Turbidimetric	mg/L	1	5	< 10	< 10	0.00
pH	pH	0.01	0.05	7.30	7.30	0.00
Electrical Conductivity (Non Compensated)	µS/cm	1	5	3,580	3,580	0.00
Temperature	°C	0.1	0.5	18.7	18.7	0.00
Standing Water Level	mbgl	-		2.94	2.94	0.00

TABLE 14-10: Duplicate Surface Water Results and QC Data

Lab Report No.				EW2205529002	EW2205529006	RPD
Sample No.				SWC_2	SWDuplicate	
Sample type				Surfacewater	OffSiteSWQC	
EPA No,				19	QC2	
Date Sampled				2/12/2022	2/12/2022	
Analyte	Units	PQL	5 x PQL	Result	Result	
Chloride	mg/L	1	5	5,380	5,390	0.19
Calcium	mg/L	1	5	124	127	2.39
Potassium	mg/L	1	5	101	106	4.83
Manganese	mg/L	0.001	0.005	0.165	0.161	2.45
Total Iron	mg/L	0.05	0.25	1.20	1.11	7.79
Dissolved Iron	mg/L	0.05	0.25	< 0.05	< 0.05	0.00
Fluoride	mg/L	0.1	0.5	0.6	0.6	0.00
Ammonia as N	mg/L	0.01	0.05	0.53	0.60	12.39
Nitrite as N	mg/L	0.01	0.05	0.01	0.01	0.00
Nitrate as N	mg/L	0.01	0.05	0.11	0.11	0.00
Nitrite + Nitrate as N	mg/L	0.01	0.05	0.12	0.12	0.00
Total Organic Carbon	mg/L	1	5	9	9	0.00
Bicarbonate Alkalinity as CaCO3	mg/L	1	5	141	132	6.59
Total Alkalinity as CaCO3	mg/L	1	5	141	132	6.59
Sulfate as SO4 - Turbidimetric	mg/L	1	5	680	704	3.47
Dissolved Oxygen	mg/L	0.01	0.05	5.80	5.81	0.17
pH	pH	0.01	0.05	7.00	7.00	0.00
Electrical Conductivity (Non Compensated)	µS/cm	1	5	14,100	14,100	0.00
Temperature	°C	0.1	0.5	18.7	18.7	0.00

TABLE 14-11: Duplicate Groundwater Sample Results and QC Data

Lab Report No.				EW2300850010	EW2300850013	RPD
Sample No.				BH18	GWDuplicate	
Sample type				Groundwater	GWQC	
EPA No,				25	QC1	
Date Sampled				2/03/2023	2/03/2023	
Analyte	Units	PQL	5 x PQL	Result	Result	
Chloride	mg/L	1	5	31	32	3.17
Calcium	mg/L	1	5	80	81	1.24
Potassium	mg/L	1	5	11	11	0.00
Manganese	mg/L	0.001	0.005	0.139	0.142	2.14
Dissolved Iron	mg/L	0.05	0.25	2.02	2.02	0.00
Fluoride	mg/L	0.1	0.5	0.20	0.20	0.00
Ammonia as N	mg/L	0.01	0.05	1.02	1.10	7.55
Nitrite as N	mg/L	0.01	0.05	< 0.01	< 0.01	0.00
Nitrate as N	mg/L	0.01	0.05	< 0.01	< 0.01	0.00
Nitrite + Nitrate as N	mg/L	0.01	0.05	< 0.01	< 0.01	0.00
Total Organic Carbon	mg/L	1	5	14	14	0.00
Bicarbonate Alkalinity as CaCO3	mg/L	1	5	272	281	3.25
Total Alkalinity as CaCO3	mg/L	1	5	272	281	3.25
Sulfate as SO4 - Turbidimetric	mg/L	1	5	< 10	< 10	0.00
pH	pH	0.01	0.05	6.80	6.80	0.00
Electrical Conductivity (Non Compensated)	µS/cm	1	5	601	601	0.00
Temperature	°C	0.1	0.5	20.8	20.8	0.00
Standing Water Level	mbgl	-		2.10	2.10	0.00

TABLE 14-12: Duplicate Surface Water Results and QC Data

Lab Report No.				EW2300849001	EW2300849006	RPD
Sample No.				SWP1	SWDuplicate	
Sample type				Surfacewater	OffSiteSWQC	
EPA No,				1	QC2	
Date Sampled				1/03/2023	1/03/2023	
Analyte	Units	PQL	5 x PQL	Result	Result	
Chloride	mg/L	1	5	147	154	✓ 4.65
Calcium	mg/L	1	5	67	66	✓ 1.50
Potassium	mg/L	1	5	13	13	✓ 0.00
Manganese	mg/L	0.001	0.005	0.570	0.426	✓ 28.92
Total Iron	mg/L	0.05	0.25	1.45	1.33	✓ 8.63
Dissolved Iron	mg/L	0.05	0.25	0.20	0.19	✓ 5.13
Fluoride	mg/L	0.1	0.5	0.3	0.3	✓ 0.00
Ammonia as N	mg/L	0.01	0.05	0.03	0.01	✗ 100.00
Nitrite as N	mg/L	0.01	0.05	< 0.01	< 0.01	✓ 0.00
Nitrate as N	mg/L	0.01	0.05	< 0.01	0.01	✓ 0.00
Nitrite + Nitrate as N	mg/L	0.01	0.05	< 0.01	0.01	✓ 0.00
Total Organic Carbon	mg/L	1	5	24	16	✗ 40.00
Bicarbonate Alkalinity as CaCO3	mg/L	1	5	397	435	✓ 9.13
Total Alkalinity as CaCO3	mg/L	1	5	397	435	✓ 9.13
Sulfate as SO4 - Turbidimetric	mg/L	1	5	53	54	✓ 1.87
Dissolved Oxygen	mg/L	0.01	0.05	8.53	8.51	✓ 0.23
pH	pH	0.01	0.05	7.50	7.70	✓ 2.63
Electrical Conductivity (Non Compensated)	µS/cm	1	5	1,210	1,210	✓ 0.00
Temperature	°C	0.1	0.5	21.9	21.9	✓ 0.00

TABLE 14-13: Duplicate Groundwater Sample Results and QC Data

Lab Report No.				EW2302416010	EW2302416013	RPD
Sample No.				BH18	GWDuplicate	
Sample type				Groundwater	GWQC	
EPA No,				25	QC1	
Date Sampled				2/06/2023	2/06/2023	
Analyte	Units	PQL	5 x PQL	Result	Result	
Chloride	mg/L	1	5	16	16	0.00
Calcium	mg/L	1	5	60	61	1.65
Potassium	mg/L	1	5	10	10	0.00
Manganese	mg/L	0.001	0.005	0.067	0.068	1.48
Dissolved Iron	mg/L	0.05	0.25	1.31	1.33	1.52
Fluoride	mg/L	0.1	0.5	0.20	0.20	0.00
Ammonia as N	mg/L	0.01	0.05	1.05	1.06	0.95
Nitrite as N	mg/L	0.01	0.05	< 0.01	< 0.01	0.00
Nitrate as N	mg/L	0.01	0.05	< 0.01	< 0.01	0.00
Nitrite + Nitrate as N	mg/L	0.01	0.05	< 0.01	< 0.01	0.00
Total Organic Carbon	mg/L	1	5	14	14	0.00
Bicarbonate Alkalinity as CaCO3	mg/L	1	5	267	268	0.37
Total Alkalinity as CaCO3	mg/L	1	5	267	268	0.37
Sulfate as SO4 - Turbidimetric	mg/L	1	5	< 10	< 10	0.00
pH	pH	0.01	0.05	6.80	6.80	0.00
Electrical Conductivity (Non Compensated)	µS/cm	1	5	511	511	0.00
Temperature	°C	0.1	0.5	20.7	20.7	0.00
Standing Water Level	mbgl	-		2.26	2.26	0.00

TABLE 14-14: Duplicate Surface Water Results and QC Data

Lab Report No.				EW2302415001	EW2302415006	RPD
Sample No.				SWP1	SWDuplicate	
Sample type				Surfacewater	OffSiteSWQC	
EPA No,				1	QC2	
Date Sampled				2/06/2023	2/06/2023	
Analyte	Units	PQL	5 x PQL	Result	Result	
Chloride	mg/L	1	5	173	6,790	✗ 190.06
Calcium	mg/L	1	5	73	172	✗ 80.82
Potassium	mg/L	1	5	17	140	✗ 156.69
Manganese	mg/L	0.001	0.005	0.116	0.077	✗ 40.41
Total Iron	mg/L	0.05	0.25	0.16	0.93	✗ 141.28
Dissolved Iron	mg/L	0.05	0.25	< 0.05	< 0.05	✓ 0.00
Fluoride	mg/L	0.1	0.5	0.3	0.6	✗ 66.67
Ammonia as N	mg/L	0.01	0.05	0.96	0.32	✗ 100.00
Nitrite as N	mg/L	0.01	0.05	0.04	0.03	✓ 28.57
Nitrate as N	mg/L	0.01	0.05	< 0.01	0.11	✗ 166.67
Nitrite + Nitrate as N	mg/L	0.01	0.05	0.03	0.14	✗ 129.41
Total Organic Carbon	mg/L	1	5	25	8	✗ 103.03
Bicarbonate Alkalinity as CaCO3	mg/L	1	5	431	141	✗ 101.40
Total Alkalinity as CaCO3	mg/L	1	5	431	141	✗ 101.40
Sulfate as SO4 - Turbidimetric	mg/L	1	5	39	915	✗ 183.65
Dissolved Oxygen	mg/L	0.01	0.05	5.90	6.32	✓ 6.87
pH	pH	0.01	0.05	7.70	7.20	✓ 6.71
Electrical Conductivity (Non Compensated)	µS/cm	1	5	1,080	17,400	✗ 176.62
Temperature	°C	0.1	0.5	13.4	15.0	✓ 11.27

TABLE 14-15: Duplicate Groundwater Sample Results and QC Data

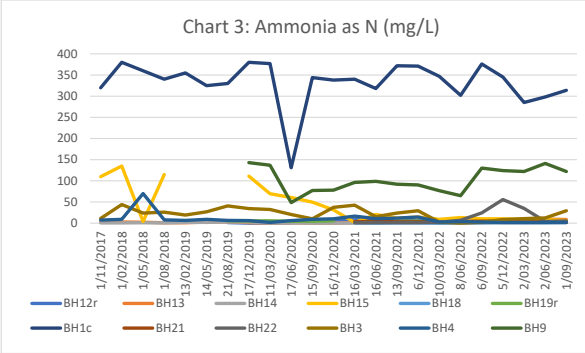
Lab Report No.				EW2303854010	EW2303854013	RPD
Sample No.				BH18	GWDuplicate	
Sample type				Groundwater	GWQC	
EPA No,				25	QC1	
Date Sampled				1/09/2023	1/09/2023	
Analyte	Units	PQL	5 x PQL	Result	Result	
Chloride	mg/L	1	5	13	13	0.00
Calcium	mg/L	1	5	70	71	1.42
Potassium	mg/L	1	5	9	9	0.00
Manganese	mg/L	0.001	0.005	0.241	0.242	0.41
Dissolved Iron	mg/L	0.05	0.25	2.43	2.46	1.23
Fluoride	mg/L	0.1	0.5	0.20	0.20	0.00
Ammonia as N	mg/L	0.01	0.05	1.44	1.31	9.45
Nitrite as N	mg/L	0.01	0.05	< 0.01	< 0.01	0.00
Nitrate as N	mg/L	0.01	0.05	< 0.01	< 0.01	0.00
Nitrite + Nitrate as N	mg/L	0.01	0.05	< 0.01	< 0.01	0.00
Total Organic Carbon	mg/L	1	5	14	15	6.90
Bicarbonate Alkalinity as CaCO3	mg/L	1	5	283	279	1.42
Total Alkalinity as CaCO3	mg/L	1	5	283	279	1.42
Sulfate as SO4 - Turbidimetric	mg/L	1	5	4	4	0.00
pH	pH	0.01	0.05	6.60	6.60	0.00
Electrical Conductivity (Non Compensated)	µS/cm	1	5	470	470	0.00
Temperature	°C	0.1	0.5	18.6	18.6	0.00
Standing Water Level	mbgl	-		2.28	2.38	4.29

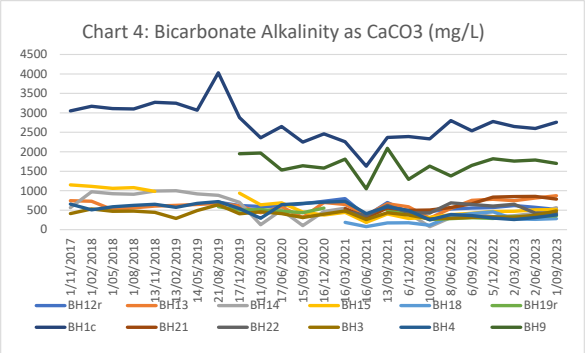
TABLE 14-16: Duplicate Surface Water Results and QC Data

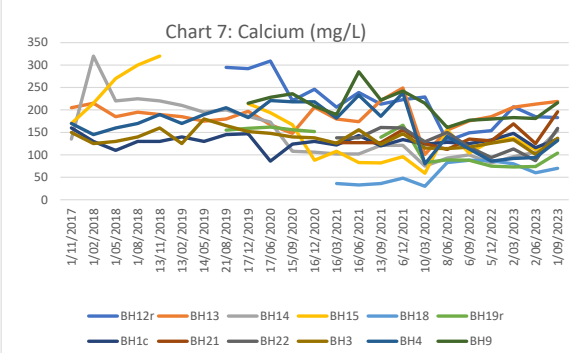
Lab Report No.				EW2303862001	EW2303862006	RPD
Sample No.				SWP1	SWDuplicate	
Sample type				Surfacewater	OffSiteSWQC	
EPA No,				1	QC2	
Date Sampled				1/09/2023	1/09/2023	
Analyte	Units	PQL	5 x PQL	Result	Result	
Chloride	mg/L	1	5	145	10,100	✗ 194.34
Calcium	mg/L	1	5	58	282	✗ 131.76
Potassium	mg/L	1	5	18	218	✗ 169.49
Manganese	mg/L	0.001	0.005	0.263	0.042	✗ 144.92
Total Iron	mg/L	0.05	0.25	0.17	0.43	✗ 86.67
Dissolved Iron	mg/L	0.05	0.25	0.06	< 0.10	✗ 50.00
Fluoride	mg/L	0.1	0.5	0.3	0.7	✗ 80.00
Ammonia as N	mg/L	0.01	0.05	0.09	0.76	✗ 157.65
Nitrite as N	mg/L	0.01	0.05	< 0.01	0.02	✗ 66.67
Nitrate as N	mg/L	0.01	0.05	< 0.01	0.06	✗ 142.86
Nitrite + Nitrate as N	mg/L	0.01	0.05	< 0.01	0.08	✗ 155.56
Total Organic Carbon	mg/L	1	5	20	7	✗ 96.30
Bicarbonate Alkalinity as CaCO3	mg/L	1	5	316	163	✗ 63.88
Total Alkalinity as CaCO3	mg/L	1	5	316	163	✗ 63.88
Sulfate as SO4 - Turbidimetric	mg/L	1	5	23	1,610	✗ 194.37
Dissolved Oxygen	mg/L	0.01	0.05	4.16	4.91	✓ 16.54
pH	pH	0.01	0.05	7.70	7.30	✓ 5.33
Electrical Conductivity (Non Compensated)	µS/cm	1	5	788	26,800	✗ 188.57
Temperature	°C	0.1	0.5	14.6	15.6	✓ 6.62

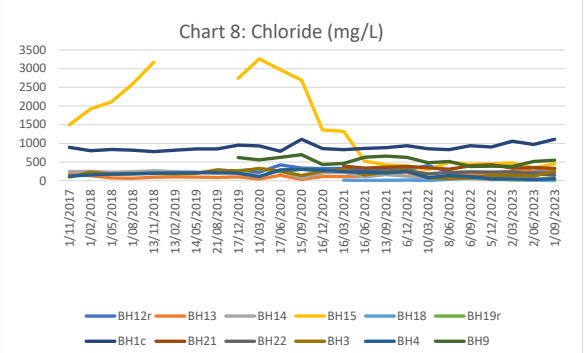
CHARTS

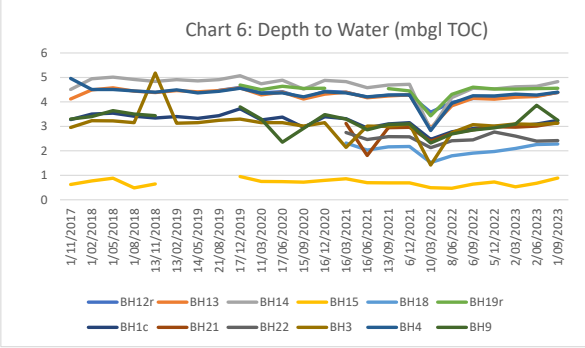
Charts 3-18: Groundwater Charts

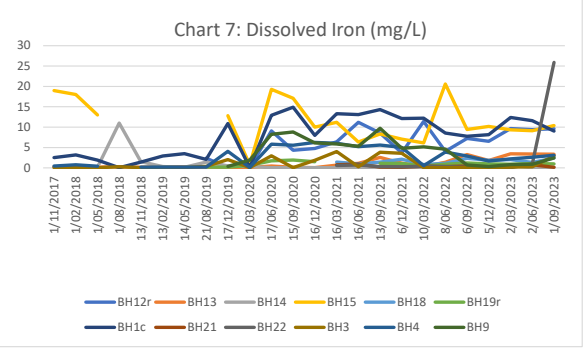


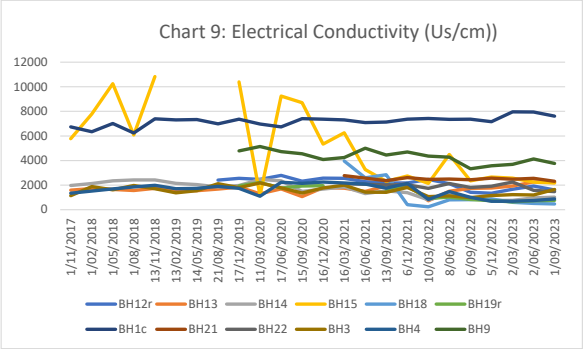


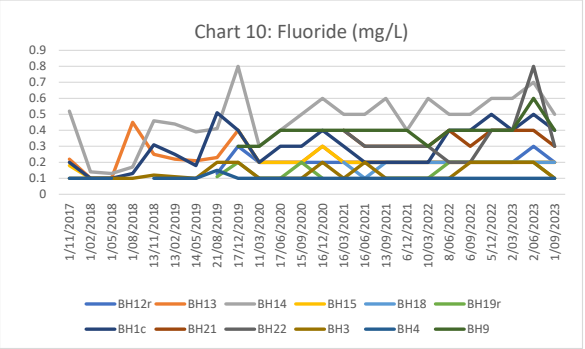












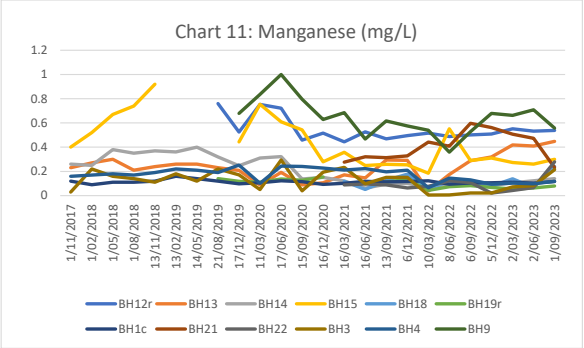


Chart 11: Manganese (mg/L)
1.2
1
0.8
0.6
0.4
0.2
0
1/11/2017
1/02/2018
1/05/2018
1/08/2018
13/11/2018
13/02/2019
14/05/2019
21/08/2019
17/12/2019
11/03/2020
17/06/2020
15/09/2020
16/12/2020
16/03/2021
16/06/2021
13/09/2021
6/12/2021
10/03/2022
8/06/2022
6/09/2022
5/12/2022
2/03/2023
2/06/2023
1/09/2023
BH12r
BH13
BH14
BH15
BH18
BH19r
BH1c
BH21
BH22
BH3
BH4
BH9

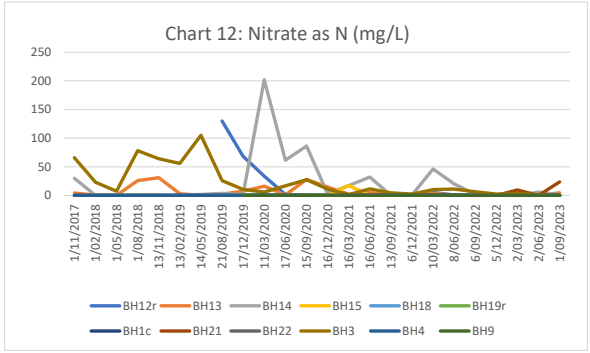


Chart 12: Nitrate as N (mg/L)
250
200
150
100
50
0
1/11/2017
1/02/2018
1/05/2018
1/08/2018
13/11/2018
13/02/2019
14/05/2019
21/08/2019
17/12/2019
11/03/2020
17/06/2020
15/09/2020
16/12/2020
16/03/2021
16/06/2021
13/09/2021
6/12/2021
10/03/2022
8/06/2022
6/09/2022
5/12/2022
2/03/2023
2/06/2023
1/09/2023
BH12r
BH13
BH14
BH15
BH18
BH19r
BH1c
BH21
BH22
BH3
BH4
BH9

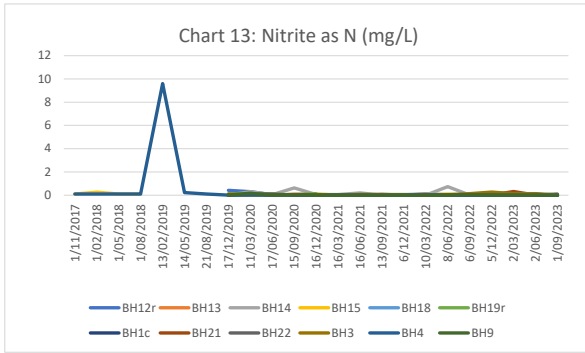


Chart 13: Nitrite as N (mg/L)
12
10
8
6
4
2
0
1/11/2017
1/02/2018
1/05/2018
1/08/2018
13/02/2019
14/05/2019
21/08/2019
17/12/2019
11/03/2020
17/06/2020
15/09/2020
16/12/2020
16/03/2021
16/06/2021
13/09/2021
6/12/2021
10/03/2022
8/06/2022
6/09/2022
5/12/2022
2/03/2023
2/06/2023
1/09/2023
BH12r
BH13
BH14
BH15
BH18
BH19r
BH1c
BH21
BH22
BH3
BH4
BH9

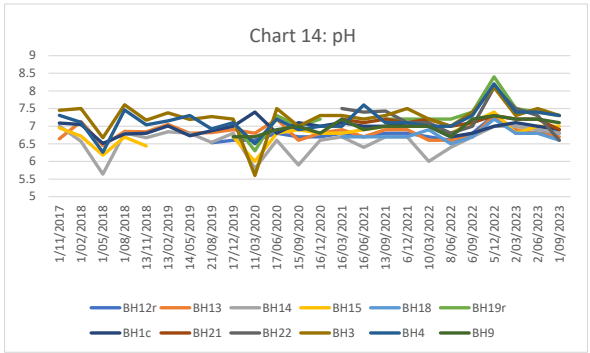


Chart 14: pH
9
8.5
8
7.5
7
6.5
6
5.5
5
1/11/2017
1/02/2018
1/05/2018
1/08/2018
13/11/2018
13/02/2019
14/05/2019
21/08/2019
17/12/2019
11/03/2020
17/06/2020
15/09/2020
16/12/2020
16/03/2021
16/06/2021
13/09/2021
6/12/2021
10/03/2022
8/06/2022
6/09/2022
5/12/2022
2/03/2023
2/06/2023
1/09/2023
BH12r
BH13
BH14
BH15
BH18
BH19r
BH1c
BH21
BH22
BH3
BH4
BH9

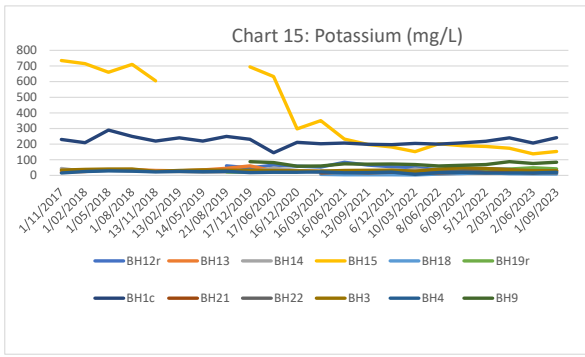


Chart 15: Potassium (mg/L)
800
700
600
500
400
300
200
100
0
1/11/2017
1/02/2018
1/05/2018
1/08/2018
13/11/2018
13/02/2019
14/05/2019
21/08/2019
17/12/2019
17/06/2020
16/12/2020
16/03/2021
16/06/2021
13/09/2021
6/12/2021
10/03/2022
8/06/2022
6/09/2022
5/12/2022
2/03/2023
2/06/2023
1/09/2023
BH12r
BH13
BH14
BH15
BH18
BH19r
BH1c
BH21
BH22
BH3
BH4
BH9

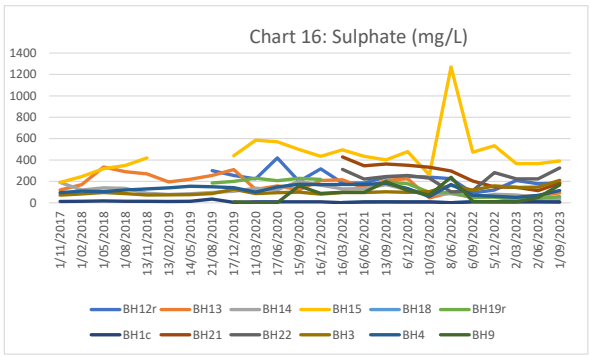


Chart 16: Sulphate (mg/L)
1400
1200
1000
800
600
400
200
0
1/11/2017
1/02/2018
1/05/2018
1/08/2018
13/11/2018
13/02/2019
14/05/2019
21/08/2019
17/12/2019
11/03/2020
17/06/2020
15/09/2020
16/12/2020
16/03/2021
16/06/2021
13/09/2021
6/12/2021
10/03/2022
8/06/2022
6/09/2022
5/12/2022
2/03/2023
2/06/2023
1/09/2023
BH12r
BH13
BH14
BH15
BH18
BH19r
BH1c
BH21
BH22
BH3
BH4
BH9

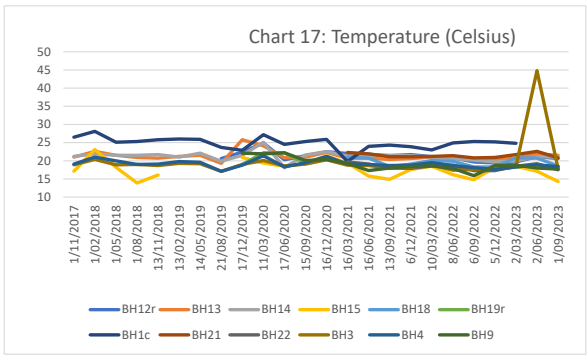


Chart 17: Temperature (Celsius)
50
45
40
35
30
25
20
15
10
1/11/2017
1/02/2018
1/05/2018
1/08/2018
13/11/2018
13/02/2019
14/05/2019
21/08/2019
17/12/2019
11/03/2020
17/06/2020
15/09/2020
16/12/2020
16/03/2021
16/06/2021
13/09/2021
6/12/2021
10/03/2022
8/06/2022
6/09/2022
5/12/2022
2/03/2023
2/06/2023
1/09/2023
BH12r
BH13
BH14
BH15
BH18
BH19r
BH1c
BH21
BH22
BH3
BH4
BH9

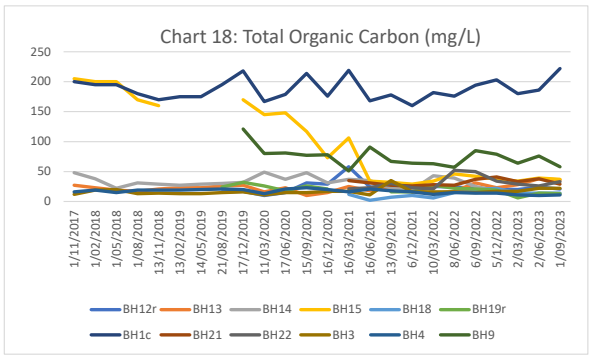
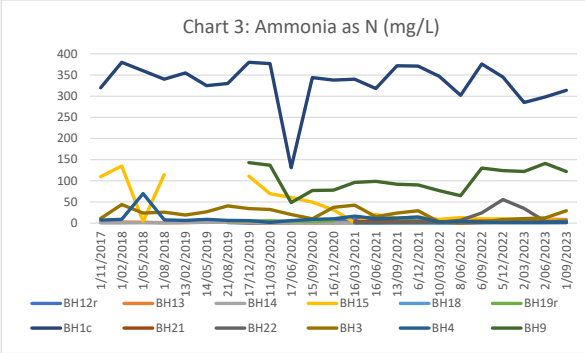
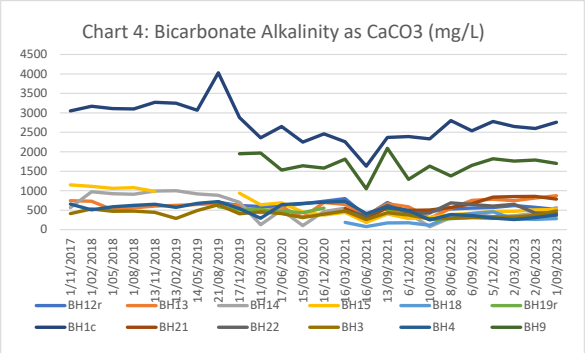
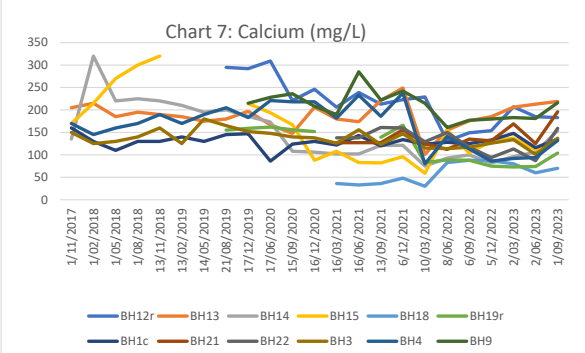


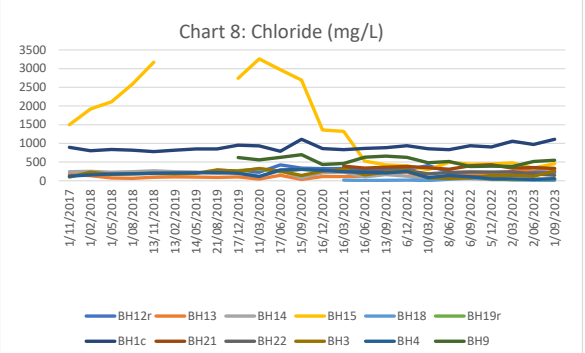
Chart 18: Total Organic Carbon (mg/L)
250
200
150
100
50
0
1/11/2017
1/02/2018
1/05/2018
1/08/2018
13/11/2018
13/02/2019
14/05/2019
21/08/2019
17/12/2019
11/03/2020
17/06/2020
15/09/2020
16/12/2020
16/03/2021
16/06/2021
13/09/2021
6/12/2021
10/03/2022
8/06/2022
6/09/2022
5/12/2022
2/03/2023
2/06/2023
1/09/2023
BH12r
BH13
BH14
BH15
BH18
BH19r
BH1c
BH21
BH22
BH3
BH4
BH9

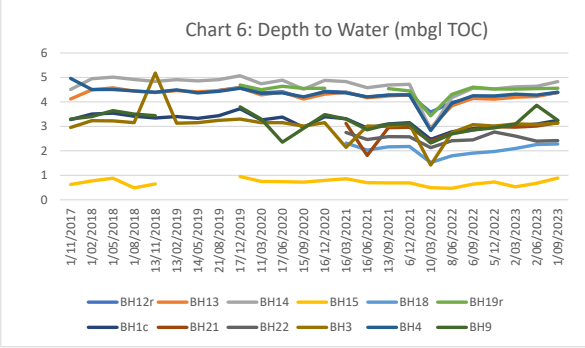
Charts 3-18: Groundwater Charts

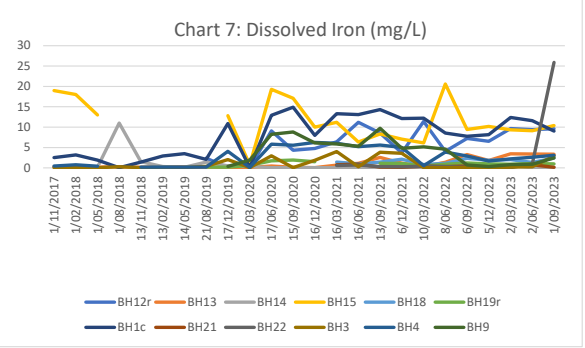


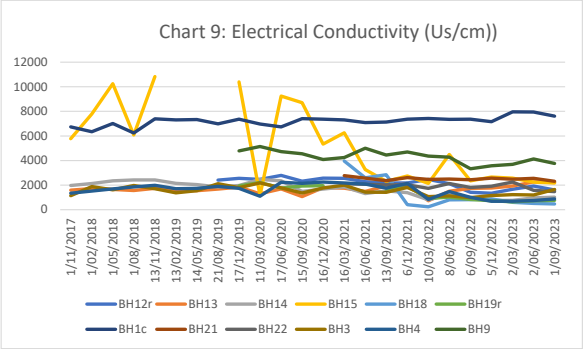


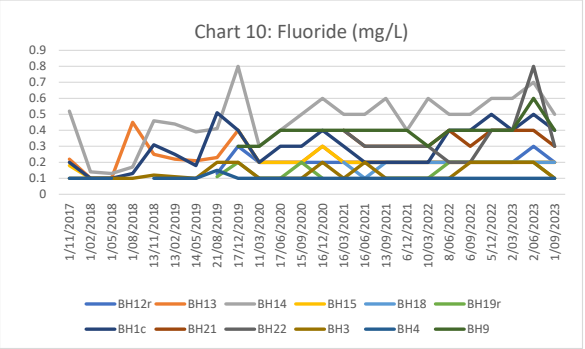












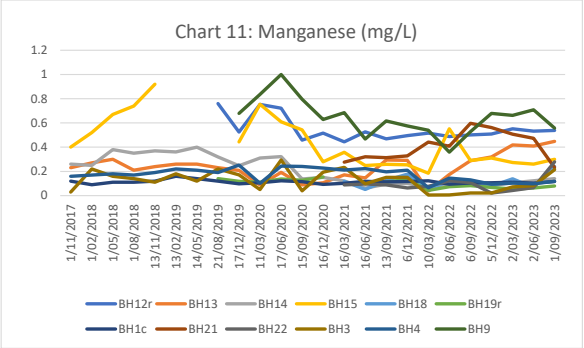


Chart 11: Manganese (mg/L)
1.2
1
0.8
0.6
0.4
0.2
0
1/11/2017
1/02/2018
1/05/2018
1/08/2018
13/11/2018
13/02/2019
14/05/2019
21/08/2019
17/12/2019
11/03/2020
17/06/2020
15/09/2020
16/12/2020
16/03/2021
16/06/2021
13/09/2021
6/12/2021
10/03/2022
8/06/2022
6/09/2022
5/12/2022
2/03/2023
2/06/2023
1/09/2023
BH12r
BH13
BH14
BH15
BH18
BH19r
BH1c
BH21
BH22
BH3
BH4
BH9

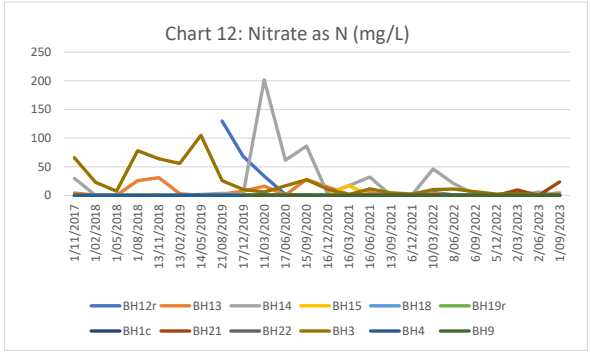


Chart 12: Nitrate as N (mg/L)
250
200
150
100
50
0
1/11/2017
1/02/2018
1/05/2018
1/08/2018
13/11/2018
13/02/2019
14/05/2019
21/08/2019
17/12/2019
11/03/2020
17/06/2020
15/09/2020
16/12/2020
16/03/2021
16/06/2021
13/09/2021
6/12/2021
10/03/2022
8/06/2022
6/09/2022
5/12/2022
2/03/2023
2/06/2023
1/09/2023
BH12r
BH13
BH14
BH15
BH18
BH19r
BH1c
BH21
BH22
BH3
BH4
BH9

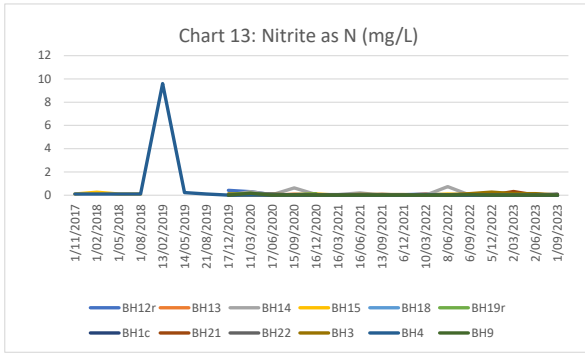


Chart 13: Nitrite as N (mg/L)
12
10
8
6
4
2
0
1/11/2017
1/02/2018
1/05/2018
1/08/2018
13/02/2019
14/05/2019
21/08/2019
17/12/2019
11/03/2020
17/06/2020
15/09/2020
16/12/2020
16/03/2021
16/06/2021
13/09/2021
6/12/2021
10/03/2022
8/06/2022
6/09/2022
5/12/2022
2/03/2023
2/06/2023
1/09/2023
BH12r
BH13
BH14
BH15
BH18
BH19r
BH1c
BH21
BH22
BH3
BH4
BH9

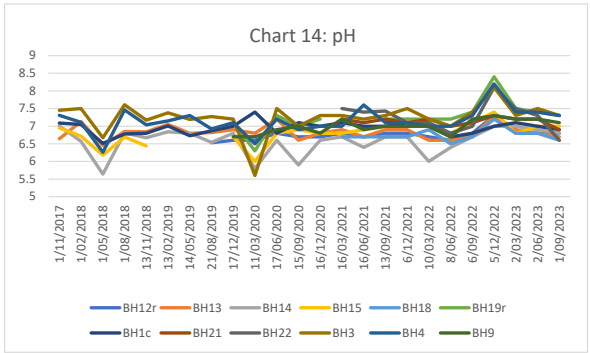


Chart 14: pH
9
8.5
8
7.5
7
6.5
6
5.5
5
1/11/2017
1/02/2018
1/05/2018
1/08/2018
13/11/2018
13/02/2019
14/05/2019
21/08/2019
17/12/2019
11/03/2020
17/06/2020
15/09/2020
16/12/2020
16/03/2021
16/06/2021
13/09/2021
6/12/2021
10/03/2022
8/06/2022
6/09/2022
5/12/2022
2/03/2023
2/06/2023
1/09/2023
BH12r
BH13
BH14
BH15
BH18
BH19r
BH1c
BH21
BH22
BH3
BH4
BH9

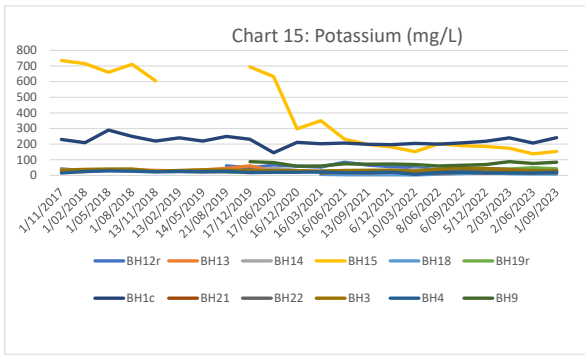


Chart 15: Potassium (mg/L)
800
700
600
500
400
300
200
100
0
1/11/2017
1/02/2018
1/05/2018
1/08/2018
13/11/2018
13/02/2019
14/05/2019
21/08/2019
17/12/2019
17/06/2020
16/12/2020
16/03/2021
16/06/2021
13/09/2021
6/12/2021
10/03/2022
8/06/2022
6/09/2022
5/12/2022
2/03/2023
2/06/2023
1/09/2023
BH12r
BH13
BH14
BH15
BH18
BH19r
BH1c
BH21
BH22
BH3
BH4
BH9

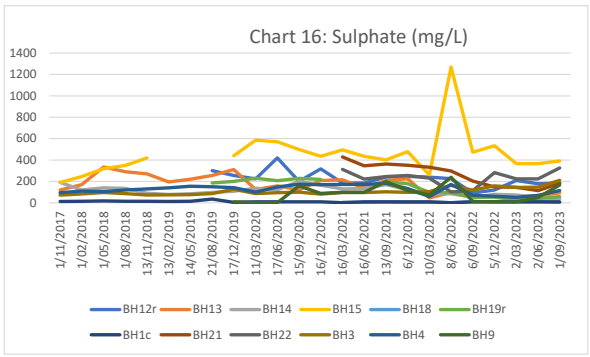


Chart 16: Sulphate (mg/L)
1400
1200
1000
800
600
400
200
0
1/11/2017
1/02/2018
1/05/2018
1/08/2018
13/11/2018
13/02/2019
14/05/2019
21/08/2019
17/12/2019
11/03/2020
17/06/2020
15/09/2020
16/12/2020
16/03/2021
16/06/2021
13/09/2021
6/12/2021
10/03/2022
8/06/2022
6/09/2022
5/12/2022
2/03/2023
2/06/2023
1/09/2023
BH12r
BH13
BH14
BH15
BH18
BH19r
BH1c
BH21
BH22
BH3
BH4
BH9

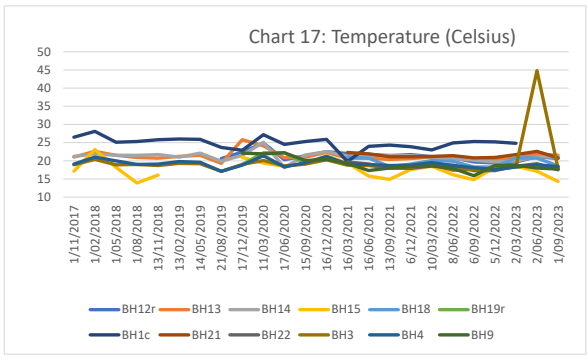


Chart 17: Temperature (Celsius)
50
45
40
35
30
25
20
15
10
1/11/2017
1/02/2018
1/05/2018
1/08/2018
13/11/2018
13/02/2019
14/05/2019
21/08/2019
17/12/2019
11/03/2020
17/06/2020
15/09/2020
16/12/2020
16/03/2021
16/06/2021
13/09/2021
6/12/2021
10/03/2022
8/06/2022
6/09/2022
5/12/2022
2/03/2023
2/06/2023
1/09/2023
BH12r
BH13
BH14
BH15
BH18
BH19r
BH1c
BH21
BH22
BH3
BH4
BH9

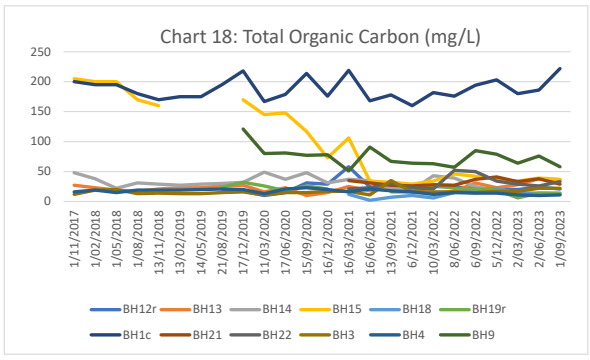
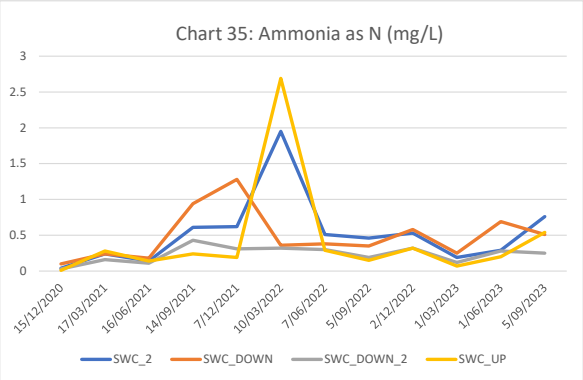
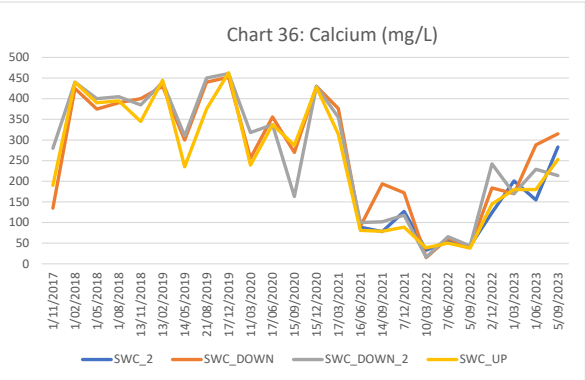
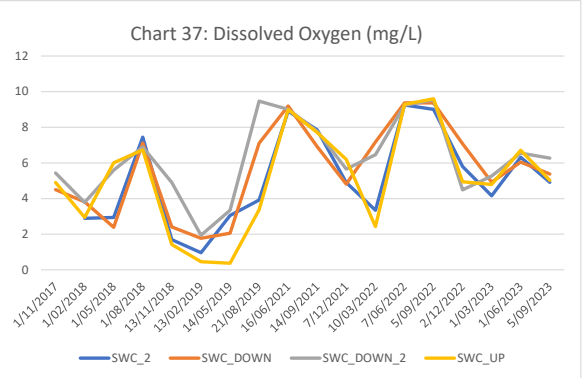


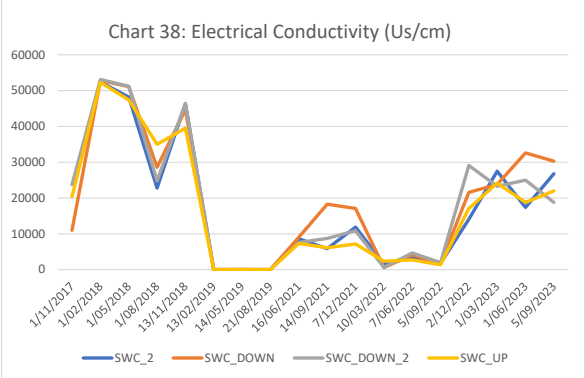
Chart 18: Total Organic Carbon (mg/L)
250
200
150
100
50
0
1/11/2017
1/02/2018
1/05/2018
1/08/2018
13/11/2018
13/02/2019
14/05/2019
21/08/2019
17/12/2019
11/03/2020
17/06/2020
15/09/2020
16/12/2020
16/03/2021
16/06/2021
13/09/2021
6/12/2021
10/03/2022
8/06/2022
6/09/2022
5/12/2022
2/03/2023
2/06/2023
1/09/2023
BH12r
BH13
BH14
BH15
BH18
BH19r
BH1c
BH21
BH22
BH3
BH4
BH9

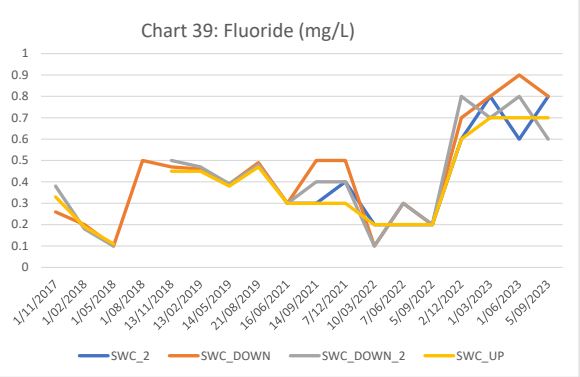
Charts 35-46: Rocklow Creek Surface Water Charts

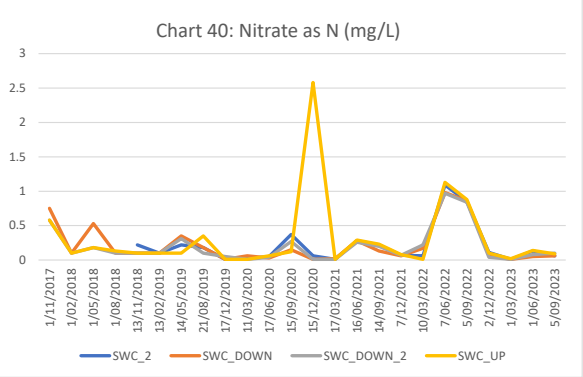


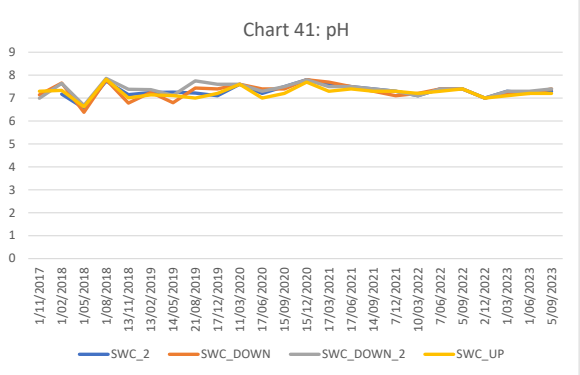


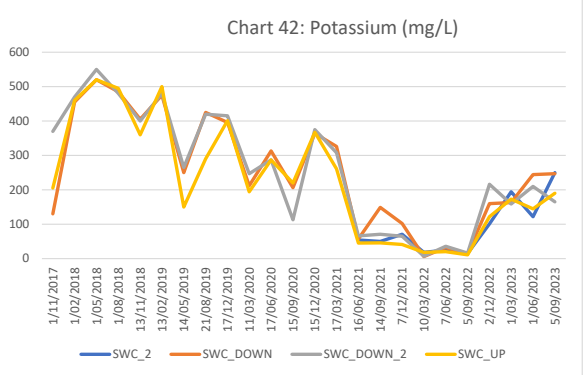












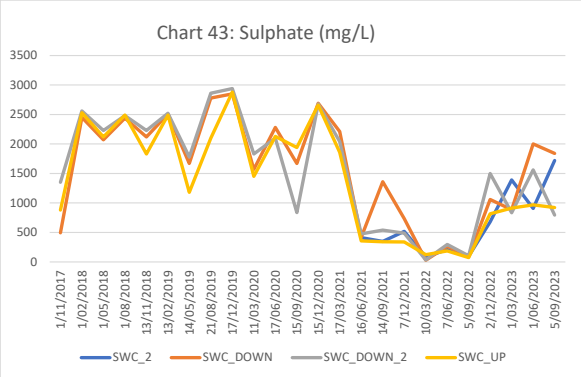


Chart 43: Sulphate (mg/L)
3500
3000
2500
2000
1500
1000
500
0
1/11/2017
1/02/2018
1/05/2018
1/08/2018
13/11/2018
13/02/2019
14/05/2019
21/08/2019
17/12/2019
11/03/2020
17/06/2020
15/09/2020
15/12/2020
17/03/2021
16/06/2021
14/09/2021
7/12/2021
10/03/2022
7/06/2022
5/09/2022
2/12/2022
1/03/2023
1/06/2023
5/09/2023
SWC_2
SWC_DOWN
SWC_DOWN_2
SWC_UP

