Quarterly Environmental Monitoring Report (QEMR)

Q3 June 2025

Project No: ENRS0033
Address: Dunmore Recycling & Waste Depot, 55 Buckleys Road, Dunmore, NSW
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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 Quarterly Environmental Monitoring Report (QEMR) for the Dunmore Recycling and Waste Depot (herein referred to as the Site).

This (QEMR) summarises the results of field testing and laboratory analysis conducted by ALS for the third quarter (Q3) of the 2024-2025 monitoring period. Environmental monitoring is conducted by ALS over four (4) quarterly sampling events which and provides the necessary data assessment and analysis to meet requirements of the Site's Environment Protection Licence/s (EPL's); No.5984.

The Site was established in 1945 and has been managed by Shellharbour City Council (SSC) since 1983. The Site is an active landfill and 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. The Site contains multiple landfill cells consisting of a historic legacy cell and multiple lined cells.

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 (3) 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. ENRS note that EPL No. 12903 does not specify any monitoring or sampling requirements.

EPL No. 5984 specifies the environmental monitoring requirements of the landfill which includes quarterly sampling and analysis of groundwater, surface water, leachate, landfill gas and depositional dust. A copy of the relevant EPL sections outlining the sampling requirements is provided in Appendix A (EPL No. 5984).

The objectives of this AEMR are to:

- Meet the environmental monitoring requirements of Sites EPLs; No. 5984;
- 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 a Quarterly Environmental Monitoring Report.

1.1 Scope of Work

The scope of work for this QEMR comprised the collation, assessment and reporting of Site data made available to ENRS from the monitoring events in regard to the following tasks:

- Review previous reports and document the hydrogeological setting;
- Tabulate results of all monitoring data for water, dust samples and methane gas collected and provided by ALS and landfill gas flare temperatures collected by LGI, as required by the EPLs for the respective reporting period.
- Analysis and interpretation of all monitoring data (water, dust, methane gas, gas flare temperatures);
- Review the quarterly environmental monitoring data and reports from the first quarterly sampling event and compare against data from at least 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 this quarterly 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. Depth to groundwater was <5mBGL. 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 quarterly monitoring period reported exceedances above the assessment criteria for; ammonia, heavy metals and nitrate within groundwater wells across the Site. The analytes were considered to be key indicators of leachate. The exceedances were within range of historical values with no significant changes in concentrations;
- Offsite sample locations within Rocklow Creek generally reported concentrations of analytes below the SAC. However, concentrations of ammonia were generally reported slightly above the ecological stressor value;
- Surface gas methane monitoring of the landfill cap 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;

- Gas Flare temperatures were reported below the required KPI of 760 degrees Celsius;
- Based on the data reviewed for the quarterly monitoring period, contaminants associated with the landfill cell, leachate dam/s and general site uses were present within groundwater and consistent with the historical data;
- 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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2 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 Quarterly Environmental Monitoring Report (QEMR) for the Dunmore Recycling and Waste Depot (herein referred to as the Site).

This (QEMR) summarises the results of field testing and laboratory analysis conducted by ALS for the third quarter (Q3) of the 2024-2025 monitoring period. Environmental monitoring is conducted by ALS over four (4) quarterly sampling events which and provides the necessary data assessment and analysis to meet requirements of the Site's Environment Protection Licence/s (EPL's); No.5984.

2.1 Project Background

2.1.1 Site History

The Site was established in 1945 and has been managed by Shellharbour City Council (SSC) since 1983. The Site is an active landfill and 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. The Site contains multiple landfill cells consisting of a historic legacy cell and multiple lined cells.

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 (3) 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.

2.2 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:

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EPL No. 5984 specifies the environmental monitoring requirements of the landfill which includes quarterly sampling and analysis of groundwater, surface water, leachate, landfill gas and

depositional dust. A copy of the relevant EPL sections outlining the sampling requirements is provided in Appendix A (EPL No. 5984).