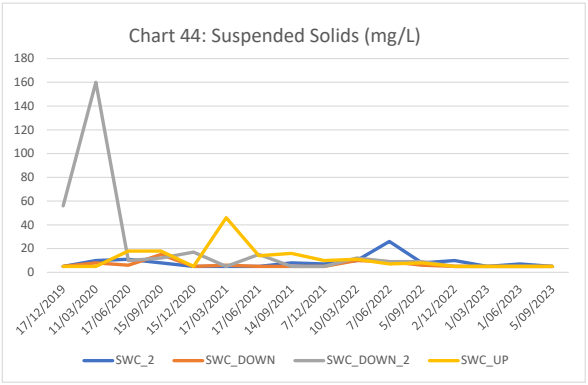


Chart 44: Suspended Solids (mg/L)
180
160
140
120
100
80
60
40
20
0
17/12/2019
11/03/2020
17/06/2020
15/09/2020
15/12/2020
17/03/2021
17/06/2021
14/09/2021
7/12/2021
10/03/2022
7/06/2022
5/09/2022
2/12/2022
1/03/2023
1/06/2023
5/09/2023
SWC_2
SWC_DOWN
SWC_DOWN_2
SWC_UP

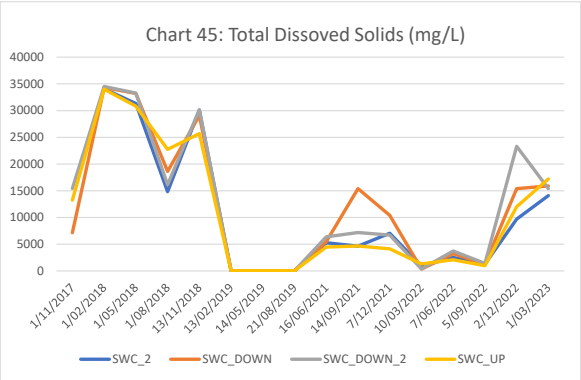


Chart 45: Total Dissoved Solids (mg/L)
40000
35000
30000
25000
20000
15000
10000
5000
0
1/11/2017
1/02/2018
1/05/2018
1/08/2018
13/11/2018
13/02/2019
14/05/2019
21/08/2019
16/06/2021
14/09/2021
7/12/2021
10/03/2022
7/06/2022
5/09/2022
2/12/2022
1/03/2023
SWC_2
SWC_DOWN
SWC_DOWN_2
SWC_UP

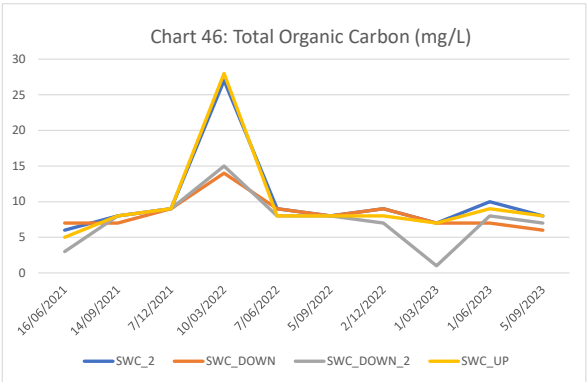
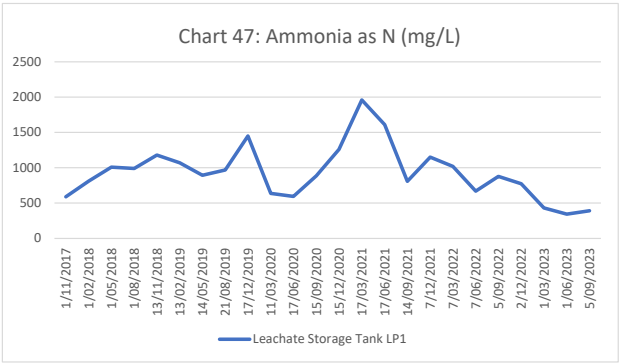
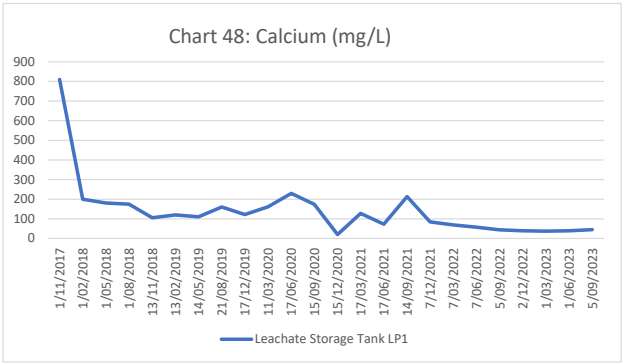
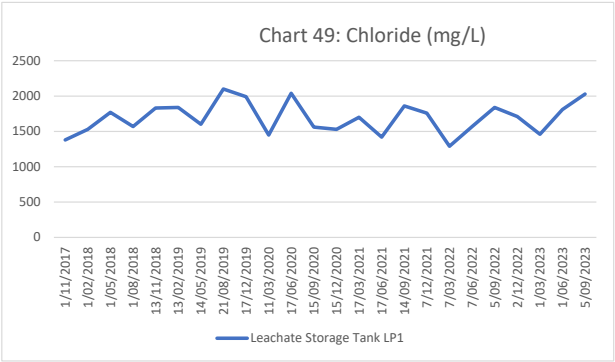


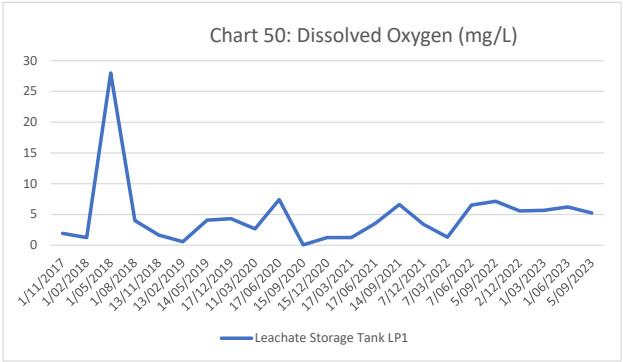
Chart 46: Total Organic Carbon (mg/L)
30
25
20
15
10
5
0
16/06/2021
14/09/2021
7/12/2021
10/03/2022
7/06/2022
5/09/2022
2/12/2022
1/03/2023
1/06/2023
5/09/2023
SWC_2
SWC_DOWN
SWC_DOWN_2
SWC_UP

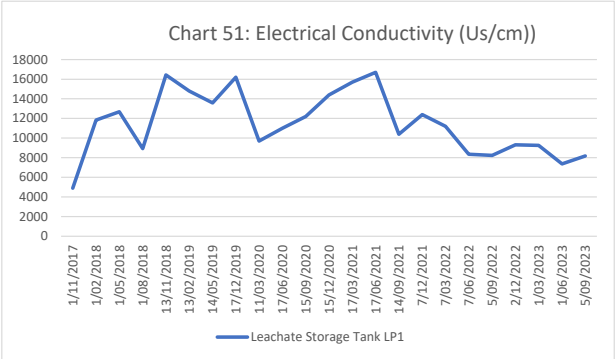
Charts 47-61 Leachate Water Quality Charts

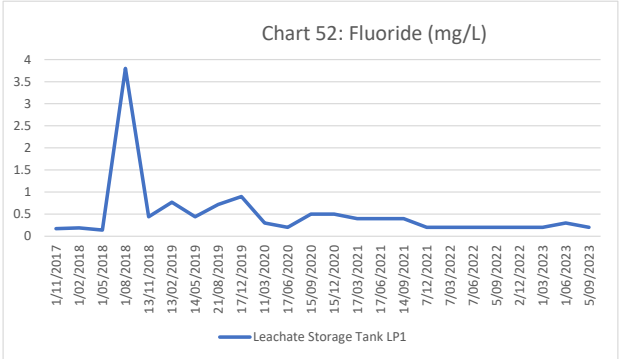


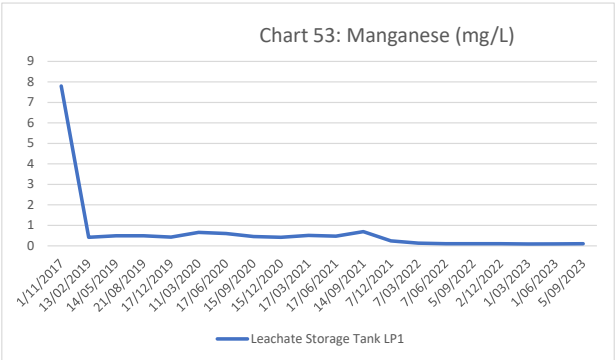


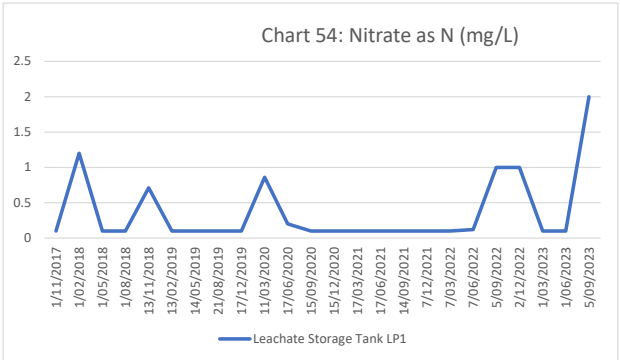












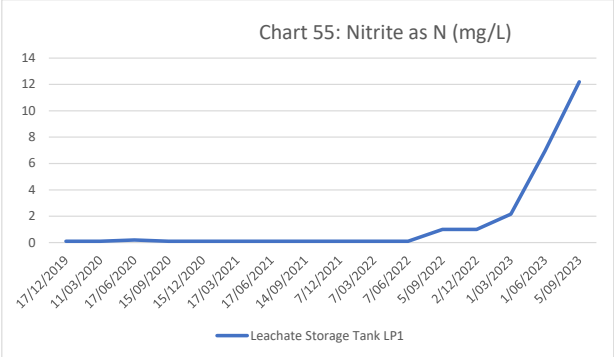


Chart 55: Nitrite as N (mg/L)
14
12
10
8
6
4
2
0
17/12/2019
11/03/2020
17/06/2020
15/09/2020
15/12/2020
17/03/2021
17/06/2021
14/09/2021
7/12/2021
7/03/2022
7/06/2022
5/09/2022
2/12/2022
1/03/2023
1/06/2023
5/09/2023
Leachate Storage Tank LP1

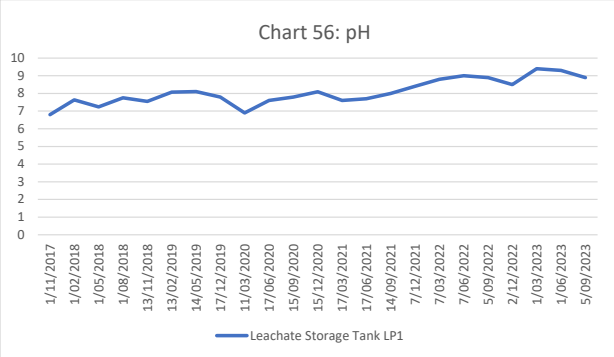


Chart 56: pH
10
9
8
7
6
5
4
3
2
1
0
1/11/2017
1/02/2018
1/05/2018
1/08/2018
13/11/2018
13/02/2019
14/05/2019
17/12/2019
11/03/2020
17/06/2020
15/09/2020
15/12/2020
17/03/2021
17/06/2021
14/09/2021
7/12/2021
7/03/2022
7/06/2022
5/09/2022
2/12/2022
1/03/2023
1/06/2023
5/09/2023
Leachate Storage Tank LP1

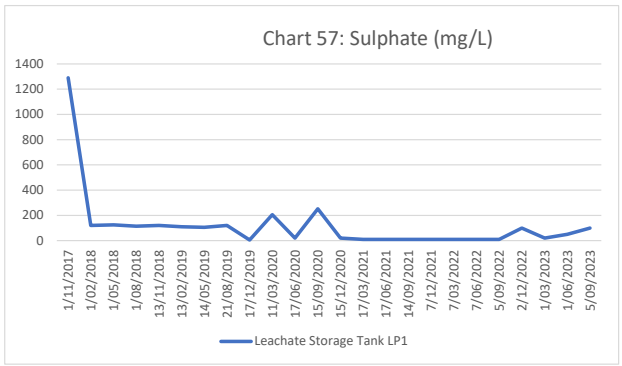


Chart 57: Sulphate (mg/L)
1400
1200
1000
800
600
400
200
0
1/11/2017
1/02/2018
1/05/2018
1/08/2018
13/11/2018
13/02/2019
14/05/2019
21/08/2019
17/12/2019
11/03/2020
17/06/2020
15/09/2020
15/12/2020
17/03/2021
17/06/2021
14/09/2021
7/12/2021
7/03/2022
7/06/2022
5/09/2022
2/12/2022
1/03/2023
1/06/2023
5/09/2023
Leachate Storage Tank LP1

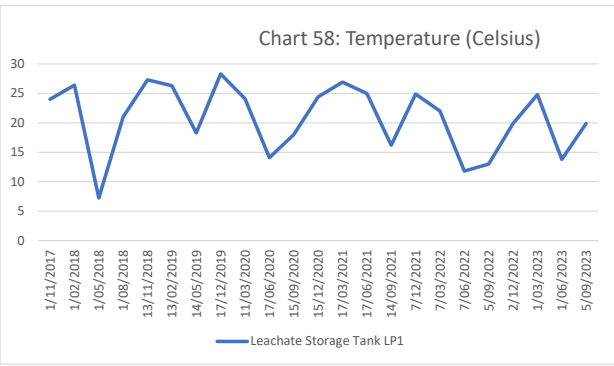


Chart 58: Temperature (Celsius)
30
25
20
15
10
5
0
1/11/2017
1/02/2018
1/05/2018
1/08/2018
13/11/2018
13/02/2019
14/05/2019
17/12/2019
11/03/2020
17/06/2020
15/09/2020
15/12/2020
17/03/2021
17/06/2021
14/09/2021
7/12/2021
7/03/2022
7/06/2022
5/09/2022
2/12/2022
1/03/2023
1/06/2023
5/09/2023
Leachate Storage Tank LP1

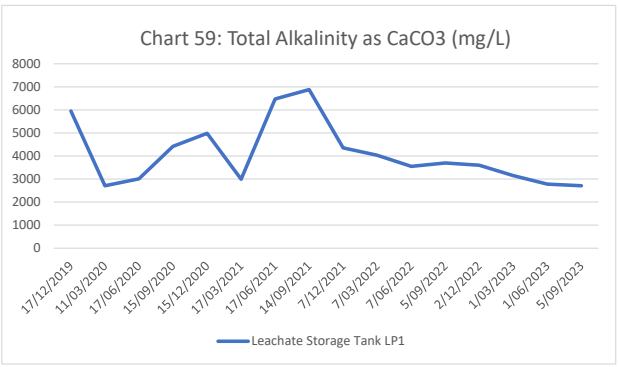


Chart 59: Total Alkalinity as CaCO3 (mg/L)
8000
7000
6000
5000
4000
3000
2000
1000
0
17/12/2019
11/03/2020
17/06/2020
15/09/2020
15/12/2020
17/03/2021
17/06/2021
14/09/2021
7/12/2021
7/03/2022
7/06/2022
5/09/2022
2/12/2022
1/03/2023
1/06/2023
5/09/2023
Leachate Storage Tank LP1

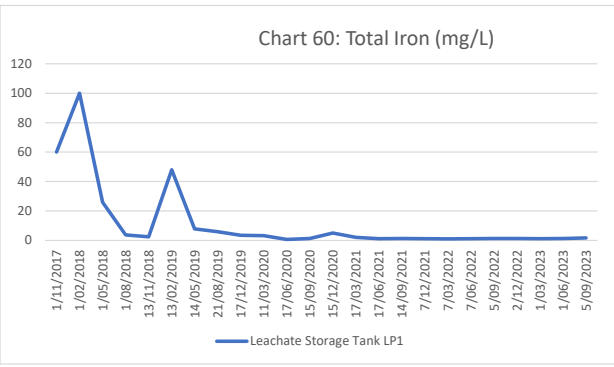


Chart 60: Total Iron (mg/L)
120
100
80
60
40
20
0
1/11/2017
1/02/2018
1/05/2018
1/08/2018
13/11/2018
13/02/2019
14/05/2019
21/08/2019
17/12/2019
11/03/2020
17/06/2020
15/09/2020
15/12/2020
17/03/2021
17/06/2021
14/09/2021
7/12/2021
7/03/2022
7/06/2022
5/09/2022
2/12/2022
1/03/2023
1/06/2023
5/09/2023
Leachate Storage Tank LP1

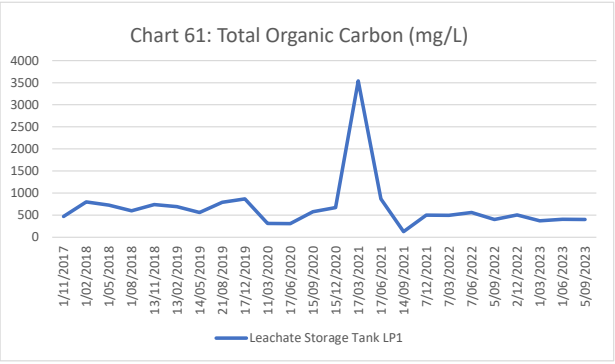


Chart 61: Total Organic Carbon (mg/L)
4000
3500
3000
2500
2000
1500
1000
500
0
1/11/2017
1/02/2018
1/05/2018
1/08/2018
13/11/2018
13/02/2019
14/05/2019
21/08/2019
17/12/2019
11/03/2020
17/06/2020
15/09/2020
15/12/2020
17/03/2021
17/06/2021
14/09/2021
7/12/2021
7/03/2022
7/06/2022
5/09/2022
2/12/2022
1/03/2023
1/06/2023
5/09/2023
Leachate Storage Tank LP1

APPENDICES

Appendix A:

EPL 5984 Sampling Point Summary (NSW EPA, 10/02/2022)

2	Leachate monitoring	Leachate tank labelled LP1 on the drawing titled "Shellharbour City Council - Dunmore, NSW - Site Layout - Figure no. 1" dated July 2019 (EPA Ref. no. DOC19/1027702).
3	Groundwater monitoring	BH1c - as shown on the drawing titled "Shellharbour City Council - Dunmore, NSW - Site Layout - Figure no. 1" dated July 2019 (EPA Ref. no. DOC19/1027702).
5	Groundwater monitoring	BH3 - as shown on the drawing titled "Shellharbour City Council - Dunmore, NSW - Site Layout - Figure no. 1" dated July 2019 (EPA Ref. no. DOC19/1027702).
6	Groundwater monitoring	BH4 - as shown on the drawing titled "Shellharbour City Council - Dunmore, NSW - Site Layout - Figure no. 1" dated July 2019 (EPA Ref. no. DOC19/1027702).
7	Groundwater monitoring	BH15 - as shown on the drawing titled "Shellharbour City Council - Dunmore, NSW - Site Layout - Figure no. 1" dated July 2019 (EPA Ref. no. DOC19/1027702).
10	Groundwater monitoring	BH13 - as shown on the drawing titled "Shellharbour City Council - Dunmore, NSW - Site Layout - Figure no. 1" dated July 2019 (EPA Ref. no. DOC19/1027702).
11	Groundwater monitoring	BH14 - as shown on the drawing titled "Shellharbour City Council - Dunmore, NSW - Site Layout - Figure no. 1" dated July 2019 (EPA Ref. no. DOC19/1027702).
16	Groundwater monitoring	BH19 - as shown on the drawing titled "Shellharbour City Council - Dunmore, NSW - Site Layout - Figure no. 1" dated July 2019 (EPA Ref. no. DOC19/1027702).
17	Groundwater monitoring	BH12R - as shown on the drawing titled "Shellharbour City Council - Dunmore, NSW - Site Layout - Figure no. 1" dated July 2019 (EPA Ref. no. DOC19/1027702).

18	Groundwater monitoring	BH9 - as shown on the drawing titled "Shellharbour City Council - Dunmore, NSW - Site Layout - Figure no. 1" dated July 2019 (EPA Ref. no. DOC19/1027702).
19	Surface Water Monitoring	SWC_2 - as shown on the drawing titled "Shellharbour City Council - Dunmore, NSW - Site Layout - Figure no. 1" dated July 2019 (EPA Ref. no. DOC19/1027702).
20	Surface Water Monitoring	SWC_UP - as shown on the drawing titled "Shellharbour City Council - Dunmore, NSW - Site Layout - Figure no. 1" dated July 2019 (EPA Ref. no. DOC19/1027702).
21	Surface Water Monitoring	SWC_DOWN - as shown on the drawing titled "Shellharbour City Council - Dunmore, NSW - Site Layout - Figure no. 1" dated July 2019 (EPA Ref. no. DOC19/1027702).
22	Surface Water Monitoring	SWC_DOWN2 - as shown on the drawing titled "Shellharbour City Council - Dunmore, NSW - Site Layout - Figure no. 1" dated July 2019 (EPA Ref. no. DOC19/1027702).
23	Groundwater Monitoring	BH21 - as shown on drawing titled "Monitoring Point Location Plan - Dunmore Recycling and Waste Depot - EPL No. 5984" prepared by Cardno and attached to correspondence dated 7 April 2020 (EPA ref. no. DOC20/317779).
24	Groundwater monitoring	BH22 - as shown on drawing titled "Monitoring Point Location Plan - Dunmore Recycling and Waste Depot - EPL No. 5984" prepared by Cardno and attached to correspondence dated 7 April 2020 (EPA ref. no. DOC20/317779).
25	Groundwater monitoring	BH18 - as shown on drawing titled "Monitoring Point Location Plan - Dunmore Recycling and Waste Depot - EPL No. 5984" prepared by Cardno and attached to correspondence dated 7 April 2020 (EPA ref. no. DOC20/317779).

Appendix B:

Laboratory Chain of Custody (COC) & Certificates of Analysis (COA) – Water Samples – Quarter 1

CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ Sydney: 277 Woodpark Rd, Smithfield NSW 2176 Ph: 02 8784 8555 E: samples.sydney@alsenviro.com
☐ Newcastle: 5 Rosegum Rd, Warabrook NSW 2304 Ph: 02 4968 9433 E: samples.newcastle@alsenviro.com
☐ Brisbane: 32 Shand St, Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsenviro.com
☐ Townsville: 14-15 Desma Ct, Bohle QLD 4818 Ph: 07 4796 0600 E: townsville.environmental@alsenviro.com
☐ Melbourne: 2-4 Westall Rd, Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsenviro.com
☐ Adelaide: 3-1 Burma Rd, Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsenviro.com
☐ Perth: 10 Hod Way, Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsenviro.com
☐ Launceston: 27 Wellington St, Launceston TAS 7250 Ph: 03 6331 2136 E: launceston@alsenviro.com

CLIENT:	Shellharbour City Council	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g. Ultra Trace Organics)	☐ Standard TAT (List due date): ☐ Non Standard or urgent TAT (List due date):
OFFICE:	41 Burelli St WOLLONGONG NSW 2500	ALS QUOTE NO.:	WO/030/19 TENDER
PROJECT:	Dunmore Quarterly Ground Waters EPL		
ORDER NUMBER:			
PROJECT MANAGER:	Ryan Stirling		
SAMPLER:	Robert. DaLio	SAMPLER MOBILE:	
COC emailed to ALS? (YES / NO)		EDD FORMAT (or default):	
Email Reports to :			
Email Invoice to :			

COC SEQUENCE NUMBER (Circle)

COC:	1	2	3	4	5	6	7
OF:	1	2	3	4	5	6	7

FOR LABORATORY USE ONLY (Circle)

Custody Seal Intact?	Yes	No	N/A
Free ice / frozen ice packs present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt	5.3 °C		
Other comment:			

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:
Robert DaLio	Anela	
DATE/TIME: 5/12/22. 13:30	DATE/TIME: 5/12/22	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: CC reports to:

Environmental Division Wollongong
Work Order Reference
EW2205534

Telephone : 02 42253125

ALS USE ONLY	SAMPLE DETAILS (MATRIX: Solid(S) Water(W))			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite pri. Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).)							
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	Ammonia	NT-2A (Alka, So4, Cl, Fl) Filtered Ca, K,	TOC	Dissolved Fe & Mn	NT-4 (NO2, NO3)	Send to Eurofins		
	BH1C	5.12.22 9:30	W			✓	✓	✓	✓	✓			Field Tests - pH, EC, Temp & SWL
	BH3	12:55	W			✓	✓	✓	✓	✓			Field Tests - pH, EC, Temp & SWL
	BH4	13:45	W			✓	✓	✓	✓	✓			Field Tests - pH, EC, Temp & SWL
	BH9	8:35	W			✓	✓	✓	✓	✓			Field Tests - pH, EC, Temp & SWL
	BH12R	11:50	W			✓	✓	✓	✓	✓			Field Tests - pH, EC, Temp & SWL
	BH13	12:10	W			✓	✓	✓	✓	✓			Field Tests - pH, EC, Temp & SWL
	BH14	12:30	W			✓	✓	✓	✓	✓			Field Tests - pH, EC, Temp & SWL
	BH15	11:15	W			✓	✓	✓	✓	✓			Field Tests - pH, EC, Temp & SWL
	BH19R	13:20	W			✓	✓	✓	✓	✓			Field Tests - pH, EC, Temp & SWL
	BH18	10:50	W			✓	✓	✓	✓	✓			Field Tests - pH, EC, Temp & SWL
	BH21	10:20	W			✓	✓	✓	✓	✓			Field Tests - pH, EC, Temp & SWL
	BH22	9:55	W			✓	✓	✓	✓	✓			Field Tests - pH, EC, Temp & SWL
	Duplicate	8:35	W			✓	✓	✓	✓	✓			Field Tests - pH, EC, Temp & SWL
	Triplicate	✓ 8:35	W								✓		
				TOTAL	10								

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EW2205534**	Page	: 1 of 8
Client	: **SHELLHARBOUR CITY COUNCIL**	Laboratory	: Environmental Division NSW South Coast
Contact	: Ryan Stirling	Contact	: Aneta Prosaroski
Address	: LAMERTON HOUSE, LAMERTON CRESCENT SHELL HARBOUR CITY CENTRE NSW, AUSTRALIA 2529	Address	: 1/19 Ralph Black Dr, North Wollongong 2500 NSW Australia
Telephone	: ----	Telephone	: +61 2 4225 3125
Project	: Dunmore Quarterly Groundwaters EPL	Date Samples Received	: 05-Dec-2022 16:46
Order number	: 1045179	Date Analysis Commenced	: 05-Dec-2022
C-O-C number	: ----	Issue Date	: 20-Dec-2022 13:48
Sampler	: Robert DaLio		
Site	: DUNMORE LANDFILL TENDER		
Quote number	: WO/030/19 TENDER GROUNDWATERS		
No. of samples received	: 14		
No. of samples analysed	: 13		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

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

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*
Aneta Prosaroski	Environmental Services Representative	Administration - Wollongong, NSW
Aneta Prosaroski	Environmental Services Representative	Laboratory - Wollongong, NSW
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Wisam Marassa	Inorganics Coordinator	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.

- **Analytical work for this work order will be conducted at ALS Sydney.**
- ED041G: LOR raised for Sulfate on sample 4 & 13 due to sample matrix.
- ED041G: LOR raised for Sulfate on sample 1 due to sample matrix.
- EK057G: It has been noted that Nitrite is greater than NOX. (Confirmed by re-analysis)
- It has been noted that Nitrite is greater than NOx for sample 9, however this difference is within the limits of experimental variation.
- pH performed by ALS Wollongong via in-house method EA005FD and EN67 PK.
- Electrical conductivity performed by ALS Wollongong via in-house method EA010FD and EN67 PK.
- Sampling and groundwater depth measurements completed by ALS Wollongong via inhouse sampling method EN/67.11 Groundwater Sampling via Bailer Method.
- Temperature performed by ALS Wollongong via in-house method EA116 and EN67 PK.
- All field analysis performed by ALS Wollongong were completed at the time of sampling.
- Sample collection of Ground Waters by in-house EN67 where the “surface layer of the aquifer was sampled”.
- 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.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	BH1C	BH3	BH4	BH9	BH12R
			Sampling date / time	05-Dec-2022 09:30	05-Dec-2022 12:55	05-Dec-2022 13:45	05-Dec-2022 08:35	05-Dec-2022 11:50
Compound	CAS Number	LOR	Unit	EW2205534-001	EW2205534-002	EW2205534-003	EW2205534-004	EW2205534-005
				Result	Result	Result	Result	Result
EA005FD: Field pH								
pH	----	0.1	pH Unit	7.0	8.1	8.2	7.3	7.3
EA010FD: Field Conductivity								
Electrical Conductivity (Non Compensated)	----	1	µS/cm	7160	1160	692	3580	1340
EA116: Temperature								
Temperature	----	0.5	°C	25.2	17.6	17.6	18.7	19.4
ED037P: Alkalinity by PC Titrator								
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	2780	330	297	1820	568
Total Alkalinity as CaCO3	----	1	mg/L	2780	330	297	1820	568
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<10	158	61	<10	119
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	904	140	50	392	107
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	133	126	86	180	154
Potassium	7440-09-7	1	mg/L	219	44	16	69	28
EG020F: Dissolved Metals by ICP-MS								
Manganese	7439-96-5	0.001	mg/L	0.106	0.022	0.094	0.679	0.508
Iron	7439-89-6	0.05	mg/L	8.16	<0.05	1.70	0.32	6.52
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	0.5	0.2	0.1	0.4	0.2
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	345	8.51	1.62	124	3.74
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.27	0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	<0.01	2.39	0.01	<0.01	0.01
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	2.66	0.02	<0.01	0.01
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	203	17	14	79	21

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			Sample ID	BH1C	BH3	BH4	BH9	BH12R
			Sampling date / time	05-Dec-2022 09:30	05-Dec-2022 12:55	05-Dec-2022 13:45	05-Dec-2022 08:35	05-Dec-2022 11:50
Compound	*CAS Number*	*LOR*	*Unit*	**EW2205534-001**	**EW2205534-002**	**EW2205534-003**	**EW2205534-004**	**EW2205534-005**
				Result	Result	Result	Result	Result
QWI-EN 67.11 Sampling of Groundwaters								
Standing Water Level	----	0.01	m AHD	**3.00**	**3.01**	**4.24**	**2.94**	**4.15**

Analytical Results

Sub-Matrix: **WATER**
(Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	BH13	BH14	BH15	BH19R	BH18
				Sampling date / time	05-Dec-2022 12:10	05-Dec-2022 12:30	05-Dec-2022 11:15	05-Dec-2022 13:20	05-Dec-2022 10:50
					EW2205534-006	EW2205534-007	EW2205534-008	EW2205534-009	EW2205534-010
					Result	Result	Result	Result	Result
EA005FD: Field pH									
pH	----	0.1	pH Unit		**7.3**	**7.0**	**7.4**	**8.4**	**7.2**
EA010FD: Field Conductivity									
Electrical Conductivity (Non Compensated)	----	1	µS/cm		**1770**	**756**	**2650**	**724**	**880**
EA116: Temperature									
Temperature	----	0.5	°C		**20.3**	**19.7**	**18.2**	**17.6**	**18.3**
ED037P: Alkalinity by PC Titrator									
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		**779**	**334**	**467**	**287**	**458**
Total Alkalinity as CaCO3	----	1	mg/L		**779**	**334**	**467**	**287**	**458**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**64**	**80**	**534**	**53**	**12**
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**204**	**33**	**447**	**52**	**76**
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**185**	**82**	**131**	**75**	**87**
Potassium	7440-09-7	1	mg/L		**17**	**14**	**185**	**37**	**18**
EG020F: Dissolved Metals by ICP-MS									
Manganese	7439-96-5	0.001	mg/L		**0.320**	**0.082**	**0.311**	**0.068**	**0.078**
Iron	7439-89-6	0.05	mg/L		**1.82**	**0.07**	**10.2**	**0.97**	**1.85**
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		**0.2**	**0.6**	**0.2**	**0.2**	**0.2**
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**3.32**	**0.93**	**10.3**	**2.35**	**1.51**
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		**0.03**	**0.01**	<0.01	**0.01**	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**0.19**	**1.57**	**0.14**	<0.01	<0.01
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.22**	**1.58**	**0.14**	<0.01	<0.01
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		**23**	**18**	**37**	**19**	**22**

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			Sample ID	**BH13**	**BH14**	**BH15**	**BH19R**	**BH18**
			Sampling date / time	05-Dec-2022 12:10	05-Dec-2022 12:30	05-Dec-2022 11:15	05-Dec-2022 13:20	05-Dec-2022 10:50
Compound	*CAS Number*	*LOR*	*Unit*	**EW2205534-006**	**EW2205534-007**	**EW2205534-008**	**EW2205534-009**	**EW2205534-010**
				Result	Result	Result	Result	Result
QWI-EN 67.11 Sampling of Groundwaters								
Standing Water Level	----	0.01	m AHD	**4.11**	**4.53**	**0.73**	**4.53**	**1.97**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	BH21	BH22	Duplicate	----	----
			Sampling date / time	05-Dec-2022 10:20	05-Dec-2022 09:55	05-Dec-2022 08:35	----	----
Compound	CAS Number	LOR	Unit	EW2205534-011	EW2205534-012	EW2205534-013	--------	--------
				Result	Result	Result	----	----
EA005FD: Field pH								
pH	----	0.1	pH Unit	**7.3**	**8.1**	**7.3**	----	----
EA010FD: Field Conductivity								
Electrical Conductivity (Non Compensated)	----	1	µS/cm	**2560**	**1910**	**3580**	----	----
EA116: Temperature								
Temperature	----	0.5	°C	**20.9**	**17.3**	**18.7**	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**834**	**606**	**1820**	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**834**	**606**	**1820**	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**149**	**283**	<10	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**429**	**235**	**390**	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**131**	**94**	**177**	----	----
Potassium	7440-09-7	1	mg/L	**18**	**43**	**68**	----	----
EG020F: Dissolved Metals by ICP-MS								
Manganese	7439-96-5	0.001	mg/L	**0.562**	**0.021**	**0.670**	----	----
Iron	7439-89-6	0.05	mg/L	**0.13**	**0.12**	**0.31**	----	----
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	**0.4**	**0.4**	**0.3**	----	----
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	**4.92**	**55.8**	**119**	----	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	----	----
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	<0.01	**0.01**	<0.01	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	**0.01**	<0.01	----	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	**41**	**34**	**80**	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH21	BH22	Duplicate	----	----
				Sampling date / time	05-Dec-2022 10:20	05-Dec-2022 09:55	05-Dec-2022 08:35	----	----
Compound	CAS Number	LOR	Unit		EW2205534-011	EW2205534-012	EW2205534-013	--------	--------
					Result	Result	Result	----	----
QWI-EN 67.11 Sampling of Groundwaters									
Standing Water Level	----	0.01	m AHD		**2.98**	**2.77**	**3.94**	**----**	**----**

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EK055G: Ammonia as N by Discrete Analyser

(WATER) EG020F: Dissolved Metals by ICP-MS

(WATER) EK057G: Nitrite as N by Discrete Analyser

(WATER) EK058G: Nitrate as N by Discrete Analyser

(WATER) EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser

(WATER) ED045G: Chloride by Discrete Analyser

(WATER) ED037P: Alkalinity by PC Titrator

(WATER) EK040P: Fluoride by PC Titrator

(WATER) ED041G: Sulfate (Turbidimetric) as SO4 2- by DA

(WATER) ED093F: Dissolved Major Cations

(WATER) EP005: Total Organic Carbon (TOC)

CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ **Sydney:** 277 Woodpark Rd, Smithfield NSW 2176 Ph: 02 8784 8555 E:samples.sydney@alsenviro.com
☐ **Newcastle:** 5 Rosegum Rd, Warabrook NSW 2304 Ph:02 4968 9433 E:samples.newcastle@alsenviro.com
☐ **Brisbane:** 32 Shand St, Stafford QLD 4053 Ph:07 3243 7222 E:samples.brisbane@alsenviro.com
☐ **Townsville:** 14-15 Desma Ct, Bohle QLD 4818 Ph:07 4796 0600 E: townsville.environmental@alsenviro.com
☐ **Melbourne:** 2-4 Westall Rd, Springvale VIC 3171 Ph:03 8549 9600 E: samples.melbourne@alsenviro.com
☐ **Adelaide:** 2-1 Burma Rd, Pooraka SA 5095 Ph: 08 8359 0890 E:adelaide@alsenviro.com
☐ **Perth:** 10 Hod Way, Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsenviro.com
☐ **Launceston:** 27 Wellington St, Launceston TAS 7250 Ph: 03 6331 2158 E: launceston@alsenviro.com

CLIENT:	Shellharbour City Council	**TURNAROUND REQUIREMENTS :** (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	☐ Standard TAT **(List due date):** ☐ Non Standard or urgent TAT **(List due date):**
OFFICE:	41 Burelli St WOLLONGONG NSW 2500		
PROJECT:	Dunmore Quarterly Surface Waters EPL	**ALS QUOTE NO.:** WO/030/19 TENDER	**COC SEQUENCE NUMBER (Circle)** COC: 1 2 3 4 5 6 7 OF: 1 2 3 4 5 6 7
ORDER NUMBER:			
PROJECT MANAGER:	Ryan Stirling		

FOR LABORATORY USE ONLY (Circle)

Custody Seal Intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt:	6.2 °C		
Other comment:			

SAMPLER: Robert Dabib	**SAMPLER MOBILE:**	**RELINQUISHED BY:** Robert Dabib	**RECEIVED BY:** Anele	**RELINQUISHED BY:**	**RECEIVED BY:**
COC emailed to ALS? (YES / NO)	**EDD FORMAT (or default):**				
Email Reports to :		**DATE/TIME:** 2/12/22	**DATE/TIME:** 2/12/22	**DATE/TIME:**	**DATE/TIME:**
Email Invoice to :					

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: **CC reports to:**

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where **Metals** are required, specify **Total** (unfiltered bottle required) or **Dissolved** (field filtered bottle required).								Additional Information
LAB ID	**SAMPLE ID**	**DATE / TIME**	**MATRIX**	**TYPE & PRESERVATIVE** *(refer to codes below)*	**TOTAL BOTTLES**	**TSS**	**NT-1, NT-2A (Ionic Balance)**	**TOC, NT-4, NH3, Total Mn**	**Dissolved and Total Fe**	**Turbidity**	**NH3, NH4 & NO3**	**TSS, TDS, TOC, Total Mn**		Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
	SWP1	2.12.22 11:35	W			✓	✓	✓	✓					**Field Tests - pH, EC, DO & Temp**
	SWC_2	9:55	W				✓		✓	✓	✓	✓		**Field Tests - pH, EC, DO & Temp**
	SWC_UP	8:50	W				✓		✓	✓	✓	✓		**Field Tests - pH, EC, DO & Temp**
	SWC_DOWN	9:00	W				✓		✓	✓	✓	✓		**Field Tests - pH, EC, DO & Temp**
	SWC_DOWN_2	9:15	W				✓		✓	✓	✓	✓		**Field Tests - pH, EC, DO & Temp**
	Duplicate	9:55	W				✓		✓	✓	✓	✓		**Field Tests - pH, EC, DO & Temp**
				TOTAL	10									

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Pres
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

Environmental Division
Wollongong
Work Order Reference
EW2205529

Telephone : 02 42253125

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EW2205529**	Page	: 1 of 7
Client	: **SHELLHARBOUR CITY COUNCIL**	Laboratory	: Environmental Division NSW South Coast
Contact	: Ryan Stirling	Contact	: Aneta Prosaroski
Address	: LAMERTON HOUSE, LAMERTON CRESCENT SHELL HARBOUR CITY CENTRE NSW, AUSTRALIA 2529	Address	: 1/19 Ralph Black Dr, North Wollongong 2500 NSW Australia
Telephone	: ----	Telephone	: +61 2 4225 3125
Project	: Dunmore Quarterly Surface Water EPL	Date Samples Received	: 02-Dec-2022 14:55
Order number	: 147649	Date Analysis Commenced	: 02-Dec-2022
C-O-C number	: ----	Issue Date	: 09-Dec-2022 17:53
Sampler	: Robert DaLio		
Site	: DUNMORE LANDFILL TENDER		
Quote number	: WO/030/19 TENDER SURFACE WATER		
No. of samples received	: 6		
No. of samples analysed	: 6		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

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

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*
Aneta Prosaroski	Environmental Services Representative	Laboratory - Wollongong, NSW
Ankit Joshi	Senior Chemist - Inorganics	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.

- **Analytical work for this work order will be conducted at ALS Sydney.**
- 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, SiO2 and Fluoride to the Anions.
- TDS by method EA-015 may bias high for sample 5 due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- pH performed by ALS Wollongong via in-house method EA005FD and EN67 PK.
- Electrical conductivity performed by ALS Wollongong via in-house method EA010FD and EN67 PK.
- Sampling completed by ALS Wollongong in accordance with in-house sampling method EN/67.6 Rivers and Streams.
- Temperature performed by ALS Wollongong via in-house method EA116 and EN67 PK.
- Dissolved oxygen (DO) performed by ALS Wollongong via in-house method EA025FD and EN67 PK.
- All field analysis performed by ALS Wollongong were completed at the time of sampling.
- Sampling completed by ALS Wollongong in accordance with in-house sampling method EN/67.4 Lakes and Reservoirs
- 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.

Analytical Results

Sub-Matrix: **WATER**
(Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	SWP1 Point 1	SWC_2 Point 19	SWC_UP Point 20	SWC_Down Point 21	SWC_DOWN_2 Point 22
				Sampling date / time	02-Dec-2022 11:35	02-Dec-2022 09:55	02-Dec-2022 08:50	02-Dec-2022 09:00	02-Dec-2022 09:15
					EW2205529-001	EW2205529-002	EW2205529-003	EW2205529-004	EW2205529-005
					Result	Result	Result	Result	Result
EA005FD: Field pH									
pH	----	0.1	pH Unit		**7.5**	**7.0**	**7.0**	**7.0**	**7.0**
EA010FD: Field Conductivity									
Electrical Conductivity (Non Compensated)	----	1	µS/cm		**1500**	**14100**	**17100**	**21600**	**29100**
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		**----**	**9700**	**12000**	**15400**	**23300**
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		**14**	**10**	<5	<5	<5
EA045: Turbidity									
Turbidity	----	0.1	NTU		**2.7**	**19.7**	**14.0**	**10.7**	**6.3**
EA116: Temperature									
Temperature	----	0.5	°C		**19.5**	**18.7**	**19.0**	**19.0**	**18.7**
ED037P: Alkalinity by PC Titrator									
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		**464**	**141**	**150**	**154**	**142**
Total Alkalinity as CaCO3	----	1	mg/L		**464**	**141**	**150**	**154**	**142**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**96**	**680**	**817**	**1060**	**1500**
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**225**	**5380**	**6620**	**8410**	**11200**
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**65**	**124**	**145**	**184**	**242**
Magnesium	7439-95-4	1	mg/L		**41**	**308**	**378**	**493**	**678**
Sodium	7440-23-5	1	mg/L		**213**	**2680**	**3280**	**4310**	**5920**
Potassium	7440-09-7	1	mg/L		**20**	**101**	**122**	**160**	**216**
EG020F: Dissolved Metals by ICP-MS									
Iron	7439-89-6	0.05	mg/L		**0.06**	<0.05	<0.05	<0.05	<0.05
EG020T: Total Metals by ICP-MS									
Manganese	7439-96-5	0.001	mg/L		**0.842**	**0.165**	**0.169**	**0.130**	**0.114**
Iron	7439-89-6	0.05	mg/L		**0.14**	**1.20**	**0.89**	**0.68**	**0.48**
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		**0.4**	**0.6**	**0.6**	**0.7**	**0.8**

Analytical Results

Sub-Matrix: **WATER**
(Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	SWP1 Point 1	SWC_2 Point 19	SWC_UP Point 20	SWC_Down Point 21	SWC_DOWN_2 Point 22
				Sampling date / time	02-Dec-2022 11:35	02-Dec-2022 09:55	02-Dec-2022 08:50	02-Dec-2022 09:00	02-Dec-2022 09:15
					EW2205529-001	EW2205529-002	EW2205529-003	EW2205529-004	EW2205529-005
					Result	Result	Result	Result	Result
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**8.52**	**0.53**	**0.32**	**0.58**	**0.32**
EK055G-NH4: Ammonium as N by DA									
Ammonium as N	14798-03-9_N	0.01	mg/L		**8.42**	**0.53**	**0.32**	**0.58**	**0.32**
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		**0.04**	**0.01**	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**0.02**	**0.11**	**0.10**	**0.07**	**0.04**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.06**	**0.12**	**0.10**	**0.07**	**0.04**
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**17.6**	**169**	**207**	**262**	**350**
ø Total Cations	----	0.01	meq/L		**16.4**	**151**	**184**	**241**	**331**
ø Ionic Balance	----	0.01	%		**3.59**	**5.65**	**5.78**	**4.18**	**2.80**
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		**30**	**9**	**8**	**9**	**7**
EP025FD: Field Dissolved Oxygen									
Dissolved Oxygen	----	0.01	mg/L		**3.43**	**5.80**	**4.94**	**7.07**	**4.49**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	Duplicate	----	----	----	----
			Sampling date / time	02-Dec-2022 09:55	----	----	----	----
Compound	CAS Number	LOR	Unit	EW2205529-006	--------	--------	--------	--------
				Result	----	----	----	----
EA005FD: Field pH								
pH	----	0.1	pH Unit	**7.0**	----	----	----	----
EA010FD: Field Conductivity								
Electrical Conductivity (Non Compensated)	----	1	µS/cm	**14100**	----	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	**9660**	----	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	**10**	----	----	----	----
EA045: Turbidity								
Turbidity	----	0.1	NTU	**19.0**	----	----	----	----
EA116: Temperature								
Temperature	----	0.5	°C	**18.7**	----	----	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**132**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**132**	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**704**	----	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**5390**	----	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**127**	----	----	----	----
Magnesium	7439-95-4	1	mg/L	**318**	----	----	----	----
Sodium	7440-23-5	1	mg/L	**2750**	----	----	----	----
Potassium	7440-09-7	1	mg/L	**106**	----	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Iron	7439-89-6	0.05	mg/L	<0.05	----	----	----	----
EG020T: Total Metals by ICP-MS								
Manganese	7439-96-5	0.001	mg/L	**0.161**	----	----	----	----
Iron	7439-89-6	0.05	mg/L	**1.11**	----	----	----	----
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	**0.6**	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	Duplicate	----	----	----	----
				Sampling date / time	02-Dec-2022 09:55	----	----	----	----
Compound	CAS Number	LOR	Unit		EW2205529-006	--------	--------	--------	--------
					Result	----	----	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.60**	----	----	----	----
EK055G-NH4: Ammonium as N by DA									
Ammonium as N	14798-03-9_N	0.01	mg/L		**0.60**	----	----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		**0.01**	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**0.11**	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.12**	----	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**169**	----	----	----	----
ø Total Cations	----	0.01	meq/L		**155**	----	----	----	----
ø Ionic Balance	----	0.01	%		**4.47**	----	----	----	----
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		**9**	----	----	----	----
EP025FD: Field Dissolved Oxygen									
Dissolved Oxygen	----	0.01	mg/L		**5.81**	----	----	----	----

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EA045: Turbidity

(WATER) EP005: Total Organic Carbon (TOC)

(WATER) EG020F: Dissolved Metals by ICP-MS

(WATER) EG020T: Total Metals by ICP-MS

(WATER) EK057G: Nitrite as N by Discrete Analyser

(WATER) EK058G: Nitrate as N by Discrete Analyser

(WATER) EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser

(WATER) EA025: Total Suspended Solids dried at 104 ± 2°C

(WATER) EK055G-NH4: Ammonium as N by DA

(WATER) EK055G: Ammonia as N by Discrete Analyser

(WATER) EN055: Ionic Balance

(WATER) ED045G: Chloride by Discrete Analyser

(WATER) ED041G: Sulfate (Turbidimetric) as SO4 2- by DA

(WATER) EK040P: Fluoride by PC Titrator

(WATER) ED037P: Alkalinity by PC Titrator

(WATER) ED093F: Dissolved Major Cations

(WATER) EA015: Total Dissolved Solids dried at 180 ± 5 °C

CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ Sydney: 277 Woodpark Rd, Smithfield NSW 2176 Ph: 02 8784 8555 E:samples.sydney@alsenviro.com

☐ Newcastle: 5 Rosegum Rd, Warabrook NSW 2304 Ph:02 4968 9433 E:samples.newcastle@alsenviro.com

☐ Brisbane: 32 Shand St, Stafford QLD 4053 Ph:07 3243 7222 E:samples.brisbane@alsenviro.com

☐ Townsville: 14-15 Desma Ct, Bohle QLD 4818 Ph:07 4796 0600 E: townsville.environmental@alsenviro.com

☐ Melbourne: 2-4 Westall Rd, Springvale VIC 3171 Ph:03 8549 9600 E: samples.melbourne@alsenviro.com

☐ Adelaide: 2-4 Burma Rd, Pooraka SA 5095 Ph: 08 8359 0890 E:adelaide@alsenviro.com

☐ Perth: 10 Hod Way, Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsenviro.com

☐ Launceston: 27 Wellington St, Launceston TAS 7250 Ph: 03 8231 2158 E: launceston@alsenviro.com

CLIENT:	Shellharbour City Council	**TURNAROUND REQUIREMENTS :** (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	☐ Standard TAT (List due date): ☐ Non Standard or urgent TAT (List due date):
OFFICE:	41 Burelli St WOLLONGONG NSW 2500		
PROJECT:	Dunmore Quarterly Leachate	**ALS QUOTE NO.:**	WO/030/19 TENDER
ORDER NUMBER:			
PROJECT MANAGER:	Ryan Stirling		
SAMPLER:	Robert Dalro	**SAMPLER MOBILE:**	
COC emailed to ALS?	(YES / NO)	**EDD FORMAT (or default):**	
Email Reports to :			
Email Invoice to :			

COC SEQUENCE NUMBER (Circle)

COC:	1	2	3	4	5	6	7
OF:	1	2	3	4	5	6	7

FOR LABORATORY USE ONLY (Circle)

Custody Seal Intact?	Yes	No	N/A
Free Ice / Frozen Ice Bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt		°C	
Other comment:	6 : 2		

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Robert Dalro	Aneta		
DATE/TIME: 2/12/22	DATE/TIME: 2/12/22	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: **CC reports to:**

ALS USE ONLY	SAMPLE DETAILS (MATRIX: Solid(S) Water(W))			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price). Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	Ammonia	NT-2A (Alka, So4, Cl, Fl) Filtered Ca, K	TOC	Total Fe & Mn	NT-4 (NO2, NO3)				Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
	Leachate Storage Tank - LP1	2/12/22 10:45	W			✓	✓	✓	✓	✓				Field Tests - pH, EC, Temp & DO
				TOTAL	10									

Environmental Division Wollongong
Work Order Reference
EW2205533

Telephone : 02 42253125

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EW2205533**	Page	: 1 of 4
Client	: **SHELLHARBOUR CITY COUNCIL**	Laboratory	: Environmental Division NSW South Coast
Contact	: Ryan Stirling	Contact	: Aneta Prosaroski
Address	: LAMERTON HOUSE, LAMERTON CRESCENT SHELL HARBOUR CITY CENTRE NSW, AUSTRALIA 2529	Address	: 1/19 Ralph Black Dr, North Wollongong 2500 NSW Australia
Telephone	: ----	Telephone	: +61 2 4225 3125
Project	: Dunmore Quarterly Leachate Tank EPL	Date Samples Received	: 02-Dec-2022 14:48
Order number	: 147649	Date Analysis Commenced	: 02-Dec-2022
C-O-C number	: ----	Issue Date	: 09-Dec-2022 16:39
Sampler	: Robert DaLio		
Site	: DUNMORE LANDFILL TENDER		
Quote number	: WO/030/19 TENDER LEACHATE		
No. of samples received	: 1		
No. of samples analysed	: 1		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

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

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*
Aneta Prosaroski	Environmental Services Representative	Laboratory - Wollongong, NSW
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Wisam Marassa	Inorganics Coordinator	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.

- **Analytical work for this work order will be conducted at ALS Sydney.**
- EK059G: LOR raised for NOx on sample 1 due to sample matrix.
- EK057G: LOR raised for Nitrite on sample 1 due to sample matrix.
- EK058G: LOR raised for Nitrate on sample 1 due to sample matrix.
- ED041G: LOR raised for Sulfate on sample 1 due to sample matrix.
- pH performed by ALS Wollongong via in-house method EA005FD and EN67 PK.
- Electrical conductivity performed by ALS Wollongong via in-house method EA010FD and EN67 PK.
- Temperature performed by ALS Wollongong via in-house method EA116 and EN67 PK.
- Dissolved oxygen (DO) performed by ALS Wollongong via in-house method EA025FD and EN67 PK.
- All field analysis performed by ALS Wollongong were completed at the time of sampling.
- Sampling completed by ALS Wollongong in accordance with in-house sampling method EN/67.10 Wastewaters
- 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.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	Leachate Storage Tank LP1	----	----	----	----
			Sampling date / time	02-Dec-2022 10:45	----	----	----	----
Compound	CAS Number	LOR	Unit	EW2205533-001	--------	--------	--------	--------
				Result	----	----	----	----
EA005FD: Field pH								
pH	----	0.1	pH Unit	**8.5**	----	----	----	----
EA010FD: Field Conductivity								
Electrical Conductivity (Non Compensated)	----	1	µS/cm	**9310**	----	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	**5310**	----	----	----	----
EA116: Temperature								
Temperature	----	0.1	°C	**19.9**	----	----	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	**1000**	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**2600**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**3600**	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<100	----	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**1710**	----	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**39**	----	----	----	----
Potassium	7440-09-7	1	mg/L	**363**	----	----	----	----
EG020T: Total Metals by ICP-MS								
Manganese	7439-96-5	0.001	mg/L	**0.101**	----	----	----	----
Iron	7439-89-6	0.05	mg/L	**1.35**	----	----	----	----
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	**0.2**	----	----	----	----
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	**773**	----	----	----	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	<1.00	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	<1.00	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	Leachate Storage Tank LP1	----	----	----	----
				Sampling date / time	02-Dec-2022 10:45	----	----	----	----
Compound	CAS Number	LOR	Unit		EW2205533-001	--------	--------	--------	--------
					Result	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser - Continued									
Nitrite + Nitrate as N	----	0.01	mg/L		<1.00	----	----	----	----
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		**506**	----	----	----	----
EP025FD: Field Dissolved Oxygen									
Dissolved Oxygen	----	0.01	mg/L		**5.58**	----	----	----	----
Dissolved Oxygen - % Saturation	----	0.1	% saturation		**63.2**	----	----	----	----

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) ED093F: Dissolved Major Cations

(WATER) EP005: Total Organic Carbon (TOC)

(WATER) EK055G: Ammonia as N by Discrete Analyser

(WATER) EG020T: Total Metals by ICP-MS

(WATER) EK057G: Nitrite as N by Discrete Analyser

(WATER) EK058G: Nitrate as N by Discrete Analyser

(WATER) EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser

(WATER) EA015: Total Dissolved Solids dried at 180 ± 5 °C

(WATER) ED045G: Chloride by Discrete Analyser

(WATER) ED037P: Alkalinity by PC Titrator

(WATER) EK040P: Fluoride by PC Titrator

(WATER) ED041G: Sulfate (Turbidimetric) as SO4 2- by DA

Appendix C:

Laboratory Chain of Custody (COC) & Certificates of Analysis (COA) – Water Samples – Quarter 2

CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ Sydney: 277 Woodpark Rd, Smithfield NSW 2176 Ph: 02 8784 8555 E:samples.sydney@alsenviro.com
☐ Newcastle: 5 Rosegum Rd, Warabrook NSW 2304 Ph 02 4968 9433 E:samples.newcastle@alsenviro.com
☐ Brisbane: 32 Shand St, Stafford QLD 4053 Ph:07 3243 7222 E:samples.brisbane@alsenviro.com
☐ Townsville: 14-15 Desma Ct, Bohle QLD 4818 Ph:07 4796 0600 E: townsville.environmental@alsenviro.com
☐ Melbourne: 2-4 Westall Rd, Springvale VIC 3171 Ph:03 8549 9600 E: samples.melbourne@alsenviro.com
☐ Adelaide: 2-1 Burma Rd, Pooraka SA 5095 Ph: 08 8359 0890 E:adelaide@alsenviro.com
☐ Perth: 10 Hod Way, Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsenviro.com
☐ Launceston: 27 Wellington St, Launceston TAS 7250 Ph: 03 6331 2158 E: launceston@alsenviro.com

CLIENT:	Shellharbour City Council	TURNAROUND REQUIREMENTS : ☐ Standard TAT (List due date):	FOR LABORATORY USE ONLY (Circle)
OFFICE:	41 Burelli St WOLLONGONG NSW 2500	(Standard TAT may be longer for some tests e.g., Ultra Trace Organics) ☐ Non Standard or urgent TAT (List due date):	Custody Seal Intact? Yes No N/A
PROJECT:	Dunmore Quarterly Ground Waters EPL	ALS QUOTE NO.: WO/030/19 TENDER	Free ice / frozen ice bricks present upon receipt? Yes No N/A
ORDER NUMBER:		COC SEQUENCE NUMBER (Circle) COC: 1 2 3 4 5 6 7	Random Sample Temperature on Receipt: 5.7 °C
PROJECT MANAGER:	Ryan Stirling	OF: 1 2 3 4 5 6 7	Other comment:

SAMPLER: Robert Dalv	SAMPLER MOBILE:	RELINQUISHED BY: Robert Dalia	RECEIVED BY: Anety.
COC emailed to ALS? (YES / NO)	EDD FORMAT (or default):	DATE/TIME: 2.3.23	DATE/TIME: 2.3.23
Email Reports to :			RELINQUISHED BY:
Email Invoice to :			DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: CC reports to:

Environmental Division Wollongong
Work Order Reference
EW2300850

Telephone : 02 42253125

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite pr. Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	Ammonia	NT-2A (Alka, So4, Cl, Fl) Filtered Ca, K	TOC	Dissolved Fe & Mn	NT-4 (NO2, NO3)	Send to Eurofins			
	BH1C	2.3.23 11:40	W			✓	✓	✓	✓	✓				Field Tests - pH, EC, Temp & SWL
	BH3	12:23	W			✓	✓	✓	✓	✓				Field Tests - pH, EC, Temp & SWL
	BH4	13:15	W			✓	✓	✓	✓	✓				Field Tests - pH, EC, Temp & SWL
	BH9	8:30	W			✓	✓	✓	✓	✓				Field Tests - pH, EC, Temp & SWL
	BH12R	10:40	W			✓	✓	✓	✓	✓				Field Tests - pH, EC, Temp & SWL
	BH13	10:55	W			✓	✓	✓	✓	✓				Field Tests - pH, EC, Temp & SWL
	BH14	11:12	W			✓	✓	✓	✓	✓				Field Tests - pH, EC, Temp & SWL
	BH15	10:05	W			✓	✓	✓	✓	✓				Field Tests - pH, EC, Temp & SWL
	BH19R	12:55	W			✓	✓	✓	✓	✓				Field Tests - pH, EC, Temp & SWL
	BH18	9:00	W			✓	✓	✓	✓	✓				Field Tests - pH, EC, Temp & SWL
	BH21	9:40	W			✓	✓	✓	✓	✓				Field Tests - pH, EC, Temp & SWL
	BH22	12:10	W			✓	✓	✓	✓	✓				Field Tests - pH, EC, Temp & SWL
	Duplicate	~~9:05~~	W	9:00		✓	✓	✓	✓	✓				Field Tests - pH, EC, Temp & SWL
	Triplicate	9:00	W	RNC.							✓			
				TOTAL	10									

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EW2300850**	Page	: 1 of 8
Client	: **SHELLHARBOUR CITY COUNCIL**	Laboratory	: Environmental Division NSW South Coast
Contact	: Ryan Stirling	Contact	: Aneta Prosaroski
Address	: LAMERTON HOUSE, LAMERTON CRESCENT SHELL HARBOUR CITY CENTRE NSW, AUSTRALIA 2529	Address	: 1/19 Ralph Black Dr, North Wollongong 2500 NSW Australia
Telephone	: ----	Telephone	: +61 2 4225 3125
Project	: Dunmore Quarterly Groundwaters EPL	Date Samples Received	: 02-Mar-2023 15:40
Order number	: 147649	Date Analysis Commenced	: 02-Mar-2023
C-O-C number	: ----	Issue Date	: 14-Mar-2023 12:38
Sampler	: Robert DaLio		
Site	: DUNMORE LANDFILL TENDER		
Quote number	: WO/030/19 TENDER GROUNDWATERS		
No. of samples received	: 14		
No. of samples analysed	: 13		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

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

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*
Aneta Prosaroski	Environmental Services Representative	Laboratory - Wollongong, NSW
Ankit Joshi	Senior Chemist - Inorganics	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.

- **Analytical work for this work order will be conducted at ALS Sydney.**
- ED041G: LOR raised for Sulfate due to sample matrix
- It has been noted that Nitrite is greater than NOx, however this difference is within the limits of experimental variation sample #9
- EK057G/EK059G: It has been noted that Nitrite is greater than NOx on sample 3, however this difference is within the limits of experimental variation.
- pH performed by ALS Wollongong via in-house method EA005FD and EN67 PK.
- Electrical conductivity performed by ALS Wollongong via in-house method EA010FD and EN67 PK.
- Sampling and groundwater depth measurements completed by ALS Wollongong via inhouse sampling method EN/67.11 Groundwater Sampling Via High Flow and Bailer Method.
- Temperature performed by ALS Wollongong via in-house method EA116 and EN67 PK.
- Sample collection of Ground Waters by in-house EN67 where the “surface layer of the aquifer was sampled”.
- 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.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	BH1C	BH3	BH4	BH9	BH12R
			Sampling date / time	02-Mar-2023 01:40	02-Mar-2023 12:23	02-Mar-2023 13:15	02-Mar-2023 08:30	02-Mar-2023 10:40
Compound	CAS Number	LOR	Unit	EW2300850-001	EW2300850-002	EW2300850-003	EW2300850-004	EW2300850-005
				Result	Result	Result	Result	Result
EA005FD: Field pH								
pH	----	0.1	pH Unit	7.1	7.3	7.4	7.2	6.8
EA010FD: Field Conductivity								
Electrical Conductivity (Non Compensated)	----	1	µS/cm	7960	1230	688	3690	1670
EA116: Temperature								
Temperature	----	0.5	°C	24.8	18.5	18.3	18.8	19.7
ED037P: Alkalinity by PC Titrator								
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	2650	318	261	1760	619
Total Alkalinity as CaCO3	----	1	mg/L	2650	318	261	1760	619
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<10	143	51	<10	208
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	1060	140	51	382	174
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	148	134	92	183	207
Potassium	7440-09-7	1	mg/L	240	36	16	88	28
EG020F: Dissolved Metals by ICP-MS								
Manganese	7439-96-5	0.001	mg/L	0.111	0.072	0.103	0.663	0.552
Iron	7439-89-6	0.05	mg/L	12.4	0.18	2.19	0.81	9.67
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	0.4	0.2	0.1	0.4	0.2
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	285	10.6	2.00	122	4.24
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.14	0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	<0.01	3.20	<0.01	0.02	<0.01
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	3.34	<0.01	0.02	<0.01
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	180	17	11	64	20

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)				Sample ID	BH1C	BH3	BH4	BH9	BH12R
				Sampling date / time	02-Mar-2023 01:40	02-Mar-2023 12:23	02-Mar-2023 13:15	02-Mar-2023 08:30	02-Mar-2023 10:40
Compound	*CAS Number*	*LOR*	*Unit*		**EW2300850-001**	**EW2300850-002**	**EW2300850-003**	**EW2300850-004**	**EW2300850-005**
					Result	Result	Result	Result	Result
QWI-EN 67.11 Sampling of Groundwaters									
Standing Water Level	----	0.01	m AHD		**3.02**	**3.10**	**4.32**	**3.09**	**4.23**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	BH13	BH14	BH15	BH19R	BH18
			Sampling date / time	02-Mar-2023 10:55	02-Mar-2023 11:12	02-Mar-2023 10:05	02-Mar-2023 12:55	02-Mar-2023 09:00
Compound	CAS Number	LOR	Unit	EW2300850-006	EW2300850-007	EW2300850-008	EW2300850-009	EW2300850-010
				Result	Result	Result	Result	Result
EA005FD: Field pH								
pH	----	0.1	pH Unit	6.9	7.0	6.8	7.5	6.8
EA010FD: Field Conductivity								
Electrical Conductivity (Non Compensated)	----	1	µS/cm	1930	762	2570	638	601
EA116: Temperature								
Temperature	----	0.5	°C	20.7	20.0	18.5	18.3	20.8
ED037P: Alkalinity by PC Titrator								
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	744	359	471	339	272
Total Alkalinity as CaCO3	----	1	mg/L	744	359	471	339	272
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	58	73	366	26	<10
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	245	30	476	29	31
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	206	96	137	73	80
Potassium	7440-09-7	1	mg/L	21	14	174	41	11
EG020F: Dissolved Metals by ICP-MS								
Manganese	7439-96-5	0.001	mg/L	0.419	0.107	0.273	0.055	0.139
Iron	7439-89-6	0.05	mg/L	3.45	0.55	9.33	0.89	2.02
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	0.2	0.6	0.2	0.2	0.2
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	5.31	1.18	8.12	2.28	1.02
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.03	0.02	<0.01
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	<0.01	<0.01	0.17	<0.01	<0.01
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.20	0.01	<0.01
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	28	13	34	6	14

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)				Sample ID	BH13	BH14	BH15	BH19R	BH18
				Sampling date / time	02-Mar-2023 10:55	02-Mar-2023 11:12	02-Mar-2023 10:05	02-Mar-2023 12:55	02-Mar-2023 09:00
Compound	*CAS Number*	*LOR*	*Unit*		**EW2300850-006**	**EW2300850-007**	**EW2300850-008**	**EW2300850-009**	**EW2300850-010**
					Result	Result	Result	Result	Result
QWI-EN 67.11 Sampling of Groundwaters									
Standing Water Level	----	0.01	m AHD		**4.19**	**4.62**	**0.53**	**4.52**	**2.10**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	BH21	BH22	Duplicate	----	----
			Sampling date / time	02-Mar-2023 09:40	02-Mar-2023 12:10	02-Mar-2023 09:00	----	----
Compound	CAS Number	LOR	Unit	EW2300850-011	EW2300850-012	EW2300850-013	--------	--------
				Result	Result	Result	----	----
EA005FD: Field pH								
pH	----	0.1	pH Unit	7.2	7.5	6.8	----	----
EA010FD: Field Conductivity								
Electrical Conductivity (Non Compensated)	----	1	µS/cm	2480	2250	601	----	----
EA116: Temperature								
Temperature	----	0.5	°C	21.7	18.5	20.8	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	851	651	281	----	----
Total Alkalinity as CaCO3	----	1	mg/L	851	651	281	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	145	223	<10	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	339	240	32	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	169	113	81	----	----
Potassium	7440-09-7	1	mg/L	23	39	11	----	----
EG020F: Dissolved Metals by ICP-MS								
Manganese	7439-96-5	0.001	mg/L	0.507	0.043	0.142	----	----
Iron	7439-89-6	0.05	mg/L	0.26	0.06	2.02	----	----
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	0.4	0.4	0.2	----	----
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	2.64	35.0	1.10	----	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	0.32	<0.01	<0.01	----	----
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	9.68	<0.01	<0.01	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	10.0	<0.01	<0.01	----	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	33	29	14	----	----

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			Sample ID	**BH21**	**BH22**	**Duplicate**	**----**	**----**
			Sampling date / time	02-Mar-2023 09:40	02-Mar-2023 12:10	02-Mar-2023 09:00	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**EW2300850-011**	**EW2300850-012**	**EW2300850-013**	**--------**	**--------**
				Result	Result	Result	----	----
QWI-EN 67.11 Sampling of Groundwaters								
Standing Water Level	----	0.01	m AHD	**2.97**	**2.60**	**2.10**	**----**	**----**

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) ED093F: Dissolved Major Cations

(WATER) EP005: Total Organic Carbon (TOC)

(WATER) EK055G: Ammonia as N by Discrete Analyser

(WATER) EG020F: Dissolved Metals by ICP-MS

(WATER) EK057G: Nitrite as N by Discrete Analyser

(WATER) EK058G: Nitrate as N by Discrete Analyser

(WATER) EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser

(WATER) ED045G: Chloride by Discrete Analyser

(WATER) ED037P: Alkalinity by PC Titrator

(WATER) EK040P: Fluoride by PC Titrator

(WATER) ED041G: Sulfate (Turbidimetric) as SO4 2- by DA

CHAIN OF CUSTODY

ALS Laboratory: please tick →

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☐ **Brisbane**: 32 Shand St, Stafford QLD 4053 Ph:07 3243 7222 E:samples.brisbane@alsenviro.com
☐ **Townsville**: 14-15 Desma Ct, Bohle QLD 4818 Ph:07 4796 0600 E: townsville.environmental@alsenviro.com
☐ **Melbourne**: 2-4 Westall Rd, Springvale VIC 3171 Ph:03 8549 9600 E: samples.melbourne@alsenviro.com
☐ **Adelaide**: 2-1 Burma Rd, Pooraka SA 5095 Ph: 08 8359 0890 E:adelaide@alsenviro.com
☐ **Perth**: 10 Hod Way, Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsenviro.com
☐ **Launceston**: 27 Wellington St, Launceston TAS 7250 Ph: 03 6331 2158 E: launceston@alsenviro.com

CLIENT:	Shellharbour City Council	**TURNAROUND REQUIREMENTS :** (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	☐ Standard TAT **(List due date):** ☐ Non Standard or urgent TAT **(List due date):**
OFFICE:	41 Burelli St WOLLONGONG NSW 2500		
PROJECT:	Dunmore Quarterly Surface Waters EPL	**ALS QUOTE NO.:** WO/030/19 TENDER	
ORDER NUMBER:			
PROJECT MANAGER:	Ryan Stirling		

COC SEQUENCE NUMBER (Circle)

COC:	1	2	3	4	5	6	7
OF:	1	2	3	4	5	6	7

FOR LABORATORY USE ONLY (Circle)

Custody Seal Intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt	10.4 °C		
Other comment:			

SAMPLER:	Robert Dakis	**SAMPLER MOBILE:**	
COC emailed to ALS?	(YES / NO)	**EDD FORMAT (or default):**	
Email Reports to :			
Email Invoice to :			

RELINQUISHED BY:	**RECEIVED BY:**	**RELINQUISHED BY:**	**RECEIVED BY:**
Robert Dakis	Robert Dakis		
DATE/TIME: 1.3.23	DATE/TIME: 1.3.23	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: **CC reports to:**

ALS USE ONLY	SAMPLE DETAILS (MATRIX: Solid(S) Water(W))			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price). Where **Metals** are required, specify **Total** (unfiltered bottle required) or **Dissolved** (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE *(refer to codes below)*	TOTAL BOTTLES	TSS	NT-1, NT-2A (Ionic Balance)	TOC, NT-4, NH3, Total Mn	Dissolved and Total Fe	Turbidity	NH3, NH4 & NO3	TSS, TDS, TOC, Total Mn		Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
	SWP1	1.3.23 10:05	W			✓	✓	✓	✓					Field Tests - pH, EC, DO & Temp
	SWC_2	10:45	W				✓		✓	✓	✓	✓		Field Tests - pH, EC, DO & Temp
	SWC_UP	11:00	W				✓		✓	✓	✓	✓		Field Tests - pH, EC, DO & Temp
	SWC_DOWN	11:30	W				✓		✓	✓	✓	✓		Field Tests - pH, EC, DO & Temp
	SWC_DOWN_2	11:40	W				✓		✓	✓	✓	✓		Field Tests - pH, EC, DO & Temp
	Duplicate	10:05	W				✓		✓	✓	✓	✓		Field Tests - pH, EC, DO & Temp
				TOTAL	10									

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserve
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP =
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

Environmental Division Wollongong
Work Order Reference
EW2300849

Telephone : 02 42253125

ENFM204

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EW2300849**	Page	: 1 of 7
Client	: **SHELLHARBOUR CITY COUNCIL**	Laboratory	: Environmental Division NSW South Coast
Contact	: Ryan Stirling	Contact	: Aneta Prosaroski
Address	: LAMERTON HOUSE, LAMERTON CRESCENT SHELL HARBOUR CITY CENTRE NSW, AUSTRALIA 2529	Address	: 1/19 Ralph Black Dr, North Wollongong 2500 NSW Australia
Telephone	: ----	Telephone	: +61 2 4225 3125
Project	: Dunmore Quarterly Surface Water EPL	Date Samples Received	: 01-Mar-2023 15:39
Order number	: 147649	Date Analysis Commenced	: 01-Mar-2023
C-O-C number	: ----	Issue Date	: 14-Mar-2023 11:09
Sampler	: Robert DaLio		
Site	: DUNMORE LANDFILL TENDER		
Quote number	: WO/030/19 TENDER SURFACE WATER		
No. of samples received	: 6		
No. of samples analysed	: 6		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

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

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*
Aneta Prosaroski	Environmental Services Representative	Laboratory - Wollongong, NSW
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Wisam Marassa	Inorganics Coordinator	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.

- **Analytical work for this work order will be conducted at ALS Sydney.**
- 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, SiO2 and Fluoride to the Anions.
- EG020: Total Manganese results for samples EW2300849-#001 and #006 confirmed by re-digestion and reanalysis.
- pH performed by ALS Wollongong via in-house method EA005FD and EN67 PK.
- Electrical conductivity performed by ALS Wollongong via in-house method EA010FD and EN67 PK.
- Sampling completed by ALS Wollongong in accordance with in-house sampling method EN/67.6 Rivers and Streams.
- Temperature performed by ALS Wollongong via in-house method EA116 and EN67 PK.
- Dissolved oxygen (DO) performed by ALS Wollongong via in-house method EA025FD and EN67 PK.
- All field analysis performed by ALS Wollongong were completed at the time of sampling.
- Sampling completed by ALS Wollongong in accordance with in-house sampling method EN/67.4 Lakes and Reservoirs
- 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.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	SWP1 Point 1	SWC_2 Point 19	SWC_UP Point 20	SWC_Down Point 21	SWC_DOWN_2 Point 22
			Sampling date / time	01-Mar-2023 00:00	01-Mar-2023 00:00	01-Mar-2023 00:00	01-Mar-2023 00:00	01-Mar-2023 00:00
Compound	CAS Number	LOR	Unit	EW2300849-001	EW2300849-002	EW2300849-003	EW2300849-004	EW2300849-005
				Result	Result	Result	Result	Result
EA005FD: Field pH								
pH	----	0.1	pH Unit	7.5	7.3	7.1	7.2	7.3
EA010FD: Field Conductivity								
Electrical Conductivity (Non Compensated)	----	1	µS/cm	1210	27500	24200	23800	23300
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	----	14100	17200	15900	15400
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	99	----	----	----	----
Suspended Solids (SS)	----	5	mg/L	----	<5	<5	<5	<5
EA045: Turbidity								
Turbidity	----	0.1	NTU	40.0	2.2	3.2	2.9	2.9
EA116: Temperature								
Temperature	----	0.5	°C	21.9	22.9	22.3	23.8	23.7
ED037P: Alkalinity by PC Titrator								
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	397	114	138	131	127
Total Alkalinity as CaCO3	----	1	mg/L	397	114	138	131	127
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	53	1390	913	886	835
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	147	9180	8150	7720	7640
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	67	201	180	170	170
Magnesium	7439-95-4	1	mg/L	33	633	552	522	513
Sodium	7440-23-5	1	mg/L	161	5460	4750	4510	4340
Potassium	7440-09-7	1	mg/L	13	194	173	163	159
EG020F: Dissolved Metals by ICP-MS								
Iron	7439-89-6	0.05	mg/L	0.20	0.08	0.10	0.05	<0.05
EG020T: Total Metals by ICP-MS								
Manganese	7439-96-5	0.001	mg/L	0.570	0.180	0.204	0.218	0.219
Iron	7439-89-6	0.05	mg/L	1.45	0.46	0.61	0.59	0.58
EK040P: Fluoride by PC Titrator								

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	SWP1 Point 1	SWC_2 Point 19	SWC_UP Point 20	SWC_Down Point 21	SWC_DOWN_2 Point 22
			Sampling date / time	01-Mar-2023 00:00	01-Mar-2023 00:00	01-Mar-2023 00:00	01-Mar-2023 00:00	01-Mar-2023 00:00
Compound	CAS Number	LOR	Unit	EW2300849-001	EW2300849-002	EW2300849-003	EW2300849-004	EW2300849-005
				Result	Result	Result	Result	Result
EK040P: Fluoride by PC Titrator - Continued								
Fluoride	16984-48-8	0.1	mg/L	**0.3**	**0.8**	**0.7**	**0.8**	**0.7**
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	**0.03**	**0.19**	**0.07**	**0.25**	**0.12**
EK055G-NH4: Ammonium as N by DA								
Ammonium as N	14798-03-9_N	0.01	mg/L	**0.03**	**0.19**	**0.07**	**0.25**	**0.12**
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	**0.01**	<0.01	**0.01**	**0.01**
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	<0.01	<0.01	**0.02**	**0.01**	**0.01**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	**0.01**	**0.02**	**0.02**	**0.02**
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	**13.2**	**290**	**252**	**239**	**235**
ø Total Cations	----	0.01	meq/L	**13.4**	**304**	**265**	**252**	**244**
ø Ionic Balance	----	0.01	%	**0.80**	**2.42**	**2.66**	**2.64**	**1.69**
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	**24**	**7**	**7**	**7**	<1
EP025FD: Field Dissolved Oxygen								
Dissolved Oxygen	----	0.01	mg/L	**8.53**	**4.16**	**4.79**	**4.92**	**5.26**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	Duplicate	----	----	----	----
			Sampling date / time	01-Mar-2023 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EW2300849-006	--------	--------	--------	--------
				Result	----	----	----	----
EA005FD: Field pH								
pH	----	0.1	pH Unit	**7.7**	----	----	----	----
EA010FD: Field Conductivity								
Electrical Conductivity (Non Compensated)	----	1	µS/cm	**1210**	----	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	**774**	----	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	**35**	----	----	----	----
EA045: Turbidity								
Turbidity	----	0.1	NTU	**18.7**	----	----	----	----
EA116: Temperature								
Temperature	----	0.5	°C	**21.9**	----	----	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**435**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**435**	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**54**	----	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**154**	----	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**66**	----	----	----	----
Magnesium	7439-95-4	1	mg/L	**33**	----	----	----	----
Sodium	7440-23-5	1	mg/L	**167**	----	----	----	----
Potassium	7440-09-7	1	mg/L	**13**	----	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Iron	7439-89-6	0.05	mg/L	**0.19**	----	----	----	----
EG020T: Total Metals by ICP-MS								
Manganese	7439-96-5	0.001	mg/L	**0.426**	----	----	----	----
Iron	7439-89-6	0.05	mg/L	**1.33**	----	----	----	----
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	**0.3**	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	Duplicate	----	----	----	----
				Sampling date / time	01-Mar-2023 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EW2300849-006	--------	--------	--------	--------
					Result	----	----	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.01**	----	----	----	----
EK055G-NH4: Ammonium as N by DA									
Ammonium as N	14798-03-9_N	0.01	mg/L		<0.01	----	----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**0.01**	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.01**	----	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**14.2**	----	----	----	----
ø Total Cations	----	0.01	meq/L		**13.6**	----	----	----	----
ø Ionic Balance	----	0.01	%		**1.99**	----	----	----	----
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		**16**	----	----	----	----
EP025FD: Field Dissolved Oxygen									
Dissolved Oxygen	----	0.01	mg/L		**8.51**	----	----	----	----

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EA045: Turbidity

(WATER) EP005: Total Organic Carbon (TOC)

(WATER) EG020F: Dissolved Metals by ICP-MS

(WATER) EG020T: Total Metals by ICP-MS

(WATER) EK057G: Nitrite as N by Discrete Analyser

(WATER) EK058G: Nitrate as N by Discrete Analyser

(WATER) EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser

(WATER) EA025: Total Suspended Solids dried at 104 ± 2°C

(WATER) EK055G-NH4: Ammonium as N by DA

(WATER) EK055G: Ammonia as N by Discrete Analyser

(WATER) EN055: Ionic Balance

(WATER) ED045G: Chloride by Discrete Analyser

(WATER) ED041G: Sulfate (Turbidimetric) as SO4 2- by DA

(WATER) EK040P: Fluoride by PC Titrator

(WATER) ED037P: Alkalinity by PC Titrator

(WATER) ED093F: Dissolved Major Cations

(WATER) EA015: Total Dissolved Solids dried at 180 ± 5 °C

CHAIN OF CUSTODY

ALS Laboratory: please tick →

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☐ Perth: 10 Hod Way, Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsenviro.com
☐ Launceston: 27 Wellington St, Launceston TAS 7250 Ph: 03 6331 2158 E: launceston@alsenviro.com

CLIENT:	Shellharbour City Council	**TURNAROUND REQUIREMENTS :** (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	☐ Standard TAT (List due date): ☐ Non Standard or urgent TAT (List due date):
OFFICE:	41 Burelli St WOLLONGONG NSW 2500		
PROJECT:	Dunmore Quarterly Leachate	**ALS QUOTE NO.:**	WO/030/19 TENDER
ORDER NUMBER:			
PROJECT MANAGER:	Ryan Stirling		
SAMPLER:	Robert DaLio	**SAMPLER MOBILE:**	
COC emailed to ALS? (YES / NO)		**EDD FORMAT (or default):**	
Email Reports to :			
Email Invoice to :			

COC SEQUENCE NUMBER (Circle)

COC:	1	2	3	4	5	6	7
OF:	1	2	3	4	5	6	7

FOR LABORATORY USE ONLY (Circle)

Custody Seal Intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt:	10.4 °C		
Other Comments:			

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Robert DaLio	Robert DaLio		
DATE/TIME: 1.3.23	DATE/TIME: 1.3.23	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: **CC reports to:**

ALS USE ONLY	SAMPLE DETAILS (MATRIX: Solid(S) Water(W))			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price). Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	Ammonia	NT-2A (Alka, So4, Cl, Fl) Filtered Ca, K	TOC	Total Fe & Mn	NT-4 (NO2, NO3)				Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
	Leachate Sump	1.3.23 12:15	W			✓	✓	✓	✓	✓				Field Tests - pH, EC, Temp & DO
				TOTAL	10									

Environmental Division Wollongong
Work Order Reference
EW2300846

Telephone : 02 42583125

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EW2300846**	Page	: 1 of 4
Client	: **SHELLHARBOUR CITY COUNCIL**	Laboratory	: Environmental Division NSW South Coast
Contact	: Ryan Stirling	Contact	: Aneta Prosaroski
Address	: LAMERTON HOUSE, LAMERTON CRESCENT SHELL HARBOUR CITY CENTRE NSW, AUSTRALIA 2529	Address	: 1/19 Ralph Black Dr, North Wollongong 2500 NSW Australia
Telephone	: ----	Telephone	: +61 2 4225 3125
Project	: Dunmore Quarterly Leachate	Date Samples Received	: 01-Mar-2023 15:40
Order number	: 147649	Date Analysis Commenced	: 03-Mar-2023
C-O-C number	: ----	Issue Date	: 10-Mar-2023 15:51
Sampler	: Robert DaLio		
Site	: DUNMORE LANDFILL TENDER		
Quote number	: WO/030/19 TENDER LEACHATE		
No. of samples received	: 1		
No. of samples analysed	: 1		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

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

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*
Aneta Prosaroski	Environmental Services Representative	Laboratory - Wollongong, NSW
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Wisam Marassa	Inorganics Coordinator	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.

- **Analytical work for this work order will be conducted at ALS Sydney.**
- EK057G: LOR raised for sample 1 due to sample matrix.
- ED041G: LOR raised for Sulfate due to sample matrix
- EK059G: LOR raised for NOx due to sample matrix
- pH performed by ALS Wollongong via in-house method EA005FD and EN67 PK.
- Electrical conductivity performed by ALS Wollongong via in-house method EA010FD and EN67 PK.
- Temperature performed by ALS Wollongong via in-house method EA116 and EN67 PK.
- Dissolved oxygen (DO) performed by ALS Wollongong via in-house method EA025FD and EN67 PK.
- All field analysis performed by ALS Wollongong were completed at the time of sampling.
- Sampling completed by ALS Wollongong in accordance with in-house sampling method EN/67.10 Wastewaters
- 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.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	Leachate Sump	----	----	----	----
			Sampling date / time	01-Mar-2023 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EW2300846-001	--------	--------	--------	--------
				Result	----	----	----	----
EA005FD: Field pH								
pH	----	0.1	pH Unit	**8.9**	----	----	----	----
EA010FD: Field Conductivity								
Electrical Conductivity (Non Compensated)	----	1	µS/cm	**10100**	----	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	**5460**	----	----	----	----
EA116: Temperature								
Temperature	----	0.1	°C	**27.7**	----	----	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	**967**	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**2110**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**3070**	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<20	----	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**1540**	----	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**40**	----	----	----	----
Potassium	7440-09-7	1	mg/L	**400**	----	----	----	----
EG020T: Total Metals by ICP-MS								
Manganese	7439-96-5	0.001	mg/L	**0.113**	----	----	----	----
Iron	7439-89-6	0.05	mg/L	**1.35**	----	----	----	----
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	**0.3**	----	----	----	----
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	**426**	----	----	----	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	<0.10	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	<0.10	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	<0.10	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	Leachate Sump	----	----	----	----
				Sampling date / time	01-Mar-2023 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EW2300846-001	--------	--------	--------	--------
					Result	----	----	----	----
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		**384**	----	----	----	----
EP025FD: Field Dissolved Oxygen									
Dissolved Oxygen	----	0.01	mg/L		**2.14**	----	----	----	----
Dissolved Oxygen - % Saturation	----	0.1	% saturation		**28.1**	----	----	----	----

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) ED093F: Dissolved Major Cations

(WATER) EP005: Total Organic Carbon (TOC)

(WATER) EK055G: Ammonia as N by Discrete Analyser

(WATER) EG020T: Total Metals by ICP-MS

(WATER) EK057G: Nitrite as N by Discrete Analyser

(WATER) EK058G: Nitrate as N by Discrete Analyser

(WATER) EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser

(WATER) EA015: Total Dissolved Solids dried at 180 ± 5 °C

(WATER) ED045G: Chloride by Discrete Analyser

(WATER) ED037P: Alkalinity by PC Titrator

(WATER) EK040P: Fluoride by PC Titrator

(WATER) ED041G: Sulfate (Turbidimetric) as SO4 2- by DA

CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ Sydney: 277 Woodpark Rd Smithfield NSW 2176 Ph: 02 8784 8555 E:samples.sydney@alsenviro.com
☐ Newcastle: 5 Rosegum Rd Warabrook NSW 2304 Ph: 02 4968 9433 E:samples.newcastle@alsenviro.com
☐ Brisbane: 32 Shand St, Stafford QLD 4053 Ph:07 3243 7222 E:samples.brisbane@alsenviro.com
☐ Townsville: 14-15 Desma Ct Bohle QLD 4818 Ph:07 4796 0600 E: townsville.environmental@alsenviro.com
☐ Melbourne: 2-4 Westall Rd, Springvale VIC 3171 Ph:03 8549 9600 E: samples.melbourne@alsenviro.com
☐ Adelaide: 2-4 Burma Rd, Pooraka SA 5095 Ph: 08 8359 0890 E:adelaide@alsenviro.com
☐ Perth: 10 Hod Way, Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsenviro.com
☐ Launceston: 27 Wellington St, Launceston TAS 7250 Ph: 03 6331 2158 E: launceston@alsenviro.com

CLIENT:	Shellharbour City Council	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g. Ultra Trace Organics)	☐ Standard TAT (List due date): ☐ Non Standard or urgent TAT (List due date):
OFFICE:	41 Burelli St WOLLONGONG NSW 2500		
PROJECT:	Dunmore Quarterly Leachate	ALS QUOTE NO.:	WO/030/19 TENDER
ORDER NUMBER:			
PROJECT MANAGER:	Ryan Stirling		
SAMPLER:	Robert Dalio	SAMPLER MOBILE:	
COC emailed to ALS? (YES / NO)		EDD FORMAT (or default):	
Email Reports to :			
Email Invoice to :			

COC SEQUENCE NUMBER (Circle)

COC:	1	2	3	4	5	6	7
OF:	1	2	3	4	5	6	7

FOR LABORATORY USE ONLY (Circle)

Custody Seal Intact?	Yes	No	(N/A)
Free ice / frozen ice bricks present upon receipt?	(Yes)	No	N/A
Random Sample Temperature on Receipt:	10.4 °C		
Other comment:			

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Robert Dalio	Robert Daly		
DATE/TIME: 1.3.23	DATE/TIME: 1.3.23	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: CC reports to:

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED Including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	Ammonia	NT-2A (Alka, So4, Cl, Fl) Filtered Ca, K	TOC	Total Fe & Mn	NT-4 (NO2, NO3)				Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
	Leachate Storage Tank - LP1	1.3.23 12:20	W			✓	✓	✓	✓	✓				Field Tests - pH, EC, Temp & DO
				TOTAL	10									

Environmental Division Wollongong
Work Order Reference
EW2300847

Telephone : 02 42253125

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EW2300847**	Page	: 1 of 4
Client	: **SHELLHARBOUR CITY COUNCIL**	Laboratory	: Environmental Division NSW South Coast
Contact	: Ryan Stirling	Contact	: Aneta Prosaroski
Address	: LAMERTON HOUSE, LAMERTON CRESCENT SHELL HARBOUR CITY CENTRE NSW, AUSTRALIA 2529	Address	: 1/19 Ralph Black Dr, North Wollongong 2500 NSW Australia
Telephone	: ----	Telephone	: +61 2 4225 3125
Project	: Dunmore Quarterly Leachate Tank EPL	Date Samples Received	: 01-Mar-2023 15:41
Order number	: 147649	Date Analysis Commenced	: 01-Mar-2023
C-O-C number	: ----	Issue Date	: 13-Mar-2023 11:38
Sampler	: Robert DaLio		
Site	: DUNMORE LANDFILL TENDER		
Quote number	: WO/030/19 TENDER LEACHATE		
No. of samples received	: 1		
No. of samples analysed	: 1		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

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

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*
Aneta Prosaroski	Environmental Services Representative	Laboratory - Wollongong, NSW
Ankit Joshi	Senior Chemist - Inorganics	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.

- **Analytical work for this work order will be conducted at ALS Sydney.**
- EK059G, EK057G: NOx and Nitrite on sample no:1 confirmed by re-analysis.
- ED041G: LOR raised for Sulfate due to sample matrix
- pH performed by ALS Wollongong via in-house method EA005FD and EN67 PK.
- Electrical conductivity performed by ALS Wollongong via in-house method EA010FD and EN67 PK.
- Temperature performed by ALS Wollongong via in-house method EA116 and EN67 PK.
- Dissolved oxygen (DO) performed by ALS Wollongong via in-house method EA025FD and EN67 PK.
- All field analysis performed by ALS Wollongong were completed at the time of sampling.
- Sampling completed by ALS Wollongong in accordance with in-house sampling method EN/67.10 Wastewaters
- 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.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	Leachate Storage Tank LP1	----	----	----	----
				Sampling date / time	01-Mar-2023 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EW2300847-001	--------	--------	--------	--------	
				Result	----	----	----	----	
EA005FD: Field pH									
pH	----	0.1	pH Unit	**9.4**	----	----	----	----	
EA010FD: Field Conductivity									
Electrical Conductivity (Non Compensated)	----	1	µS/cm	**9260**	----	----	----	----	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	**5370**	----	----	----	----	
EA116: Temperature									
Temperature	----	0.1	°C	**24.8**	----	----	----	----	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	**1080**	----	----	----	----	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**2060**	----	----	----	----	
Total Alkalinity as CaCO3	----	1	mg/L	**3150**	----	----	----	----	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<20	----	----	----	----	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	**1460**	----	----	----	----	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	**37**	----	----	----	----	
Potassium	7440-09-7	1	mg/L	**393**	----	----	----	----	
EG020T: Total Metals by ICP-MS									
Manganese	7439-96-5	0.001	mg/L	**0.092**	----	----	----	----	
Iron	7439-89-6	0.05	mg/L	**1.24**	----	----	----	----	
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	**0.2**	----	----	----	----	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	**432**	----	----	----	----	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L	**2.16**	----	----	----	----	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	<0.10	----	----	----	----	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	Leachate Storage Tank LP1	----	----	----	----
				Sampling date / time	01-Mar-2023 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EW2300847-001	--------	--------	--------	--------
					Result	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser - Continued									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.20**	----	----	----	----
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		**373**	----	----	----	----
EP025FD: Field Dissolved Oxygen									
Dissolved Oxygen	----	0.01	mg/L		**5.66**	----	----	----	----
Dissolved Oxygen - % Saturation	----	0.1	% saturation		**70.5**	----	----	----	----

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) ED093F: Dissolved Major Cations

(WATER) EP005: Total Organic Carbon (TOC)

(WATER) EK055G: Ammonia as N by Discrete Analyser

(WATER) EG020T: Total Metals by ICP-MS

(WATER) EK057G: Nitrite as N by Discrete Analyser

(WATER) EK058G: Nitrate as N by Discrete Analyser

(WATER) EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser

(WATER) EA015: Total Dissolved Solids dried at 180 ± 5 °C

(WATER) ED045G: Chloride by Discrete Analyser

(WATER) ED037P: Alkalinity by PC Titrator

(WATER) EK040P: Fluoride by PC Titrator

(WATER) ED041G: Sulfate (Turbidimetric) as SO4 2- by DA

Appendix D:

Laboratory Chain of Custody (COC) & Certificates of Analysis (COA) – Water Samples – Quarter 3

CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ Sydney: 277 Woodpark Rd, Smithfield NSW 2176 Ph: 02 8784 8555 E: samples.sydney@alsenviro.com
☐ Brisbane: 32 Shand St, Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsenviro.com
☐ Melbourne: 2-4 Westall Rd, Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsenviro.com
☐ Perth: 10 Hod Way, Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsenviro.com
☐ Newcastle: 5 Rosegum Rd, Warabrook NSW 2304 Ph: 02 4968 9433 E: samples.newcastle@alsenviro.com
☐ Townsville: 14-15 Desma Ct, Bohle QLD 4818 Ph: 07 4796 0600 E: townsville.environmental@alsenviro.com
☐ Adelaide: 2-1 Burma Rd, Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsenviro.com
☐ Launceston: 27 Wellington St, Launceston TAS 7250 Ph: 03 6331 2158 E: launceston@alsenviro.com

CLIENT:	Shellharbour City Council	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	☐ Standard TAT (List due date): ☐ Non Standard or urgent TAT (List due date):
OFFICE:	41 Burelli St WOLLONGONG NSW 2500		
PROJECT:	Dunmore Quarterly Ground Waters EPL	ALS QUOTE NO.:	WO/030/19 TENDER
ORDER NUMBER:			
PROJECT MANAGER:	Ryan Stirling		
SAMPLER:	Robert DeLio / M. Santos	SAMPLER MOBILE:	
COC emailed to ALS? (YES / NO)		EDD FORMAT (or default):	
Email Reports to :			
Email Invoice to :			

COC SEQUENCE NUMBER (Circle)

COC:	1	2	3	4	5	6	7
OF:	1	2	3	4	5	6	7

FOR LABORATORY USE ONLY (Circle)

Custody Seal Intact?	Yes	No	N/A
Free Ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt:	5.6 °C		
Other comment:			

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Robert DeLio	Aneta		
DATE/TIME: 2.6.23	DATE/TIME: 2/6/23 14:00	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: CC reports to:

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	Ammonia	NT-2A (Alka, So4, Cl, Fl) Filtered Ca, K	TOC	Dissolved Fe & Mn	NT-4 (NO2, NO3)	Send to Eurofins			Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
	BH1C	2.6.23 9:40	W			✓	✓	✓	✓	✓				Field Tests - pH, EC, Temp & SWL
	BH3	12:50	W			✓	✓	✓	✓	✓				Field Tests - pH, EC, Temp & SWL
	BH4	12:25	W			✓	✓	✓	✓	✓				Field Tests - pH, EC, Temp & SWL
	BH9	8:55	W			✓	✓	✓	✓	✓				Field Tests - pH, EC, Temp & SWL
	BH12R	11:23	W			✓	✓	✓	✓	✓				Field Tests - pH, EC, Temp & SWL
	BH13	11:50	W			✓	✓	✓	✓	✓				Field Tests - pH, EC, Temp & SWL
	BH14	12:05	W			✓	✓	✓	✓	✓				Field Tests - pH, EC, Temp & SWL
	BH15	11:10	W			✓	✓	✓	✓	✓				Field Tests - pH, EC, Temp & SWL
	BH19R	13:05	W			✓	✓	✓	✓	✓				Field Tests - pH, EC, Temp & SWL
	BH18	10:25	W			✓	✓	✓	✓	✓				Field Tests - pH, EC, Temp & SWL
	BH21	10:45	W			✓	✓	✓	✓	✓				Field Tests - pH, EC, Temp & SWL
	BH22	9:25	W			✓	✓	✓	✓	✓				Field Tests - pH, EC, Temp & SWL
	Duplicate	10:25	W			✓	✓	✓	✓	✓				Field Tests - pH, EC, Temp & SWL
	Triplicate	10:25.	W								✓			
				TOTAL	10									

Environmental Division Wollongong
Work Order Reference
EW2302416

Telephone : 02 42253125

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

CERTIFICATE OF ANALYSIS

Work Order	: **EW2302416**	Page	: 1 of 8
Client	: **SHELLHARBOUR CITY COUNCIL**	Laboratory	: Environmental Division NSW South Coast
Contact	: Ryan Stirling	Contact	: Aneta Prosaroski
Address	: LAMERTON HOUSE, LAMERTON CRESCENT SHELL HARBOUR CITY CENTRE NSW, AUSTRALIA 2529	Address	: 1/19 Ralph Black Dr, North Wollongong 2500 NSW Australia
Telephone	: ----	Telephone	: +61 2 4225 3125
Project	: Dunmore Quarterly Groundwaters EPL	Date Samples Received	: 02-Jun-2023 14:09
Order number	: 147649	Date Analysis Commenced	: 02-Jun-2023
C-O-C number	: ----	Issue Date	: 15-Jun-2023 17:48
Sampler	: Michael Santos, Robert DaLio		
Site	: DUNMORE LANDFILL TENDER		
Quote number	: WO/030/19 TENDER GROUNDWATERS		
No. of samples received	: 14		
No. of samples analysed	: 13		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

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

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
Dian Dao	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Robert DaLio	Sampler	Laboratory - Wollongong, 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.