2.3 Objectives

The objectives of this AEMR are to:

- Meet the environmental monitoring requirements of Sites EPLs; No. 5984;
- 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
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2.4 Scope of Work

The scope of work for this QEMR comprised the collation, assessment and reporting of Site data made available to ENRS from the monitoring events in regard to the following tasks:

- Review previous reports and document the hydrogeological setting;
- Tabulate results of all monitoring data for water, dust samples and methane gas collected and provided by ALS and landfill gas flare temperatures collected by LGI, as required by the EPLs for the respective reporting period.
- Analysis and interpretation of all monitoring data (water, dust, methane gas, gas flare temperatures);
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- 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.

3 Site Identification

3.1 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
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)	54.78 hectares
Site dimensions	Irregular shaped boundary. 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; • Contaminated Land Management Act 1997; • Environment Protection Act 1997; • Waste Avoidance and Resource Recovery Act (2001). • Work Health and Safety Act 2011; and • Work Health and Safety Regulations 2011.
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: Nearmap.com.au (cited 15/10/2024)

3.2 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.

3.2.1 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.

3.3 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.

3.4 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 the Mangrove Creek Estuarine (mc) organic, black, massive sandy loam topsoil overlying loose bleached light grey sand with iron staining in the subsoil.

Landscape – vegetated tidal flats in estuarine areas on Holocene sediments. Relief <3 m. Slopes <3%. Mangrove open-scrub, saltmarsh herbland, sedgeland and low open-forest

Soils - deep (>150 cm) Siliceous Sands (Uc1.21) and Calcareous Sands (Uc1.11) and Solonchaks (Uc1.11) occur on mangrove flats. Humic Gley Soils (Uc4.53) and Solonchaks (Uc1.11) occur on saltmarshes.

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.

3.5 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.

3.6 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.

3.6.1 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.

3.6.2 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.

3.7 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.

4 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.

4.1 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)

4.1 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	-	-	-	-
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:

4.1.1 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 14-2 attached.

4.2 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.

4.3 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.

4.4 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).

5 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).

5.1 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.

5.2 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 a Quarterly Environmental Monitoring Report.

5.3 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 Quarterly Environmental Monitoring Report.

5.4 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.

5.5 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.

5.6 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**.

5.7 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.

DQO	Evaluation Criteria
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.

6 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.

6.1 Water Sampling

6.1.1 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.

6.1.2 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.

6.1.3 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.

6.1.4 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.

6.1.5 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).

6.2 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.

6.3 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.

6.4 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.

6.5 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.

6.6 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.

6.7 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.

7 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 14-1 and Table 14-2 with comparison against the relevant Site Assessment Criteria (SAC). The laboratory certificates of analysis are provided in Appendix B, Appendix C, Appendix D and Appendix E.

7.1 Overflow Results

ENRS understands that no overflow events occurred during the Q3 monitoring period at the overflow point SWP1 (EPA Point 1).

7.2 Physical Indicators

7.2.1 Groundwater Depth

The measured depth to groundwater remained relatively consistent with a low degree of variance in comparison to the historical data. The Site was charactered by a shallow water table of less than 5.0 mBGL. The depth to water was measured between:

- Quarter 3 June 2025: 0.75 mbgl (BH15) and 4.28 mbgl (BH18).

7.2.2 Salinity

Salinity is reported by the laboratory as either Electrical Conductivity (EC) or Total Dissolved Solids (TDS). The ANZECC guidelines document a conversion ratio 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 monitoring period, salinity in groundwater samples was generally characterised by freshwater EC values in the upgradient northern portions of the Sites, tending to become more saline towards Rocklow Creek, being a tidal river system. Results for groundwater were reported between

441 µS/cm (BH18) and 6,870 µS/cm (BH1c). The results were all considered to be in range of historical values.

Surface Waters

Surface water samples collected from Rocklow Creek reported EC values between 5,390 µS/cm (SWC_UP) and 7,160 µS/cm (SWC_Down_2). EC values were consistent with the saline conditions of a tidal river system and may fluctuate due to Rocklow Creek being a tidal system.