- **Analytical work for this work order will be conducted at ALS Sydney.**
- ED041G: LOR raised for Sulfate due to sample matrix
- pH performed by ALS Wollongong via in-house method EA005FD and EN67 PK.
- Electrical conductivity performed by ALS Wollongong via in-house method EA010FD and EN67 PK.
- Sampling and groundwater depth measurements completed by ALS Wollongong via inhouse sampling method EN/67.11 Groundwater Sampling Via High Flow and Bailer Method.
- Temperature performed by ALS Wollongong via in-house method EA116 and EN67 PK.
- Sample collection of Ground Waters by in-house EN67 where the “surface layer of the aquifer was sampled”.
- 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.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	BH1C	BH3	BH4	BH9	BH12R
			Sampling date / time	02-Jun-2023 09:40	02-Jun-2023 12:50	02-Jun-2023 12:25	02-Jun-2023 08:55	02-Jun-2023 11:23
Compound	CAS Number	LOR	Unit	EW2302416-001	EW2302416-002	EW2302416-003	EW2302416-004	EW2302416-005
				Result	Result	Result	Result	Result
EA005FD: Field pH								
pH	----	0.1	pH Unit	7.0	7.5	7.4	7.2	6.8
EA010FD: Field Conductivity								
Electrical Conductivity (Non Compensated)	----	1	µS/cm	7945	1200	751	4120	1930
EA116: Temperature								
Temperature	----	0.5	°C	25.9	18.9	18.9	18.0	21.1
ED037P: Alkalinity by PC Titrator								
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	2600	370	310	1790	571
Total Alkalinity as CaCO3	----	1	mg/L	2600	370	310	1790	571
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<10	146	70	50	178
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	970	123	35	516	246
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	116	101	94	181	185
Potassium	7440-09-7	1	mg/L	207	31	16	76	27
EG020F: Dissolved Metals by ICP-MS								
Manganese	7439-96-5	0.001	mg/L	0.103	0.082	0.097	0.708	0.532
Iron	7439-89-6	0.05	mg/L	11.6	0.27	2.59	0.89	9.38
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	0.5	0.2	0.1	0.6	0.3
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	298	12.3	2.04	141	3.59
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.13	<0.01	<0.01	0.07
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	<0.01	1.37	<0.01	0.03	0.39
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	1.50	<0.01	0.03	0.46
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	186	22	10	76	24

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	BH1C	BH3	BH4	BH9	BH12R
			Sampling date / time	02-Jun-2023 09:40	02-Jun-2023 12:50	02-Jun-2023 12:25	02-Jun-2023 08:55	02-Jun-2023 11:23
Compound	CAS Number	LOR	Unit	EW2302416-001	EW2302416-002	EW2302416-003	EW2302416-004	EW2302416-005
				Result	Result	Result	Result	Result
QWI-EN 67.11 Sampling of Groundwaters								
Standing Water Level	----	0.01	m AHD	**3.09**	**3.08**	**4.28**	**3.86**	**4.25**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	BH13	BH14	BH15	BH19R	BH18
			Sampling date / time	02-Jun-2023 11:50	02-Jun-2023 12:05	02-Jun-2023 11:10	02-Jun-2023 13:05	02-Jun-2023 10:25
Compound	CAS Number	LOR	Unit	EW2302416-006	EW2302416-007	EW2302416-008	EW2302416-009	EW2302416-010
				Result	Result	Result	Result	Result
EA005FD: Field pH								
pH	----	0.1	pH Unit	6.8	6.9	7.0	7.4	6.8
EA010FD: Field Conductivity								
Electrical Conductivity (Non Compensated)	----	1	µS/cm	2260	958	2250	731	511
EA116: Temperature								
Temperature	----	0.5	°C	21.9	21.1	17.1	18.9	20.7
ED037P: Alkalinity by PC Titrator								
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	812	422	507	336	267
Total Alkalinity as CaCO3	----	1	mg/L	812	422	507	336	267
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	67	50	366	39	<10
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	308	36	340	38	16
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	213	106	112	74	60
Potassium	7440-09-7	1	mg/L	29	12	138	49	10
EG020F: Dissolved Metals by ICP-MS								
Manganese	7439-96-5	0.001	mg/L	0.409	0.123	0.260	0.063	0.067
Iron	7439-89-6	0.05	mg/L	3.40	0.05	9.12	1.06	1.31
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	0.2	0.7	0.2	0.2	0.2
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	9.59	1.40	8.74	1.85	1.05
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	0.02	0.06	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	0.37	5.94	0.01	<0.01	<0.01
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	0.39	6.00	0.01	<0.01	<0.01
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	38	12	39	14	14

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	BH13	BH14	BH15	BH19R	BH18
			Sampling date / time	02-Jun-2023 11:50	02-Jun-2023 12:05	02-Jun-2023 11:10	02-Jun-2023 13:05	02-Jun-2023 10:25
Compound	CAS Number	LOR	Unit	EW2302416-006	EW2302416-007	EW2302416-008	EW2302416-009	EW2302416-010
				Result	Result	Result	Result	Result
QWI-EN 67.11 Sampling of Groundwaters								
Standing Water Level	----	0.01	m AHD	**4.22**	**4.64**	**0.68**	**4.54**	**2.26**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	BH21	BH22	Duplicate	----	----
			Sampling date / time	02-Jun-2023 10:45	02-Jun-2023 09:25	02-Jun-2023 10:25	----	----
Compound	CAS Number	LOR	Unit	EW2302416-011	EW2302416-012	EW2302416-013	--------	--------
				Result	Result	Result	----	----
EA005FD: Field pH								
pH	----	0.1	pH Unit	**7.2**	**7.3**	**6.8**	**----**	**----**
EA010FD: Field Conductivity								
Electrical Conductivity (Non Compensated)	----	1	µS/cm	**2550**	**1580**	**511**	**----**	**----**
EA116: Temperature								
Temperature	----	0.5	°C	**22.6**	**19.2**	**20.7**	**----**	**----**
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	**----**	**----**
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	**----**	**----**
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**854**	**424**	**268**	**----**	**----**
Total Alkalinity as CaCO3	----	1	mg/L	**854**	**424**	**268**	**----**	**----**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**114**	**224**	<10	**----**	**----**
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**353**	**183**	**16**	**----**	**----**
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**125**	**87**	**61**	**----**	**----**
Potassium	7440-09-7	1	mg/L	**16**	**18**	**10**	**----**	**----**
EG020F: Dissolved Metals by ICP-MS								
Manganese	7439-96-5	0.001	mg/L	**0.473**	**0.067**	**0.068**	**----**	**----**
Iron	7439-89-6	0.05	mg/L	**0.76**	**0.96**	**1.33**	**----**	**----**
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	**0.4**	**0.8**	**0.2**	**----**	**----**
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	**3.60**	**4.11**	**1.06**	**----**	**----**
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	**----**	**----**
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	<0.01	<0.01	<0.01	**----**	**----**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	<0.01	**----**	**----**
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	**38**	**26**	**14**	**----**	**----**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH21	BH22	Duplicate	----	----
				Sampling date / time	02-Jun-2023 10:45	02-Jun-2023 09:25	02-Jun-2023 10:25	----	----
Compound	CAS Number	LOR	Unit		EW2302416-011	EW2302416-012	EW2302416-013	--------	--------
					Result	Result	Result	----	----
QWI-EN 67.11 Sampling of Groundwaters									
Standing Water Level	----	0.01	m AHD		**3.01**	**2.40**	**2.26**	**----**	**----**

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) ED093F: Dissolved Major Cations

(WATER) EP005: Total Organic Carbon (TOC)

(WATER) EK055G: Ammonia as N by Discrete Analyser

(WATER) EG020F: Dissolved Metals by ICP-MS

(WATER) EK057G: Nitrite as N by Discrete Analyser

(WATER) EK058G: Nitrate as N by Discrete Analyser

(WATER) EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser

(WATER) ED045G: Chloride by Discrete Analyser

(WATER) ED037P: Alkalinity by PC Titrator

(WATER) EK040P: Fluoride by PC Titrator

(WATER) ED041G: Sulfate (Turbidimetric) as SO4 2- by DA

CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ **Sydney**: 277 Woodpark Rd, Smithfield NSW 2176 Ph: 02 8784 8555 E:samples.sydney@alsenviro.com
☐ **Brisbane**: 32 Shand St, Stafford QLD 4053 Ph:07 3243 7222 E:samples.brisbane@alsenviro.com
☐ **Melbourne**: 2-4 Westall Rd, Springvale VIC 3171 Ph:03 8549 9600 E: samples.melbourne@alsenviro.com
☐ **Perth**: 10 Hod Way, Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsenviro.com
☐ **Newcastle**: 5 Rosegum Rd, Warabrook NSW 2304 Ph:02 4968 9433 E:samples.newcastle@alsenviro.com
☐ **Townsville**: 14-15 Desma Ct, Bohle QLD 4818 Ph:07 4796 0600 E: townsville.environmental@alsenviro.com
☐ **Adelaide**: 2-1 Burma Rd, Pooraka SA 5095 Ph: 08 8359 0890 E:adelaide@alsenviro.com
☐ **Launceston**: 27 Wellington St, Launceston TAS 7250 Ph: 03 6331 2158 E: launceston@alsenviro.com

CLIENT:	Shellharbour City Council	**TURNAROUND REQUIREMENTS :** (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	☐ Standard TAT (List due date): ☐ Non Standard or urgent TAT (List due date):
OFFICE:	41 Burelli St WOLLONGONG NSW 2500		
PROJECT:	Dunmore Quarterly Surface Waters EPL	**ALS QUOTE NO.:** WO/030/19 TENDER	
ORDER NUMBER:			
PROJECT MANAGER:	Ryan Stirling		
SAMPLER:	R. DALTO / M. Smith	**SAMPLER MOBILE:**	
COC emailed to ALS?	(YES / NO)	**EDD FORMAT (or default):**	
Email Reports to :			
Email Invoice to :			

COC SEQUENCE NUMBER (Circle)

COC:	1	2	3	4	5	6	7
OF:	1	2	3	4	5	6	7

FOR LABORATORY USE ONLY (Circle)

Custody Seal Intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt:	4.5 °C		
Other comment:			

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
R. DALTO	Anela		
DATE/TIME: 3/6/23	DATE/TIME: 1/6/23	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: **CC reports to:**

ALS USE ONLY	SAMPLE DETAILS (MATRIX: Solid(S) Water(W))			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price). Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).							Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	TSS	NT-1, NT-2A (Ionic Balance)	TOC, NT-4, NH3, Total Mn	Dissolved and Total Fe	Turbidity	NH3, NH4 & NO3	TSS, TDS, TOC, Total Mn	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
	SWP1	5/6/23 9:40	W			✓	✓	✓	✓				Field Tests - pH, EC, DO & Temp
	SWC_2	11:00	W				✓		✓	✓	✓	✓	Field Tests - pH, EC, DO & Temp
	SWC_UP	10:45	W				✓		✓	✓	✓	✓	Field Tests - pH, EC, DO & Temp
	SWC_DOWN	11:10	W				✓		✓	✓	✓	✓	Field Tests - pH, EC, DO & Temp
	SWC_DOWN_2	11:20	W				✓		✓	✓	✓	✓	Field Tests - pH, EC, DO & Temp
	Duplicate	11:00	W				✓		✓	✓	✓	✓	Field Tests - pH, EC, DO & Temp
				TOTAL	10								

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl pres Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

ormaldehyde Preserved Glass;

Environmental Division
Wollongong
Work Order Reference
EW2302415

Telephone : 02 42253125

CERTIFICATE OF ANALYSIS

Work Order	: **EW2302415**	Page	: 1 of 7
Client	: **SHELLHARBOUR CITY COUNCIL**	Laboratory	: Environmental Division NSW South Coast
Contact	: Ryan Stirling	Contact	: Aneta Prosaroski
Address	: LAMERTON HOUSE, LAMERTON CRESCENT SHELL HARBOUR CITY CENTRE NSW, AUSTRALIA 2529	Address	: 1/19 Ralph Black Dr, North Wollongong 2500 NSW Australia
Telephone	: ----	Telephone	: +61 2 4225 3125
Project	: Dunmore Quarterly Surface Water EPL	Date Samples Received	: 01-Jun-2023 15:14
Order number	: 147649	Date Analysis Commenced	: 01-Jun-2023
C-O-C number	: ----	Issue Date	: 08-Jun-2023 16:58
Sampler	: ----		
Site	: DUNMORE LANDFILL TENDER		
Quote number	: WO/030/19 TENDER SURFACE WATER		
No. of samples received	: 6		
No. of samples analysed	: 6		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

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

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
Dian Dao	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Robert DaLio	Sampler	Laboratory - Wollongong, 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.

- **Analytical work for this work order will be conducted at ALS Sydney.**
- 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, SiO2 and Fluoride to the Anions.
- EG020: LORs have been raised for some samples due to matrix interference (High sample salinity)
- It has been noted that Nitrite is greater than NOx, however this difference is within the limits of experimental variation.
- TDS by method EA-015 may bias high for sample 4 due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- pH performed by ALS Wollongong via in-house method EA005FD and EN67 PK.
- Electrical conductivity performed by ALS Wollongong via in-house method EA010FD and EN67 PK.
- Sampling completed by ALS Wollongong in accordance with in-house sampling method EN/67.6 Rivers and Streams.
- Temperature performed by ALS Wollongong via in-house method EA116 and EN67 PK.
- Dissolved oxygen (DO) performed by ALS Wollongong via in-house method EP025FD and EN67 PK.
- All field analysis performed by ALS Wollongong were completed at the time of sampling.
- Sampling completed by ALS Wollongong in accordance with in-house sampling method EN/67.4 Lakes and Reservoirs
- 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.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	SWP1 Point 1	SWC_2 Point 19	SWC_UP Point 20	SWC_Down Point 21	SWC_DOWN_2 Point 22
			Sampling date / time	01-Jun-2023 09:40	01-Jun-2023 11:00	01-Jun-2023 10:45	01-Jun-2023 11:10	01-Jun-2023 11:20
Compound	CAS Number	LOR	Unit	EW2302415-001	EW2302415-002	EW2302415-003	EW2302415-004	EW2302415-005
				Result	Result	Result	Result	Result
EA005FD: Field pH								
pH	----	0.1	pH Unit	7.7	7.2	7.2	7.2	7.3
EA010FD: Field Conductivity								
Electrical Conductivity (Non Compensated)	----	1	µS/cm	1080	17400	18800	32600	25000
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	----	13600	13800	26100	19200
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	<5	7	5	<5	<5
EA045: Turbidity								
Turbidity	----	0.1	NTU	1.4	8.0	7.4	4.0	5.1
EA116: Temperature								
Temperature	----	0.5	°C	13.4	15.0	15.4	16.9	15.9
ED037P: Alkalinity by PC Titrator								
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	431	141	139	151	144
Total Alkalinity as CaCO3	----	1	mg/L	431	141	139	151	144
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	39	908	968	2000	1560
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	173	6870	7090	12100	9680
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	73	155	180	288	229
Magnesium	7439-95-4	1	mg/L	33	380	465	765	592
Sodium	7440-23-5	1	mg/L	156	3280	3840	6440	5000
Potassium	7440-09-7	1	mg/L	17	122	145	244	210
EG020F: Dissolved Metals by ICP-MS								
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	<0.05	<0.10	<0.10
EG020T: Total Metals by ICP-MS								
Manganese	7439-96-5	0.001	mg/L	0.116	0.074	0.074	0.052	0.055
Iron	7439-89-6	0.05	mg/L	0.16	0.88	0.79	0.34	0.53
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	0.3	0.6	0.7	0.9	0.8

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	SWP1 Point 1	SWC_2 Point 19	SWC_UP Point 20	SWC_Down Point 21	SWC_DOWN_2 Point 22
			Sampling date / time	01-Jun-2023 09:40	01-Jun-2023 11:00	01-Jun-2023 10:45	01-Jun-2023 11:10	01-Jun-2023 11:20
Compound	CAS Number	LOR	Unit	EW2302415-001	EW2302415-002	EW2302415-003	EW2302415-004	EW2302415-005
				Result	Result	Result	Result	Result
EK040P: Fluoride by PC Titrator - Continued								
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	**0.96**	**0.29**	**0.20**	**0.69**	**0.28**
EK055G-NH4: Ammonium as N by DA								
Ammonium as N	14798-03-9_N	0.01	mg/L	**0.95**	**0.29**	**0.20**	**0.69**	**0.28**
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	**0.04**	**0.02**	**0.02**	**0.02**	**0.02**
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	<0.01	**0.13**	**0.14**	**0.05**	**0.08**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**0.03**	**0.15**	**0.16**	**0.07**	**0.10**
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	**14.3**	**216**	**223**	**386**	**308**
ø Total Cations	----	0.01	meq/L	**13.6**	**185**	**218**	**364**	**283**
ø Ionic Balance	----	0.01	%	**2.60**	**7.67**	**1.12**	**2.97**	**4.30**
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	**25**	**10**	**9**	**7**	**8**
EP025FD: Field Dissolved Oxygen								
Dissolved Oxygen	----	0.01	mg/L	**5.90**	**6.32**	**6.71**	**6.05**	**6.55**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	Duplicate	----	----	----	----
			Sampling date / time	01-Jun-2023 11:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EW2302415-006	--------	--------	--------	--------
				Result	----	----	----	----
EA005FD: Field pH								
pH	----	0.1	pH Unit	**7.2**	----	----	----	----
EA010FD: Field Conductivity								
Electrical Conductivity (Non Compensated)	----	1	µS/cm	**17400**	----	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	**13100**	----	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	<5	----	----	----	----
EA045: Turbidity								
Turbidity	----	0.1	NTU	**8.0**	----	----	----	----
EA116: Temperature								
Temperature	----	0.5	°C	**15.0**	----	----	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**141**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**141**	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**915**	----	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**6790**	----	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**172**	----	----	----	----
Magnesium	7439-95-4	1	mg/L	**435**	----	----	----	----
Sodium	7440-23-5	1	mg/L	**3650**	----	----	----	----
Potassium	7440-09-7	1	mg/L	**140**	----	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Iron	7439-89-6	0.05	mg/L	<0.05	----	----	----	----
EG020T: Total Metals by ICP-MS								
Manganese	7439-96-5	0.001	mg/L	**0.077**	----	----	----	----
Iron	7439-89-6	0.05	mg/L	**0.93**	----	----	----	----
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	**0.6**	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	Duplicate	----	----	----	----
				Sampling date / time	01-Jun-2023 11:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EW2302415-006	--------	--------	--------	--------
					Result	----	----	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.32**	----	----	----	----
EK055G-NH4: Ammonium as N by DA									
Ammonium as N	14798-03-9_N	0.01	mg/L		**0.32**	----	----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		**0.03**	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**0.11**	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.14**	----	----	----	----
EN055: Ionic Balance									
ø **Total Anions**	----	0.01	meq/L		**213**	----	----	----	----
ø **Total Cations**	----	0.01	meq/L		**207**	----	----	----	----
ø **Ionic Balance**	----	0.01	%		**1.59**	----	----	----	----
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		**8**	----	----	----	----
EP025FD: Field Dissolved Oxygen									
Dissolved Oxygen	----	0.01	mg/L		**6.32**	----	----	----	----

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EA045: Turbidity
(WATER) EP005: Total Organic Carbon (TOC)
(WATER) EG020F: Dissolved Metals by ICP-MS
(WATER) EG020T: Total Metals by ICP-MS
(WATER) EK057G: Nitrite as N by Discrete Analyser
(WATER) EK058G: Nitrate as N by Discrete Analyser
(WATER) EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser
(WATER) EA025: Total Suspended Solids dried at 104 ± 2°C
(WATER) EK055G-NH4: Ammonium as N by DA
(WATER) EK055G: Ammonia as N by Discrete Analyser
(WATER) EN055: Ionic Balance
(WATER) ED045G: Chloride by Discrete Analyser
(WATER) ED041G: Sulfate (Turbidimetric) as SO4 2- by DA
(WATER) EK040P: Fluoride by PC Titrator
(WATER) ED037P: Alkalinity by PC Titrator
(WATER) ED093F: Dissolved Major Cations
(WATER) EA015: Total Dissolved Solids dried at 180 ± 5 °C

CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ Sydney: 277 Woodpark Rd, Smithfield NSW 2176 Ph: 02 8784 8555 E:samples.sydney@alsenviro.com
☐ Newcastle: 5 Rosegum Rd, Warabrook NSW 2304 Ph:02 4968 9433 E:samples.newcastle@alsenviro.com
☐ Brisbane: 32 Shand St, Stafford QLD 4053 Ph:07 3243 7222 E:samples.brisbane@alsenviro.com
☐ Townsville: 14-15 Desma Ct, Bohle QLD 4818 Ph:07 4796 0600 E: townsville.environmental@alsenviro.com
☐ Melbourne: 2-4 Westall Rd, Springvale VIC 3171 Ph:03 8549 9600 E: samples.melbourne@alsenviro.com
☐ Adelaide: 2-1 Burma Rd, Pooraka SA 5095 Ph: 08 8359 0890 E:adelaide@alsenviro.com
☐ Perth: 10 Hod Way, Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsenviro.com
☐ Launceston: 27 Wellington St, Launceston TAS 7250 Ph: 03 8331 2158 E: launceston@alsenviro.com

CLIENT:	Shellharbour City Council	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	☐ Standard TAT (List due date): ☐ Non Standard or urgent TAT (List due date):
OFFICE:	41 Burelli St WOLLONGONG NSW 2500		
PROJECT:	Dunmore Quarterly Surface Waters SWP01 Overflow full Testing	ALS QUOTE NO.: WO/030/19 TENDER	
ORDER NUMBER:			
PROJECT MANAGER:	Joel Culton		
SAMPLER:	Michael Santos	SAMPLER MOBILE: 0403520891	
COC emailed to ALS? (YES / NO)		EDD FORMAT (or default):	
Email Reports to :			
Email Invoice to :			

COC SEQUENCE NUMBER (Circle)

COC:	1	2	3	4	5	6	7
OF:	1	2	3	4	5	6	7

FOR LABORATORY USE ONLY (Circle)

Custody Seal Intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt:		°C	
Other comment:	S2		

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Michael Santos	Aneta		
DATE/TIME: 01-05-23 13:36	DATE/TIME: 1/5/23	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: CC reports to:

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	TSS	NT-1, NT-2A (Ionic Balance)	TOC, NT-4, NH3, Total Mn	Dissolved and Total Fe					Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
	SWP1	1-5-23 12:47	W			✓	✓	✓	✓					Field Tests - pH, EC, DO & Temp
				TOTAL	10									

Environmental Division Wollongong
Work Order Reference
EW2301940

Telephone : 02 42253125

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

CERTIFICATE OF ANALYSIS

Work Order	: **EW2301940**	Page	: 1 of 5
Client	: **SHELLHARBOUR CITY COUNCIL**	Laboratory	: Environmental Division NSW South Coast
Contact	: Ryan Stirling	Contact	: Aneta Prosaroski
Address	: LAMERTON HOUSE, LAMERTON CRESCENT SHELL HARBOUR CITY CENTRE NSW, AUSTRALIA 2529	Address	: 1/19 Ralph Black Dr, North Wollongong 2500 NSW Australia
Telephone	: ----	Telephone	: +61 2 4225 3125
Project	: Dunmore Surface Water SWP01 Overflow	Date Samples Received	: 01-May-2023 13:38
Order number	: 147649	Date Analysis Commenced	: 01-May-2023
C-O-C number	: ----	Issue Date	: 08-May-2023 10:48
Sampler	: Michael Santos		
Site	: DUNMORE LANDFILL TENDER		
Quote number	: WO/030/19 TENDER SURFACE WATER		
No. of samples received	: 1		
No. of samples analysed	: 1		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

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

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*
Aneta Prosaroski	Environmental Services Representative	Laboratory - Wollongong, NSW
Ankit Joshi	Senior Chemist - Inorganics	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.

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ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- **Analytical work for this work order will be conducted at ALS Sydney.**
- 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, SiO2 and Fluoride to the Anions.
- Sample site SWP1 was not discharging at time of sampling.
- pH performed by ALS Wollongong via in-house method EA005FD and EN67 PK.
- Electrical conductivity performed by ALS Wollongong via in-house method EA010FD and EN67 PK.
- Temperature performed by ALS Wollongong via in-house method EA116 and EN67 PK.
- Dissolved oxygen (DO) performed by ALS Wollongong via in-house method EP025FD and EN67 PK.
- All field analysis performed by ALS Wollongong were completed at the time of sampling.
- Sampling completed by ALS Wollongong in accordance with in-house sampling method EN/67.4 Lakes and Reservoirs
- 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.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	SWP1 Point 1	----	----	----	----
			Sampling date / time	01-May-2023 12:47	----	----	----	----
Compound	CAS Number	LOR	Unit	EW2301940-001	--------	--------	--------	--------
				Result	----	----	----	----
EA005FD: Field pH								
pH	----	0.1	pH Unit	**7.6**	----	----	----	----
EA010FD: Field Conductivity								
Electrical Conductivity (Non Compensated)	----	1	µS/cm	**1240**	----	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	**654**	----	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	**9**	----	----	----	----
EA045: Turbidity								
Turbidity	----	0.1	NTU	**4.5**	----	----	----	----
EA116: Temperature								
Temperature	----	0.1	°C	**19.5**	----	----	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**354**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**354**	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**43**	----	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**168**	----	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**59**	----	----	----	----
Magnesium	7439-95-4	1	mg/L	**27**	----	----	----	----
Sodium	7440-23-5	1	mg/L	**135**	----	----	----	----
Potassium	7440-09-7	1	mg/L	**14**	----	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Iron	7439-89-6	0.05	mg/L	**0.06**	----	----	----	----
EG020T: Total Metals by ICP-MS								
Manganese	7439-96-5	0.001	mg/L	**0.184**	----	----	----	----
Iron	7439-89-6	0.05	mg/L	**0.32**	----	----	----	----
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	**0.3**	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	SWP1 Point 1	----	----	----	----
				Sampling date / time	01-May-2023 12:47	----	----	----	----
Compound	CAS Number	LOR	Unit		EW2301940-001	--------	--------	--------	--------
					Result	----	----	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.04**	----	----	----	----
EK055G-NH4: Ammonium as N by DA									
Ammonium as N	14798-03-9_N	0.01	mg/L		**0.04**	----	----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		<0.01	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.01	----	----	----	----
EN055: Ionic Balance									
ø **Total Anions**	----	0.01	meq/L		**12.7**	----	----	----	----
ø **Total Cations**	----	0.01	meq/L		**11.4**	----	----	----	----
ø **Ionic Balance**	----	0.01	%		**5.44**	----	----	----	----
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		**281**	----	----	----	----
EP025FD: Field Dissolved Oxygen									
Dissolved Oxygen	----	0.01	mg/L		**6.77**	----	----	----	----

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EA045: Turbidity
(WATER) EP005: Total Organic Carbon (TOC)
(WATER) EG020F: Dissolved Metals by ICP-MS
(WATER) EG020T: Total Metals by ICP-MS
(WATER) EK057G: Nitrite as N by Discrete Analyser
(WATER) EK058G: Nitrate as N by Discrete Analyser
(WATER) EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser
(WATER) EA025: Total Suspended Solids dried at 104 ± 2°C
(WATER) EK055G-NH4: Ammonium as N by DA
(WATER) EK055G: Ammonia as N by Discrete Analyser
(WATER) EN055: Ionic Balance
(WATER) ED045G: Chloride by Discrete Analyser
(WATER) ED041G: Sulfate (Turbidimetric) as SO4 2- by DA
(WATER) EK040P: Fluoride by PC Titrator
(WATER) ED037P: Alkalinity by PC Titrator
(WATER) ED093F: Dissolved Major Cations
(WATER) EA015: Total Dissolved Solids dried at 180 ± 5 °C

CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ Sydney: 277 Woodpark Rd Smithfield NSW 2176 Ph: 02 8784 8555 E: samples.sydney@alsenviro.com
☐ Newcastle: 5 Rosegum Rd, Warabrook NSW 2304 Ph: 02 4968 9433 E: samples.newcastle@alsenviro.com
☐ Brisbane: 32 Shand St, Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsenviro.com
☐ Townsville: 14-15 Desma Ct, Bohle QLD 4818 Ph: 07 4796 0600 E: townsville.environmental@alsenviro.com
☐ Melbourne: 2-4 Westall Rd, Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsenviro.com
☐ Adelaide: 2-1 Burma Rd, Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsenviro.com
☐ Perth: 10 Hod Way, Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsenviro.com
☐ Launceston: 27 Wellington St, Launceston TAS 7250 Ph: 03 6331 2158 E: launceston@alsenviro.com

CLIENT:	Shellharbour City Council	TURNAROUND REQUIREMENTS: (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	☐ Standard TAT (List due date): ☐ Non Standard or urgent TAT (List due date):
OFFICE:	41 Burelli St WOLLONGONG NSW 2500		
PROJECT:	Dunmore Quarterly Leachate	ALS QUOTE NO.:	WO/030/19 TENDER
ORDER NUMBER:			
PROJECT MANAGER:	Ryan Stirling		
SAMPLER:	R. DALTO / M. Santos	SAMPLER MOBILE:	
COC emailed to ALS? (YES / NO)		EDD FORMAT (or default):	
Email Reports to :			
Email Invoice to :			

COC SEQUENCE NUMBER (Circle)

COC:	1	2	3	4	5	6	7
OF:	1	2	3	4	5	6	7

FOR LABORATORY USE ONLY (Circle)

Custody Seal Intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt	14.5 °C		
Other comments:			

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
R. Dalto			
DATE/TIME: 1.6.23	DATE/TIME: 1/6/23	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: CC reports to:

ALS USE ONLY	SAMPLE DETAILS (MATRIX: Solid(S) Water(W))			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	Ammonia	NT-2A (Alka, So4, Cl, Fl) Filtered Ca, K	TOC	Total Fe & Mn	NT-4 (NO2, NO3)				Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
	Leachate Storage Tank - LP1	1.6.23 12:40	W			✓	✓	✓	✓	✓				Field Tests - pH, EC, Temp & DO
				TOTAL	10									

Environmental Division Wollongong
Work Order Reference
EW2302414

Telephone : 02 42253125

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

CERTIFICATE OF ANALYSIS

Work Order	: **EW2302414**	Page	: 1 of 4
Client	: **SHELLHARBOUR CITY COUNCIL**	Laboratory	: Environmental Division NSW South Coast
Contact	: Ryan Stirling	Contact	: Aneta Prosaroski
Address	: LAMERTON HOUSE, LAMERTON CRESCENT SHELL HARBOUR CITY CENTRE NSW, AUSTRALIA 2529	Address	: 1/19 Ralph Black Dr, North Wollongong 2500 NSW Australia
Telephone	: ----	Telephone	: +61 2 4225 3125
Project	: Dunmore Quarterly Leachate Tank EPL	Date Samples Received	: 01-Jun-2023 15:16
Order number	: 147649	Date Analysis Commenced	: 01-Jun-2023
C-O-C number	: ----	Issue Date	: 07-Jun-2023 18:50
Sampler	: Michael Santos, Robert DaLio		
Site	: DUNMORE LANDFILL TENDER		
Quote number	: WO/030/19 TENDER LEACHATE		
No. of samples received	: 1		
No. of samples analysed	: 1		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

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

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*
Aneta Prosaroski	Environmental Services Representative	Laboratory - Wollongong, NSW
Ankit Joshi	Senior Chemist - Inorganics	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.

- **Analytical work for this work order will be conducted at ALS Sydney.**
- ED041G: LOR raised for Sulfate due to sample matrix
- EK057/EK059G:Nitrite and NOx results confirmed by re analysis.
- pH performed by ALS Wollongong via in-house method EA005FD and EN67 PK.
- Electrical conductivity performed by ALS Wollongong via in-house method EA010FD and EN67 PK.
- Temperature performed by ALS Wollongong via in-house method EA116 and EN67 PK.
- Dissolved oxygen (DO) performed by ALS Wollongong via in-house method EP025FD and EN67 PK.
- All field analysis performed by ALS Wollongong were completed at the time of sampling.
- Sampling completed by ALS Wollongong in accordance with in-house sampling method EN/67.10 Wastewaters
- 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.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	Leachate Storage Tank LP1	----	----	----	----
			Sampling date / time	01-Jun-2023 12:40	----	----	----	----
Compound	CAS Number	LOR	Unit	EW2302414-001	--------	--------	--------	--------
				Result	----	----	----	----
EA005FD: Field pH								
pH	----	0.1	pH Unit	**9.3**	----	----	----	----
EA010FD: Field Conductivity								
Electrical Conductivity (Non Compensated)	----	1	µS/cm	**7380**	----	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	**5290**	----	----	----	----
EA116: Temperature								
Temperature	----	0.1	°C	**13.8**	----	----	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	**946**	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**1840**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**2780**	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<50	----	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**1810**	----	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**39**	----	----	----	----
Potassium	7440-09-7	1	mg/L	**375**	----	----	----	----
EG020T: Total Metals by ICP-MS								
Manganese	7439-96-5	0.001	mg/L	**0.096**	----	----	----	----
Iron	7439-89-6	0.05	mg/L	**1.29**	----	----	----	----
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	**0.3**	----	----	----	----
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	**344**	----	----	----	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	**6.96**	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	<0.10	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	Leachate Storage Tank LP1	----	----	----	----
				Sampling date / time	01-Jun-2023 12:40	----	----	----	----
Compound	CAS Number	LOR	Unit		EW2302414-001	--------	--------	--------	--------
					Result	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**1.25**	**----**	**----**	**----**	**----**
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		**407**	**----**	**----**	**----**	**----**
EP025FD: Field Dissolved Oxygen									
Dissolved Oxygen	----	0.01	mg/L		**6.22**	**----**	**----**	**----**	**----**
Dissolved Oxygen - % Saturation	----	0.1	% saturation		**60.0**	**----**	**----**	**----**	**----**

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) ED093F: Dissolved Major Cations

(WATER) EP005: Total Organic Carbon (TOC)

(WATER) EK055G: Ammonia as N by Discrete Analyser

(WATER) EG020T: Total Metals by ICP-MS

(WATER) EK057G: Nitrite as N by Discrete Analyser

(WATER) EK058G: Nitrate as N by Discrete Analyser

(WATER) EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser

(WATER) EA015: Total Dissolved Solids dried at 180 ± 5 °C

(WATER) ED045G: Chloride by Discrete Analyser

(WATER) ED037P: Alkalinity by PC Titrator

(WATER) EK040P: Fluoride by PC Titrator

(WATER) ED041G: Sulfate (Turbidimetric) as SO4 2- by DA

Appendix E:

Laboratory Chain of Custody (COC) & Certificates of Analysis (COA) – Water Samples – Quarter 4

CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ Sydney: 277 Woodpark Rd, Smithfield NSW 2176 Ph: 02 8784 8555 E:samples.sydney@alsenviro.com
☐ Newcastle: 5 Rosegum Rd, Warabrook NSW 2304 Ph:02 4968 9433 E:samples.newcastle@alsenviro.com
☐ Brisbane: 32 Shand St, Stafford QLD 4053 Ph:07 3243 7222 E:samples.brisbane@alsenviro.com
☐ Townsville: 14-15 Desma Ct, Bohle QLD 4818 Ph:07 4796 0600 E: townsville.environmental@alsenviro.com
☐ Melbourne: 2-4 Westall Rd, Springvale VIC 3171 Ph:03 8549 9600 E: samples.melbourne@alsenviro.com
☐ Adelaide: 2-4 Burma Rd, Pooraka SA 5095 Ph: 08 8359 0890 E:adelaide@alsenviro.com
☐ Perth: 10 Hod Way, Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsenviro.com
☐ Launceston: 27 Wellington St, Launceston TAS 7250 Ph: 03 6331 2158 E: launceston@alsenviro.com

CLIENT:	Shellharbour City Council	TURNAROUND REQUIREMENTS: (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	☐ Standard TAT (List due date): ☐ Non Standard or urgent TAT (List due date):
OFFICE:	41 Burelli St WOLLONGONG NSW 2500		
PROJECT:	Dunmore Quarterly Ground Waters EPL	ALS QUOTE NO.:	WO/030/19 TENDER
ORDER NUMBER:			
PROJECT MANAGER:	Ryan Stirling		
SAMPLER:	Robert Dalio	SAMPLER MOBILE:	
COC emailed to ALS? (YES / NO)		EDD FORMAT (or default):	
Email Reports to :			
Email Invoice to :			

COC SEQUENCE NUMBER (Circle)

COC:	1	2	3	4	5	6	7
OF:	1	2	3	4	5	6	7

FOR LABORATORY USE ONLY (Circle)

Custody Seal Intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt:		°C	
Other comment:			

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Robert Dalio	Aneta		
DATE/TIME: 1/9/23	DATE/TIME: 1/9/23	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: CC reports to:

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	Ammonia	NT-2A (Alka, So4, Cl, Fl) Filtered Ca, K	TOC	Dissolved Fe & Mn	NT-4 (NO2, NO3)	Send to Eurofins			Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
	BH1C	1.9.23 9:15	W			✓	✓	✓	✓	✓				Field Tests - pH, EC, Temp & SWL
	BH3	13:05	W			✓	✓	✓	✓	✓				Field Tests - pH, EC, Temp & SWL
	BH4	12:20	W			✓	✓	✓	✓	✓				Field Tests - pH, EC, Temp & SWL
	BH9	8:40	W			✓	✓	✓	✓	✓				Field Tests - pH, EC, Temp & SWL
	BH12R	11:15	W			✓	✓	✓	✓	✓				Field Tests - pH, EC, Temp & SWL
	BH13	11:35	W			✓	✓	✓	✓	✓				Field Tests - pH, EC, Temp & SWL
	BH14	11:55	W			✓	✓	✓	✓	✓				Field Tests - pH, EC, Temp & SWL
	BH15	10:45	W			✓	✓	✓	✓	✓				Field Tests - pH, EC, Temp & SWL
	BH19R	12:40	W			✓	✓	✓	✓	✓				Field Tests - pH, EC, Temp & SWL
	BH18	8:05	W			✓	✓	✓	✓	✓				Field Tests - pH, EC, Temp & SWL
	BH21	10:20				✓	✓	✓	✓	✓				Field Tests - pH, EC, Temp & SWL
	BH22	9:55				✓	✓	✓	✓	✓				Field Tests - pH, EC, Temp & SWL
	Duplicate	8:05				✓	✓	✓	✓	✓				Field Tests - pH, EC, Temp & SWL
	Triplicate	8:05									✓			
					10									

Environmental Division
Wollongong
Work Order Reference
EW2303854

Telephone : 02 42253125

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved C... xide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserve... Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

CERTIFICATE OF ANALYSIS

Work Order	: **EW2303854**	Page	: 1 of 8
Client	: **SHELLHARBOUR CITY COUNCIL**	Laboratory	: Environmental Division NSW South Coast
Contact	: Ryan Stirling	Contact	: Aneta Prosaroski
Address	: LAMERTON HOUSE, LAMERTON CRESCENT SHELL HARBOUR CITY CENTRE NSW, AUSTRALIA 2529	Address	: 1/19 Ralph Black Dr, North Wollongong 2500 NSW Australia
Telephone	: ----	Telephone	: +61 2 4225 3125
Project	: Dunmore Quarterly Groundwaters EPL	Date Samples Received	: 01-Sep-2023 14:03
Order number	: 156810	Date Analysis Commenced	: 01-Sep-2023
C-O-C number	: ----	Issue Date	: 13-Sep-2023 10:20
Sampler	: Robert DaLio		
Site	: DUNMORE LANDFILL TENDER		
Quote number	: WO/030/19 TENDER GROUNDWATERS		
No. of samples received	: 14		
No. of samples analysed	: 13		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

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

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
Robert DaLio	Sampler	Laboratory - Wollongong, 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.

- **Analytical work for this work order will be conducted at ALS Sydney.**
- ED041G: LOR raised for Sulfate on sample no.1 due to sample matrix.
- EK057G: LOR raised for Nitrite on sample no.12 due to sample matrix.
- EK059G: LOR raised for NOx on sample 12 due to sample matrix.
- EK058G: LOR raised for Nitrate on sample 12 due to sample matrix.
- EK059G: LOR raised for NOx due to sample matrix.
- EK057G/EK059G: It has been noted that Nitrite is greater than NOx on sample 8, however this difference is confirmed by re-analysis.
- pH performed by ALS Wollongong via in-house method EA005FD and EN67 PK.
- Electrical conductivity performed by ALS Wollongong via in-house method EA010FD and EN67 PK.
- Sampling and groundwater depth measurements completed by ALS Wollongong via inhouse sampling method EN/67.11 Groundwater Sampling Via Bailer Method.
- Temperature performed by ALS Wollongong via in-house method EA116 and EN67 PK.
- All field analysis performed by ALS Wollongong were completed at the time of sampling.
- Sample collection of Ground Waters by in-house EN67 where the “surface layer of the aquifer was sampled”.
- 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	BH1C	BH3	BH4	BH9	BH12R
			Sampling date / time	01-Sep-2023 09:15	01-Sep-2023 13:05	01-Sep-2023 12:20	01-Sep-2023 08:40	01-Sep-2023 11:15
Compound	CAS Number	LOR	Unit	EW2303854-001	EW2303854-002	EW2303854-003	EW2303854-004	EW2303854-005
				Result	Result	Result	Result	Result
EA005FD: Field pH								
pH	----	0.1	pH Unit	6.9	7.3	7.3	7.1	6.8
EA010FD: Field Conductivity								
Electrical Conductivity (Non Compensated)	----	1	µS/cm	7610	1650	880	3760	1610
EA116: Temperature								
Temperature	----	0.5	°C	23.9	17.8	18.4	17.7	20.6
ED037P: Alkalinity by PC Titrator								
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	2760	483	381	1700	516
Total Alkalinity as CaCO3	----	1	mg/L	2760	483	381	1700	516
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<10	210	115	167	184
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	1110	260	55	548	223
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	135	137	132	216	183
Potassium	7440-09-7	1	mg/L	242	31	20	84	27
EG020F: Dissolved Metals by ICP-MS								
Manganese	7439-96-5	0.001	mg/L	0.116	0.214	0.118	0.558	0.539
Iron	7439-89-6	0.05	mg/L	9.04	2.90	3.08	2.45	9.62
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	0.4	0.1	0.1	0.4	0.2
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	314	29.2	1.68	122	3.37
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.03	<0.01	<0.01	0.01
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	<0.10	0.08	0.14	0.01	0.15
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	<0.10	0.11	0.14	0.01	0.16
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	222	22	11	58	21

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	BH1C	BH3	BH4	BH9	BH12R
			Sampling date / time	01-Sep-2023 09:15	01-Sep-2023 13:05	01-Sep-2023 12:20	01-Sep-2023 08:40	01-Sep-2023 11:15
Compound	CAS Number	LOR	Unit	EW2303854-001	EW2303854-002	EW2303854-003	EW2303854-004	EW2303854-005
				Result	Result	Result	Result	Result
QWI-EN 67.11 Sampling of Groundwaters								
Standing Water Level	----	0.01	m AHD	**3.25**	**3.13**	**4.40**	**3.25**	**4.38**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	BH13	BH14	BH15	BH19R	BH18
			Sampling date / time	01-Sep-2023 11:35	01-Sep-2023 11:55	01-Sep-2023 10:45	01-Sep-2023 12:40	01-Sep-2023 08:05
Compound	CAS Number	LOR	Unit	EW2303854-006	EW2303854-007	EW2303854-008	EW2303854-009	EW2303854-010
				Result	Result	Result	Result	Result
EA005FD: Field pH								
pH	----	0.1	pH Unit	6.7	6.8	7.0	7.3	6.6
EA010FD: Field Conductivity								
Electrical Conductivity (Non Compensated)	----	1	µS/cm	2210	1020	2180	765	470
EA116: Temperature								
Temperature	----	0.5	°C	21.5	21.0	14.3	18.1	18.6
ED037P: Alkalinity by PC Titrator								
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	872	563	519	358	283
Total Alkalinity as CaCO3	----	1	mg/L	872	563	519	358	283
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	93	37	391	58	4
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	330	36	459	48	13
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	219	154	133	104	70
Potassium	7440-09-7	1	mg/L	29	16	153	42	9
EG020F: Dissolved Metals by ICP-MS								
Manganese	7439-96-5	0.001	mg/L	0.448	0.140	0.300	0.080	0.241
Iron	7439-89-6	0.05	mg/L	3.34	0.15	10.4	0.99	2.43
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	0.2	0.5	0.2	0.1	0.2
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	8.64	1.42	6.24	3.05	1.44
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.03	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	4.43	1.03	<0.01	0.06	<0.01
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	4.43	1.03	0.01	0.06	<0.01
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	36	12	37	13	14

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	BH13	BH14	BH15	BH19R	BH18
			Sampling date / time	01-Sep-2023 11:35	01-Sep-2023 11:55	01-Sep-2023 10:45	01-Sep-2023 12:40	01-Sep-2023 08:05
Compound	CAS Number	LOR	Unit	EW2303854-006	EW2303854-007	EW2303854-008	EW2303854-009	EW2303854-010
				Result	Result	Result	Result	Result
QWI-EN 67.11 Sampling of Groundwaters								
Standing Water Level	----	0.01	m AHD	**4.39**	**4.83**	**0.89**	**4.56**	**2.28**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	BH21	BH22	Duplicate	----	----
			Sampling date / time	01-Sep-2023 10:20	01-Sep-2023 09:55	01-Sep-2023 08:05	----	----
Compound	CAS Number	LOR	Unit	EW2303854-011	EW2303854-012	EW2303854-013	--------	--------
				Result	Result	Result	----	----
EA005FD: Field pH								
pH	----	0.1	pH Unit	**6.9**	**6.6**	**6.6**	**----**	**----**
EA010FD: Field Conductivity								
Electrical Conductivity (Non Compensated)	----	1	µS/cm	**2310**	**1470**	**470**	**----**	**----**
EA116: Temperature								
Temperature	----	0.5	°C	**20.8**	**17.5**	**18.6**	**----**	**----**
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	**----**	**----**
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	**----**	**----**
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**783**	**428**	**279**	**----**	**----**
Total Alkalinity as CaCO3	----	1	mg/L	**783**	**428**	**279**	**----**	**----**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**183**	**326**	**4**	**----**	**----**
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**328**	**147**	**13**	**----**	**----**
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**196**	**159**	**71**	**----**	**----**
Potassium	7440-09-7	1	mg/L	**28**	**16**	**9**	**----**	**----**
EG020F: Dissolved Metals by ICP-MS								
Manganese	7439-96-5	0.001	mg/L	**0.231**	**0.279**	**0.242**	**----**	**----**
Iron	7439-89-6	0.05	mg/L	**0.16**	**25.9**	**2.46**	**----**	**----**
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	**0.3**	**0.3**	**0.2**	**----**	**----**
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	**1.92**	**5.14**	**1.31**	**----**	**----**
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	**0.06**	<0.10	<0.01	**----**	**----**
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	**23.7**	<0.10	<0.01	**----**	**----**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**23.8**	<0.10	<0.01	**----**	**----**
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	**29**	**33**	**15**	**----**	**----**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH21	BH22	Duplicate	----	----
				Sampling date / time	01-Sep-2023 10:20	01-Sep-2023 09:55	01-Sep-2023 08:05	----	----
Compound	CAS Number	LOR	Unit		EW2303854-011	EW2303854-012	EW2303854-013	--------	--------
					Result	Result	Result	----	----
QWI-EN 67.11 Sampling of Groundwaters									
Standing Water Level	----	0.01	m AHD		**3.15**	**2.42**	**2.38**	**----**	**----**

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) ED093F: Dissolved Major Cations

(WATER) EP005: Total Organic Carbon (TOC)

(WATER) EK055G: Ammonia as N by Discrete Analyser

(WATER) EG020F: Dissolved Metals by ICP-MS

(WATER) EK057G: Nitrite as N by Discrete Analyser

(WATER) EK058G: Nitrate as N by Discrete Analyser

(WATER) EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser

(WATER) ED045G: Chloride by Discrete Analyser

(WATER) ED037P: Alkalinity by PC Titrator

(WATER) EK040P: Fluoride by PC Titrator

(WATER) ED041G: Sulfate (Turbidimetric) as SO4 2- by DA

CHAIN OF CUSTODY

ALS Laboratory: please tick →

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☐ **Melbourne:** 2-4 Westall Rd Springvale VIC 3171 Ph:03 8549 9600 E: samples.melbourne@alsenviro.com
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☐ **Perth:** 10 Hod Way, Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsenviro.com
☐ **Launceston:** 27 Wellington St, Launceston TAS 7250 Ph: 03 6331 2136 E: launceston@alsenviro.com

CLIENT:	Shellharbour City Council	**TURNAROUND REQUIREMENTS :** (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	☐ Standard TAT (List due date): ☐ Non Standard or urgent TAT (List due date):
OFFICE:	41 Burelli St WOLLONGONG NSW 2500		
PROJECT:	Dunmore Quarterly Leachate	**ALS QUOTE NO.:**	WO/030/19 TENDER
ORDER NUMBER:			
PROJECT MANAGER:	Ryan Stirling		

COC SEQUENCE NUMBER (Circle)

COC:	1	2	3	4	5	6	7
OF:	1	2	3	4	5	6	7

FOR LABORATORY USE ONLY (Circle)

Custody Seal Intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt:	5.2 6 °C		
Other comment:			

SAMPLER: Robert Dalis	**SAMPLER MOBILE:**	**RELINQUISHED BY:** Robert Dalis	**RECEIVED BY:** Anetg.
COC emailed to ALS? (YES / NO)	**EDD FORMAT (or default):**		
Email Reports to :		**DATE/TIME:** 5.9.23	**DATE/TIME:** 5/9/23
Email Invoice to :		**RELINQUISHED BY:**	**RECEIVED BY:**
		DATE/TIME:	**DATE/TIME:**

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: **CC reports to:**

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE *(refer to codes below)*	TOTAL BOTTLES	Ammonia	NT-2A (Alka, So4, Cl, Fl) Filtered Ca, K	TOC	Total Fe & Mn	NT-4 (NO2, NO3)				Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
	Leachate Storage Tank - LP1	5.9.23. ~~10:05~~ 10:10 RMK 5.9.23	W			✓	✓	✓	✓	✓				Field Tests - pH, EC, Temp & DO
				TOTAL	10									

Environmental Division Wollongong
Work Order Reference
EW2303859

Telephone : 02 42253125

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

CERTIFICATE OF ANALYSIS

Work Order	: **EW2303859**	Page	: 1 of 4
Client	: **SHELLHARBOUR CITY COUNCIL**	Laboratory	: Environmental Division NSW South Coast
Contact	: Ryan Stirling	Contact	: Aneta Prosaroski
Address	: LAMERTON HOUSE, LAMERTON CRESCENT SHELL HARBOUR CITY CENTRE NSW, AUSTRALIA 2529	Address	: 1/19 Ralph Black Dr, North Wollongong 2500 NSW Australia
Telephone	: ----	Telephone	: +61 2 4225 3125
Project	: Dunmore Quarterly Leachate Tank EPL	Date Samples Received	: 05-Sep-2023 13:52
Order number	: 156810	Date Analysis Commenced	: 05-Sep-2023
C-O-C number	: ----	Issue Date	: 11-Sep-2023 19:56
Sampler	: Robert DaLio		
Site	: DUNMORE LANDFILL TENDER		
Quote number	: WO/030/19 TENDER LEACHATE		
No. of samples received	: 1		
No. of samples analysed	: 1		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

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

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
Robert DaLio	Sampler	Laboratory - Wollongong, 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.

- **Analytical work for this work order will be conducted at ALS Sydney.**
- ED041G: LOR raised for Sulfate due to sample matrix
- EK059G: LOR raised for NOx due to sample matrix.
- It has been noted that Nitrite is greater than NOx, however these results have been confirmed by reanalysis
- pH performed by ALS Wollongong via in-house method EA005FD and EN67 PK.
- Electrical conductivity performed by ALS Wollongong via in-house method EA010FD and EN67 PK.
- Temperature performed by ALS Wollongong via in-house method EA116 and EN67 PK.
- Dissolved oxygen (DO) performed by ALS Wollongong via in-house method EP025FD and EN67 PK.
- All field analysis performed by ALS Wollongong were completed at the time of sampling.
- Sampling completed by ALS Wollongong in accordance with in-house sampling method EN/67.10 Wastewaters
- 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	Leachate Storage Tank LP1	----	----	----	----
				Sampling date / time	05-Sep-2023 10:10	----	----	----	----
Compound	CAS Number	LOR	Unit		EW2303859-001	--------	--------	--------	--------
					Result	----	----	----	----
EA005FD: Field pH									
pH	----	0.1	pH Unit		**8.9**	**----**	**----**	**----**	**----**
EA010FD: Field Conductivity									
Electrical Conductivity (Non Compensated)	----	1	µS/cm		**8180**	**----**	**----**	**----**	**----**
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		**5280**	**----**	**----**	**----**	**----**
EA116: Temperature									
Temperature	----	0.5	°C		**19.9**	**----**	**----**	**----**	**----**
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	**----**	**----**	**----**	**----**
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		**743**	**----**	**----**	**----**	**----**
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**1970**	**----**	**----**	**----**	**----**
Total Alkalinity as CaCO3	----	1	mg/L		**2710**	**----**	**----**	**----**	**----**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		<100	**----**	**----**	**----**	**----**
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**2030**	**----**	**----**	**----**	**----**
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**45**	**----**	**----**	**----**	**----**
Potassium	7440-09-7	1	mg/L		**349**	**----**	**----**	**----**	**----**
EG020T: Total Metals by ICP-MS									
Manganese	7439-96-5	0.001	mg/L		**0.108**	**----**	**----**	**----**	**----**
Iron	7439-89-6	0.05	mg/L		**1.67**	**----**	**----**	**----**	**----**
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		**0.2**	**----**	**----**	**----**	**----**
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**391**	**----**	**----**	**----**	**----**
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		**12.2**	**----**	**----**	**----**	**----**
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		<2.00	**----**	**----**	**----**	**----**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	Leachate Storage Tank LP1	----	----	----	----
				Sampling date / time	05-Sep-2023 10:10	----	----	----	----
Compound	CAS Number	LOR	Unit		EW2303859-001	--------	--------	--------	--------
					Result	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		<2.00	----	----	----	----
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		**405**	----	----	----	----
EP025FD: Field Dissolved Oxygen									
Dissolved Oxygen	----	0.01	mg/L		**5.25**	----	----	----	----
Dissolved Oxygen - % Saturation	----	0.1	% saturation		**60.3**	----	----	----	----

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) ED093F: Dissolved Major Cations

(WATER) EP005: Total Organic Carbon (TOC)

(WATER) EK055G: Ammonia as N by Discrete Analyser

(WATER) EG020T: Total Metals by ICP-MS

(WATER) EK057G: Nitrite as N by Discrete Analyser

(WATER) EK058G: Nitrate as N by Discrete Analyser

(WATER) EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser

(WATER) EA015: Total Dissolved Solids dried at 180 ± 5 °C

(WATER) ED045G: Chloride by Discrete Analyser

(WATER) ED037P: Alkalinity by PC Titrator

(WATER) EK040P: Fluoride by PC Titrator

(WATER) ED041G: Sulfate (Turbidimetric) as SO4 2- by DA

CHAIN OF CUSTODY

ALS Laboratory: please tick →

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☐ **Townsville**: 14-15 Desma Ct, Bohle QLD 4818 Ph:07 4796 0600 E: townsville.environmental@alsenviro.com
☐ **Melbourne**: 2-4 Westall Rd, Springvale VIC 3171 Ph:03 8549 9600 E: samples.melbourne@alsenviro.com
☐ **Adelaide**: 2-1 Burma Rd, Pooraka SA 5095 Ph: 08 8359 0890 E:adelaide@alsenviro.com
☐ **Perth**: 10 Hod Way, Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsenviro.com
☐ **Launceston**: 27 Wellington St, Launceston TAS 7250 Ph: 03 6331 2158 E: launceston@alsenviro.com

CLIENT:	Shellharbour City Council	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	☐ Standard TAT (List due date): ☐ Non Standard or urgent TAT (List due date):
OFFICE:	41 Burelli St WOLLONGONG NSW 2500		
PROJECT:	Dunmore Quarterly Surface Waters EPL	ALS QUOTE NO.: WO/030/19 TENDER	
ORDER NUMBER:			
PROJECT MANAGER:	Ryan Stirling		
SAMPLER:	Robert Dalia	SAMPLER MOBILE:	
COC emailed to ALS? (YES / NO)		EDD FORMAT (or default):	
Email Reports to :			
Email Invoice to :			

COC SEQUENCE NUMBER (Circle)

COC:	1	2	3	4	5	6	7
OF:	1	2	3	4	5	6	7

FOR LABORATORY USE ONLY (Circle)

Custody Seal Intact? Yes No N/A
Free Ice / Frozen Ice Bricks present upon receipt? Yes No N/A
Random Sample Temperature on Receipt: 5.8 °C
Other comment:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Robert Dalia.	Anefy		
DATE/TIME: 5.9.23	DATE/TIME: 5/9/23	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: CC reports to:

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	TSS	NT-1, NT-2A (Ionic Balance)	TOC, NT-4, NH3, Total Mn	Dissolved and Total Fe	Turbidity	NH3, NH4 & NO3	TSS, TDS, TOC, Total Mn		Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
	SWP1	5.9.23 9:35	W			✓	✓	✓	✓					Field Tests - pH, EC, DO & Temp
	SWC_2	8:45	W				✓		✓	✓	✓	✓		Field Tests - pH, EC, DO & Temp
	SWC_UP	7:50	W				✓		✓	✓	✓	✓		Field Tests - pH, EC, DO & Temp
	SWC_DOWN	8:10	W				✓		✓	✓	✓	✓		Field Tests - pH, EC, DO & Temp
	SWC_DOWN_2	8:20	W				✓		✓	✓	✓	✓		Field Tests - pH, EC, DO & Temp
	Duplicate	8:45	W				✓		✓	✓	✓	✓		Field Tests - pH, EC, DO & Temp
				TOTAL	10									

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unprese
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

= Formaldehyde Preserved Glass;

Environmental Division
Wollongong
Work Order Reference
EW2303862

Telephone : 02 42263125

ENFM204

CERTIFICATE OF ANALYSIS

Work Order	: **EW2303862**	Page	: 1 of 7
Client	: **SHELLHARBOUR CITY COUNCIL**	Laboratory	: Environmental Division NSW South Coast
Contact	: Ryan Stirling	Contact	: Aneta Prosaroski
Address	: LAMERTON HOUSE, LAMERTON CRESCENT SHELL HARBOUR CITY CENTRE NSW, AUSTRALIA 2529	Address	: 1/19 Ralph Black Dr, North Wollongong 2500 NSW Australia
Telephone	: ----	Telephone	: +61 2 4225 3125
Project	: Dunmore Quarterly Surface Water EPL	Date Samples Received	: 05-Sep-2023 13:42
Order number	: 156810	Date Analysis Commenced	: 05-Sep-2023
C-O-C number	: ----	Issue Date	: 12-Sep-2023 10:55
Sampler	: Robert DaLio		
Site	: DUNMORE LANDFILL TENDER		
Quote number	: WO/030/19 TENDER SURFACE WATER		
No. of samples received	: 6		
No. of samples analysed	: 6		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

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

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
Robert DaLio	Sampler	Laboratory - Wollongong, 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.

- **Analytical work for this work order will be conducted at ALS Sydney.**
- 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, SiO2 and Fluoride to the Anions.
- EG020: LOR's have been raised due to matrix interference.
- TDS by method EA-015 may bias high for all samples due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- pH performed by ALS Wollongong via in-house method EA005FD and EN67 PK.
- Electrical conductivity performed by ALS Wollongong via in-house method EA010FD and EN67 PK.
- Sampling completed by ALS Wollongong in accordance with in-house sampling method EN/67.6 Rivers and Streams.
- Temperature performed by ALS Wollongong via in-house method EA116 and EN67 PK.
- Dissolved oxygen (DO) performed by ALS Wollongong via in-house method EP025FD and EN67 PK.
- All field analysis performed by ALS Wollongong were completed at the time of sampling.
- 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	SWP1 Point 1	SWC_2 Point 19	SWC_UP Point 20	SWC_Down Point 21	SWC_DOWN_2 Point 22
			Sampling date / time	05-Sep-2023 09:35	05-Sep-2023 08:45	05-Sep-2023 07:50	05-Sep-2023 08:10	05-Sep-2023 08:20
Compound	CAS Number	LOR	Unit	EW2303862-001	EW2303862-002	EW2303862-003	EW2303862-004	EW2303862-005
				Result	Result	Result	Result	Result
EA005FD: Field pH								
pH	----	0.1	pH Unit	7.7	7.3	7.2	7.4	7.4
EA010FD: Field Conductivity								
Electrical Conductivity (Non Compensated)	----	1	µS/cm	788	26800	22000	30300	18800
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	----	21100	17800	24800	14800
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	<5	<5	<5	<5	<5
EA045: Turbidity								
Turbidity	----	0.1	NTU	2.2	3.5	4.6	3.0	4.6
EA116: Temperature								
Temperature	----	0.5	°C	14.6	15.6	15.4	15.7	14.7
ED037P: Alkalinity by PC Titrator								
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	316	163	169	160	150
Total Alkalinity as CaCO3	----	1	mg/L	316	163	169	160	150
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	23	1720	922	1840	795
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	145	10000	8240	11300	7170
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	58	283	253	315	214
Magnesium	7439-95-4	1	mg/L	26	726	608	843	508
Sodium	7440-23-5	1	mg/L	127	5940	5060	6970	4310
Potassium	7440-09-7	1	mg/L	18	250	190	247	165
EG020F: Dissolved Metals by ICP-MS								
Iron	7439-89-6	0.05	mg/L	0.06	<0.10	0.08	<0.10	<0.05
EG020T: Total Metals by ICP-MS								
Manganese	7439-96-5	0.001	mg/L	0.263	0.276	0.106	0.030	0.053
Iron	7439-89-6	0.05	mg/L	0.17	<0.10	0.63	0.36	0.54
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	0.3	0.8	0.7	0.8	0.6

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	SWP1 Point 1	SWC_2 Point 19	SWC_UP Point 20	SWC_Down Point 21	SWC_DOWN_2 Point 22
				Sampling date / time	05-Sep-2023 09:35	05-Sep-2023 08:45	05-Sep-2023 07:50	05-Sep-2023 08:10	05-Sep-2023 08:20
Compound	CAS Number	LOR	Unit		EW2303862-001	EW2303862-002	EW2303862-003	EW2303862-004	EW2303862-005
					Result	Result	Result	Result	Result
EK040P: Fluoride by PC Titrator - Continued									
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.09**	**0.76**	**0.54**	**0.51**	**0.25**
EK055G-NH4: Ammonium as N by DA									
Ammonium as N	14798-03-9_N	0.01	mg/L		**0.09**	**0.76**	**0.54**	**0.51**	**0.25**
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	**0.02**	**0.02**	**0.01**	**0.01**
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		<0.01	**0.06**	**0.09**	**0.06**	**0.10**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.01	**0.08**	**0.11**	**0.07**	**0.11**
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**10.9**	**321**	**255**	**360**	**222**
ø Total Cations	----	0.01	meq/L		**11.0**	**339**	**288**	**394**	**244**
ø Ionic Balance	----	0.01	%		**0.62**	**2.65**	**6.01**	**4.55**	**4.80**
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		**20**	**8**	**8**	**6**	**7**
EP025FD: Field Dissolved Oxygen									
Dissolved Oxygen	----	0.01	mg/L		**4.16**	**4.91**	**5.02**	**5.37**	**6.27**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	Duplicate	----	----	----	----
			Sampling date / time	05-Sep-2023 08:45	----	----	----	----
Compound	CAS Number	LOR	Unit	EW2303862-006	--------	--------	--------	--------
				Result	----	----	----	----
EA005FD: Field pH								
pH	----	0.1	pH Unit	**7.3**	----	----	----	----
EA010FD: Field Conductivity								
Electrical Conductivity (Non Compensated)	----	1	µS/cm	**26800**	----	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	**21500**	----	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	<5	----	----	----	----
EA045: Turbidity								
Turbidity	----	0.1	NTU	**3.6**	----	----	----	----
EA116: Temperature								
Temperature	----	0.5	°C	**15.6**	----	----	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**163**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**163**	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**1610**	----	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**10100**	----	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**282**	----	----	----	----
Magnesium	7439-95-4	1	mg/L	**719**	----	----	----	----
Sodium	7440-23-5	1	mg/L	**5950**	----	----	----	----
Potassium	7440-09-7	1	mg/L	**218**	----	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Iron	7439-89-6	0.05	mg/L	<0.10	----	----	----	----
EG020T: Total Metals by ICP-MS								
Manganese	7439-96-5	0.001	mg/L	**0.042**	----	----	----	----
Iron	7439-89-6	0.05	mg/L	**0.43**	----	----	----	----
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	**0.7**	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	Duplicate	----	----	----	----
				Sampling date / time	05-Sep-2023 08:45	----	----	----	----
Compound	CAS Number	LOR	Unit		EW2303862-006	--------	--------	--------	--------
					Result	----	----	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.76**	----	----	----	----
EK055G-NH4: Ammonium as N by DA									
Ammonium as N	14798-03-9_N	0.01	mg/L		**0.76**	----	----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		**0.02**	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**0.06**	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.08**	----	----	----	----
EN055: Ionic Balance									
ø **Total Anions**	----	0.01	meq/L		**322**	----	----	----	----
ø **Total Cations**	----	0.01	meq/L		**338**	----	----	----	----
ø **Ionic Balance**	----	0.01	%		**2.42**	----	----	----	----
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		**7**	----	----	----	----
EP025FD: Field Dissolved Oxygen									
Dissolved Oxygen	----	0.01	mg/L		**4.91**	----	----	----	----

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EA045: Turbidity
(WATER) EP005: Total Organic Carbon (TOC)
(WATER) EG020F: Dissolved Metals by ICP-MS
(WATER) EG020T: Total Metals by ICP-MS
(WATER) EK057G: Nitrite as N by Discrete Analyser
(WATER) EK058G: Nitrate as N by Discrete Analyser
(WATER) EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser
(WATER) EA025: Total Suspended Solids dried at 104 ± 2°C
(WATER) EK055G-NH4: Ammonium as N by DA
(WATER) EK055G: Ammonia as N by Discrete Analyser
(WATER) EN055: Ionic Balance
(WATER) ED045G: Chloride by Discrete Analyser
(WATER) ED041G: Sulfate (Turbidimetric) as SO4 2- by DA
(WATER) EK040P: Fluoride by PC Titrator
(WATER) ED037P: Alkalinity by PC Titrator
(WATER) ED093F: Dissolved Major Cations
(WATER) EA015: Total Dissolved Solids dried at 180 ± 5 °C

Appendix F:

Laboratory Chain of Custody (COC) & Certificates of Analysis (COA) – Dust Samples. Quarters 1-4

CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ **Sydney**: 277 Woodpark Rd, Smithfield NSW 2176 Ph: 02 8784 8555 E:samples.sydney@alsenviro.com
☐ **Newcastle**: 5 Rosegum Rd, Warabrook NSW 2304 Ph:02 4968 9433 E:samples.newcastle@alsenviro.com
☐ **Brisbane**: 32 Shand St, Stafford QLD 4053 Ph:07 3243 7222 E:samples.brisbane@alsenviro.com
☐ **Townsville**: 14-15 Desma Ct, Bohle QLD 4818 Ph:07 4796 0600 E: townsville.environmental@alsenviro.com
☐ **Melbourne**: 2-4 Westall Rd, Springvale VIC 3171 Ph:03 8549 9600 E: samples.melbourne@alsenviro.com
☐ **Adelaide**: 2-1 Burma Rd, Pooraka SA 5095 Ph: 08 8359 0890 E:adelaide@alsenviro.com
☐ **Perth**: 10 Hod Way, Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsenviro.com
☐ **Launceston**: 27 Wellington St, Launceston TAS 7250 Ph: 03 6331 2158 E: launceston@alsenviro.com

CLIENT:	Shellharbour City Council	**TURNAROUND REQUIREMENTS :**	☐ Standard TAT (List due date):	**FOR LABORATORY USE ONLY (Circle)**				
OFFICE:	Dunmore	(Standard TAT may be longer for some tests e.g.. Ultra Trace Organics)	☐ Non Standard or urgent TAT (List due date):	Custody Seal Intact?	Yes	No	N/A	
PROJECT:	Dunmore Dust	**ALS QUOTE NO.:** WO/030/19 TENDER	**COC SEQUENCE NUMBER (Circle)**	Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A	
ORDER NUMBER:			COC: 1 2 3 4 5 6 7	Random Sample Temperature on Receipt:		°C		
PROJECT MANAGER:	Joel Culton		OF: 1 2 3 4 5 6 7	Other comment:				

SAMPLER: Robert Dalo	**SAMPLER MOBILE:**	**RELINQUISHED BY:** Robert Dalo	**RECEIVED BY:**	**RELINQUISHED BY:**	**RECEIVED BY:**
COC emailed to ALS? (YES / NO)	**EDD FORMAT (or default):**	DATE/TIME: 1/12/22	DATE/TIME:	DATE/TIME:	DATE/TIME:
Email Reports to :					
Email Invoice to :					

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: **CC reports to:**

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE *(refer to codes below)*	TOTAL BOTTLES	A04 (Ash, CM, TIS)								Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
	DDG1	1/12/22 9:25	AIR			✓								
	DDG2	9:40	AIR			✓								
	DDG3	8:45	AIR			✓								
	DDG4	8:35	AIR			✓								
				TOTAL	10									

Environmental Division Wollongong
Work Order Reference
EW2205528

Telephone : 02 42253125

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EW2205528**	Page	: 1 of 3
Client	: **SHELLHARBOUR CITY COUNCIL**	Laboratory	: Environmental Division NSW South Coast
Contact	: Ryan Stirling	Contact	: Aneta Prosaroski
Address	: LAMERTON HOUSE, LAMERTON CRESCENT SHELL HARBOUR CITY CENTRE NSW, AUSTRALIA 2529	Address	: 1/19 Ralph Black Dr, North Wollongong 2500 NSW Australia
Telephone	: ----	Telephone	: +61 2 4225 3125
Project	: Dunmore Landfill Dust	Date Samples Received	: 01-Dec-2022 13:00
Order number	: 147649	Date Analysis Commenced	: 02-Dec-2022
C-O-C number	: ----	Issue Date	: 12-Dec-2022 18:08
Sampler	: Robert DaLio		
Site	: DUNMORE LANDFILL TENDER		
Quote number	: WO/030/19 TENDER DUST		
No. of samples received	: 4		
No. of samples analysed	: 4		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

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

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*
Zoran Grozdanovski	Laboratory Operator	Newcastle - Inorganics, Mayfield West, 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.

- **Analytical work for this work order will be conducted at ALS Newcastle.**
- Analysis as per AS3580.10.1-2016. Samples passed through a 1mm sieve prior to analysis. NATA accreditation does not apply for results reported in g/m².mth.
- Sample exposure period is 27 days which is outside the typical exposure period of 30 +/- 2 days as per AS3580.10.1.
- Sampling completed by ALS Wollongong in accordance with in-house sampling method EN/66.1 Sampling and Siting of Dust Depositon Gauges.
- For dust analysis, the Limit of Reporting (LOR) referenced in the reports for deposited matter parameters represents the reporting increment rather than reporting limit.

Analytical Results

Sub-Matrix: **DEPOSITIONAL DUST** (Matrix: **AIR**)

			Sample ID	DDG1 04/11/2022 - 01/12/2022	DDG2 04/11/2022 - 01/12/2022	DDG3 04/11/2022 - 01/12/2022	DDG4 04/11/2022 - 01/12/2022	----
			Sampling date / time	01-Dec-2022 00:00	01-Dec-2022 00:00	01-Dec-2022 00:00	01-Dec-2022 00:00	----
Compound	CAS Number	LOR	Unit	EW2205528-001	EW2205528-002	EW2205528-003	EW2205528-004	--------
				Result	Result	Result	Result	----
EA120: Ash Content								
Ash Content	----	0.1	g/m².month	**0.8**	**0.6**	**1.0**	**1.3**	**----**
Ash Content (mg)	----	2	mg	**12**	**9**	**16**	**20**	**----**
EA125: Combustible Matter								
Combustible Matter	----	0.1	g/m².month	**0.4**	**0.2**	**0.7**	**0.8**	**----**
Combustible Matter (mg)	----	2	mg	**7**	**4**	**11**	**13**	**----**
EA141: Total Insoluble Matter								
Total Insoluble Matter	----	0.1	g/m².month	**1.2**	**0.8**	**1.7**	**2.1**	**----**
Total Insoluble Matter (mg)	----	2	mg	**19**	**13**	**27**	**33**	**----**

Inter-Laboratory Testing

Analysis conducted by ALS Newcastle, NATA accreditation no. 825, site no. 1656 (Chemistry) 9854 (Biology).

(AIR) EA125: Combustible Matter

(AIR) EA120: Ash Content

(AIR) EA141: Total Insoluble Matter

CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ **Sydney** 277 Woodpark Rd, Smithfield NSW 2176 Ph: 02 8784 8555 E:samples.sydney@alsenviro.com
☐ **Newcastle:** 5 Rosegum Rd, Warabrook NSW 2304 Ph:02 4968 9433 E:samples.newcastle@alsenviro.com
☐ **Brisbane** 32 Shand St, Stafford QLD 4053 Ph:07 3243 7222 E:samples.brisbane@alsenviro.com
☐ **Townsville:** 14-15 Desma Ct, Bohle QLD 4818 Ph:07 4796 0600 E:townsville.environmental@alsenviro.com
☐ **Melbourne** 2-4 Westall Rd, Springvale VIC 3171 Ph:03 8549 9600 E: samples.melbourne@alsenviro.com
☐ **Adelaide:** 2-1 Burma Rd, Pooraka SA 5095 Ph: 08 8359 0890 E:adelaide@alsenviro.com
☐ **Perth:** 10 Hod Way, Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsenviro.com
☐ **Launceston:** 27 Wellington St, Launceston TAS 7250 Ph: 03 6331 2158 E: launceston@alsenviro.com

CLIENT:	Shellharbour City Council	**TURNAROUND REQUIREMENTS :** (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	☐ Standard TAT **(List due date):** ☐ Non Standard or urgent TAT **(List due date):**
OFFICE:	Dunmore		
PROJECT:	Dunmore Dust	**ALS QUOTE NO.:** WO/030/19 TENDER	**COC SEQUENCE NUMBER (Circle)** COC: 1 2 3 4 5 6 7 OF: 1 2 3 4 5 6 7
ORDER NUMBER:			
PROJECT MANAGER:	Ryan Stirling		
SAMPLER:	Robert Dabic	**SAMPLER MOBILE:**	
COC emailed to ALS? (YES / NO)		**EDD FORMAT (or default):**	
Email Reports to :			
Email Invoice to :			

FOR LABORATORY USE ONLY (Circle)

Custody Seal Intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt		°C	
Other comment:			

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Robert Dabic	Anet		
DATE/TIME: 1.3.23	DATE/TIME: 2/3/23	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: **CC reports to:**

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE *(refer to codes below)*	TOTAL BOTTLES	A04 (Ash, CM, TIS)								Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
	DDG1	1.3.23 9:15	AIR			✓								
	DDG2	8:55	AIR			✓								
	DDG3	9:25	AIR			✓								
	DDG4	9:15	AIR			✓								
				TOTAL	10									

Environmental Division
Wollongong
Work Order Reference
EW2300845

Telephone : 02 42253125

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EW2300845**	Page	: 1 of 3
Client	: **SHELLHARBOUR CITY COUNCIL**	Laboratory	: Environmental Division NSW South Coast
Contact	: Ryan Stirling	Contact	: Aneta Prosaroski
Address	: LAMERTON HOUSE, LAMERTON CRESCENT SHELL HARBOUR CITY CENTRE NSW, AUSTRALIA 2529	Address	: 1/19 Ralph Black Dr, North Wollongong 2500 NSW Australia
Telephone	: ----	Telephone	: +61 2 4225 3125
Project	: Dunmore Landfill Dust	Date Samples Received	: 02-Mar-2023 10:42
Order number	: 147649	Date Analysis Commenced	: 06-Mar-2023
C-O-C number	: ----	Issue Date	: 13-Mar-2023 13:29
Sampler	: Robert DaLio		
Site	: DUNMORE LANDFILL TENDER		
Quote number	: WO/030/19 TENDER DUST		
No. of samples received	: 4		
No. of samples analysed	: 4		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

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

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*
Zoran Grozdanovski	Laboratory Operator	Newcastle - Inorganics, Mayfield West, 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.

- **Dust analysis conducted by ALS Newcastle, NATA accreditation no. 825, site no. 1656.**
- Analysis as per AS3580.10.1-2016. Samples passed through a 1mm sieve prior to analysis. NATA accreditation does not apply for results reported in g/m².mth as sampling data was provided by the client.
- Sampling completed by ALS Wollongong in accordance with in-house sampling method EN/66.1 Sampling and Siting of Dust Depositon Gauges.
- The dust gauges for all samples were full when received by the laboratory. They may have overflowed in the field. Results for these gauges are thus reported on an 'as received' basis.
- For dust analysis, the Limit of Reporting (LOR) referenced in the reports for deposited matter parameters represents the reporting increment rather than reporting limit.

Analytical Results

Sub-Matrix: **DEPOSITIONAL DUST** (Matrix: **AIR**)

			Sample ID	DDG1 01/02/2023 - 01/03/2023	DDG2 01/02/2023 - 01/03/2023	DDG3 01/02/2023 - 01/03/2023	DDG4 01/02/2023 - 01/03/2023	----
			Sampling date / time	01-Mar-2023 09:15	01-Mar-2023 08:55	01-Mar-2023 09:25	01-Mar-2023 09:15	----
Compound	CAS Number	LOR	Unit	EW2300845-001	EW2300845-002	EW2300845-003	EW2300845-004	--------
				Result	Result	Result	Result	----
EA120: Ash Content								
Ash Content	----	0.1	g/m².month	**0.9**	**0.3**	**0.7**	**1.9**	**----**
Ash Content (mg)	----	2	mg	**15**	**5**	**12**	**31**	**----**
EA125: Combustible Matter								
Combustible Matter	----	0.1	g/m².month	**0.6**	**0.5**	**0.8**	**0.5**	**----**
Combustible Matter (mg)	----	2	mg	**9**	**8**	**12**	**9**	**----**
EA141: Total Insoluble Matter								
Total Insoluble Matter	----	0.1	g/m².month	**1.5**	**0.8**	**1.5**	**2.4**	**----**
Total Insoluble Matter (mg)	----	2	mg	**24**	**13**	**24**	**40**	**----**

Inter-Laboratory Testing

Analysis conducted by ALS Newcastle, NATA accreditation no. 825, site no. 1656 (Chemistry) 9854 (Biology).

(AIR) EA125: Combustible Matter

(AIR) EA120: Ash Content

(AIR) EA141: Total Insoluble Matter

CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ **Sydney**: 277 Woodpark Rd, Smithfield NSW 2176 Ph: 02 8784 8555 E: samples.sydney@alsenviro.com
☐ **Newcastle**: 5 Rosegum Rd, Warabrook NSW 2304 Ph:02 4968 9433 E:samples.newcastle@alsenviro.com
☐ **Brisbane**: 32 Shand St, Stafford QLD 4053 Ph:07 3243 7222 E:samples.brisbane@alsenviro.com
☐ **Townsville**: 14-15 Desma Ct, Bohle QLD 4818 Ph:07 4796 0600 E: townsville.environmental@alsenviro.com
☐ **Melbourne**: 2-4 Westall Rd, Springvale VIC 3171 Ph:03 8549 9600 E: samples.melbourne@alsenviro.com
☐ **Adelaide**: 2-1 Burma Rd, Pooraka SA 5095 Ph: 08 8359 0890 E:adelaide@alsenviro.com
☐ **Perth**: 10 Hod Way, Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsenviro.com
☐ **Launceston**: 27 Wellington St, Launceston TAS 7250 Ph: 03 6331 2158 E: launceston@alsenviro.com

CLIENT:	Shellharbour City Council	**TURNAROUND REQUIREMENTS :** (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	☐ Standard TAT **(List due date):**
OFFICE:	Dunmore		☐ Non Standard or urgent TAT **(List due date):**
PROJECT:	Dunmore Dust	**ALS QUOTE NO.:**	WO/030/19 TENDER
ORDER NUMBER:			
PROJECT MANAGER:	Ryan Stirling		
SAMPLER:	Michael Santos	**SAMPLER MOBILE:**	0403590 899
COC emailed to ALS?	(YES / NO)	**EDD FORMAT (or default):**	
Email Reports to :			
Email Invoice to :			

COC SEQUENCE NUMBER (Circle)

COC:	1	2	3	4	5	6	7
OF:	1	2	3	4	5	6	7

FOR LABORATORY USE ONLY (Circle)

Custody Seal Intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt:		°C	
Other comments:			

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Michael Santos			
DATE/TIME: 27.9.23 17:00	DATE/TIME: 27/9/23	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: **CC reports to:**

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where **Metals** are required, specify **Total** (unfiltered bottle required) or **Dissolved** (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE *(refer to codes below)*	TOTAL BOTTLES	A04 (Ash, CM, TIS)								Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
	DDG1	27.9.23 10:18	AIR			✓								
	DDG2	10:10	AIR			✓								
	DDG3	11:10	AIR			✓								
	DDG4	10:30	AIR			✓								
				TOTAL	10									

Environmental Division Wollongong
Work Order Reference
EW2303858

Telephone : 02 42253125

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

CERTIFICATE OF ANALYSIS

Work Order	: **EW2303858**	Page	: 1 of 3
Client	: **SHELLHARBOUR CITY COUNCIL**	Laboratory	: Environmental Division NSW South Coast
Contact	: Ryan Stirling	Contact	: Aneta Prosaroski
Address	: LAMERTON HOUSE, LAMERTON CRESCENT SHELL HARBOUR CITY CENTRE NSW, AUSTRALIA 2529	Address	: 1/19 Ralph Black Dr, North Wollongong 2500 NSW Australia
Telephone	: ----	Telephone	: +61 2 4225 3125
Project	: Dunmore Landfill Dust	Date Samples Received	: 27-Sep-2023 15:31
Order number	: 156810	Date Analysis Commenced	: 29-Sep-2023
C-O-C number	: ----	Issue Date	: 09-Oct-2023 16:06
Sampler	: Michael Santos, Robert DaLio		
Site	: DUNMORE LANDFILL TENDER		
Quote number	: WO/030/19 TENDER DUST		
No. of samples received	: 4		
No. of samples analysed	: 4		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

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

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*
Thomas Regan	Laboratory Technician	Newcastle - Inorganics, Mayfield West, 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.

- **Dust analysis conducted by ALS Newcastle, NATA accreditation no. 825, site no. 1656.**
- Analysis as per AS3580.10.1-2016. Samples passed through a 1mm sieve prior to analysis. NATA accreditation is not held for results reported in g/m².mth.
- Sampling completed by ALS Wollongong in accordance with in-house sampling method EN/66.1 Sampling and Siting of Dust Depositon Gauges.
- Sample exposure period is 26 days which is outside the typical exposure period of 30 +/- 2 days as per AS3580.10.1.
- For dust analysis, the Limit of Reporting (LOR) referenced in the reports for deposited matter parameters represents the reporting increment rather than reporting limit.

Analytical Results

Sub-Matrix: **DEPOSITIONAL DUST** (Matrix: **AIR**)

			Sample ID	**DDG1 01/09/2023 - 27/09/2023**	**DDG2 01/09/2023 - 27/09/2023**	**DDG3 01/09/2023 - 27/09/2023**	**DDG4 01/09/2023 - 27/09/2023**	**----**
			Sampling date / time	27-Sep-2023 10:18	27-Sep-2023 10:10	27-Sep-2023 11:10	27-Sep-2023 10:30	----
Compound	*CAS Number*	*LOR*	*Unit*	**EW2303858-001**	**EW2303858-002**	**EW2303858-003**	**EW2303858-004**	**--------**
				Result	Result	Result	Result	----
EA120: Ash Content								
Ash Content	----	0.1	g/m².month	**0.4**	**0.5**	**0.8**	**6.5**	**----**
Ash Content (mg)	----	2	mg	**6**	**9**	**14**	**103**	**----**
EA125: Combustible Matter								
Combustible Matter	----	0.1	g/m².month	**0.3**	**1.0**	**0.4**	**3.0**	**----**
Combustible Matter (mg)	----	2	mg	**6**	**16**	**8**	**46**	**----**
EA141: Total Insoluble Matter								
Total Insoluble Matter	----	0.1	g/m².month	**0.7**	**1.5**	**1.2**	**9.5**	**----**
Total Insoluble Matter (mg)	----	2	mg	**12**	**25**	**22**	**149**	**----**

Inter-Laboratory Testing

Analysis conducted by ALS Newcastle, NATA accreditation no. 825, site no. 1656 (Chemistry) 9854 (Biology).

(AIR) EA125: Combustible Matter

(AIR) EA120: Ash Content

(AIR) EA141: Total Insoluble Matter

Appendix G:

Surface Gas (Methane) Field Sheets. Quarters 1-4

CHAIN OF COUNSEL

ALS Laboratory: please tick →

☐ **Sydney:** 277 Woodpark Rd, Smithfield NSW 2176 Ph: 02 8784 8555 E:samples.sydney@alsenviro.com
☐ **Newcastle:** 5 Rosegum Rd, Warabrook NSW 2304 Ph:02 4968 9433 E:samples.newcastle@alsenviro.com
☐ **Brisbane:** 32 Shand St, Stafford QLD 4053 Ph:07 3243 7222 E:samples.brisbane@alsenviro.com
☐ **Townsville:** 14-15 Desma Ct, Bohle QLD 4818 Ph:07 4796 0600 E: townsville.environmental@alsenviro.com
☐ **Melbourne:** 2-4 Westall Rd, Springvale VIC 3171 Ph:03 8549 9600 E: samples.melbourne@alsenviro.com
☐ **Adelaide:** 2-1 Burma Rd, Pooraka SA 5095 Ph: 08 8359 0890 E:adelaide@alsenviro.com
☐ **Perth:** 10 Hod Way, Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsenviro.com
☐ **Launceston:** 27 Wellington St, Launceston TAS 7250 Ph: 03 6331 2158 E: launceston@alsenviro.com

CLIENT:	Shellharbour City Council
OFFICE:	41 Burelli St WOLLONGONG NSW 2500
PROJECT:	Dunmore Quarterly Methane Testing
ORDER NUMBER:	
PROJECT MANAGER:	Joel Culton
SAMPLER:	**SAMPLER MOBILE:**
COC emailed to ALS? (YES / NO)	**EDD FORMAT (or default):**
Email Reports to :	
Email Invoice to :	

TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g.. Ultra Trace Organics)
☐ Standard TAT (List due date):
☐ Non Standard or urgent TAT (List due date):

ALS QUOTE NO.: WO/030/19 TENDER

COC SEQUENCE NUMBER (Circle)
COC: 1 2 3 4 5 6 7
OF: 1 2 3 4 5 6 7

FOR LABORATORY USE ONLY (Circle)
Custody Seal Intact? Yes No N/A
Free ice / frozen ice bricks present upon receipt? Yes No N/A
Random Sample Temperature on Receipt: °C
Other comment:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Michael	Anete		
DATE/TIME: 13/12/22	DATE/TIME: 13/12/22	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: **CC reports to:**

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	**SAMPLE ID**	**DATE / TIME**	**MATRIX**	**TYPE & PRESERVATIVE** *(refer to codes below)*	**TOTAL BOTTLES**	Surface Methane Testing								Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
	Methane	13/12/22	W			✓	✓							
				TOTAL	10									

Environmental Division
Wollongong
Work Order Reference
EW2205928
Telephone : 02 42253125

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

ENFM204

ALS Landfill Emissions Report

Client: Shellharbour City Council
Date: 13/12/2022
Site: Dunmore
Sampler(s) Robert DaLio, Michael Santos

Transact / Location	Point	GPS North	GPS East	CH4 Conc (ppm)	Comments
A					**No Access,**
B	1	6168 220	302 432	0.0	
B	2	6168 253	302 438	0.0	
B	3	6168 280	302 437	0.0	
B	4	6168 311	302 439	0.0	
B	5	6168 335	302 437	0.0	
B	6	6168 376	302 435	0.0	
B	7	6168 372	302 434	0.0	
C	1	6168 437	302 374	0.0	
C	2	6168 406	302 381	0.0	
C	3	6168 362	302 393	0.0	
C	4	6167 317	302 409	0.0	
C	5	6167 253	302 415	0.0	
C	6	6168 182	302 422	0.0	

C	7	6168 115	302 415	1.4	
C	8	6168 075	302 412	1.4	
D	1	6168 181	302 352	0.0	
D	2	6168 189	302 368	0.0	
D	3	6168 195	302 366	0.0	
D	4				No Safe Access
D	5				No Safe Access
D	6				No Safe Access
E	1	6168	302		No Safe Access
E	2	6168	302		No Safe Access
E	3	6168	302		No Safe Access
E	4	6168 188	302 342	0.0	
E	5	6168 202	302 340	0.0	
E	6	6168 222	302 336	0.0	
E	7	6168 244	302 330	0.0	
E	8	6168 255	302 324	0.0	
F	1	6168 160	302 325	0.0	
F	2	6168 170	302 323	0.0	
F	3	6168 179	302 325	0.0	
F	4	6168 189	302 324	0.0	

F	5	6168 241	302 314	0.0	
G	1	6168 410	302 249	0.0	
G	2	6168 419	302 289	0.0	
G	3	6168 442	302 325	0.0	
G	4	6168 466	302 360	0.0	
H	1	6168 487	302 376	0.0	
H	2	6168 465	302 295	0.0	
H	3	6168 393	302 220	0.0	
H	4	6168 330	302 161	0.0	
H	5	6168 277	302 112	0.0	
H	6	6168 241	302 085	0.0	
H	7	6168 162	301 077	0.0	
H	8	6168 078	301 073	0.0	
H	9	6167 991	302 149	2.3	
H	10	6167 889	302 246	0.0	
H	11	6167 876	302 317	0.0	
H	12	6167 887	302 423	0.0	
H	13	6168 396	302 555	0.0	
H	14	6168 350	302 549	0.0	
H	15	6168 290	302 539	0.0	
H	16	6168 221	302 558	0.0	

H	17	6168 176	302 585	0.0	
H	18	6168 122	302 620	0.0	
H	19	6168 079	302 617	0.0	
H	20	6168 111	302 568	0.0	
H	21	6168 160	302 540	0.0	
H	22	6168 093	302 513	0.0	
H	23	6168 230	302 525	0.0	
H	24	6168 291	302 530	0.0	
H	25	6167 380	302 544	0.0	
I	1				NO ACCESS EXCLUSION ZONE
J	1	6168 328	302 209	0.0	
J	2	6168 294	302 221	0.0	
J	3	6168 256	302 231	0.0	
J	4	6167 207	302 248	0.0	
J	5	6167 179	302 257	0.0	
K	1	6168 524	302 389	0.0	
K	2	6168 537	302 433	0.0	
K	3	6168 563	302 459	0.0	
K	4	6168 593	302 422	0.0	

L	1	6168 758	302 336	0.0	
L	2	6168 728	302 321	0.0	
L	3	6168 707	302 301	0.0	
L	4	6168 690	302 275	0.0	
L	5	6168 660	302 247	0.0	
L	6	6168 636	302 241	0.0	
Compressor Shed	1			0.0	
Office	1			0.0	
Community Recycling	1			0.0	
OLD Weighbridge	1			0.0	
OLD Weighbridge	1			0.0	
Revolve Shop	1			0.0	
Building Truckwash	1			0.0	
New Weighbridge	1			0.0	
Methane Blank (Pre testing)				0.0	Taken at entrance to Dunmore site before main gate
Methane Blank (Post testing)				0.0	Taken at entrance to Dunmore site before main gate

Comments:

Sampling performed in accordance to EPA Environmental Guidelines Solid Waste Landfills, Second Edition, 2016

Gas concentrations are reported as raw values without correction for background concentration.

H	1	6168 189	302 450	1.1	
H	2	6168 146	302 443	1.3	
H	3	6168 046	302 447	1.8	
H	4	6168 016	302 468	1.7	
H	5	6167 964	302 494	1.4	
H	6	6167 917	302 513	1.3	
H	7	6168 885	301 508	1.7	
H	8	6167 892	301 475	1.9	
H	9	6167 928	302 450	2.1	
H	10	6167 741	302 386	1.7	
H	11	6168 800	302 391	2.0	
H	12	6167 857	302 398	1.6	
H	13	6167 921	302 407	1.1	
H	14	6167 972	302 413	0.7	
H	15	6167 037	302 419	0.7	
H	16	6167 093	302 425	0.7	
H	17	6167 172	302 434	0.6	
H	18	6167 271	302 370	0.6	
H	19	6167 286	302 221	0.7	
H	20	6167 227	302 144	0.9	
H	21	6167 158	302 072	1.0	
H	22	6167 101	302 017	1.3	
H	23	6167 006	301 971	0.7	
H	24	6167 895	302 968	0.8	
H	25	6167 844	302 996	1.8	
H	26	6168 801	301 42	5.1	
H	27	6168 773	302 067	1.8	
H	28	6168 969	302 145	1.8	
H	29	6168 679	301 204	1.9	
H	30	6167 682	302 261	1.6	
H	31	6167 697	302 328	1.8	
H	32	6167 712	302 378	1.9	
I	1	6167 932	301 154	1.4	
I	2	6167 933	302 104	1.6	
I	3	6167 939	302 049	1.5	
I	4	6167 952	301 995	1.4	
J	1	6168 147	302 100	1.6	
J	2	6168 084	302 124	1.5	
J	3	6168 008	302 153	1.5	
J	4	6167 970	302 164	1.5	
J	5	6167 938	302 166	1.5	
K	1	6168 333	302 287	0.4	
K	2	6168 350	302 337	0.4	
K	3	6168 390	302 343	0.6	
K	4	6168 396	302 301	0.4	
K	5	6168 364	302 276	0.5	
L	1	6168 568	302 232	0.6	
L	2	6168 563	302 203	0.7	
L	3	6168 437	302 175	0.8	
L	4	6168 377	302 125	0.6	
L	5	6168 340	302 068	0.9	
L	6	6168 301	302 034	0.9	
Compressor Shed	1			2.1	
Office	1			2.8	
Community Recycling Centre	1			2.1	
OLD Weighbridge	1			0.5	
OLD Weighbridge Toilet	1			3.4	
Revolve Shop	1			1.8	
Building Truckwash	1			0.6	
New Weighbridge	1			2.1	
Methane Blank (Pre testing)				1.0	Taken at entrance to Dunmore site before main gate
Methane Blank (Post testing)				0.9	Taken at entrance to Dunmore site before main gate

Comments:

Sampling performed in accordance to EPA Environmental Guidelines Solid Waste Landfills, Second Edition, 2016
Gas concentrations are reported as raw values without correction for background concentration.

ALS Landfill Emissions Report

Client: Shellharbour City Council
Site: Dunmore
Date: 17/12/2021
Sampler(s) Robert DaLio, Megan Gould

Transact / Location	Point	GPS North	GPS East	CH4 Conc (ppm)	Comments
A					**No Vehicle Access, Very Overgrown (Snake Haszrd and uneven footing)**
B	1	6168 021	302 330	0.4	
B	2	6168 052	302 334	3.1	Methane Cage
B	3	6168 077	302 334	0.6	
B	4	6168 102	302 332	0.8	
B	5-8				No Vehicle Access, Very Overgrown (Snake Haszrd and uneven footing)
C	1	6168 244	302 275	0.8	
C	2	6168 133	302 303	0.8	
C	3	6168 076	302 313	4.0	
C	4	6167 980	302 319	0.8	
C	5	6167 905	302 306	0.5	
C	6	6168 857	302 299	0.6	
C	7	6168 840	302 294	0.4	
D	1	6167 944	302 282	1.8	
D	2	6167 955	302 283	1.9	
D	3	6168 977	302 277	1.2	
D	4-9				No Vehicle Access, Very Overgrown (Snake Haszrd and uneven footing)
E	1	6168 023	302 230	1.4	
E	2	6168 032	302 227	1.6	
E	3	6168 050	302 223	1.8	
E	4	6167 994	302 244	1.6	
E	5	6167 948	302 266	1.4	
F	1	6167 939	302 248	1.0	
F	2	6167 962	302 237	0.8	
F	3	6167 986	302 227	1.3	
F	4	6168 013	302 214	0.8	
F	5				No Vehicle Access, Very Overgrown (Snake Haszrd and uneven footing)
F	6				No Vehicle Access, Very Overgrown (Snake Haszrd and uneven footing)
G	1	6168 218	302 180	1.1	
G	2	6168 233	302 193	1.0	
G	3	6168 241	302 207	1.0	
G	4	6168 268	302 247	1.0	

CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ Sydney: 277 Woodpark Rd, Smithfield NSW 2176 Ph: 02 8784 8555 E: samples.sydney@alsenviro.com
☐ Newcastle: 5 Rosegum Rd, Warabrook NSW 2304 Ph: 02 4968 9433 E: samples.newcastle@alsenviro.com
☐ Brisbane: 32 Shand St, Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsenviro.com
☐ Townsville: 14-15 Desma Ct, Bohle QLD 4818 Ph: 07 4796 0600 E: townsville.environmental@alsenviro.com
☐ Melbourne: 3-4 Westall Rd, Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsenviro.com
☐ Adelaide: 2-1 Burma Rd, Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsenviro.com
☐ Perth: 10 Hod Way, Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsenviro.com
☐ Launceston: 27 Wellington St, Launceston TAS 7250 Ph: 03 8391 2158 E: launceston@alsenviro.com

CLIENT:	Shellharbour City Council	**TURNAROUND REQUIREMENTS :** (Standard TAT may be longer for some tests e.g.. Ultra Trace Organics)	☐ Standard TAT (List due date): ☐ Non Standard or urgent TAT (List due date):
OFFICE:	41 Burelli St WOLLONGONG NSW 2500		
PROJECT:	Dunmore Quarterly Methane Testing	**ALS QUOTE NO.:**	WO/030/19 TENDER
ORDER NUMBER:			
PROJECT MANAGER:	Ryan Stirling		
SAMPLER:		**SAMPLER MOBILE:**	
COC emailed to ALS? (YES / NO)		**EDD FORMAT (or default):**	
Email Reports to :			
Email Invoice to :			

COC SEQUENCE NUMBER (Circle)

COC:	1	2	3	4	5	6	7
OF:	1	2	3	4	5	6	7

FOR LABORATORY USE ONLY (Circle)

Custody Seal Intact?	Yes	No N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No N/A
Random Sample Temperature on Receipt		°C
Other comment:		

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Michael	Anita		
DATE/TIME: 21/6/23	DATE/TIME: 21/6/23	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: **CC reports to:**

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	Surface Methane Testing								Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
	Methane	21/6/23	W			✓								
				TOTAL	10									

Environmental Division Wollongong
Work Order Reference
EW2302814

Telephone : 02 42253125

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

ALS Landfill Emissions Report

Client: Shellharbour City Council
Site: Dunmore
Date: 21/06/2023
Sampler(s) Robert DaLio, Michael Santos

Transact / Location	Point	GPS North	GPS East	CH4 Conc (ppm)	Comments
A					**No Safe Access**
B	1	6168 222	302 433	0.0	
B	2	6168 238	302 436	0.0	
B	3	6168 263	302 436	0.0	
B	4	6168 290	302 439	0.0	
C	1	6168 439	302 374	0.0	
C	2	6168 391	302 389	0.0	
C	3	6168 326	302 410	0.1	
C	4	6167 252	302 422	0.1	
C	5	6167 206	302 424	0.1	
C	6	6168 164	302 423	0.1	
C	7	6168 107	302 411	0.0	
C	8	6168 055	302 406	0.0	
D	1	6168 202	302 399	0.1	
D	2	6168 191	302 402	0.0	
D	3	6168 180	302 403	0.0	
D	4	6168 173	302 405	0.0	
D	5	6168 159	302 408	0.0	
D	6	6168 149	302 407	0.0	
D	7	6168 137	302 405	0.1	
E	1	6168 145	302 375	0.0	
E	2	6168 157	302 376	0.0	
E	3	6168 172	302 378	0.0	
E	4	6168 173	302 377	0.0	
E	5	6168 181	302 376	0.0	
F	1	6168 134	302 352	0.0	
F	2	6168 145	302 349	0.0	
F	3	6168 149	302 337	0.0	
F	4	6168 159	302 331	0.0	
F	5	6168 158	302 325	0.0	
F	6	6168 157	302 320	0.0	
G	1	6168 410	302 256	0.0	
G	2	6168 420	302 283	0.0	
G	3	6168 440	302 321	0.0	
G	4	6168 464	302 356	0.0	

H	1	6168 411	302 554	0.0	
H	2	6168 360	302 553	0.0	
H	3	6168 322	302 541	0.0	
H	4	6168 310	302 535	0.0	
H	5	6168 213	302 563	0.0	
H	6	6168 188	302 581	0.0	
H	7	6168 144	301 604	0.0	
H	8	6168 101	301 631	0.0	
H	9	6168 076	302 599	0.0	
H	10	6168 118	302 556	0.1	
H	11	6168 159	302 533	0.1	
H	12	6168 046	302 520	0.1	
H	13	6168 038	302 500	0.0	
H	14	6168 090	302 511	0.0	
H	15	6168 135	302 513	0.0	
H	16	6167 197	302 520	0.0	
H	17	6167 257	302 524	0.0	
H	18	6167 471	302 322	0.0	
H	19	6167 448	302 277	0.0	
H	20	6167 394	302 218	0.0	
H	21	6167 278	302 160	0.0	
H	22	6167 225	302 111	0.0	
H	23	6167 225	302 072	0.0	
H	24	6168 012	302 064	0.0	
H	25	6168 093	302 91	0.1	
H	26	6168 150	302 150	0.0	
H	27	6168 197	302 186	0.0	
H	28	6168 250	302 240	0.1	
H	29	6168 288	302 313	1.2	
H	30	6168 345	302 404	0.0	
H	31	6168 446	302 484	0.0	
I	1				NO ACCESS CONSTRUCTION
J	1	6168 347	302 198	0.0	
J	2	6168 324	302 207	0.0	
J	3	6168 306	302 216	0.0	
J	4	6167 284	302 225	0.0	
K	1	6168 523	302 396	0.0	
K	2	6168 540	302 446	0.0	
K	3	6168 581	302 448	0.0	
K	4	6168 580	302 387	0.0	
K	5	6168 546	302 376	0.0	
L	1	6168 740	302 329	0.0	
L	2	6168 702	302 303	0.0	
L	3	6168 683	302 279	0.0	
L	4	6168 655	302 248	0.0	
L	5	6168 607	302 228	0.0	
L	6	6168 557	302 179	0.0	
Compressor Shed	1			0.6	
Office	1			0.0	
Community Recycling Centre	1			0.0	
OLD Weighbridge	1			0.1	
OLD Weighbridge Toilet	1			10.1	
Revolve Shop	1			0.0	
Building Truckwash	1			0.0	
New Weighbridge	1			0.0	
Methane Blank (Pre testing)				2.0	Taken at entrance to Dunmore site before main gate
Methane Blank (Post testing)				2.0	Taken at entrance to Dunmore site before main gate

Comments:

Sampling performed in accordance to EPA Environmental Guidelines Solid Waste Landfills, Second Edition, 2016
Gas concentrations are reported as raw values without correction for background concentration.

CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ Sydney: 277 Woodpark Rd, Smithfield NSW 2176 Ph: 02 8784 8555 E: samples.sydney@alsenviro.com
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☐ Brisbane: 32 Shand St, Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsenviro.com
☐ Townsville: 14-15 Desma Ct, Bohle QLD 4818 Ph: 07 4796 0600 E: townsville.environmental@alsenviro.com
☐ Melbourne: 2-4 Westall Rd, Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsenviro.com
☐ Adelaide: 2-1 Burma Rd, Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsenviro.com
☐ Perth: 10 Hod Way, Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsenviro.com
☐ Launceston: 27 Wellington St, Launceston TAS 7250 Ph: 03 6331 2158 E: launceston@alsenviro.com

CLIENT:	Shellharbour City Council	**TURNAROUND REQUIREMENTS :** (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	☐ Standard TAT (List due date): ☐ Non Standard or urgent TAT (List due date):
OFFICE:	41 Burelli St WOLLONGONG NSW 2500		
PROJECT:	Dunmore Quarterly Methane Testing	**ALS QUOTE NO.:**	WO/030/19 TENDER
ORDER NUMBER:			
PROJECT MANAGER:	Ryan Stirling		

COC SEQUENCE NUMBER (Circle)

COC: 1 2 3 4 5 6 7

OF: 1 2 3 4 5 6 7

FOR LABORATORY USE ONLY (Circle)

Custody Seal Intact?	Yes	No
Free ice / frozen ice bricks present upon receipt?	Yes	No
Random Sample Temperature on Receipt		°C
Other comment:		

SAMPLER:	**SAMPLER MOBILE:**	**RELINQUISHED BY:** Michael	**RECEIVED BY:** Anela
COC emailed to ALS? (YES / NO)	**EDD FORMAT (or default):**	DATE/TIME: 20/9/23	DATE/TIME: 20/9/23
Email Reports to :		**RELINQUISHED BY:**	**RECEIVED BY:**
Email Invoice to :		DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: **CC reports to:**

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	Surface Methane Testing								Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
	Methane	20/9/23	W			✓								
				TOTAL	10									

Environmental Division Wollongong
Work Order Reference
EW2304326

Telephone : 02 42253125

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

CERTIFICATE OF ANALYSIS

Work Order	: **EW2304326**	Page	: 1 of 23
Client	: **SHELLHARBOUR CITY COUNCIL**	Laboratory	: Environmental Division NSW South Coast
Contact	: Ryan Stirling	Contact	: Aneta Prosaroski
Address	: LAMERTON HOUSE, LAMERTON CRESCENT SHELL HARBOUR CITY CENTRE NSW, AUSTRALIA 2529	Address	: 1/19 Ralph Black Dr, North Wollongong 2500 NSW Australia
Telephone	: ----	Telephone	: +61 2 4225 3125
Project	: Dunmore Landfill Methane	Date Samples Received	: 20-Sep-2023 16:00
Order number	: 156810	Date Analysis Commenced	: 29-Sep-2023
C-O-C number	: ----	Issue Date	: 29-Sep-2023 16:10
Sampler	: Michael Santos, Robert DaLio		
Site	: DUNMORE LANDFILL TENDER		
Quote number	: WO/030/19 TENDER METHANE		
No. of samples received	: 103		
No. of samples analysed	: 103		

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

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*
Aneta Prosaroski	Environmental Services Representative	Administration - Wollongong, 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
~ = Indicates an estimated value.

- **Analytical work for this work order will be conducted at ALS Sydney.**
- Sampling performed By Wollongong in accordance to EPA Environmental Guidelines Solid Waste Landfills, Second Edition, 2016
- Gas concentrations are reported as raw values without correction for background concentration.