Result for onsite surface water location SWP1 was reported at 1,640 µS/cm, which was below the TV and consistent with historical data.

7.2.3 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 and converted to a percentage.

Surface Waters

Dissolved Oxygen within onsite surface water location SWP-1 was 5.22 mg/L or 51.8%. The results were outside of the TV and consistent with historical data.

Results for DO at offsite surface water locations within Rocklow Creek ranged from 7.31 mg/L or 71.4% (SWC_2) to 8.11 mg/L or 77.6% (SWC_down). The results were generally consistent with the historical data.

Leachate

Dissolved oxygen within leachate tank LP1 was 8.59 mg/L or 92.5%. Results were within range of the historical data.

7.2.4 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 for pH in groundwater were reported between 6.6 (BH22) and 7.3 (BH19R). The results were relatively neutral and within the SAC. No exceedances were recorded, and the results were considered satisfactory and within range of historical data.

Surface Water

Results for pH at all surface water monitoring points of Rocklow Creek reported neutral conditions of 7.3 (SWC_2, SWC_UP, SWC_DOWN, SWC_DOWN_2). The pH of SWP-1 onsite surface water location was 8. All results were within the SAC and range of historical values.

Leachate

The pH of leachate tank LP1 was slightly elevated at 8.2 which was within the range of historical values.

7.2.5 Total Suspended Solids (TSS)

TSS was measured for surface water sample points only. 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.

Results for TSS in Rocklow Creek samples ranged from 6 mg/L (SWC_DOWN) to 9 mg/L (SWC_UP). The results were within range of historical values.

TSS recorded in onsite SWP1 was 17 mg/L, which was within range of historical values.

7.3 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.

7.3.1 Ammonia

Groundwater

Results for ammonia in groundwater were reported in exceedance of all the SAC (ESLs of 0.2 mg/L, 0.91 mg/L and pH modified TV's) in all sample locations. Results were considered to be significantly above the SAC and within range of the previous values. A table outlining the ammonia results is provided in Table 14-2 attached.

Surface Water

Ammonia in onsite surface water dam SWP-1 was reported at 1.7 mg/L which was above the minimum SAC of 0.2 mg/L and the 95% TV.

Ammonia concentrations in Rocklow Creek were reported at 0.18 mg/L (SWC_down). 0.22 mg/L (SWC_DOWN_2) and 0.26 mg/L (SWC_2, SWC_Up). Most results in Rocklow Creek

were above the ecological stressor value or 0.2 mg/L. The results were below the 95% trigger values.

Leachate

Ammonia in leachate tank LP1 was 0.31 mg/L. The result was low in comparison to previous sampling events.

7.3.2 Nitrate

Groundwater

Results for Nitrate in groundwater samples reported a mix of satisfactory results and exceedances above the SAC was in line with historical data. Five (5) exceedances were reported above the SAC of 0.7mg/L in BH21 0.73 mg/L, BH13 7.64 mg/L, BH12r 10.3 mg/L, BH3 12.7mg/L and BH14 16.40mg/L. All other monitoring wells reported satisfactory results.

Surface Water

Nitrate in onsite surface water dam SWP-1 was reported at 0.54 mg/L which exceeds the SAC.

Nitrate concentrations for all off-site surface water samples in Rocklow Creek were reported below the SAC and were considered satisfactory.

Leachate

The nitrate concentration in leachate tank LP1 was 332 mg/L, these results were consistent with historical data. Increased concentrations of nitrate may be a characteristic of untreated leachate.

7.3.3 Nitrite

Results for nitrite in all groundwater, surface water and Leachate Tank LP1 were all reported below the SAC. The results were reported within range of historical values

7.4 Anions

7.4.1 Chloride

Ground Water

The results for chloride in groundwater varied across the Site. Elevated chloride results were measured within Rocklow Creek which may be characteristic of a marine tidal river system. In comparison, upgradient groundwater results reported slightly lower chloride concentrations. Results for chloride within groundwater monitoring wells were reported between 13mg/L (BH18) and 876 mg/L (BH1C).