Analytical Results

Sub-Matrix: **GAS**
(Matrix: **GAS**)

Compound	CAS Number	LOR	Unit	Sample ID	A 1-8	B 1	B 2	B 3	B 4
				Sampling date / time	20-Sep-2023 00:00	20-Sep-2023 00:00	20-Sep-2023 00:00	20-Sep-2023 00:00	20-Sep-2023 00:00
					EW2304326-001	EW2304326-002	EW2304326-003	EW2304326-004	EW2304326-005
					Result	Result	Result	Result	Result
Sampling Data									
Transact / Location	----	-	-		**A**	**B**	**B**	**B**	**B**
Point	----	-	-		**1-8**	**1**	**2**	**3**	**4**
GPS North	----	-	-		**----**	**6168225**	**6168261**	**6168286**	**6168293**
GPS East	----	-	-		**----**	**302435**	**302440**	**302441**	**302441**
CH4 Conc (ppm)	----	-	ppm		**----**	**0.1**	**0.0**	**0.0**	**0.0**
Comments	----	-	-		**NO ACCESS**	**----**	**----**	**----**	**----**

Analytical Results

Sub-Matrix: GAS (Matrix: GAS)			Sample ID	C 1	C 2	C 3	C 4	C 5
			Sampling date / time	20-Sep-2023 00:00	20-Sep-2023 00:00	20-Sep-2023 00:00	20-Sep-2023 00:00	20-Sep-2023 00:00
Compound	CAS Number	LOR	Unit	EW2304326-006	EW2304326-007	EW2304326-008	EW2304326-009	EW2304326-010
				Result	Result	Result	Result	Result
Sampling Data								
Transact / Location	----	-	-	C	C	C	C	C
Point	----	-	-	1	2	3	4	5
GPS North	----	-	-	6168434	6168363	6168297	6168239	6168163
GPS East	----	-	-	302379	302390	302416	302420	302422
CH4 Conc (ppm)	----	-	ppm	0.0	0.0	0.5	1.2	1.0

Analytical Results

Sub-Matrix: **GAS**
(Matrix: **GAS**)

Compound	CAS Number	LOR	Unit	Sample ID	C 6	D 1	D 2	D 3	D 4
				Sampling date / time	20-Sep-2023 00:00	20-Sep-2023 00:00	20-Sep-2023 00:00	20-Sep-2023 00:00	20-Sep-2023 00:00
					EW2304326-011	EW2304326-012	EW2304326-013	EW2304326-014	EW2304326-015
					Result	Result	Result	Result	Result
Sampling Data									
Transact / Location	----	-	-		**C**	**D**	**D**	**D**	**D**
Point	----	-	-		**6**	**1**	**2**	**3**	**4**
GPS North	----	-	-		**6168080**	**6168272**	**6168257**	**6168241**	**6168220**
GPS East	----	-	-		**302412**	**302393**	**302393**	**302388**	**302389**
CH4 Conc (ppm)	----	-	ppm		**7.8**	**0.1**	**0.0**	**1.4**	**0.0**

Analytical Results

Sub-Matrix: GAS (Matrix: GAS)			Sample ID	D 5	D 6	D 7	E 1	E 2
			Sampling date / time	20-Sep-2023 00:00	20-Sep-2023 00:00	20-Sep-2023 00:00	20-Sep-2023 00:00	20-Sep-2023 00:00
Compound	CAS Number	LOR	Unit	EW2304326-016	EW2304326-017	EW2304326-018	EW2304326-019	EW2304326-020
				Result	Result	Result	Result	Result
Sampling Data								
Transact / Location	----	-	-	D	D	D	E	E
Point	----	-	-	5	6	7	1	2
GPS North	----	-	-	6168194	6168174	6168145	6168142	6168151
GPS East	----	-	-	30288	302401	302400	302373	302374
CH4 Conc (ppm)	----	-	ppm	0.9	1.0	0.6	6.0	1.6

Analytical Results

Sub-Matrix: **GAS**
(Matrix: **GAS**)

Compound	CAS Number	LOR	Unit	Sample ID	E 3	E 4	E 5	E 6	E 7
				Sampling date / time	20-Sep-2023 00:00	20-Sep-2023 00:00	20-Sep-2023 00:00	20-Sep-2023 00:00	20-Sep-2023 00:00
					EW2304326-021	EW2304326-022	EW2304326-023	EW2304326-024	EW2304326-025
					Result	Result	Result	Result	Result
Sampling Data									
Transact / Location	----	-	-		**E**	**E**	**E**	**E**	**E**
Point	----	-	-		**3**	**4**	**5**	**6**	**7**
GPS North	----	-	-		**6168164**	**6168176**	**6168184**	**6168196**	**6168222**
GPS East	----	-	-		**302372**	**302377**	**302374**	**302371**	**302372**
CH4 Conc (ppm)	----	-	ppm		**2.1**	**0.0**	**0.0**	**0.0**	**0.0**

Analytical Results

Sub-Matrix: **GAS**
(Matrix: **GAS**)

Compound	CAS Number	LOR	Unit	Sample ID	E 8	F 1	F 2	F 3	F 4
				Sampling date / time	20-Sep-2023 00:00	20-Sep-2023 00:00	20-Sep-2023 00:00	20-Sep-2023 00:00	20-Sep-2023 00:00
					EW2304326-026	EW2304326-027	EW2304326-028	EW2304326-029	EW2304326-030
					Result	Result	Result	Result	Result
Sampling Data									
Transact / Location	----	-	-		**E**	**F**	**F**	**F**	**F**
Point	----	-	-		**8**	**1**	**2**	**3**	**4**
GPS North	----	-	-		**6168246**	**6168129**	**6168139**	**6168151**	**6168162**
GPS East	----	-	-		**302371**	**302359**	**302351**	**302342**	**302329**
CH4 Conc (ppm)	----	-	ppm		**0.0**	**5.5**	**5.5**	**1.7**	**0.7**

Analytical Results

Sub-Matrix: GAS (Matrix: GAS)			Sample ID	F 5	G 1	G 2	G 3	G 4
			Sampling date / time	20-Sep-2023 00:00	20-Sep-2023 00:00	20-Sep-2023 00:00	20-Sep-2023 00:00	20-Sep-2023 00:00
Compound	CAS Number	LOR	Unit	EW2304326-031	EW2304326-032	EW2304326-033	EW2304326-034	EW2304326-035
				Result	Result	Result	Result	Result
Sampling Data								
Transact / Location	----	-	-	F	G	G	G	G
Point	----	-	-	5	1	2	3	4
GPS North	----	-	-	6168174	6168404	6168423	6168444	6168465
GPS East	----	-	-	302327	302245	302296	302324	302362
CH4 Conc (ppm)	----	-	ppm	0.0	0.1	0.1	0.0	0.0

Analytical Results

Sub-Matrix: **GAS**
(Matrix: **GAS**)

Compound	CAS Number	LOR	Unit	Sample ID	H 1	H 2	H 3	H 4	H 5
				Sampling date / time	20-Sep-2023 00:00	20-Sep-2023 00:00	20-Sep-2023 00:00	20-Sep-2023 00:00	20-Sep-2023 00:00
					EW2304326-036	EW2304326-037	EW2304326-038	EW2304326-039	EW2304326-040
					Result	Result	Result	Result	Result
Sampling Data									
Transact / Location	----	-	-		**H**	**H**	**H**	**H**	**H**
Point	----	-	-		**1**	**2**	**3**	**4**	**5**
GPS North	----	-	-		**6168335**	**6168291**	**6168232**	**6168200**	**6168166**
GPS East	----	-	-		**302551**	**302542**	**302552**	**302578**	**302592**
CH4 Conc (ppm)	----	-	ppm		**0.1**	**0.4**	**0.2**	**0.6**	**0.0**

Analytical Results

Sub-Matrix: **GAS**
(Matrix: **GAS**)

Compound	CAS Number	LOR	Unit	Sample ID	H 6	H 7	H 8	H 9	H 10
				Sampling date / time	20-Sep-2023 00:00	20-Sep-2023 00:00	20-Sep-2023 00:00	20-Sep-2023 00:00	20-Sep-2023 00:00
					EW2304326-041	EW2304326-042	EW2304326-043	EW2304326-044	EW2304326-045
					Result	Result	Result	Result	Result
Sampling Data									
Transact / Location	----	-	-		**H**	**H**	**H**	**H**	**H**
Point	----	-	-		**6**	**7**	**8**	**9**	**10**
GPS North	----	-	-		**6168117**	**6168086**	**6168069**	**6168091**	**6168125**
GPS East	----	-	-		**302630**	**302625**	**302601**	**302582**	**302563**
CH4 Conc (ppm)	----	-	ppm		**0.1**	**0.0**	**0.1**	**1.3**	**1.8**

Analytical Results

Sub-Matrix: **GAS**
(Matrix: **GAS**)

Compound	CAS Number	LOR	Unit	Sample ID	H 11	H 12	H 13	H 14	H 15
				Sampling date / time	20-Sep-2023 00:00	20-Sep-2023 00:00	20-Sep-2023 00:00	20-Sep-2023 00:00	20-Sep-2023 00:00
					EW2304326-046	EW2304326-047	EW2304326-048	EW2304326-049	EW2304326-050
					Result	Result	Result	Result	Result
Sampling Data									
Transact / Location	----	-	-		**H**	**H**	**H**	**H**	**H**
Point	----	-	-		**11**	**12**	**13**	**14**	**15**
GPS North	----	-	-		**6168172**	**6167999**	**6168038**	**6168081**	**6168133**
GPS East	----	-	-		**302545**	**302500**	**302504**	**302514**	**302517**
CH4 Conc (ppm)	----	-	ppm		**0.3**	**1.0**	**0.0**	**0.0**	**0.0**

Analytical Results

Sub-Matrix: **GAS**
(Matrix: **GAS**)

Compound	CAS Number	LOR	Unit	Sample ID	H 16	H 17	H 18	H 19	H 20
				Sampling date / time	20-Sep-2023 00:00	20-Sep-2023 00:00	20-Sep-2023 00:00	20-Sep-2023 00:00	20-Sep-2023 00:00
					EW2304326-051	EW2304326-052	EW2304326-053	EW2304326-054	EW2304326-055
					Result	Result	Result	Result	Result
Sampling Data									
Transact / Location	----	-	-		**H**	**H**	**H**	**H**	**H**
Point	----	-	-		**16**	**17**	**18**	**19**	**20**
GPS North	----	-	-		**6168172**	**6168235**	**6168291**	**6168383**	**6168432**
GPS East	----	-	-		**302520**	**302525**	**302535**	**302547**	**302517**
CH4 Conc (ppm)	----	-	ppm		**0.4**	**0.1**	**0.0**	**0.0**	**0.0**

Analytical Results

Sub-Matrix: **GAS**
(Matrix: **GAS**)

Compound	CAS Number	LOR	Unit	Sample ID	H 21	H 22	H 23	H 24	H 25
				Sampling date / time	20-Sep-2023 00:00	20-Sep-2023 00:00	20-Sep-2023 00:00	20-Sep-2023 00:00	20-Sep-2023 00:00
					EW2304326-056	EW2304326-057	EW2304326-058	EW2304326-059	EW2304326-060
					Result	Result	Result	Result	Result
Sampling Data									
Transact / Location	----	-	-		**H**	**H**	**H**	**H**	**H**
Point	----	-	-		**21**	**22**	**23**	**24**	**25**
GPS North	----	-	-		**6168453**	**6168473**	**6168482**	**6168497**	**6168485**
GPS East	----	-	-		**302490**	**302471**	**302467**	**302446**	**302420**
CH4 Conc (ppm)	----	-	ppm		**0.1**	**0.0**	**0.0**	**0.0**	**0.0**

Analytical Results

Sub-Matrix: GAS (Matrix: GAS)			Sample ID	H 26	H 27	H 28	H 29	H 30
			Sampling date / time	20-Sep-2023 00:00	20-Sep-2023 00:00	20-Sep-2023 00:00	20-Sep-2023 00:00	20-Sep-2023 00:00
Compound	CAS Number	LOR	Unit	EW2304326-061	EW2304326-062	EW2304326-063	EW2304326-064	EW2304326-065
				Result	Result	Result	Result	Result
Sampling Data								
Transact / Location	----	-	-	H	H	H	H	H
Point	----	-	-	26	27	28	29	30
GPS North	----	-	-	6168486	6168452	6168393	6168346	6168287
GPS East	----	-	-	302354	302279	302213	302167	302111
CH4 Conc (ppm)	----	-	ppm	0.0	0.0	0.0	0.0	0.0

Analytical Results

Sub-Matrix: **GAS**
(Matrix: **GAS**)

Compound	CAS Number	LOR	Unit	Sample ID	H 31	H 32	H 33	H 34	H 35
				Sampling date / time	20-Sep-2023 00:00	20-Sep-2023 00:00	20-Sep-2023 00:00	20-Sep-2023 00:00	20-Sep-2023 00:00
					EW2304326-066	EW2304326-067	EW2304326-068	EW2304326-069	EW2304326-070
					Result	Result	Result	Result	Result
Sampling Data									
Transact / Location	----	-	-		**H**	**H**	**H**	**H**	**H**
Point	----	-	-		**31**	**32**	**33**	**34**	**35**
GPS North	----	-	-		**6168231**	**6168133**	**6168041**	**6167993**	**6167950**
GPS East	----	-	-		**302076**	**302067**	**302099**	**302144**	**302183**
CH4 Conc (ppm)	----	-	ppm		**0.0**	**0.0**	**0.0**	**5.3**	**0.2**

Analytical Results

Sub-Matrix: **GAS**
(Matrix: **GAS**)

				Sample ID	H 36	H 37	H 38	I 1	I 2
				Sampling date / time	20-Sep-2023 00:00	20-Sep-2023 00:00	20-Sep-2023 00:00	20-Sep-2023 00:00	20-Sep-2023 00:00
Compound	CAS Number	LOR	Unit		EW2304326-071	EW2304326-072	EW2304326-073	EW2304326-074	EW2304326-075
					Result	Result	Result	Result	Result
Sampling Data									
Transact / Location	----	-	-		**H**	**H**	**H**	**I**	**I**
Point	----	-	-		**36**	**37**	**38**	**1**	**2**
GPS North	----	-	-		**6167889**	**6167878**	**6167900**	**6168150**	**6168166**
GPS East	----	-	-		**302254**	**302370**	**302464**	**302088**	**302125**
CH4 Conc (ppm)	----	-	ppm		**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Analytical Results

Sub-Matrix: GAS (Matrix: GAS)			Sample ID	I 3	I 4	J 1	J 2	J 3
			Sampling date / time	20-Sep-2023 00:00	20-Sep-2023 00:00	20-Sep-2023 00:00	20-Sep-2023 00:00	20-Sep-2023 00:00
Compound	CAS Number	LOR	Unit	EW2304326-076	EW2304326-077	EW2304326-078	EW2304326-079	EW2304326-080
				Result	Result	Result	Result	Result
Sampling Data								
Transact / Location	----	-	-	I	I	J	J	J
Point	----	-	-	3	4	1	2	3
GPS North	----	-	-	6168182	6168199	6168197	6168217	6168240
GPS East	----	-	-	302157	302237	302255	302249	302239
CH4 Conc (ppm)	----	-	ppm	0.1	0.0	0.0	0.0	0.0

Analytical Results

Sub-Matrix: GAS (Matrix: GAS)			Sample ID	J 4	J 5	K 1	K 2	K 3
			Sampling date / time	20-Sep-2023 00:00	20-Sep-2023 00:00	20-Sep-2023 00:00	20-Sep-2023 00:00	20-Sep-2023 00:00
Compound	CAS Number	LOR	Unit	EW2304326-081	EW2304326-082	EW2304326-083	EW2304326-084	EW2304326-085
				Result	Result	Result	Result	Result
Sampling Data								
Transact / Location	----	-	-	J	J	K	K	K
Point	----	-	-	4	5	1	2	3
GPS North	----	-	-	6168257	----	6168516	6168537	6168577
GPS East	----	-	-	302233	----	302391	302445	302454
CH4 Conc (ppm)	----	-	ppm	0.0	----	0.0	0.0	0.0
Comments	----	-	-	----	WORKS IN PROGRESS	----	----	----

Analytical Results

Sub-Matrix: GAS (Matrix: GAS)			Sample ID	K 4	K 5	L 1	L 2	L 3
			Sampling date / time	20-Sep-2023 00:00	20-Sep-2023 00:00	20-Sep-2023 00:00	20-Sep-2023 00:00	20-Sep-2023 00:00
Compound	CAS Number	LOR	Unit	EW2304326-086	EW2304326-087	EW2304326-088	EW2304326-089	EW2304326-090
				Result	Result	Result	Result	Result
Sampling Data								
Transact / Location	----	-	-	K	K	L	L	L
Point	----	-	-	4	5	1	2	3
GPS North	----	-	-	6168583	6168549	6168735	6168682	6168627
GPS East	----	-	-	302395	302376	302327	302278	302244
CH4 Conc (ppm)	----	-	ppm	0.1	0.0	0.1	0.0	0.0

Analytical Results

Sub-Matrix: GAS (Matrix: GAS)			Sample ID	L 4	L 5	L 6	Compressor Shed 1	Office 1
			Sampling date / time	20-Sep-2023 00:00	20-Sep-2023 00:00	20-Sep-2023 00:00	20-Sep-2023 00:00	20-Sep-2023 00:00
Compound	CAS Number	LOR	Unit	EW2304326-091	EW2304326-092	EW2304326-093	EW2304326-094	EW2304326-095
				Result	Result	Result	Result	Result
Sampling Data								
Transact / Location	----	-	-	L	L	L	Compressor Shed	Office
Point	----	-	-	4	5	6	1	1
GPS North	----	-	-	6168582	6168559	6168507	----	----
GPS East	----	-	-	302214	302186	302153	----	----
CH4 Conc (ppm)	----	-	ppm	0.0	0.0	0.0	1.9	0.1

Analytical Results

Sub-Matrix: **GAS**
(Matrix: **GAS**)

				Sample ID	Community Recycling Centre 1	OLD Weighbridge 1	OLD Weighbridge Toilet 1	Revolve Shop 1	Building Truckwash 1
				Sampling date / time	20-Sep-2023 00:00	20-Sep-2023 00:00	20-Sep-2023 00:00	20-Sep-2023 00:00	20-Sep-2023 00:00
Compound	*CAS Number*	*LOR*	*Unit*		**EW2304326-096**	**EW2304326-097**	**EW2304326-098**	**EW2304326-099**	**EW2304326-100**
					Result	Result	Result	Result	Result
Sampling Data									
Transact / Location	----	-	-		**Community Recycling Centre**	**OLD Weighbridge**	**OLD Weighbridge Toilet**	**Revolve Shop**	**Building Truckwash**
Point	----	-	-		**1**	**1**	**1**	**1**	**1**
CH4 Conc (ppm)	----	-	ppm		**0.1**	**0.0**	**0.0**	**0.0**	**0.0**

Analytical Results

Sub-Matrix: GAS (Matrix: GAS)			Sample ID	New Weighbridge 1	Methane Blank Pre Reading - Main Gate	Methane Blank Post Reading - Main Gate	----	----
			Sampling date / time	20-Sep-2023 00:00	20-Sep-2023 00:00	20-Sep-2023 00:00	----	----
Compound	CAS Number	LOR	Unit	EW2304326-101	EW2304326-102	EW2304326-103	--------	--------
				Result	Result	Result	----	----
Sampling Data								
Transact / Location	----	-	-	New Weighbridge	Methane Blank	Methane Blank	----	----
Point	----	-	-	1	Pre testing Main Gate	Post testing Main Gate	----	----
CH4 Conc (ppm)	----	-	ppm	0.4	0.0	0.0	----	----

Appendix H:
Laboratory Chain of Custody (COC) & Certificates of Analysis (COA) – Overflow Events

CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ **Sydney**: 277 Woodpark Rd, Smithfield NSW 2176 Ph: 02 8784 8555 E:samples.sydney@alsenviro.com
☐ **Newcastle**: 5 Rosegum Rd, Warabrook NSW 2304 Ph:02 4968 9433 E:samples.newcastle@alsenviro.com
☐ **Brisbane**: 32 Shand St, Stafford QLD 4053 Ph:07 3243 7222 E:samples.brisbane@alsenviro.com
☐ **Townsville**: 14-15 Desma Ct, Bohle QLD 4818 Ph:07 4796 0600 E: townsville.environment@alsenviro.com
☐ **Melbourne**: 2-4 Westall Rd, Springvale VIC 3171 Ph:03 8549 9600 E: samples.melbourne@alsenviro.com
☐ **Adelaide**: 2-1 Burma Rd, Pooraka SA 5095 Ph: 08 8359 0890 E:adelaide@alsenviro.com
☐ **Perth**: 10 Hod Way, Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsenviro.com
☐ **Launceston**: 27 Wellington St, Launceston TAS 7250 Ph: 03 6331 2158 E: launceston@alsenviro.com

CLIENT:	Shellharbour City Council
OFFICE:	
PROJECT:	Dunmore Landfill Overflows
ORDER NUMBER:	
PROJECT MANAGER:	Ryan Stirling
SAMPLER:	Robert Dalio
COC emailed to ALS? (YES / NO)	
Email Reports to :	
Email Invoice to :	

TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)
☐ Standard TAT **(List due date):**
☐ Non Standard or urgent TAT **(List due date):**

ALS QUOTE NO.: WO/030/19 TENDER

SAMPLER MOBILE:

EDD FORMAT (or default):

COC SEQUENCE NUMBER (Circle)

COC:	1	2	3	4	5	6	7
OF:	1	2	3	4	5	6	7

FOR LABORATORY USE ONLY (Circle)

Custody Seal Intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt	7.2 °C		
Other comment:			

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Robert Dalio	Anets		
DATE/TIME: 13.3.23	DATE/TIME: 13.3.23	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: **CC reports to:**

ALS USE ONLY	SAMPLE DETAILS (MATRIX: Solid(S) Water(W))			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where **Metals** are required, specify Total (unfiltered bottle required) or **Dissolved** (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE *(refer to codes below)*	TOTAL BOTTLES	TSS	pH									Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
	SWP1	13.3.23 9:15	W			✓	✓									pH 7.57
					TOTAL	10										

Environmental Division Wollongong
Work Order Reference
EW2301202

Telephone : 02 42253125

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EW2301202**	Page	: 1 of 2
Client	: **SHELLHARBOUR CITY COUNCIL**	Laboratory	: Environmental Division NSW South Coast
Contact	: Joel Coulton	Contact	: Aneta Prosaroski
Address	: LAMERTON HOUSE, LAMERTON CRESCENT SHELL HARBOUR CITY CENTRE NSW, AUSTRALIA 2529	Address	: 1/19 Ralph Black Dr, North Wollongong 2500 NSW Australia
Telephone	: ----	Telephone	: +61 2 4225 3125
Project	: Dunmore Landfill Overflows	Date Samples Received	: 13-Mar-2023 15:46
Order number	: 147649	Date Analysis Commenced	: 13-Mar-2023
C-O-C number	: ----	Issue Date	: 21-Mar-2023 15:20
Sampler	: , Robert DaLio		
Site	: ----		
Quote number	: WO/030/19 TENDER OVERFLOW DISCHARGE		
No. of samples received	: 1		
No. of samples analysed	: 1		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

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

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*
Aneta Prosaroski	Environmental Services Representative	Laboratory - Wollongong, NSW
Wisam Marassa	Inorganics Coordinator	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.

- **Analytical work for this work order will be conducted at ALS Sydney.**

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			Sample ID	**SWP1 Point 1**	----	----	----	----
			Sampling date / time	13-Mar-2023 09:15	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**EW2301202-001**	--------	--------	--------	--------
				Result	----	----	----	----
EA005FD: Field pH								
pH	----	0.1	pH Unit	**7.6**	----	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	**7**	----	----	----	----

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EA025: Total Suspended Solids dried at 104 ± 2°C

CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ Sydney: 277 Woodpark Rd, Smithfield NSW 2176 Ph: 02 8784 8555 E:samples.sydney@alsenviro.com
☐ Newcastle: 5 Rosegum Rd, Warabrook NSW 2304 Ph:02 4968 9433 E:samples.newcastle@alsenviro.com
☐ Brisbane: 32 Shand St, Stafford QLD 4053 Ph:07 3243 7222 E:samples.brisbane@alsenviro.com
☐ Townsville: 14-15 Desma Ct, Bohle QLD 4818 Ph:07 4796 0600 E: townsville.environmental@alsenviro.com
☐ Melbourne: 2-4 Westall Rd, Springvale VIC 3171 Ph:03 8549 9600 E: samples.melbourne@alsenviro.com
☐ Adelaide: 2-1 Burma Rd, Pooraka SA 5095 Ph: 08 8359 0890 E:adelaide@alsenviro.com
☐ Perth: 10 Hod Way, Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsenviro.com
☐ Launceston: 27 Wellington St, Launceston TAS 7250 Ph: 03 8331 2158 E: launceston@alsenviro.com

CLIENT:	Shellharbour City Council	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	☐ Standard TAT (List due date): ☐ Non Standard or urgent TAT (List due date):
OFFICE:	41 Burelli St WOLLONGONG NSW 2500		
PROJECT:	Dunmore Quarterly Surface Waters SWP01 Overflow full Testing	ALS QUOTE NO.: WO/030/19 TENDER	
ORDER NUMBER:			
PROJECT MANAGER:	Joel Culton		
SAMPLER:	Michael Santos	SAMPLER MOBILE: 0403520891	
COC emailed to ALS? (YES / NO)		EDD FORMAT (or default):	
Email Reports to :			
Email Invoice to :			

COC SEQUENCE NUMBER (Circle)

COC:	1	2	3	4	5	6	7
OF:	1	2	3	4	5	6	7

FOR LABORATORY USE ONLY (Circle)

Custody Seal Intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt:		°C	
Other comment:	S2		

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Michael Santos	Aneta		
DATE/TIME: 01-05-23 13:36	DATE/TIME: 1/5/23	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: CC reports to:

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	TSS	NT-1, NT-2A (Ionic Balance)	TOC, NT-4, NH3, Total Mn	Dissolved and Total Fe					Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
	SWP1	1-5-23 12:47	W			✓	✓	✓	✓					Field Tests - pH, EC, DO & Temp
				TOTAL	10									

Environmental Division Wollongong
Work Order Reference
EW2301940

Telephone : 02 42253125

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

CERTIFICATE OF ANALYSIS

Work Order	: **EW2301940**	Page	: 1 of 5
Client	: **SHELLHARBOUR CITY COUNCIL**	Laboratory	: Environmental Division NSW South Coast
Contact	: Ryan Stirling	Contact	: Aneta Prosaroski
Address	: LAMERTON HOUSE, LAMERTON CRESCENT SHELL HARBOUR CITY CENTRE NSW, AUSTRALIA 2529	Address	: 1/19 Ralph Black Dr, North Wollongong 2500 NSW Australia
Telephone	: ----	Telephone	: +61 2 4225 3125
Project	: Dunmore Surface Water SWP01 Overflow	Date Samples Received	: 01-May-2023 13:38
Order number	: 147649	Date Analysis Commenced	: 01-May-2023
C-O-C number	: ----	Issue Date	: 08-May-2023 10:48
Sampler	: Michael Santos		
Site	: DUNMORE LANDFILL TENDER		
Quote number	: WO/030/19 TENDER SURFACE WATER		
No. of samples received	: 1		
No. of samples analysed	: 1		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

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

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*
Aneta Prosaroski	Environmental Services Representative	Laboratory - Wollongong, NSW
Ankit Joshi	Senior Chemist - Inorganics	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.

- **Analytical work for this work order will be conducted at ALS Sydney.**
- 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, SiO2 and Fluoride to the Anions.
- Sample site SWP1 was not discharging at time of sampling.
- pH performed by ALS Wollongong via in-house method EA005FD and EN67 PK.
- Electrical conductivity performed by ALS Wollongong via in-house method EA010FD and EN67 PK.
- Temperature performed by ALS Wollongong via in-house method EA116 and EN67 PK.
- Dissolved oxygen (DO) performed by ALS Wollongong via in-house method EP025FD and EN67 PK.
- All field analysis performed by ALS Wollongong were completed at the time of sampling.
- Sampling completed by ALS Wollongong in accordance with in-house sampling method EN/67.4 Lakes and Reservoirs
- 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.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	SWP1 Point 1	----	----	----	----
			Sampling date / time	01-May-2023 12:47	----	----	----	----
Compound	CAS Number	LOR	Unit	EW2301940-001	--------	--------	--------	--------
				Result	----	----	----	----
EA005FD: Field pH								
pH	----	0.1	pH Unit	**7.6**	----	----	----	----
EA010FD: Field Conductivity								
Electrical Conductivity (Non Compensated)	----	1	µS/cm	**1240**	----	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	**654**	----	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	**9**	----	----	----	----
EA045: Turbidity								
Turbidity	----	0.1	NTU	**4.5**	----	----	----	----
EA116: Temperature								
Temperature	----	0.1	°C	**19.5**	----	----	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**354**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**354**	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**43**	----	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**168**	----	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**59**	----	----	----	----
Magnesium	7439-95-4	1	mg/L	**27**	----	----	----	----
Sodium	7440-23-5	1	mg/L	**135**	----	----	----	----
Potassium	7440-09-7	1	mg/L	**14**	----	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Iron	7439-89-6	0.05	mg/L	**0.06**	----	----	----	----
EG020T: Total Metals by ICP-MS								
Manganese	7439-96-5	0.001	mg/L	**0.184**	----	----	----	----
Iron	7439-89-6	0.05	mg/L	**0.32**	----	----	----	----
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	**0.3**	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	SWP1 Point 1	----	----	----	----
				Sampling date / time	01-May-2023 12:47	----	----	----	----
Compound	CAS Number	LOR	Unit		EW2301940-001	--------	--------	--------	--------
					Result	----	----	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.04**	----	----	----	----
EK055G-NH4: Ammonium as N by DA									
Ammonium as N	14798-03-9_N	0.01	mg/L		**0.04**	----	----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		<0.01	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.01	----	----	----	----
EN055: Ionic Balance									
ø **Total Anions**	----	0.01	meq/L		**12.7**	----	----	----	----
ø **Total Cations**	----	0.01	meq/L		**11.4**	----	----	----	----
ø **Ionic Balance**	----	0.01	%		**5.44**	----	----	----	----
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		**281**	----	----	----	----
EP025FD: Field Dissolved Oxygen									
Dissolved Oxygen	----	0.01	mg/L		**6.77**	----	----	----	----

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EA045: Turbidity
(WATER) EP005: Total Organic Carbon (TOC)
(WATER) EG020F: Dissolved Metals by ICP-MS
(WATER) EG020T: Total Metals by ICP-MS
(WATER) EK057G: Nitrite as N by Discrete Analyser
(WATER) EK058G: Nitrate as N by Discrete Analyser
(WATER) EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser
(WATER) EA025: Total Suspended Solids dried at 104 ± 2°C
(WATER) EK055G-NH4: Ammonium as N by DA
(WATER) EK055G: Ammonia as N by Discrete Analyser
(WATER) EN055: Ionic Balance
(WATER) ED045G: Chloride by Discrete Analyser
(WATER) ED041G: Sulfate (Turbidimetric) as SO4 2- by DA
(WATER) EK040P: Fluoride by PC Titrator
(WATER) ED037P: Alkalinity by PC Titrator
(WATER) ED093F: Dissolved Major Cations
(WATER) EA015: Total Dissolved Solids dried at 180 ± 5 °C

Appendix I:
Calibration Certificates

Field Calibration Form

Standard or Batch number		22WO 0010	22WO 0009	22WO 0011	22WO 0010		22WO 022		22WO 0012		22WO 0013					821/010	S22	S22	S22	S21/001	S21/001	S21/001	
Operational Limits		± 0.1	± 0.1	± 0.1	7.15-7.25	Temp	79 - 88	142 - 151	1369 - 1454	9700 - 10300	12493 - 13266	108446 - 115154	Chk Std / CRM	<0.2	95 - 105%	217 - 240				± 0.09	± 0.10	± 0.14	Analyst/ Comments
Certified Value		7.00	4.00	10.00	pH Junction	Chk Std / CRM	84	146.9	1412	10000	12880	111800		0.0mg/L	100%	229	NTU	NTU	NTU	0.24	0.95	1.63	
Meter ID	Date	pH					EC (µS/cm)							DO (% or mg/L)		ORP (mV)	Turbidity (NTU)			Chlorine (mg/L)			
ALSWOL 0660	22/11/22	7.03	4.03	10.01		22.1																	
ALSWOL 0220	22/11/22	7.00	4.06	9.98	7.17	22.8																	
ALSWOL 0664	23/11/22	7.02	3.99	10.06	7.17	22.2							(C) 0746	101	101.0 mbar	0733	1012.1 mbar			(cw)			
ALSWOL 0732	23/11/22	6.98	3.90	9.98	7.21	24.3			1421		12995			20.2	100								
ALSWOL 0660	24/11/22	7.03	3.99	9.98		25.0																	
ALSWOL 0664	25.11.22	7.03	4.03	10.01		23.3																	
ALSWOL 0662	29.11.22	6.97	4.01	10.06		18.8																	
ALSWOL 0662	29.11.22	7.01	3.99	10.07	7.25	22.0																	
ALSWOL 0220	30.11.22	7.02	4.01	10.04	7.17	21.0																	
ALSWOL 0662	30.11.22	7.04	4.04	10.08	7.19	22.0																	
ALSWOL 0662	1.12.22	7.08	4.04	10.07		23.3																	
ALSWOL 0732	1.12.22	7.05	4.05	10.04	7.23	22.81			1421		12890			<0.2	100								
ALSWOL 0732	2.12.22	6.94	3.92	9.92		23.10			1415		12810			<0.2	100								
ALSWOL 0660	2.12.22	7.04	4.02	10.04		23.8																	
ALSWOL 0220	2.12.22	7.06	4.04	9.95		23.2																	
ALSWOL 0262	5.12.22	7.02	4.03	10.04	7.20	20.4																	
ALSWOL 0662	5.12.22	7.02	4.02	10.05	7.16	25.8																	
ALSWOL 0732	5.12.22	6.94	3.92	9.90		23.42			1414		12850			<0.2	102	231							
ALSWOL 0662	6.12.22	7.02	4.02	10.05		25.6																	
ALSWOL 0732	6.12.22	6.95	3.95	9.98		24.13			1414		12830			<0.2		233							
ALSWOL 0662	7.12.22						26.3		1401														
ALSWOL 0220	7.12.22	6.95	4.00	9.94		26.2																	

GAZOMAT™
an ecotec company

CERTIFICATE OF CALIBRATION

Issued By: Ecotec Solutions, Inc.

Calibration Date: February 15, 2022

Recommended Calibration: February 15, 2024

850 S Via Lata, Suite 115
Colton, CA 92324
909-906-1001

www.ecotecco.com

Certificate #: 202215023810912

Customer: ***ANRI Instruments & Controls***

Description: Gas Analyzer ***Model:*** *Inspectra*
Serial Number: *3810912*

Calibration Results: The analyzer is considered to be in conformity with the specifications of reference.

Units	Gas	Certified Gas Concentration	Gas Traceability (Lot Number)	Instrument Reading	Tolerance
%	N_2	99.999	N70086009803	0.2 PPM	5 PPM
PPM	CH_4	10.0 PPM	70086129308	9.9 PPM	± 10%
PPM	CH_4	500 PPM	70086030712	488.5 PPM	± 10%
PPM	CH_4	2498 PPM	70086811308	2607.3 PPM	± 10%
PPM	CH_4	10000 PPM	109631206	10077.9 PPM	± 10%
PPM	CH_4	20000 PPM	109631303	20002.7 PPM	± 10%
PPM	CH_4	999700 PPM	MET-040918-UHP	1003150 PPM	± 10%

Calibration Technician: Jose Munoz

Signature: _____ **Date:** *February 15, 2022*

This certificate is issued in accordance with laboratory requirements of the National Institute of Standards and Technology. It provides traceability of measurement to recognized national standards, and to units of measurement realized a t the National Institute of Standards and Technology or other recognized national standards laboratories. Certification only applies to results shown. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

Field Calibration Form

Standard or Batch number		23WO 0001	22WO 0003	22WO 0004	23 0001	22w0009 22w0010 22w0011	22WO		22WO 0012		22WO 0013	22w0024 23w0000	23WO 0022			S21/ 010	S22	S22	S22	S21/001	S21/001	S21/001	
Operational Limits		± 0.1	± 0.1	± 0.1	7.15-7.25	Chk Std / CRM	79 - 88	142 - 151	1369 - 1454	9700 - 10300	12493 - 13266	108446 - 115154	Chk Std / CRM	<0.2	95 - 105%	217 - 240				± 0.09	± 0.10	± 0.14	Analyst/ Comments
Certified Value		7.00	4.00	10.00	pH Junction	Chk Std / CRM	84	146.9	1412	10000	12880	111800	Chk Std / CRM	0.0mg/L	100%	229	NTU	NTU	NTU	0.24	0.95	1.63	
Meter ID	Date	pH					EC (µS/cm)							DO (% or mg/L)		ORP (mV)	Turbidity (NTU)			Chlorine (mg/L)			
ALSWOL 0662	17.2.23	7.03	4.02	9.98		7.04					DNC 12123												Temp At 27.5
ALSWOL 0611	20.2.23	7.02	4.01	9.99	7.17	7.04					12970		(0724 W 1019.5	mbar			0749 C 1018.4	mbar)					RM 26.0
ALSWOL 0732	20.2.23	7.03	4.03	10.05	7.20	7.04			1419		12750	13390		<0.2	102								RM
ALSWOL 0611	21.2.23	7.03	4.03	9.98	7.21	7.03																	RM. 26°C
ALSWOL 0221	21.2.23	7.03	4.02	10.00		7.05																	RM. 27.0°C.
ALSWOL 0662	22.2.23	7.04	4.01	10.01	7.19	7.04					0730 W	1023 mhPa	1024.9	hPa (C)	0748								MS 22.3°C
ALSWOL 0732	22.2.23	7.03	4.03	10.02		7.7			1421		12990		<0.2	102									
ALSWOL 0662	23.2.23	7.05	4.02	10.02	7.21	7.06					0732 (W)	1022.7	hPa	0748 (C)	1022.4	hPa.							MS 21.3°C
ALSWOL 0732	23.2.23	6.96	4.02	10.03		7.03			1400		12800		<0.2	100									RM
ALSWOL 0221	23.2.23	7.06	4.04	10.04		7.06																	RM
ALSWOL 0662	24.2.23	7.04	4.02	10.04	7.21	7.06																	MS 22.2
ALSWOL 0221	24.2.23	7.06	4.04	10.3		7.06																	RM 25.7
ALSWOL 0611	24.2.23	7.00	4.00	10.01	7.20																		RM
ALSWOL 0662	27.2.23	7.01	4.01	10.02	7.18	7.03																	MS 23.5
ALSWOL 0611	27.2.23	7.02	4.2	10.00	7.17	7.9																	RM
ALSWOL 0221	27.2.23	7.01	4.02	10.01	7.16	7.2																	RM (7.03)
ALSWOL 0611	28.2.23	7.02	4.04	10.03		7.02							0748 (C)	1010.6 hPa	0732 (W)	1011.0 hPa							RM
ALSWOL 0732	28.2.23	7.01	4.04	10.08	7.16	6.99			1403		12800	14110	<0.2	101	230								RM
ALSWOL 0662	1.3.23	7.04	4.04	10.03	7.21	7.04																	MS 25.2
ALSWOL 0732	1.3.23	6.96	3.98	10.03		6.95																	RDL
ALSWOL 0221	1.3.23	6.94	4.00	9.97		6.94																	RDL
ALSWOL 0662	2.3.23	7.03	4.03	10.02		7.04																	MF - 27.4

Field Calibration Form

Standard or Batch number		23WO 1000	22WO 0037	22WO 0004	23WO 0001	23WO 0011	22WO		22WO W12		22WO 0012		22WO 0024			S21 0/0	S22	S22	S22	S21/001	S21/001	S21/001	
Operational Limits		± 0.1	± 0.1	± 0.1	7.15-7.25	Chk Std / CRM	79 - 88	142 - 151	1369 - 1454	9700 - 10300	12493 - 13266	108446 - 115154	Chk Std / CRM	<0.2	95 - 105%	217 - 240				± 0.09	± 0.10	± 0.14	Analyst/ Comments
Certified Value		7.00	4.00	10.00	pH Junction		84	146.9	1412	10000	12880	111800		0.0mg/L	100%	229	NTU	NTU	NTU	0.24	0.95	1.63	
Meter ID	Date	pH					EC (µS/cm)							DO (% or mg/L)		ORP (mV)	Turbidity (NTU)			Chlorine (mg/L)			
ALSWOL1000	2/3/22 ~~2/3/22~~	7.00	4.02	9.98		7.06			1438		12990												RM
ALSWOL0740	~~2/3/22~~ 2/3/22													<0.2	100								RM
ALSWOL0662	3/3/23	7.02	4.02	10.00	7.20	7.05										240							RM
ALSWOL0222	3/3/23	7.02	4.01	10.01	7.17	7.03																	RM
ALSWOL0668	6/3/23	7.03	4.03	10.04	7.19	7.04																	RM (7.12
ALSWOL0662	7/3/23	7.02	4.02	10.03		7.04																	AP 26.2
ALSWOL0222	7/3/23	~~4.03~~ 7.02	4.00	9.98		7.05			1412		12800	~~415~~	1415										AP 26.3
ALSWOL0668	8/3/23	7.02	4.01	10.01		7.02																	RM 29.8
ALSWOL0662	8/3/23	7.00	4.01	9.98		7.03			1416		12860		1420										AP
ALSWOL0662	9/3/23	7.01	4.02	9.99		7.02																	AP 25.8
ALSWOL0222	~~9/3/25~~																						MS 28.0°C
ALSWOL0222	9.3.23	7.06	4.04	10.04		7.07			(07ge)(9)		1008.0	hPa			1008.8 hPa (0730hrs)								AP 26.5
ALSWOL0732	9.3.23	7.00	4.02	10.01	7.15	6.99			1412		12840		1400	102	105								RM, (RE-1
ALSWOL0262	9.3.23						84		1417		12840		1424										RM
ALSWOL0662	10.3.23	7.02	4.02	10.00		7.02	New	check	std.	Stor	dard.		23WO	0001	1 (7.03).								MS 24.5
ALSWOL0662	13.3.23	7.02	4.02	10.3																			AP 24.0
ALSWOL0702	13.3.23								1400		12800		1410										RM
ALSWOL0222	13.3.23	7.07	4.08	10.05		7.02																	
ALSWOL0662	14.3.23	7.02	4.01	10.01		7.03																	
ALSWOL0222	14.3.23	7.04	4.03	10.04	7.19	7.05			1438		12800		1408										MS 22.2°C
ALSWOL0662	14.3.23	6.99	4.01	10.04		6.97	85		1418		12810		1412										RM 23.3
ALSWOL0662	15.5.23	7.02	4.01	10.03	7.16	7.02																	MS 22.5
																							AP 23.6

Field Calibration Form

Standard or Batch number		23WO 001	23WO 003	23WO 004	084	011	23WO		23WO 005		23WO 0023		23WO 0015							S21/001	S21/001	S21/001	
Operational Limits		± 0.1	± 0.1	± 0.1	7.15-7.25	Chk Std / CRM	79 - 88	142 - 151	1369 - 1454	9700 - 10300	12493 - 13266	108446 - 115154	Chk Std / CRM	<0.2	95 - 105%	217 - 240				± 0.09	± 0.10	± 0.14	Analyst/ Comments
Certified Value		7.00	4.00	10.00	pH Junction		84	146.9	1412	10000	12880	111800		0.0mg/L	100%	229	NTU	NTU	NTU	0.24	0.95	1.63	
Meter ID	Date	pH (7.05)					EC (µS/cm)							DO (% or mg/L)		ORP (mV)	Turbidity (NTU)			Chlorine (mg/L)			
ALSWOL0662	19.5.23	~~4.01~~	4.01	10.10	7.20	7.04																	RNL / 16.3°C
ALSWOL0670	19.5.23								1414		13290		1446										RNL
ALSWOL0730	19.5.23	~~7.04~~	4.00	10.10	7.22	7.05			1415		13280		1445										RNL
ALSWOL1002	22.5.23	7.05	3.97	10.06		7.05			1415		13200		1450	<0.2	102.6								RNL
ALSWOL0662	23.5.23	7.06	4.01	10.08		7.05																	MS / 12.9°C
ALSWOL0202	23.5.23	7.07	4.02	10.04		7.07																	RNL / 15.5
ALSWOL0262	23.5.23	7.06	4.00	10.10		7.05																	MS / 16.2°C
ALSWOL0662	24.5.23	7.05	4.02	10.04		7.06																	MS / 16.1°C
ALSWOL0662	25.5.23	7.06	4.01	10.08		7.04																	MS / 15.8°C
ALSWOL0262	27.5.23	6.96	4.01	10.01		6.97									1014.2 (w)		1014.5	(C)					
* ALSWOL0112	31.5.23	~~7.04~~ 7.03	4.04	10.05	7.18	7.02			1418		13080		1445	<0.2	105								RNL
* ALSWOL1002	31.5.23	7.08	4.09	10.10	7.26	7.08			1414		12950		1455	<0.2	105			1015 hPa			mbar		RNL
* ALSWOL0732	1.6.23	7.04	4.04	10.05	7.22	7.04			1418		12980		1450	<0.2	105	c	~~105~~	~~1051.9~~ mbar		w	1015.3		RNL
ALSWOL0262	5.6.23	7.01	3.97	10.03		7.02			~~1450~~		13210		1432										MS
ALSWOL0702	5.6.23	7.05	4.02	10.05	7.22	7.05			1418		13400		1451										RNL
ALSWOL0302	5.6.23	~~7.00~~ 7.06	4.00	~~10.06~~	~~7.21~~	7.05																	RNL
ALSWOL026	6.6.23	7.03	4.00	10.06	7.18	7.02																	MS
ALSWOL026	7.6.23	7.06	4.00	10.06		7.05																	MS
ALSWOL066	8.6.23	7.05	4.02	10.08		7.06																	MS
ALSWOL026	8.6.23	7.03	4.00	10.07		7.03			1410		12880		1440										MS
ALSWOL0362	8.6.23	7.06	4.01	10.06		7.05																	RDL
ALSWOL0262	13.6.23	7.05	4.04	10.07	7.24	7.06																	MS

Gas Verification Certificate

Instrument Huber Laser
Serial No. 19255.18
Sensors Laser

Air-Met Scientific Pty Ltd
1300 137 067

Item	Test	Pass	Comments			
Battery	Charge Condition	✓				
	Fuses	✓				
	Capacity	✓				
	Recharge OK?	✓				
Switch/keypad	Operation	✓				
Display	Intensity	✓				
	Operation (segments)	✓				
Grill Filter	Condition	✓				
	Seal	✓				
Pump	Operation					
	Filter					
	Flow					
	Valves, Diaphragm					
PCB	Condition	✓				
Connectors	Condition	✓				
			Low	**High**	**TWA**	**STEL**
Sensor	Laser	✓				
		✓				
		✓				
		✓				
		✓				
Alarms	Beeper	✓				
	Settings	✓				
Software	Version					
Datalogger	Operation					
Download	Operation					
Other tests:						

Bump Test Certification

This is to certify that the above instrument has been calibrated to the following specifications:

Diffusion mode Aspirated mode

Sensor	Serial no	Calibration gas and concentration	Certified	Gas bottle No	Instrument Reading
CH4		500ppm CH4	NIST	sy460	500 ppm CH4
CH4		2.5 % vol CH4	NIST	BC363930	2.5 % vol CH4

Bump Test by: **Jemma Treseder**

Date: **9/8/23**

CERTIFICATION OF CALIBRATION

Issued by: QED Environmental Systems Ltd.

Calibration certificate number **19255 H-09418**

Instrument **Laser One** **Serial Number** **19255**

Description of the calibration procedure:

The calibration is verified with certified gas bottle. The maximum error of the instrument as specified in the datasheet.

Gas verification from **0-1000ppm CH4**

Full scale (ppm)	Gas concentration (ppm)	Response 1 (ppm)	Response 2 (ppm)	Response 3 (ppm)	Average response (ppm)	Maximum error (ppm)	Maximum error (% F.s.)	Maximum error %
1000	0.0	0	0	0	0.00	0.00	0.00	0.00
1000	2.91	3	3	3	3.00	0.09	0.01	0.01
1000	10.3	10.3	10.3	10.3	10.30	0.00	0.00	0.00
1000	101.0	101	101	101	101.00	0.00	0.00	0.00
1000	1004	1000	1000	1000	1000.00	4.00	0.40	0.40

Uncertainty	0.40	%
Max % error	0.40	% FS

Gas verification from **0-100% vol CH4**

Full scale (%vol)	Gas concentration (%vol)	Response 1 (%vol)	Response 2 (%vol)	Response 3 (%vol)	Average response (%vol)	Maximum error (%vol)	Maximum error (% F.s.)	Maximum error %
100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100.00	2.20	2.20	2.20	2.20	2.20	0.00	0.00	0.00
100.00	5.00	5.00	5.00	5.00	5.00	0.00	0.00	0.00
100.00	15.00	15.00	15.00	15.00	15.00	0.00	0.00	0.00
100.00	50.00	49.90	49.90	49.90	49.90	0.10	0.10	0.10
100.00	100.00	100.00	100.00	100.00	100.00	0.00	0.00	0.00

Uncertainty	0.10	%
Max % error	0.10	% FS

Gas verification from **0-100% CH4 LEL (0-4.4% VOL)**

Full scale (%vol)	Gas concentration (LEL%)	Response 1 (LEL%)	Response 2 (LEL%)	Response 3 (LEL%)	Average response (%vol)	Maximum error (LEL%)	Maximum error (% F.s.)	Maximum error %
100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100.00	2.00	2.00	2.00	2.00	2.00	0.00	0.00	0.00
100.00	50.00	50.00	50.00	50.00	50.00	0.00	0.00	0.00

Uncertainty	0.00	%
Max % error	0.00	% FS

CERTIFICATION OF CALIBRATION

Issued by: QED Environmental Systems Ltd.

Environmental conditions during calibration

Temp.	18.5	C
Pressure	977	mBar

Gas bottles used for calibration

Gas	Cylinder number	Expiry date	Gas
N2	S1261680T	16/05/2024	N2
3 ppm	292675	17/08/2027	CH4
10 ppm	119779SG	11/04/2024	CH4
100 ppm	S1729157	08/03/2028	CH4
1000 ppm	S1147710R	03/01/2028	CH4
1.0% Vol	S1198415S	10/04/2024	CH4
2.2% vol	1713254	13/12/2027	CH4
5.0% vol	217147	03/12/2024	CH4
15% vol	269223	07/11/2023	CH4
50% vol	189051SG	23/02/2024	CH4
100% vol	S1182097S	15/11/2025	CH4

Calibration results: Pass

Next scheduled calibration: 03/04/2024

Calibration date: 03/04/2023

Issued by: Keeley Knight

Appendix J:
Gas Flare Reports

PEOPLE ENGINEERING
A ZERO CARBON, CLEAN
ENERGY FUTURE.

FOCUS YOUR ENERGY

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PROJECT PROFILE: DUNMORE, NSW

We expedite the transition to renewables with clean energy and carbon abatement solutions. Carbon credits enable a commercially viable project to create additional abatement.

Results Achieved since the Project Commenced*

BIOGAS CAPTURED	CARBON ABATEMENT	ACCUs CREATED	SEEDLINGS PLANTED	CARS OFF THE ROAD
23.4 million m3	222 thousand tonnes (t CO2e - environmental benefit)	92 thousand Australian Carbon Credit Units	3.7 million seedlings planted for 10 years (t CO2e)	6,093 for the last 12 months of carbon abatement (t CO2e)

BIOGAS CAPTURE AND CARBON ABATEMENT FROM LANDFILL

- Long-term contract with Shellharbour City Council to recover and beneficially use biogas and abate carbon from this regional landfill in Dunmore. This improves air quality, reduces greenhouse gas emissions and contributes to the local economy.
- No regulatory requirement to capture biogas, however ACCUs enable additional carbon abatement (above its **30% baseline**) from a commercially viable flaring project under the Emissions Reduction Fund (ERF).
- Since 2013, LGI installed a bespoke biogas management system with an LGI 1000 ERF compliant biogas flare. Council benefits from this bespoke system at minimal cost.
- LGI collaborates closely with the Council regarding the design, installation, operations and maintenance of the biogas management system, including the monitoring and reporting services provided.