Surface Water

Onsite surface water dam SWP1 reported concentrations of chloride of 156 mg/L. Off-site creek surface water results ranged from 1420 mg/L (SWC_UP) to 2360 mg/L (SWC_DOWN). All levels were deemed consistent with normal ranges and historical values.

Leachate

Chloride within Leachate Tank LP1 was 644 mg/L.

7.4.2 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.

7.4.3 Sulphate

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

7.4.4 Total Alkalinity

7.4.5 Total and Bicarbonate Alkalinity

Alkalinity is a measure of the ability of water to neutralize acids, specifically related to the presence of bicarbonate ions (HCO_3^-). At a landfill, groundwater can be affected by various contaminants from decomposing waste, and the bicarbonate alkalinity plays an important role in mitigating some of the environmental impacts. Bicarbonate alkalinity acts as a buffer to maintain the pH of water. Typical bicarbonate alkalinity levels in freshwater range from 20 to 200 mg/L and marine water of 1200 to 2500 mg/L.

Total and bicarbonate alkalinity in groundwater results ranged between 202 mg/L (BH18) and 2,300 mg/L (BH1C) which were all considered within range.

Surface waters were consistent with historical data and within the normal expected range.

7.5 Metals

7.5.1 Manganese (Total Mn)

Results for manganese in all groundwater, surface water and leachate tanks samples were reported below the 95% TV of 1.9 mg/L which was considered satisfactory.

7.5.2 Iron (total Fe)

Total iron was measured in surface water and leachate tank LP1 only. Surface water samples in Rocklow Creek were reported between 0.14 mg/L (SWC_Down, SWC_Down_2) and 0.18 mg/L (SWC_2, SWC_up). Total iron in leachate tank LP1 was 0.84 mg/L. The results were generally consistent with historical data.

7.5.3 Iron (Dissolved Fe)

Concentrations of dissolved iron in groundwater ranged from 0.24mg/L (BH19R) – 22.1 mg/L (BH22). The results were generally consistent with the historical data.

7.6 Calcium

Results for calcium in groundwater reported results between 61 mg/L (BH18) and 219 mg/L (BH9).

Results for calcium in Rocklow creek surface water samples were reported between 62 mg/L (SWC_Up) and 74 mg/L (SWC_Down 2). Results for calcium in onsite dam SWP1 was 82 mg/L. Calcium in leachate tank LP1 was 156 mg/L.

7.7 Potassium

Elevated potassium levels in groundwater near a landfill could be an indicator of contamination. Leachate from decomposing organic waste in landfills can contribute to higher concentrations of potassium, especially from fertilizers and other waste materials. High potassium concentrations in landfill leachate might reflect the breakdown of organic waste (e.g., food or agricultural waste) containing potassium-rich compounds.

Results for potassium in groundwater and surface water generally reported results considered to be normal levels, and within range of the historical data. Higher elevated results were only reported in BH1c groundwater sample at 206mg/L.

7.8 Organic Analytes

7.8.1 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 and surface water samples were generally low and consistent with historical data.

TOC in leachate tank LP1 was reported at 166 mg/L which was generally consistent with historical data.

8 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 between the dates of 02/05/2025 - 02/06/2025. Sampling was conducted in general accordance with AS3580.10.1. Dust gauge locations are provided in **Figure 14-1** attached. A summary of the 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/m^2/month)	Comment
Quarter 3 02/05/2025 - 02/06/2025	DDG1	4	0.3	Below SAC
	DDG2		0.1	Below SAC
	DDG3		0.8	Below SAC
	DDG4		2.9	Below SAC

Results for depositional dust sampling during the Q3 2025 monitoring periods reported satisfactory levels of dust, below the adopted assessment criteria of 4 g/m^2/month. Continue monitoring in accordance with EPL 5984.