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Saving the planet one landfill, one megawatt, one solar panel, one battery at a time

* ACCUs created to 15 May 2022. Other Results Achieved to 1 November 2022

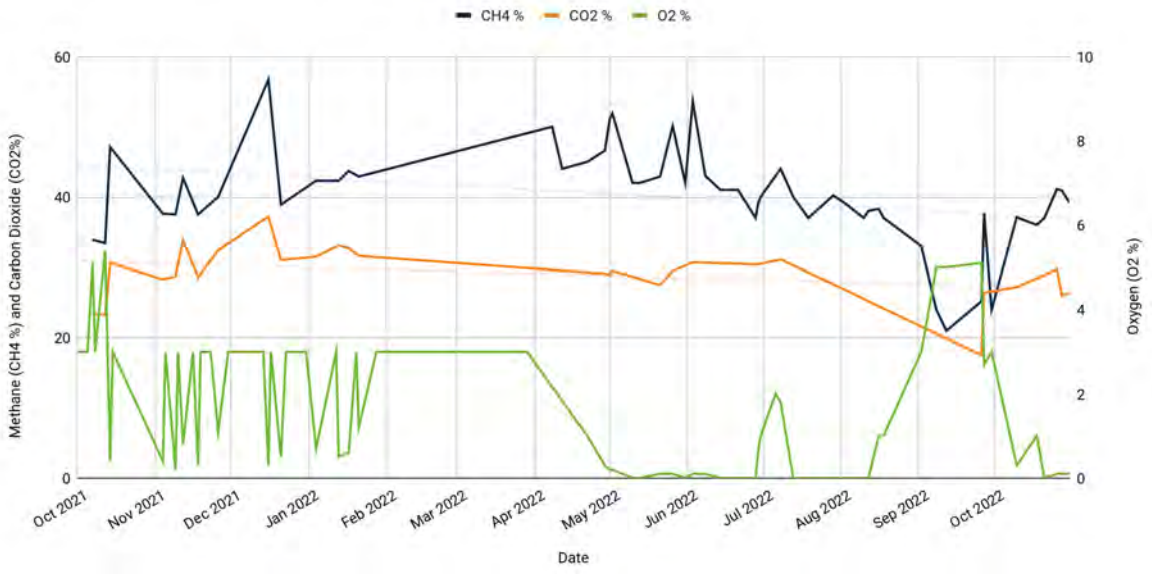
Site:	Dunmore	**Report issue date:**	14/11/2022
Report month:	October 2022	**Prepared by:**	Grace Tap
Prepared for:	Shellharbour City Council	**Checked by:**	Jessica North

Comments on changes to existing system:	• **January 2016 -** LGI disconnected the 4 lateral wells and 8 vertical wells. • **April 2016 -** LGI reconnected 8 vertical wells in the SE corner and 4 lateral wells. • **June 2016 -** LGI disconnected the extended gas capture system to assist council. • **September 2016 -** LGI disconnected the extended gas capture system to assist council. • **November 2016 -** LGI commissioned the connection to leachate sump 6 as of 23-11-2016. • **May 2017 -** LGI installed an additional 10 vertical wells to the existing LFG system • **November 2019 -** LGI on site to move mainline up batter, and reconnected infrastructure that had been previously disconnected, including 4 wells on the dimple and a 160mm leachate riser. • **April 2020 -** LGI installed a flowline to sump 6 after earlier disconnection. • **February 2021 -** LGI installed 13 new vertical wells, including a new submain • **March 2022 -** LGI replaced the flare gas analyser panel with a Draeger model analyser for greater accuracy and reliability **August 2022 -** LGI repaired the 225mm mainline and adjacent submain to allow for intermediate capping to continue across the top of cell 3
Comments on operation / maintenance:	Availability - 99.38% Down Time: 4.58hrs Field Tuned: - 31/10/2022
Recommendations:	After discussion with Council, LGI will re investigate options for leachate pumping out of gas extraction wells

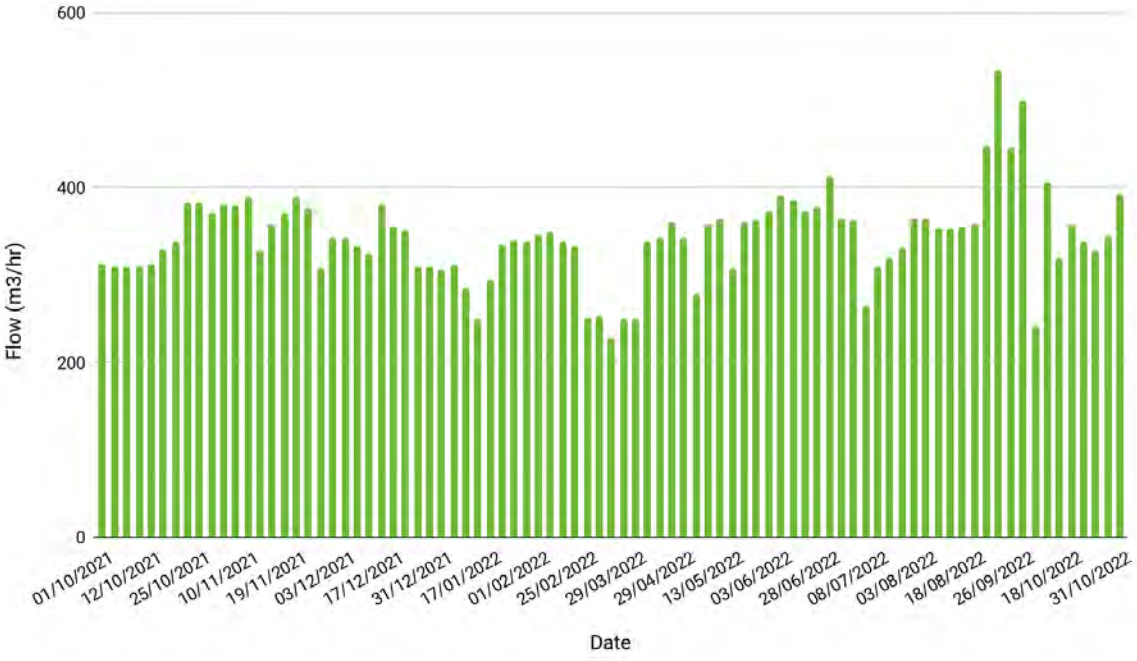
Flare Operational Data:

Date	CH4 %	CO2 %	O2 %	FLOW m3/h	STACK TEMP C	CUMULATIVE FLOW m3
10/10/2022	37.1	27.2	0.3	320	769	23,176,716
18/10/2022	36	-	1	357	614	23,243,922
26/10/2022	41.1	29.7	0.1	327	662	23,311,015
31/10/2022	39.2	26.4	0.1	392	767	23,355,257
Average	38.35	27.77	0.37	349	703	-

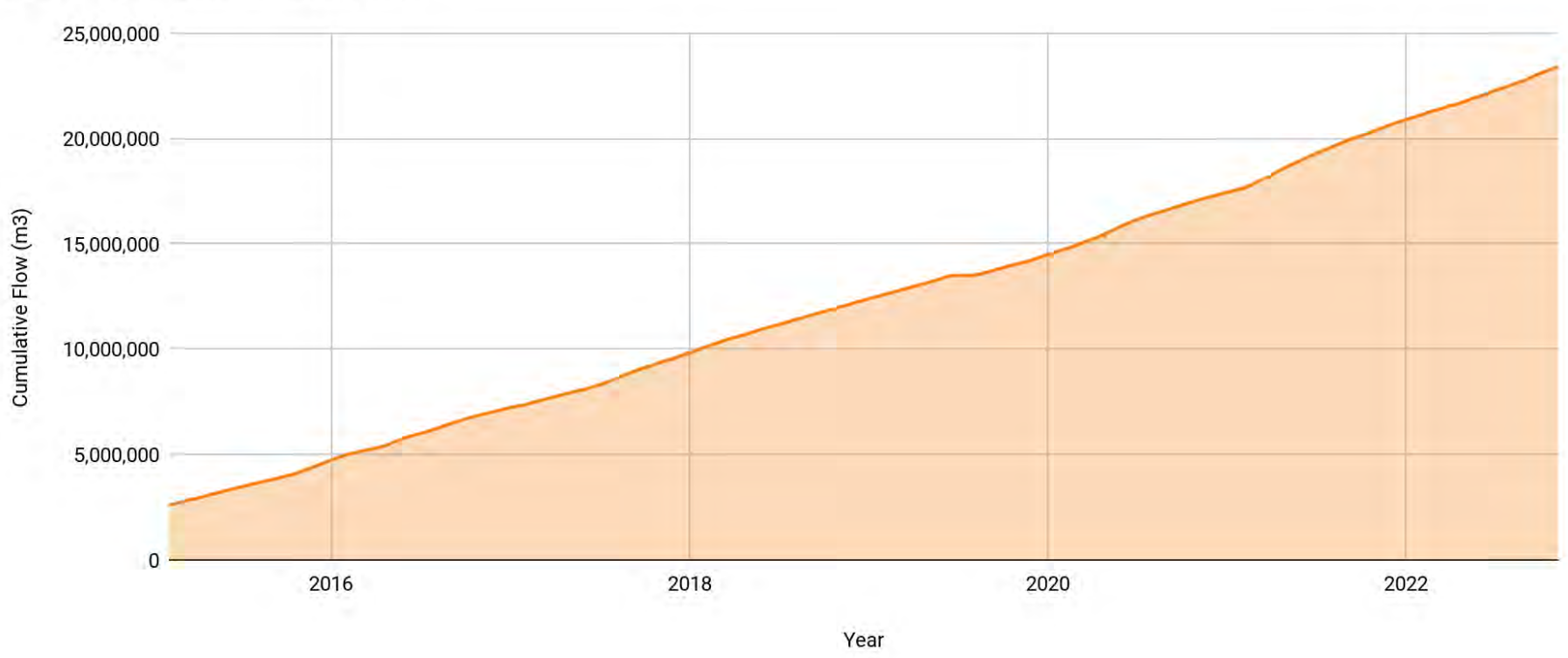
Dunmore- Methane, Carbon Dioxide & Oxygen



Dunmore - Flow Rate



Dunmore - Cumulative Flow



- 23,360,830 of combusted landfill gas up to 1 November 2022, which represents;
    - 221,872 tonnes of CO2 equivalent (total methane abated by gas capture system to date).
    - 3,697,864 seedlings planted for 10 years
    - 6,093 (cars off the road for the last 12 months)
    - 92,714 Australian Carbon Credit Units
- Biogas captured is the cumulative flow reading at the last day of the month.

Please note:

This report has been prepared by LGI Limited (LGI) with all reasonable skill, care and diligence, and taking account of the human power and resources devoted to it by agreement with the client. Information reported herein is based on the interpretation of data collected and has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of the client. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from LGI. LGI disclaims any responsibility to the client and others in respect of any matters outside the agreed scope of the work.

Where LGI has been accorded gas rights under the terms and conditions of the agreement with the client, the data contained in this report represents confidential commercial information and should not be copied or disseminated in any form to a third party without prior consent from LGI.

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PROJECT PROFILE: DUNMORE, NSW

We expedite the transition to renewables with clean energy and carbon abatement solutions. Carbon credits enable a commercially viable project to create additional abatement.

Results Achieved since the Project Commenced*

BIOGAS CAPTURED	CARBON ABATEMENT	ACCUs CREATED	SEEDLINGS PLANTED	CARS OFF THE ROAD
23.6 million m3	224 thousand tonnes (t CO2e - environmental benefit)	92 thousand Australian Carbon Credit Units	3.7 million seedlings planted for 10 years (t CO2e)	6,091 for the last 12 months of carbon abatement (t CO2e)

BIOGAS CAPTURE AND CARBON ABATEMENT FROM LANDFILL

- Long-term contract with Shellharbour City Council to recover and beneficially use biogas and abate carbon from this regional landfill in Dunmore. This improves air quality, reduces greenhouse gas emissions and contributes to the local economy.
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Saving the planet one landfill, one megawatt, one solar panel, one battery at a time

* ACCUs created to 15 May 2022. Other Results Achieved to 1 December 2022

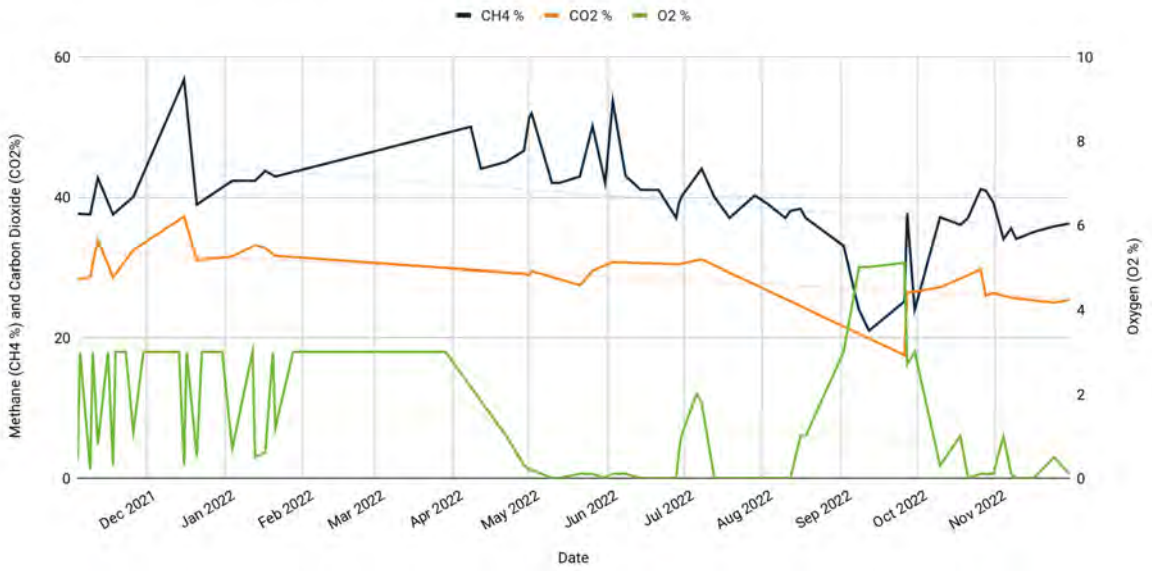
Site:	Dunmore	**Report issue date:**	16/12/2022
Report month:	November 2022	**Prepared by:**	Grace Tap
Prepared for:	Shellharbour City Council	**Checked by:**	Thomas Schnatz

Comments on changes to existing system:	• **January 2016 -** LGI disconnected the 4 lateral wells and 8 vertical wells. • **April 2016 -** LGI reconnected 8 vertical wells in the SE corner and 4 lateral wells. • **June 2016 -** LGI disconnected the extended gas capture system to assist council. • **September 2016 -** LGI disconnected the extended gas capture system to assist council. • **November 2016 -** LGI commissioned the connection to leachate sump 6 as of 23-11-2016. • **May 2017 -** LGI installed an additional 10 vertical wells to the existing LFG system • **November 2019 -** LGI on site to move mainline up batter, and reconnected infrastructure that had been previously disconnected, including 4 wells on the dimple and a 160mm leachate riser. • **April 2020 -** LGI installed a flowline to sump 6 after earlier disconnection. • **February 2021 -** LGI installed 13 new vertical wells, including a new submain • **March 2022 -** LGI replaced the flare gas analyser panel with a Draeger model analyser for greater accuracy and reliability **August 2022 -** LGI repaired the 225mm mainline and and adjacent sub main to allow for intermediate capping to continue across the top of cell 3
Comments on operation / maintenance:	Availability - 100.00% Down Time: 0.00hrs Field Tuned: - 30/11/2022
Recommendations:	After discussion with Council, LGI will re investigate options for leachate pumping out of gas extraction wells

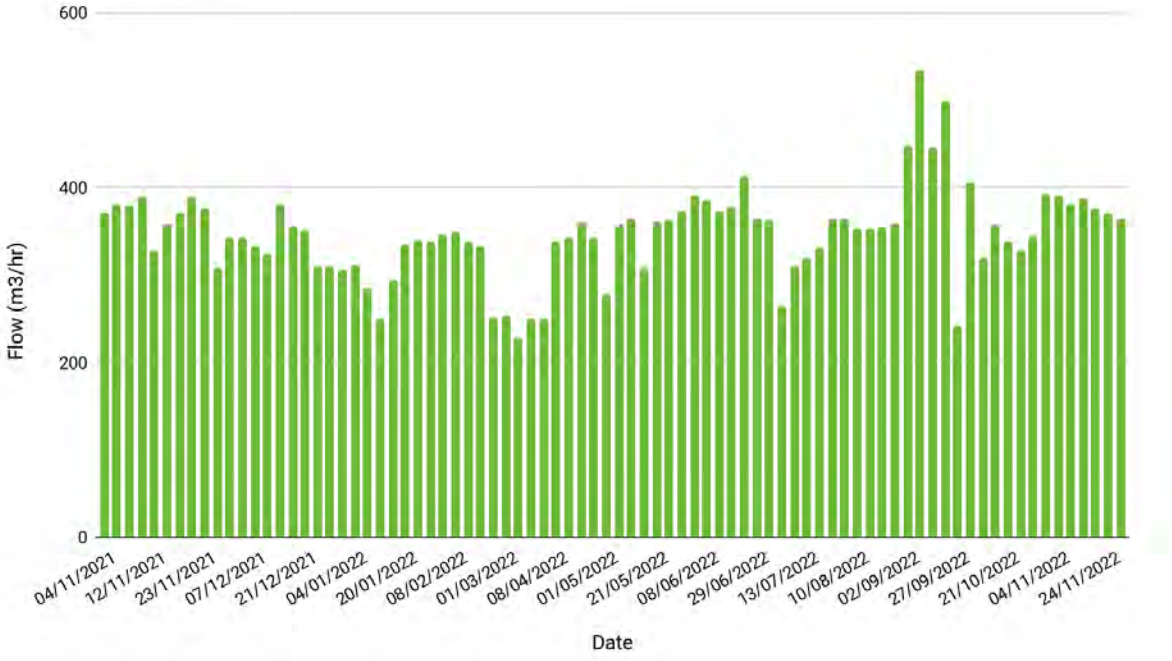
Flare Operational Data:

Date	CH4 %	CO2 %	O2 %	FLOW m3/h	STACK TEMP C	CUMULATIVE FLOW m3
07/11/2022	35.5	25.7	0.1	380	697	23,419,647
16/11/2022	35	-	0	375	667	23,501,523
24/11/2022	35.8	25	0.5	370	645	23,573,405
30/11/2022	36.2	25.4	0.1	364	730	23,625,627
Average	35.625	25.37	0.175	372	685	-

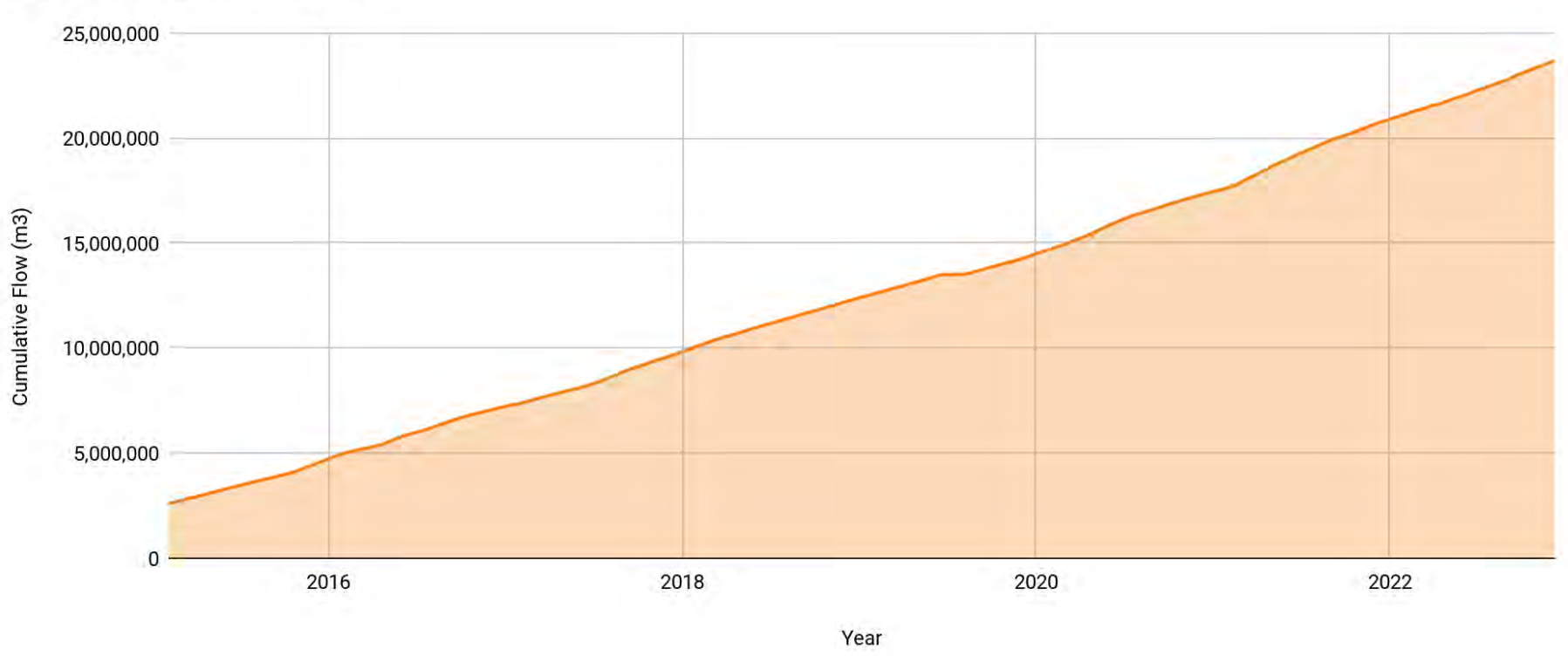
Dunmore- Methane, Carbon Dioxide & Oxygen



Dunmore - Flow Rate



Dunmore - Cumulative Flow



- 23,631,365 of combusted landfill gas up to 1 December 2022, which represents;
    - 224,441 tonnes of CO2 equivalent (total methane abated by gas capture system to date).
    - 3,740,688 seedlings planted for 10 years
    - 6,091 (cars off the road for the last 12 months)
    - 92,714 Australian Carbon Credit Units
- Biogas captured is the cumulative flow reading at the last day of the month.

Please note:

This report has been prepared by LGI Limited (LGI) with all reasonable skill, care and diligence, and taking account of the human power and resources devoted to it by agreement with the client. Information reported herein is based on the interpretation of data collected and has been accepted in good faith as being accurate and valid.

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Results Achieved since the Project Commenced*

BIOGAS CAPTURED	CARBON ABATEMENT	ACCUs CREATED	SEEDLINGS PLANTED	CARS OFF THE ROAD
23.9 million m3	227 thousand tonnes (t CO2e - environmental benefit)	92 thousand Australian Carbon Credit Units	3.8 million seedlings planted for 10 years (t CO2e)	6,139 for the last 12 months of carbon abatement (t CO2e)

BIOGAS CAPTURE AND CARBON ABATEMENT FROM LANDFILL

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Saving the planet one landfill, one megawatt, one solar panel, one battery at a time

* ACCUs created to 15 May 2022. Other Results Achieved to 1 January 2023

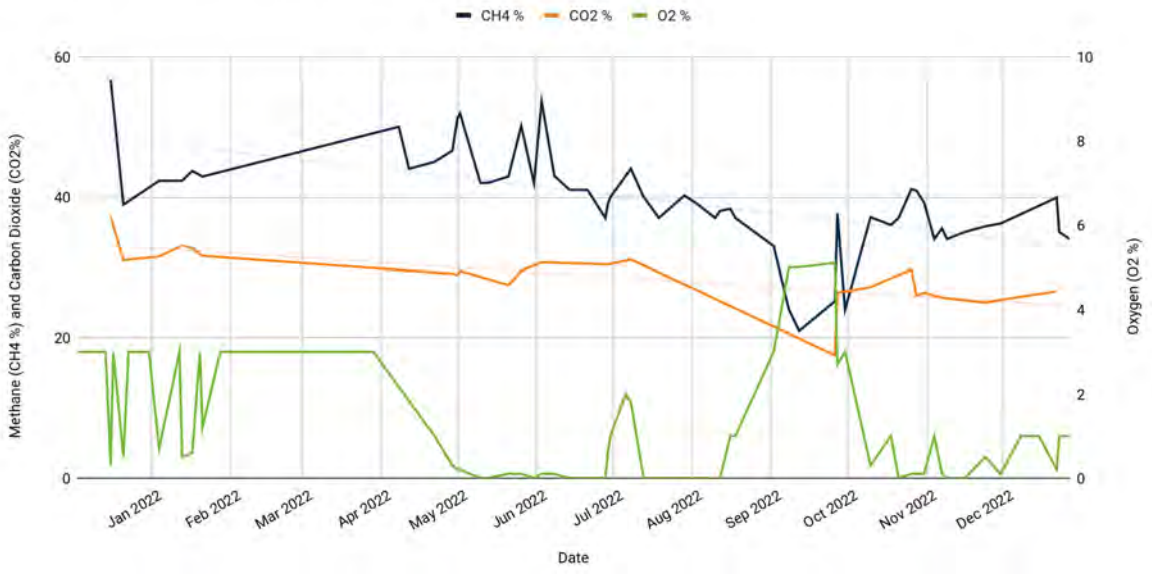
Site:	Dunmore	**Report issue date:**	16/01/2022
Report month:	December 2022	**Prepared by:**	Grace Tap
Prepared for:	Shellharbour City Council	**Checked by:**	Thomas Schnatz

Comments on changes to existing system:	• **January 2016 -** LGI disconnected the 4 lateral wells and 8 vertical wells. • **April 2016 -** LGI reconnected 8 vertical wells in the SE corner and 4 lateral wells. • **June 2016 -** LGI disconnected the extended gas capture system to assist council. • **September 2016 -** LGI disconnected the extended gas capture system to assist council. • **November 2016 -** LGI commissioned the connection to leachate sump 6 as of 23-11-2016. • **May 2017 -** LGI installed an additional 10 vertical wells to the existing LFG system • **November 2019 -** LGI on site to move mainline up batter, and reconnected infrastructure that had been previously disconnected, including 4 wells on the dimple and a 160mm leachate riser. • **April 2020 -** LGI installed a flowline to sump 6 after earlier disconnection. • **February 2021 -** LGI installed 13 new vertical wells, including a new submain • **March 2022 -** LGI replaced the flare gas analyser panel with a Draeger model analyser for greater accuracy and reliability **August 2022 -** LGI repaired the 225mm mainline and and adjacent submain to allow for intermediate capping to continue across the top of cell 3 **- December 2022** - LGI installed a pneumatic bore pump in a j-trap, allowing for greater reliability of condensate management in the main gas line.
Comments on operation / maintenance:	Availability - 100.00% Down Time: 0.00hrs Field Tuned: - 22/12/2022
Recommendations:	After discussion with Council, LGI will re investigate options for leachate pumping out of gas extraction wells

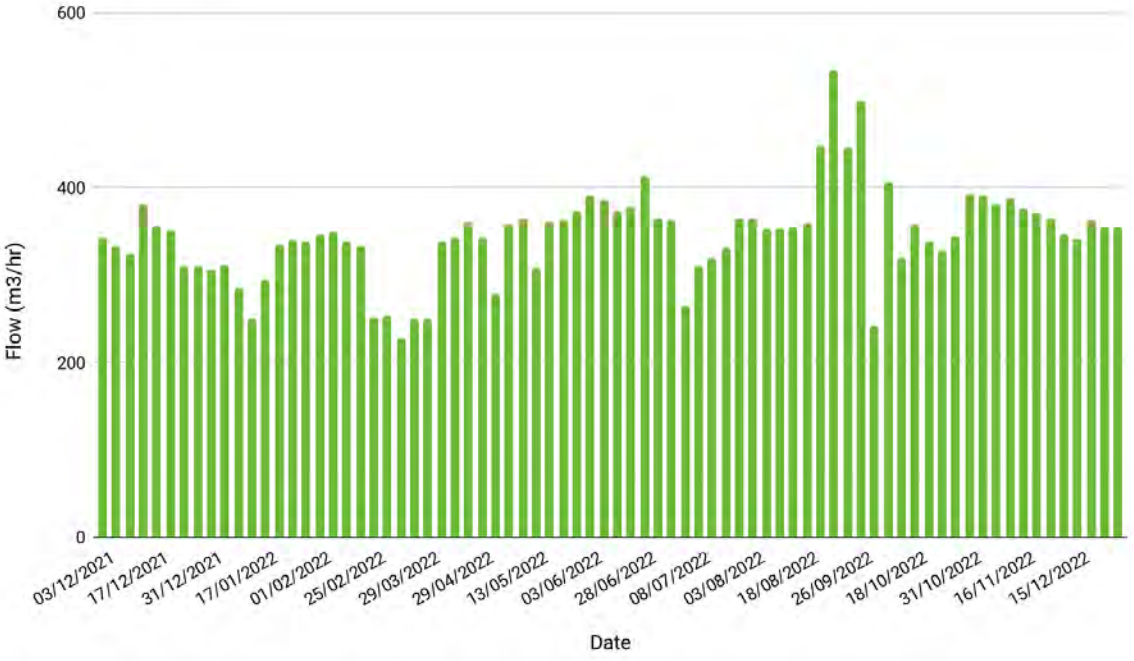
Flare Operational Data:

Date	CH4 %	CO2 %	O2 %	FLOW m3/h	STACK TEMP C	CUMULATIVE FLOW m3
08/12/2022	-	-	1	346	755	23,693,447
15/12/2022	-	-	1	341	755	23,752,988
22/12/2022	39.9	26.6	0.2	363	771	23,811,530
27/12/2022	34	-	1	355	718	-
Average	36.95	26.6	0.8	351	750	-

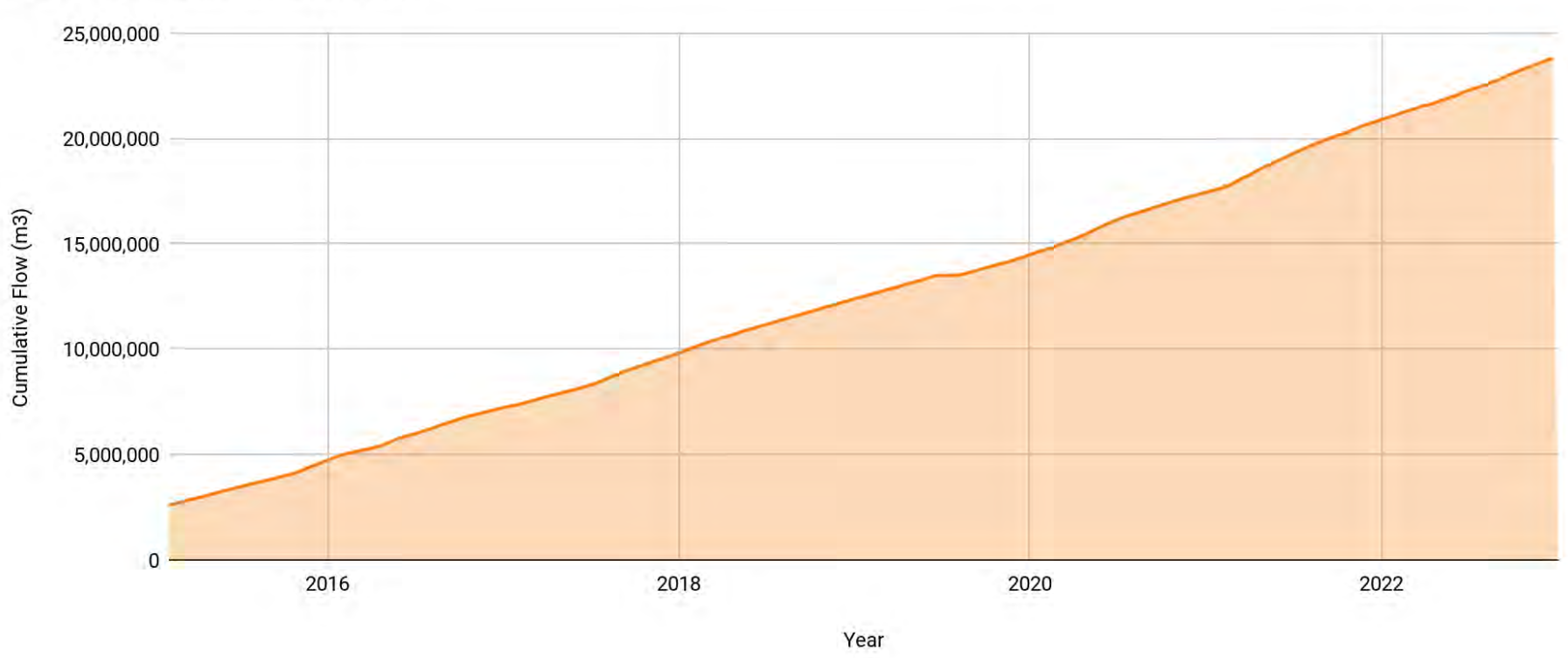
Dunmore- Methane, Carbon Dioxide & Oxygen



Dunmore - Flow Rate



Dunmore - Cumulative Flow



- 23,893,596 of combusted landfill gas up to 1 January 2023, which represents;
    - 226,932 tonnes of CO2 equivalent (total methane abated by gas capture system to date).
    - 3,782,197 seedlings planted for 10 years
    - 6,139 (cars off the road for the last 12 months)
    - 92,714 Australian Carbon Credit Units
- Biogas captured is the cumulative flow reading at the last day of the month.

Please note:

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PROJECT PROFILE: DUNMORE, NSW

We expedite the transition to renewables with clean energy and carbon abatement solutions. Carbon credits enable a commercially viable project to create additional abatement.

Results Achieved since the Project Commenced*

BIOGAS CAPTURED	CARBON ABATEMENT	ACCUs CREATED	SEEDLINGS PLANTED	CARS OFF THE ROAD
24.2 million m3	229 thousand tonnes (t CO2e - environmental benefit)	92 thousand Australian Carbon Credit Units	3.8 million seedlings planted for 10 years (t CO2e)	6,214 for the last 12 months of carbon abatement (t CO2e)

BIOGAS CAPTURE AND CARBON ABATEMENT FROM LANDFILL

- Long-term contract with Shellharbour City Council to recover and beneficially use biogas and abate carbon from this regional landfill in Dunmore. This improves air quality, reduces greenhouse gas emissions and contributes to the local economy.
- No regulatory requirement to capture biogas, however ACCUs enable additional carbon abatement (above its **30% baseline**) from a commercially viable flaring project under the Emissions Reduction Fund (ERF).
- Since 2013, LGI has installed a bespoke biogas management system with an LGI 1000 ERF compliant biogas flare. Council benefits from this bespoke system at minimal cost.
- LGI collaborates closely with the Council regarding the design, installation, operations and maintenance of the biogas management system, including the monitoring and reporting services provided.

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* ACCUs created to 15 May 2022. Other Results Achieved to 1 February 2023

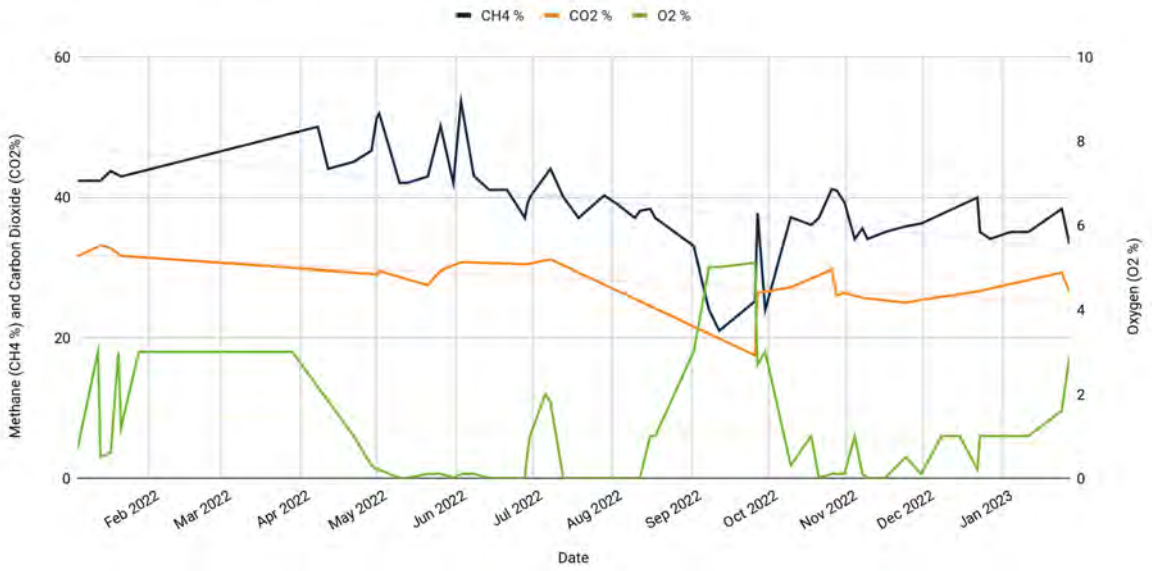
Site:	Dunmore	**Report issue date:**	17/02/2022
Report month:	January 2023	**Prepared by:**	Grace Tap
Prepared for:	Shellharbour City Council	**Checked by:**	Matthew Tap

Comments on changes to existing system:	• **January 2016 -** LGI disconnected the 4 lateral wells and 8 vertical wells. • **April 2016 -** LGI reconnected 8 vertical wells in the SE corner and 4 lateral wells. • **June 2016 -** LGI disconnected the extended gas capture system to assist council. • **September 2016 -** LGI disconnected the extended gas capture system to assist council. • **November 2016 -** LGI commissioned the connection to leachate sump 6 as of 23-11-2016. • **May 2017 -** LGI installed an additional 10 vertical wells to the existing LFG system • **November 2019 -** LGI on site to move mainline up batter, and reconnected infrastructure that had been previously disconnected, including 4 wells on the dimple and a 160mm leachate riser. • **April 2020 -** LGI installed a flowline to sump 6 after earlier disconnection. • **February 2021 -** LGI installed 13 new vertical wells, including a new submain • **March 2022 -** LGI replaced the flare gas analyser panel with a Draeger model analyser for greater accuracy and reliability **August 2022 -** LGI repaired the 225mm mainline and and adjacent sub main to allow for intermediate capping to continue across the top of cell 3 **- December 2022** - LGI installed a pneumatic bore pump in a J-trap, allowing for greater reliability of condensate management in the main gas line.
Comments on operation / maintenance:	Availability - 100.00% Down Time: 0.00hrs Field Tuned: - 24/01/2023
Recommendations:	After discussion with Council, LGI will re investigate options for leachate pumping out of gas extraction wells

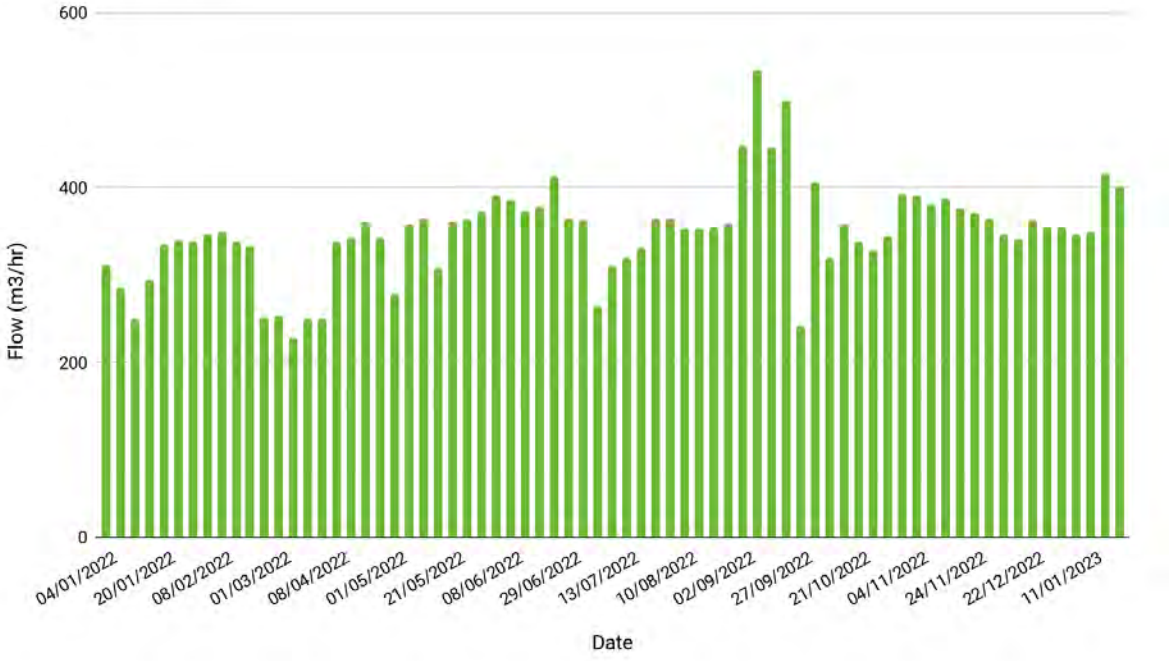
Flare Operational Data:

Date	CH4 %	CO2 %	O2 %	FLOW m3/h	STACK TEMP C	CUMULATIVE FLOW m3
04/01/2023	35	-	1	346	769	23,924,491
11/01/2023	35	-	1	350	749	23,981,011
24/01/2023	38.3	29.3	1.6	416	870	24,089,024
Average	36.1	29.3	1.2	371	796	-

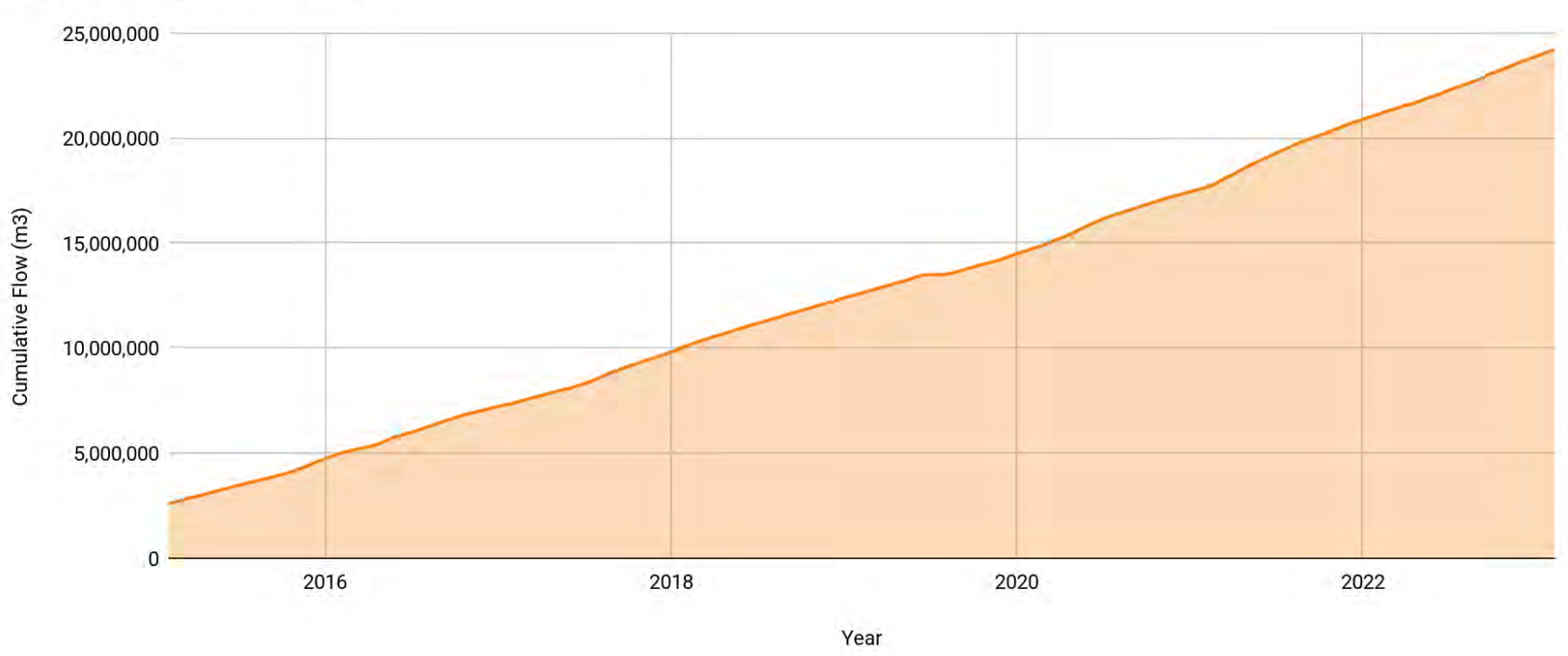
Dunmore- Methane, Carbon Dioxide & Oxygen



Dunmore - Flow Rate



Dunmore - Cumulative Flow



- 24,156,649 of combusted landfill gas up to 1 February 2023, which represents;
    - 229,430 tonnes of CO2 equivalent (total methane abated by gas capture system to date).
    - 3,823,836 seedlings planted for 10 years
    - 6,214 (cars off the road for the last 12 months)
    - 92,714 Australian Carbon Credit Units
- Biogas captured is the cumulative flow reading at the last day of the month.

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Results Achieved since the Project Commenced*

BIOGAS CAPTURED	CARBON ABATEMENT	ACCUs CREATED	SEEDLINGS PLANTED	CARS OFF THE ROAD
24.4 million m3	232 thousand tonnes (t CO2e - environmental benefit)	92 thousand Australian Carbon Credit Units	3.9 million seedlings planted for 10 years (t CO2e)	6,229 for the last 12 months of carbon abatement (t CO2e)

BIOGAS CAPTURE AND CARBON ABATEMENT FROM LANDFILL

- Long-term contract with Shellharbour City Council to recover and beneficially use biogas and abate carbon from this regional landfill in Dunmore. This improves air quality, reduces greenhouse gas emissions and contributes to the local economy.
- No regulatory requirement to capture biogas, however ACCUs enable additional carbon abatement (above its **30% baseline**) from a commercially viable flaring project under the Emissions Reduction Fund (ERF).
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r Results Achieved to 1 March 2023

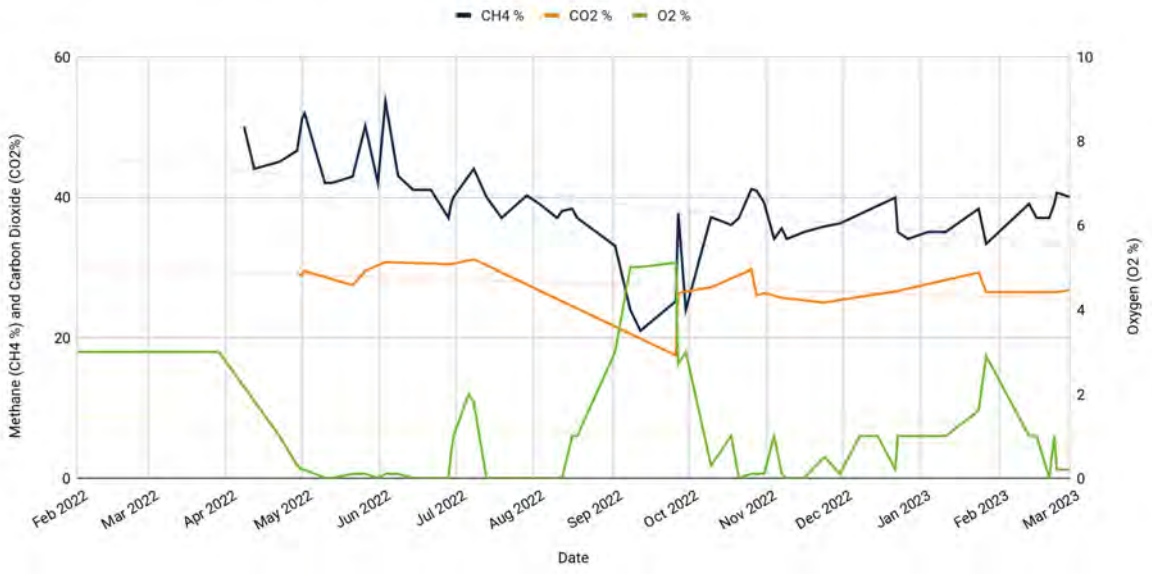
Site:	Dunmore	**Report issue date:**	17/03/2023
Report month:	February 2023	**Prepared by:**	Grace Tap
Prepared for:	Shellharbour City Council	**Checked by:**	Thomas Schnatz

Comments on changes to existing system:	• **January 2016 -** LGI disconnected the 4 lateral wells and 8 vertical wells. • **April 2016 -** LGI reconnected 8 vertical wells in the SE corner and 4 lateral wells. • **June 2016 -** LGI disconnected the extended gas capture system to assist council. • **September 2016 -** LGI disconnected the extended gas capture system to assist council. • **November 2016 -** LGI commissioned the connection to leachate sump 6 as of 23-11-2016. • **May 2017 -** LGI installed an additional 10 vertical wells to the existing LFG system • **November 2019 -** LGI on site to move mainline up batter, and reconnected infrastructure that had been previously disconnected, including 4 wells on the dimple and a 160mm leachate riser. • **April 2020 -** LGI installed a flowline to sump 6 after earlier disconnection. • **February 2021 -** LGI installed 13 new vertical wells, including a new submain • **March 2022 -** LGI replaced the flare gas analyser panel with a Draeger model analyser for greater accuracy and reliability • **August 2022 -** LGI repaired the 225mm mainline and and adjacent submain to allow for intermediate capping to continue across the top of cell 3 • **December 2022** - LGI installed a pneumatic bore pump in a jtrap, allowing for greater reliability of condensate management in the main gas line.
Comments on operation / maintenance:	Availability - 95.92% Down Time: 27.42hrs 23.75hrs - Forced Outage Internal - internal equipment fault 3.58 hrs - Planned outage - equipment repairs Field Tuned: - 24/02/2023
Recommendations:	After discussion with Council, LGI will re investigate options for leachate pumping out of gas extraction wells

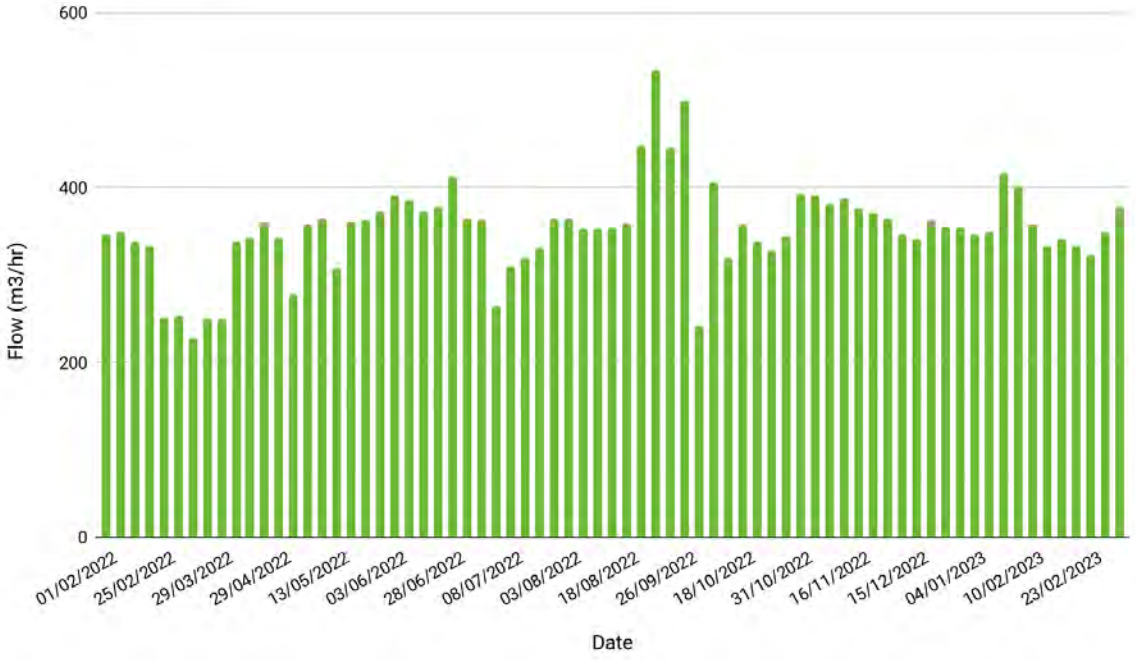
Flare Operational Data:

Date	CH4 %	CO2 %	O2 %	FLOW m3/h	STACK TEMP C	CUMULATIVE FLOW m3
24/02/2023	40.6	26.5	0.2	350	790	24,335,619
Average	40.6	26.5	0.2	350	790	-

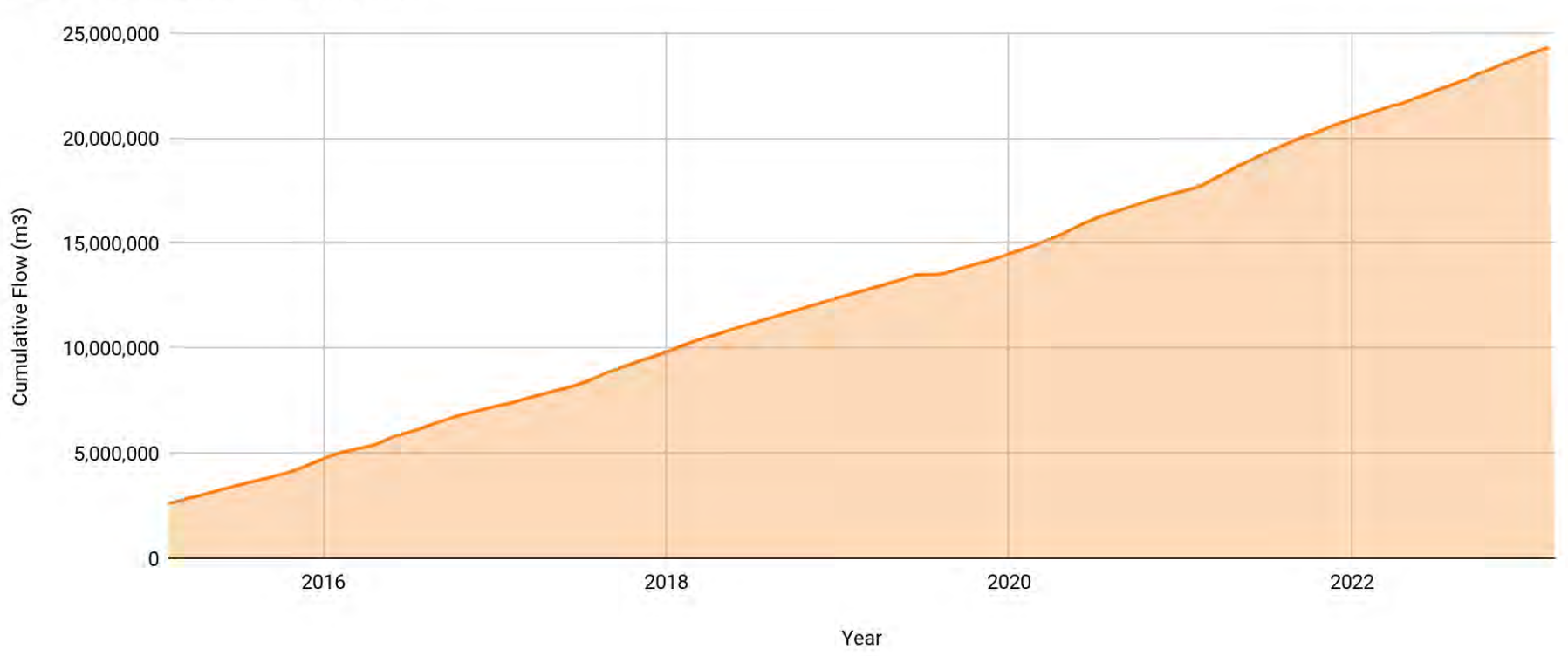
Dunmore- Methane, Carbon Dioxide & Oxygen



Dunmore - Flow Rate



Dunmore - Cumulative Flow



- 24,378,789 of combusted landfill gas up to 1 March 2023, which represents;
    - 231,540 tonnes of CO2 equivalent (total methane abated by gas capture system to date).
    - 3,859,000 seedlings planted for 10 years
    - 6,229 (cars off the road for the last 12 months)
    - 92,714 Australian Carbon Credit Units
- Biogas captured is the cumulative flow reading at the last day of the month.

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Results Achieved since the Project Commenced*

BIOGAS CAPTURED	CARBON ABATEMENT	ACCUs CREATED	SEEDLINGS PLANTED	CARS OFF THE ROAD
24.6 million m3	234 thousand tonnes (t CO2e - environmental benefit)	92 thousand Australian Carbon Credit Units	3.9 million seedlings planted for 10 years (t CO2e)	6,304 for the last 12 months of carbon abatement (t CO2e)

BIOGAS CAPTURE AND CARBON ABATEMENT FROM LANDFILL

- Long-term contract with Shellharbour City Council to recover and beneficially use biogas and abate carbon from this regional landfill in Dunmore. This improves air quality, reduces greenhouse gas emissions and contributes to the local economy.
- No regulatory requirement to capture biogas, however ACCUs enable additional carbon abatement (above its **30% baseline**) from a commercially viable flaring project under the Emissions Reduction Fund (ERF).
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Results Achieved to 1 April 2023

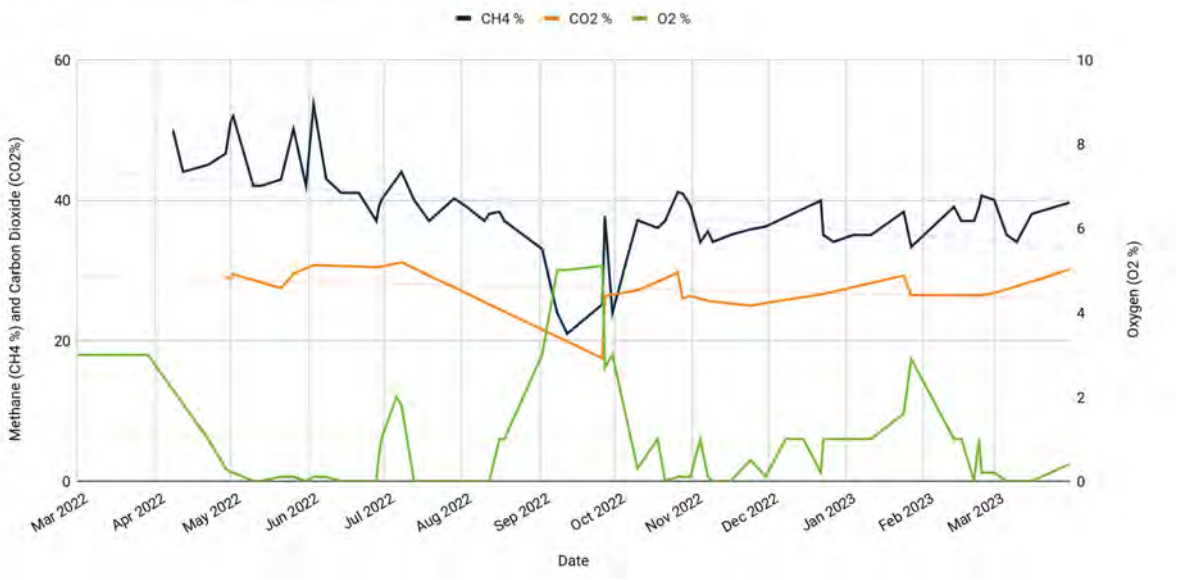
Site:	Dunmore	**Report issue date:**	18/04/2023
Report month:	March 2023	**Prepared by:**	Grace Tap
Prepared for:	Shellharbour City Council	**Checked by:**	Jarryd Doran

Comments on changes to existing system:	• **January 2016 -** LGI disconnected the 4 lateral wells and 8 vertical wells. • **April 2016 -** LGI reconnected 8 vertical wells in the SE corner and 4 lateral wells. • **June 2016 -** LGI disconnected the extended gas capture system to assist council. • **September 2016 -** LGI disconnected the extended gas capture system to assist council. • **November 2016 -** LGI commissioned the connection to leachate sump 6 as of 23-11-2016. • **May 2017 -** LGI installed an additional 10 vertical wells to the existing LFG system • **November 2019 -** LGI on site to move mainline up batter, and reconnected infrastructure that had been previously disconnected, including 4 wells on the dimple and a 160mm leachate riser. • **April 2020 -** LGI installed a flowline to sump 6 after earlier disconnection. • **February 2021 -** LGI installed 13 new vertical wells, including a new submain • **March 2022 -** LGI replaced the flare gas analyser panel with a Draeger model analyser for greater accuracy and reliability • **August 2022 -** LGI repaired the 225mm mainline and and adjacent sub main to allow for intermediate capping to continue across the top of cell 3 • **December 2022** - LGI installed a pneumatic bore pump in a jtrap, allowing for greater reliability of condensate management in the main gas line.
Comments on operation / maintenance:	Availability - 100.00% Down Time: 0.00hrs Field Tuned: - 01/03/2023 - 31/03/2023
Recommendations:	After discussion with Council, LGI will re-investigate options for leachate pumping out of gas extraction wells. We anticipate being on site to upgrade leachate infrastructure in May 2023.

Flare Operational Data:

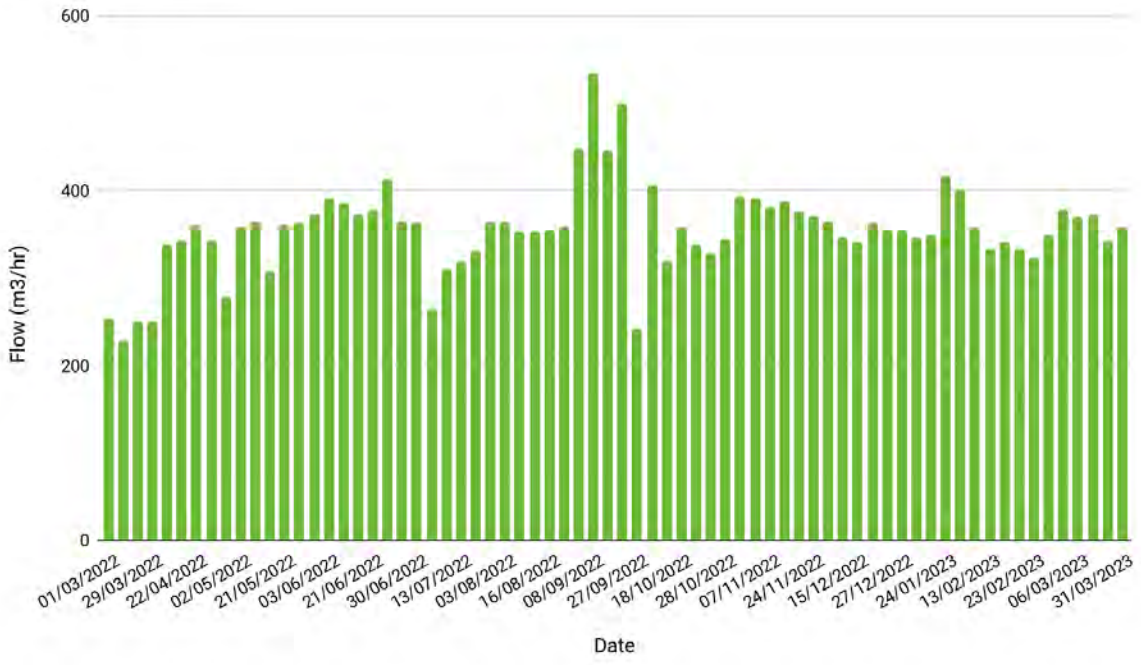
Date	CH4 %	CO2 %	O2 %	FLOW m3/h	STACK TEMP C	CUMULATIVE FLOW m3
01/03/2023	40.0	26.8	0.2	377	682	24,383,436
10/03/2023	34.0	-	0	373	615	24,462,664
16/03/2023	38.0	-	0	342	696	24,514,505
31/03/2023	39.6	30.1	0.4	358	700	24,642,826
Average	37.9	28.45	0.15	363	673	-

Dunmore- Methane, Carbon Dioxide & Oxygen

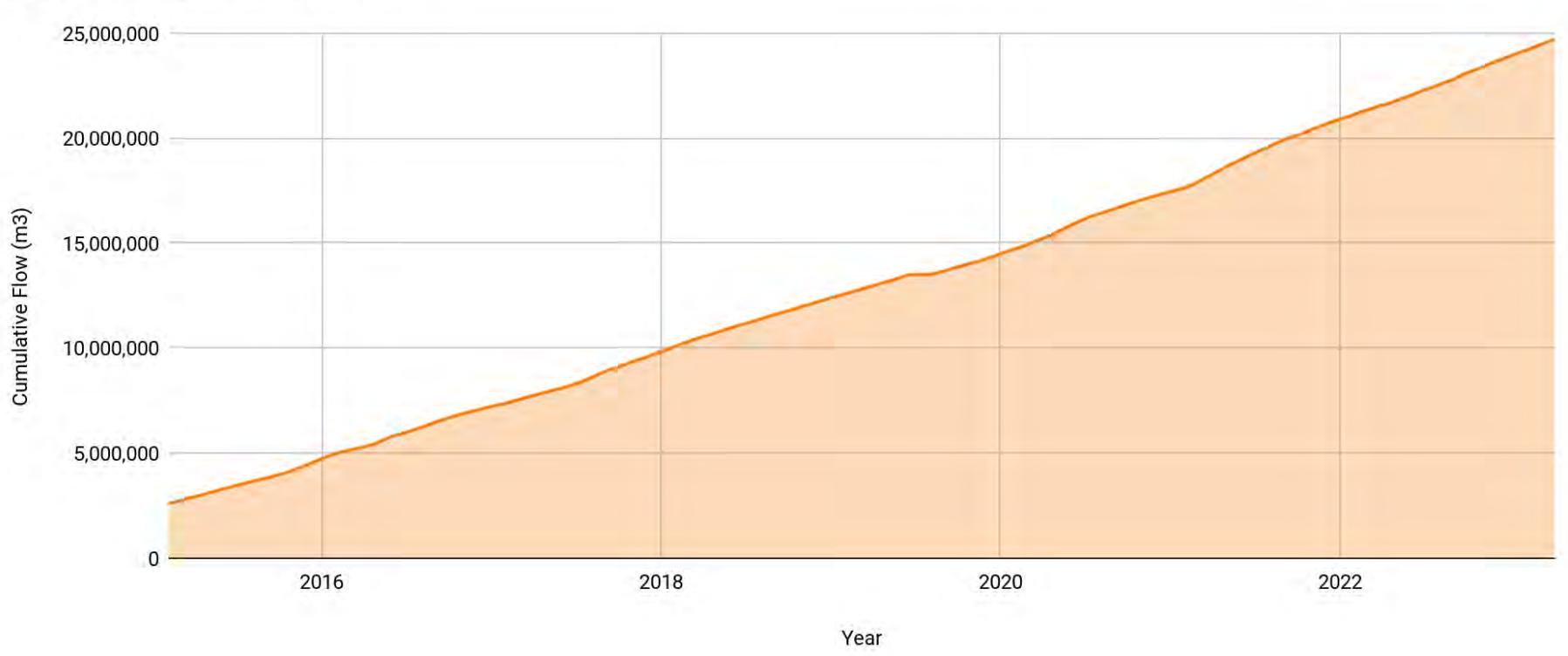


Damaged infrastructure on 02/09/2022 has allowed an influx of oxygen into the field causing readings of high O2 and low CH4.

Dunmore - Flow Rate



Dunmore - Cumulative Flow



- 24,647,231 of combusted landfill gas up to 1 April 2023, which represents;
    - 234,090 tonnes of CO2 equivalent (total methane abated by gas capture system to date).
    - 3,901,492 seedlings planted for 10 years
    - 6,304 (cars off the road for the last 12 months)
    - 92,714 Australian Carbon Credit Units
- Biogas captured is the cumulative flow reading at the last day of the month.

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PROJECT PROFILE: DUNMORE, NSW

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Results achieved since project commencement*

BIOGAS CAPTURED

25.2 million m^3

CARBON ABATEMENT

239 thousand tonnes ($t CO_2e$ - environmental benefit)

ACCUs CREATED

92 thousand Australian Carbon Credit Units (ACCUs)

SEEDLINGS PLANTED

4 million seedlings planted for 10 years ($t CO_2e$)

CARS OFF THE ROAD

6,467 for the last 12 months of carbon abatement ($t CO_2e$)

BIOGAS CAPTURE AND CARBON ABATEMENT FROM LANDFILL

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- No regulatory requirement to capture biogas, however ACCUs enable additional carbon abatement (above its **30% baseline**) from a commercially viable flaring project under the Emissions Reduction Fund (ERF).
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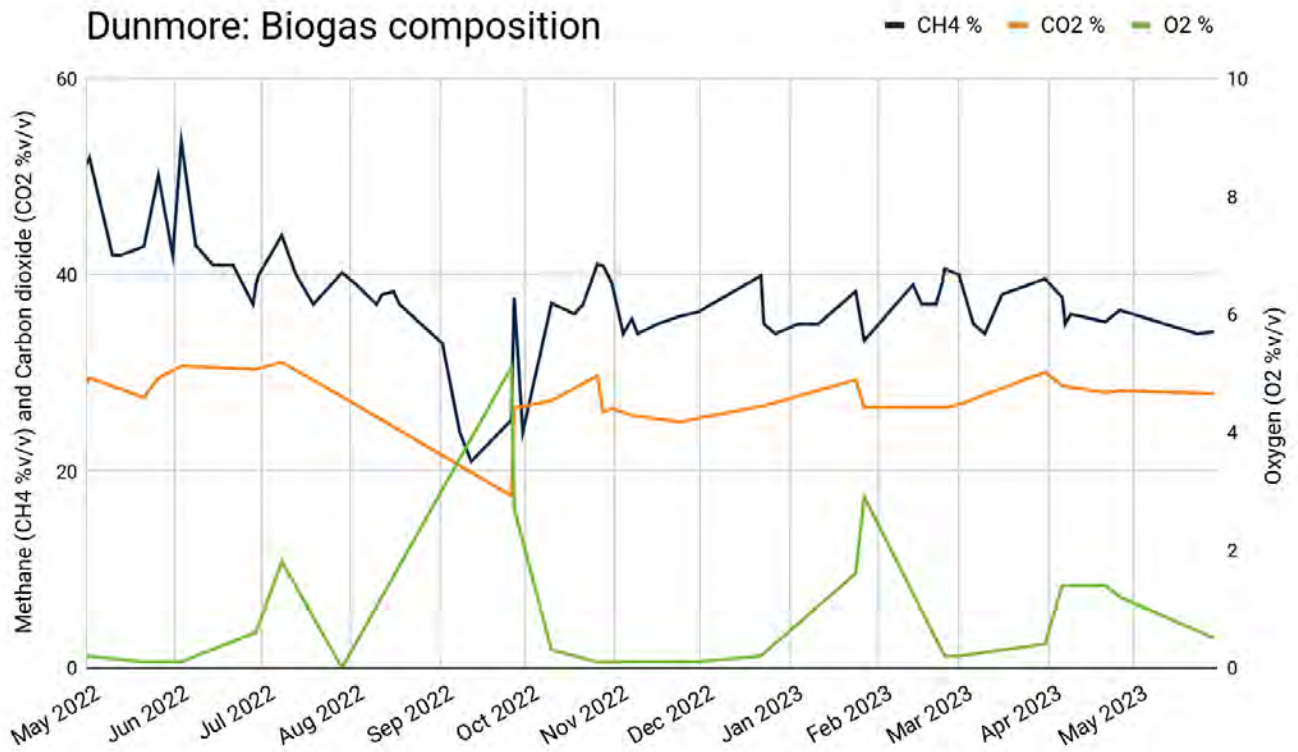
Results Achieved to 1 June 2023

Site:	Dunmore	**Report issue date:**	14/06/2023
Report month:	May 2023	**Prepared by:**	V McKay
Prepared for:	Shellharbour City Council	**Checked by:**	T Schnatz

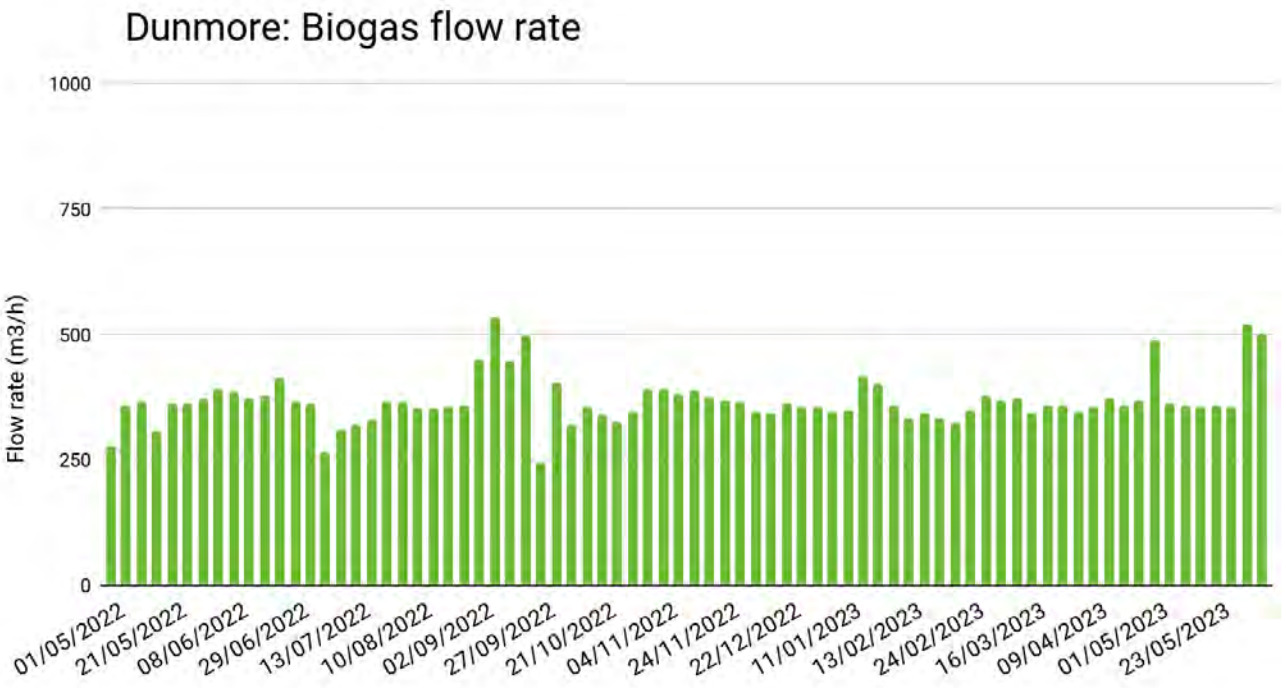
Comments on changes to existing system:	• **January 2016 -** LGI disconnected the 4 lateral wells and 8 vertical wells. • **April 2016 -** LGI reconnected 8 vertical wells in the SE corner and 4 lateral wells. • **June 2016 -** LGI disconnected the extended gas capture system to assist Council. • **September 2016 -** LGI disconnected the extended gas capture system to assist Council. • **November 2016 -** LGI commissioned the connection to leachate sump 6 as of 23-11-2016. • **May 2017 -** LGI installed an additional 10 vertical wells to the existing LFG system • **November 2019 -** LGI on site to move mainline up batter, and reconnected infrastructure that had been previously disconnected, including 4 wells on the dimple and a 160mm leachate riser. • **April 2020 -** LGI installed a flowline to sump 6 after earlier disconnection. • **February 2021 -** LGI installed 13 new vertical wells, including a new submain • **March 2022 -** LGI replaced the flare gas analyser panel with a Draeger model analyser for greater accuracy and reliability • **August 2022 -** LGI repaired the 225mm mainline and and adjacent submain to allow for intermediate capping to continue across the top of cell 3 • **December 2022 -** LGI installed a pneumatic bore pump in a j-trap, allowing for greater reliability of condensate management in the main gas line. • **May 2023 -** LGI installed a series of 3 pneumatic bore pumps at various wells with evacuated leachate being returned into sump 5.
Comments on operation / maintenance:	Availability - 99.83 % Down Time: 1.25 h 1.25 h - Planned maintenance Field Tuned: - 30/05/2023
Recommendations:	LGI recommends continued regular communication with Council regarding leachate management, site performance, and future planning.

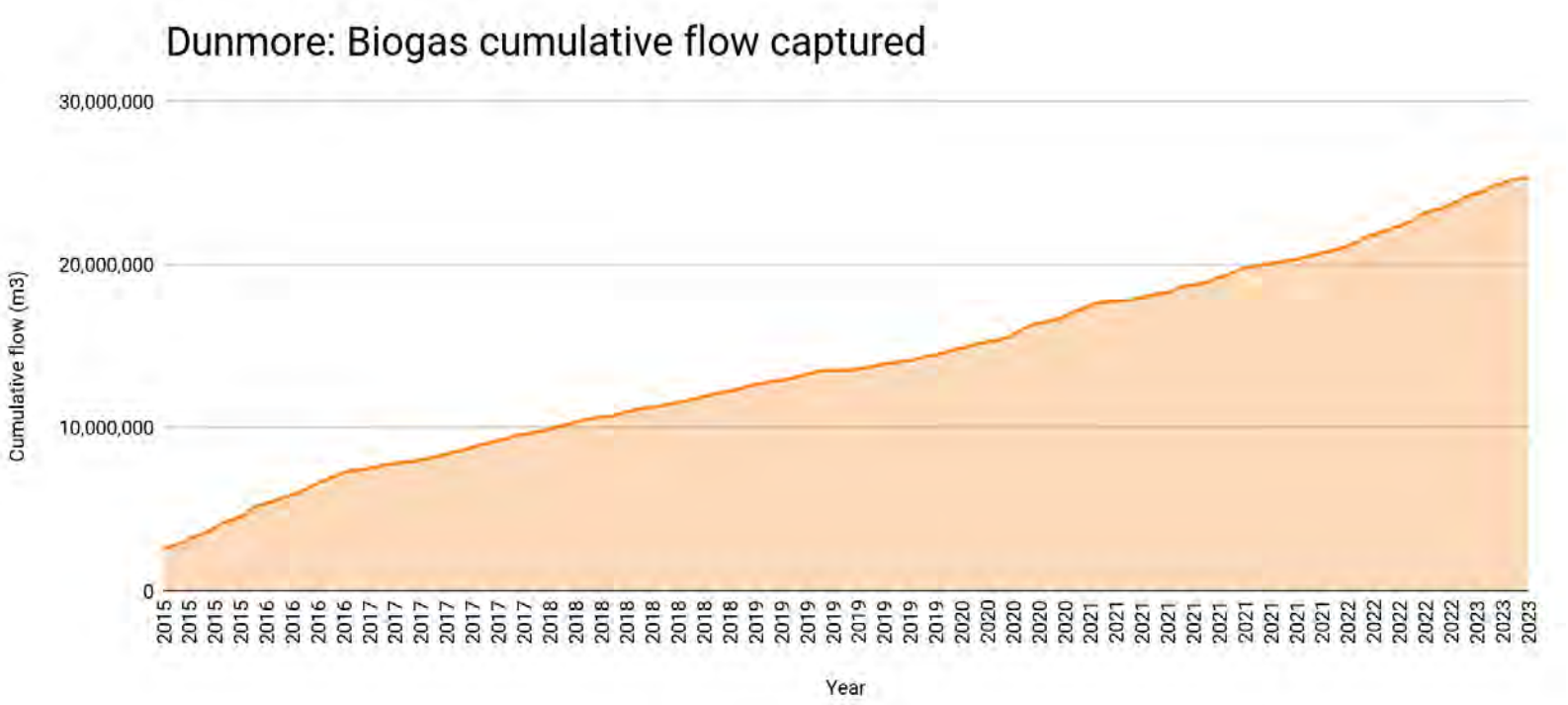
FLARE OPERATIONAL DATA (*based upon on-site technical readings):*

Date	CH4 (%v/v)	CO2 (%v/v)	O2 (%v/v)	FLOW (m3/h)	STACK TEMP (°C)	CUMULATIVE FLOW (m3)
11/05/2023	-	-	-	360	580	24,991,860
18/05/2023	-	-	-	356.9	609	25,052,697
23/05/2023	34	-	-	359	591	25,099,144
29/05/2023	34.2	27.9	0.5	521	969	25,148,776
Average	34.1	27.9	0.5	399	687	-



Note: Infrastructure damage on 02/09/2022 resulted in oxygen ingress into the field





25,176,026 m^3 of combusted landfill gas up to 1 June 2023, which represents;

- 239,112 tonnes of CO_2 equivalent (total methane abated by gas capture system to date).
- 3,985,197 seedlings planted for 10 years
- 6,467 (cars off the road for the last 12 months)
- 92,714 Australian Carbon Credit Units (ACCUs)

Biogas captured is the cumulative flow reading at the last day of the month.

Please note:

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PEOPLE ENGINEERING A CLEAN ENERGY, ZERO CARBON FUTURE.

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PROJECT PROFILE: DUNMORE, NSW

We are **people engineering a clean energy, zero carbon future**, achieving our mission of **expediting the transformation to renewables by delivering clean energy and lower carbon solutions, reliably, effectively, commercially for our customers.**

To achieve our vision and mission we put people first and this makes us different from all the rest.

Results achieved since project commencement*

BIOGAS CAPTURED

25.4 million m^3

CARBON ABATEMENT

241 thousand tonnes ($t CO_2$-e - environmental benefit)

ACCUs CREATED

92 thousand Australian Carbon Credit Units (ACCUs)

SEEDLINGS PLANTED

4 million seedlings planted for 10 years ($t CO_2$-e)

CARS OFF THE ROAD

6,388 for the last 12 months of carbon abatement ($t CO_2$-e)

BIOGAS CAPTURE AND CARBON ABATEMENT FROM LANDFILL

- Long-term contract with Shellharbour City Council to recover and beneficially use biogas and abate carbon from this regional landfill in Dunmore. This improves air quality, reduces greenhouse gas emissions and contributes to the local economy.
- No regulatory requirement to capture biogas, however ACCUs enable additional carbon abatement (above its **30% baseline**) from a commercially viable flaring project under the Emissions Reduction Fund (ERF).
- Since 2013, LGI has installed a bespoke biogas management system with an LGI 1000 ERF compliant biogas flare. Council benefits from this bespoke system at minimal cost.
- LGI collaborates closely with the Council regarding the design, installation, operations and maintenance of the biogas management system, including the monitoring and reporting services provided.

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Saving the planet one landfill, one megawatt, one solar panel, one battery at a time

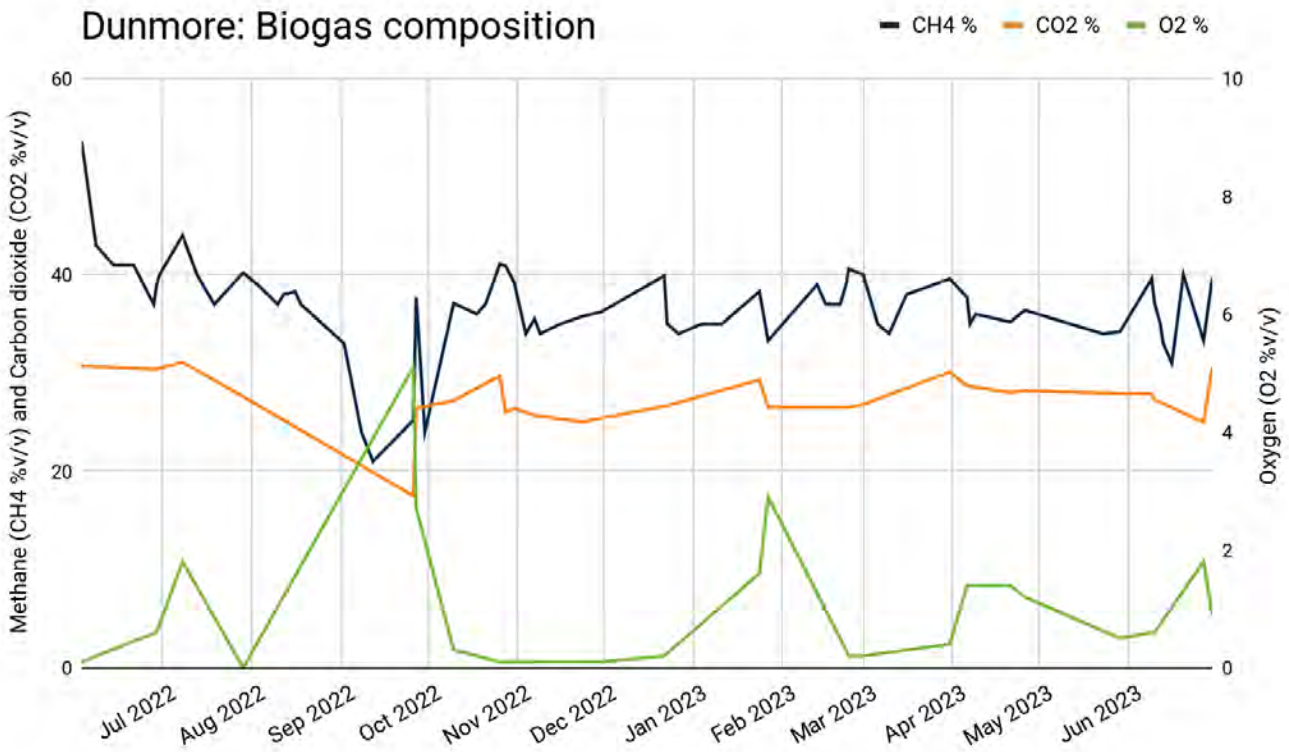
*Results achieved to 1 July 2023

Site:	Dunmore	**Report issue date:**	12/07/2023
Report month:	June 2023	**Prepared by:**	V McKay
Prepared for:	Shellharbour City Council	**Checked by:**	T Schnatz

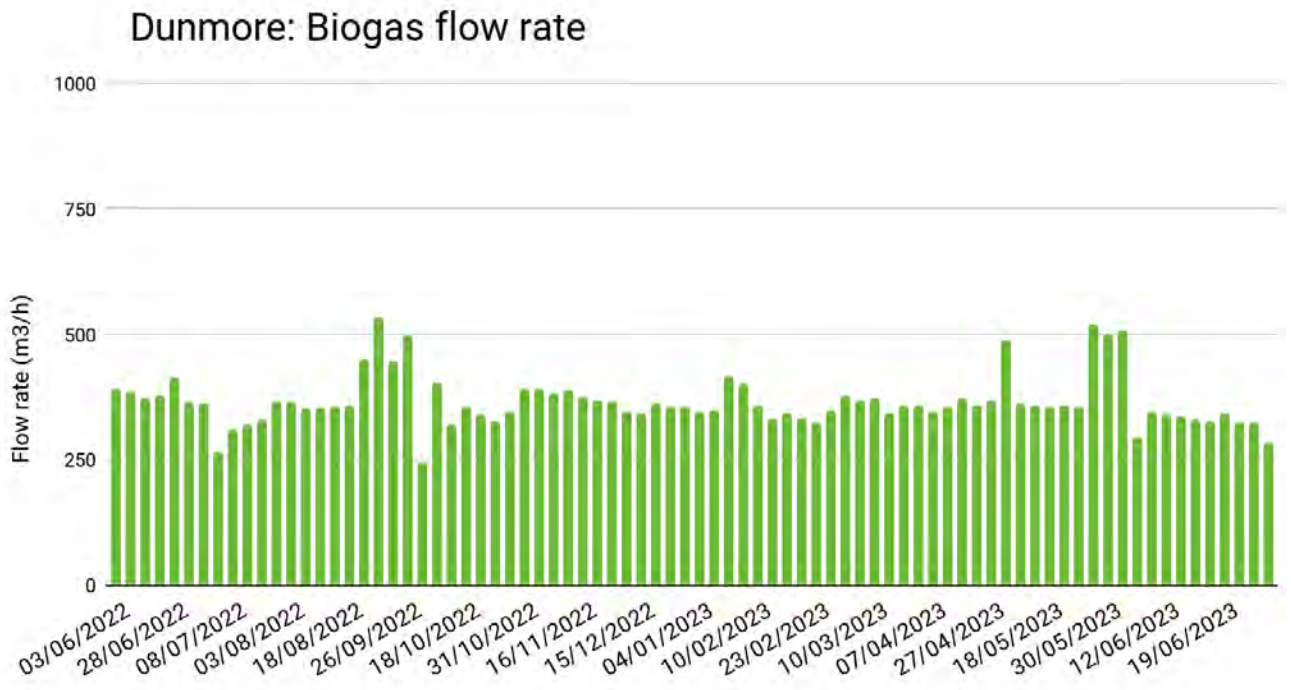
Comments on changes to existing system:	• **January 2016 -** LGI disconnected the 4 lateral wells and 8 vertical wells. • **April 2016 -** LGI reconnected 8 vertical wells in the SE corner and 4 lateral wells. • **June 2016 -** LGI disconnected the extended gas capture system to assist Council. • **September 2016 -** LGI disconnected the extended gas capture system to assist Council. • **November 2016 -** LGI commissioned the connection to leachate sump 6 as of 23-11-2016. • **May 2017 -** LGI installed an additional 10 vertical wells to the existing LFG system • **November 2019 -** LGI on site to move mainline up batter, and reconnected infrastructure that had been previously disconnected, including 4 wells on the dimple and a 160mm leachate riser. • **April 2020 -** LGI installed a flowline to sump 6 after earlier disconnection. • **February 2021 -** LGI installed 13 new vertical wells, including a new submain • **March 2022 -** LGI replaced the flare gas analyser panel with a Draeger model analyser for greater accuracy and reliability • **August 2022 -** LGI repaired the 225mm mainline and and adjacent submain to allow for intermediate capping to continue across the top of cell 3 • **December 2022 -** LGI installed a pneumatic bore pump in a j-trap, allowing for greater reliability of condensate management in the main gas line. • **May 2023 -** LGI installed a series of 3 pneumatic bore pumps at various wells with evacuated leachate being returned into sump 5.
Comments on operation / maintenance:	Availability - 84.99 % Down Time: 108.08 h 0.17 h - Planned maintenance (attempted TC repair) 53.58 h - Forced outage external (mains failure) 54.33 h - Forced outage internal (TC fault) Field tuned: - 01/06/2023 - 10/06/2023 - 30/06/2023
Recommendations:	LGI recommends continued regular communication with Council regarding leachate management, site performance and future planning.

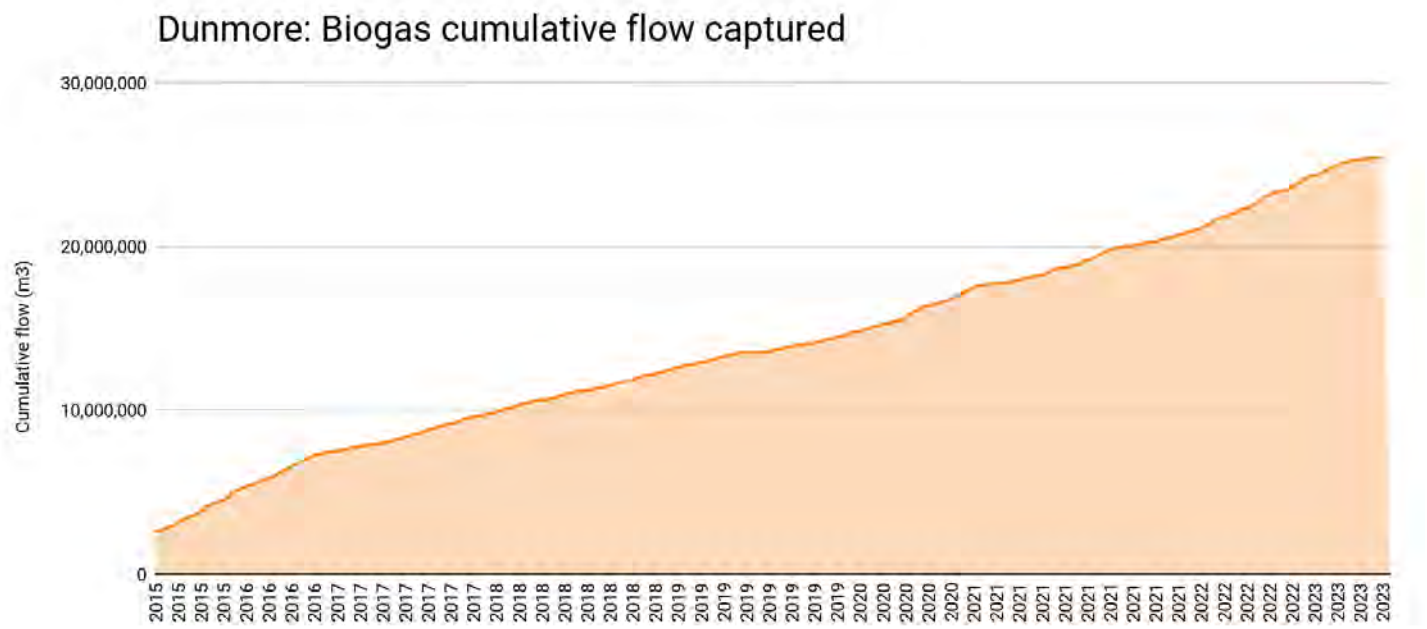
FLARE OPERATIONAL DATA (*based upon on-site technical readings):*

Date	CH_4 (%v/v)	CO_2 (%v/v)	O_2 (%v/v)	FLOW (m^3/h)	STACK TEMP (°C)	CUMULATIVE FLOW (m^3)
10/06/2023	37.1	27.3	0.6	345	711	25,270,471
16/06/2023	31.0	-	-	328	650	25,314,777
27/06/2023	33.3	25.0	1.8	322	636	25,383,280
30/06/2023	39.7	30.6	0.9	284	648	25,396,318
Average	35.3	27.6	1.1	320	661	-



Note: Infrastructure damage on 02/09/2022 resulted in oxygen ingress into the field





25,400,015 m^3 of combusted landfill gas from the beginning of the project up to 1 July 2023 represents:

- 241,239 tonnes of CO_2 equivalent (total methane abated by gas capture system to date).
- 4,020,653 seedlings planted for 10 years
- 6,388 (cars off the road for the last 12 months)
- 92,714 Australian Carbon Credit Units (ACCUs)

Biogas captured is the cumulative flow reading at the last day of the month.

Total biogas captured in the 2023 financial year (23FY Qlfg): 3,114,331 m^3

Total carbon abatement from biogas captured in the 2023 financial year (23FY): 29,579 t CO_2-e

Please note:

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WWW.LGI.COM.AU

PROJECT PROFILE: DUNMORE, NSW

We expedite the transition to renewables with clean energy and carbon abatement solutions. Carbon credits enable a commercially viable project to create additional abatement.

Results Achieved since the Project Commenced*

BIOGAS CAPTURED	CARBON ABATEMENT	ACCUs CREATED	SEEDLINGS PLANTED	CARS OFF THE ROAD
26.3 million m3	250 thousand tonnes (t CO2e - environmental benefit)	92 thousand Australian Carbon Credit Units (ACCUs)	4.2 million seedlings planted for 10 years (t CO2e)	6,017 for the last 12 months of carbon abatement (t CO2e)

BIOGAS CAPTURE AND CARBON ABATEMENT FROM LANDFILL

- Long-term contract with Shellharbour City Council to recover and beneficially use biogas and abate carbon from this regional landfill in Dunmore. This improves air quality, reduces greenhouse gas emissions and contributes to the local economy.
- No regulatory requirement to capture biogas, however ACCUs enable additional carbon abatement (above its **30% baseline**) from a commercially viable flaring project under the Emissions Reduction Fund (ERF).
- Since 2013, LGI has installed a bespoke biogas management system with an LGI 1000 ERF compliant biogas flare. Council benefits from this bespoke system at minimal cost.
- LGI collaborates closely with the Council regarding the design, installation, operations and maintenance of the biogas management system, including the monitoring and reporting services provided.

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Saving the planet one landfill, one megawatt, one solar panel, one battery at a time

*Results achieved to 1 November 2023

Site:	Dunmore	**Report issue date:**	13/11/2023
Report month:	October 2023	**Prepared by:**	Grace Tap
Prepared for:	Shellharbour City Council	**Checked by:**	Brendan Fraser

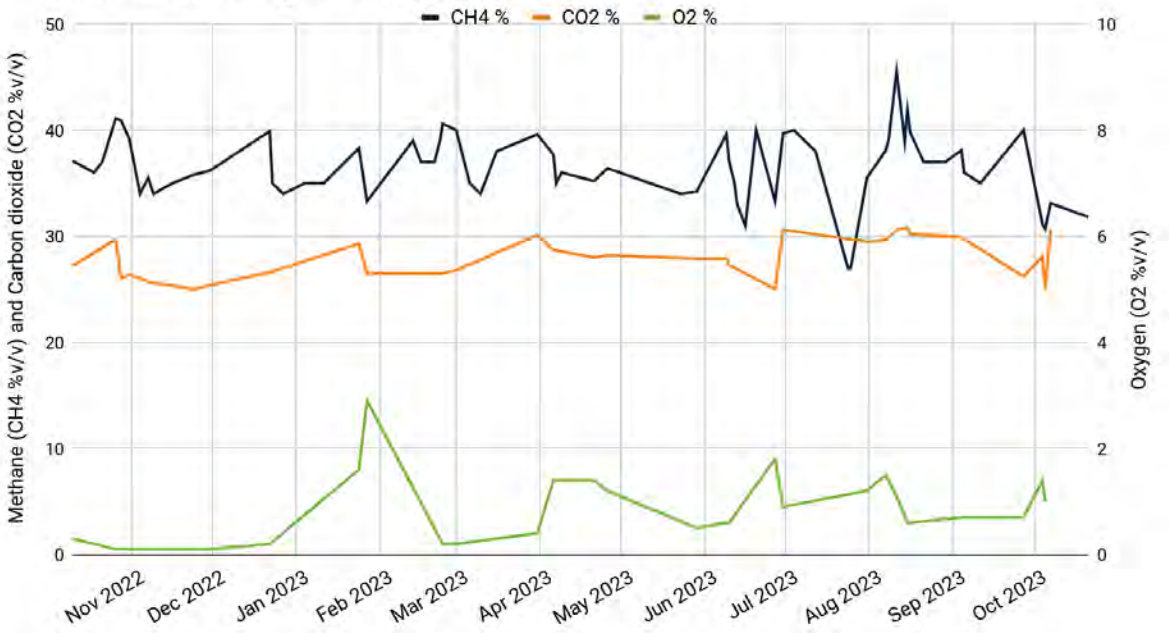
Comments on changes to existing system:	• **January 2016** - LGI disconnected the 4 lateral wells and 8 vertical wells. • **April 2016** - LGI reconnected 8 vertical wells in the SE corner and 4 lateral wells. • **June 2016** - LGI disconnected the extended gas capture system to assist Council. • **September 2016** - LGI disconnected the extended gas capture system to assist Council. • **November 2016** - LGI commissioned the connection to leachate sump 6 as of 23-11-2016. • **May 2017** - LGI installed an additional 10 vertical wells to the existing LFG system • **November 2019** - LGI on site to move mainline up batter, and reconnected infrastructure that had been previously disconnected, including 4 wells on the dimple and a 160mm leachate riser. • **April 2020 -** LGI installed a flowline to sump 6 after earlier disconnection. • **February 2021** - LGI installed 13 new vertical wells, including a new submain • **March 2022** - LGI replaced the flare gas analyser panel with a Draeger model analyser for greater accuracy and reliability • **August 2022** - LGI repaired the 225mm mainline and and adjacent submain to allow for intermediate capping to continue across the top of cell 3 • **December 2022** - LGI installed a pneumatic bore pump in a j-trap, allowing for greater reliability of condensate management in the main gas line. • **May 2023** - LGI installed a series of 3 pneumatic bore pumps at various wells with evacuated leachate being returned into sump 5. • **June 2023** - LGI installed a series of 2 pneumatic bore pumps at various wells with evacuated leachate being returned into sump 5. **- October 2023** - LGI replaced the flare with a brand new flare of identical capacity. The new flare has improved control systems, reliability and performance, and will be compliant with current Type B Gas and Hazardous Area Zoning regulations.
Comments on operation / maintenance:	Availability - 82.27 % Down Time: 131.92 h 32h - Planned Outage 99.92h - Forced Outage External Field tuned: - 04/10/2023 - 16/10/2023 - 26/10/2023 - 27/10/2023
Recommendations:	LGI recommends continued regular communication with Council regarding leachate management, site performance and future planning.

Flare Operational Data:

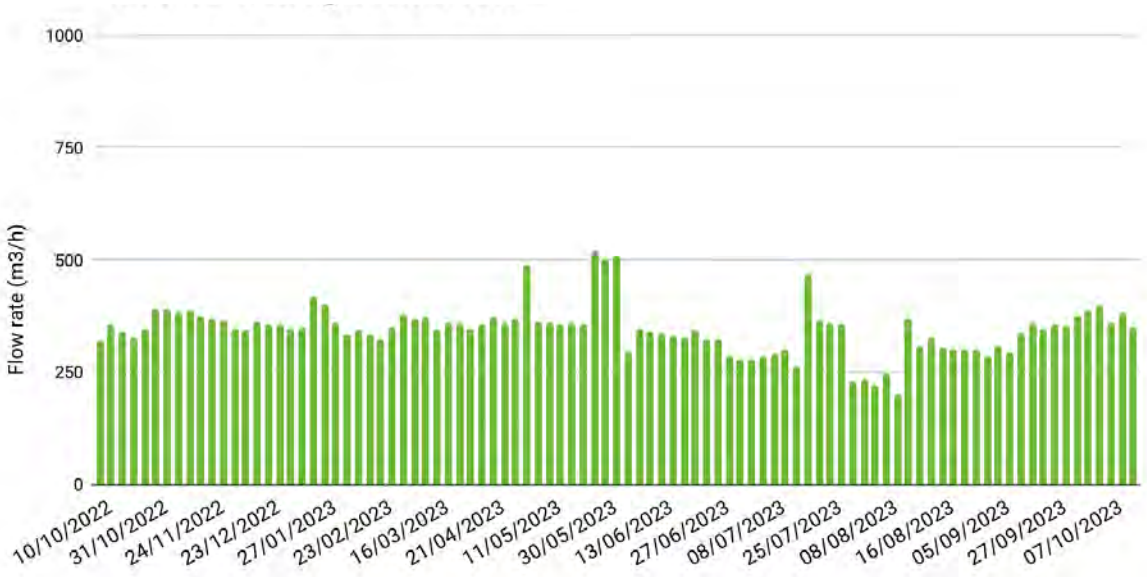
Date	CH4 (%v/v)	CO2 (%v/v)	O2 (%v/v)	FLOW (m3/h)	STACK TEMP (°C)	CUMULATIVE FLOW (m3)
04/10/2023	31.1	28.1	1.4	388	710	26,109,567
07/10/2023	33.1	30.7	-	359	538	13,480,830
20/10/2023	-	-	-	380	715	13,582,154
21/10/2023	31.8	-	-	350	629	26,230,880
Average	32.0	29.4	1.4	369	648	-

Dunmore- Methane, Carbon Dioxide & Oxygen

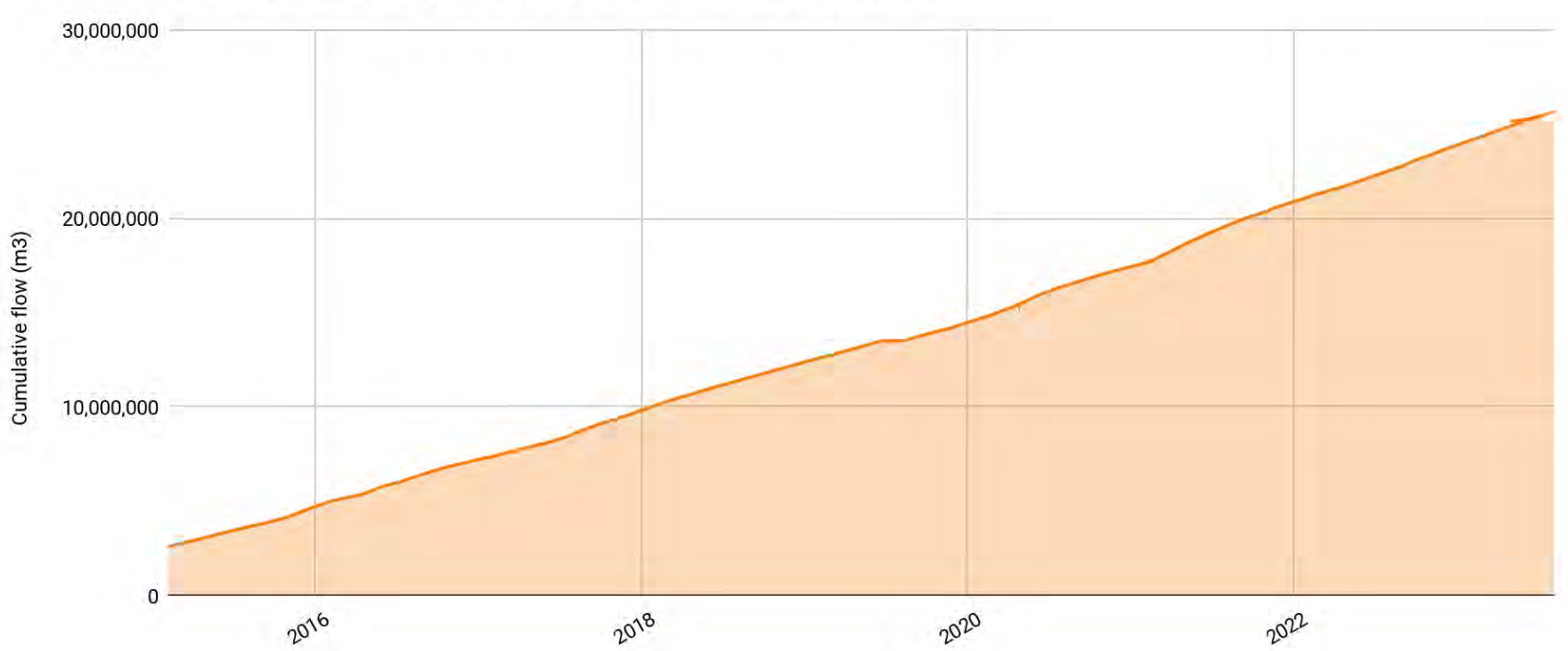
Damaged infrastructure on 02/09/2022 has allowed an influx of oxygen into the field causing readings of high O2 and low CH4.



Dunmore - Flow Rate



Dunmore - Cumulative Flow



26,293,928 m3 of combusted landfill gas from the beginning of the project up to 1 November 2023 represents:

- 249,729 tonnes of CO2 equivalent (total methane abated by gas capture system to date).
- 4,162,154 seedlings planted for 10 years
- 6,017 (cars off the road for the last 12 months)
- 92,714 Australian Carbon Credit Units (ACCUs)

Biogas captured is the cumulative flow reading at the last day of the month.

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