9 Methane Monitoring Results

9.1 Surface Gas Methane

The surface gas monitoring for the Q3 2025 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 D**.

9.2 Gas Accumulation Monitoring in Enclosed Structures

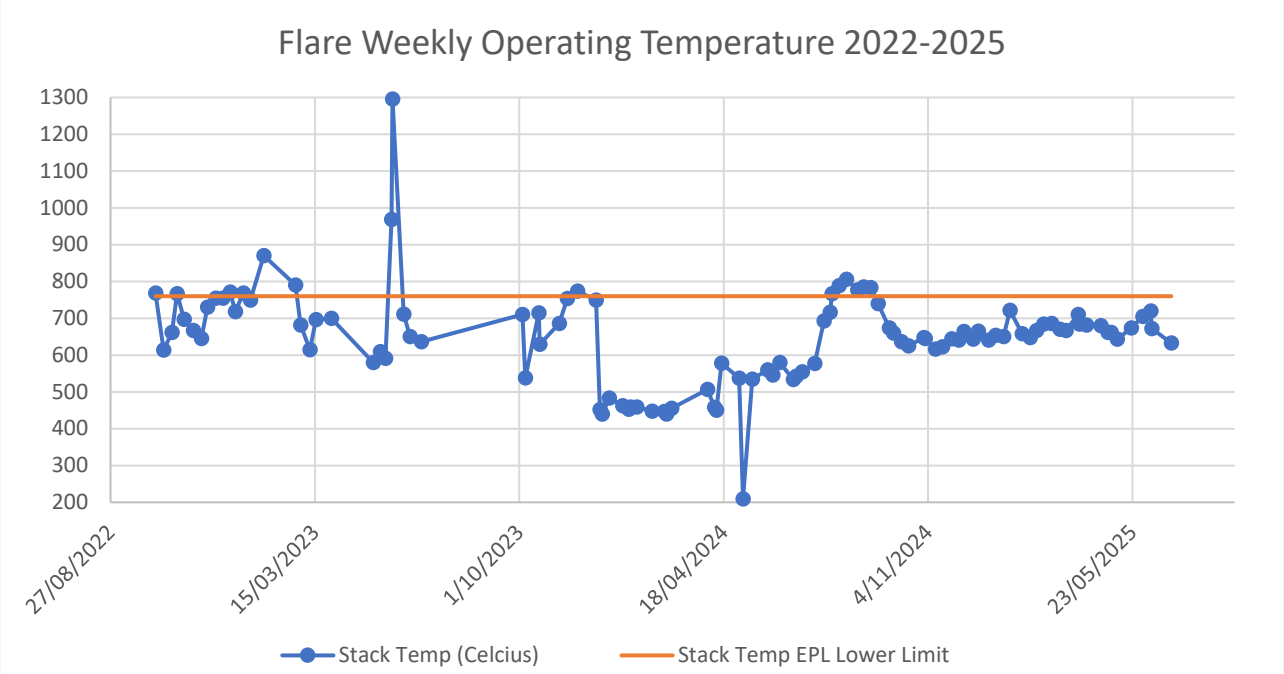
The internal methane testing for enclosed structures within 250m of the landfill during the Q3 2025 monitoring period DID NOT detect any levels of methane above the EPA license limits of 1% V/V. The results were considered satisfactory.

10 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 G**.

Weekly average operating temperatures for the Q3 2025 monitoring period supplied by LGI displayed an average temperature of 674.3 degrees Celsius. This was below the lower operation limit of 760 degrees as specified within EPL 5989. The temperature has remained relatively steady since steady since October 2024. Further information is documented within the LGI reports in Appendix G.

Chart 1: Weekly Flare Operating Temperatures October 2022 – June 2025



Notes: Data sourced from the LGI reports provided in Appendix G.

11 Quality Assurance/Quality Control Data Evaluation (QAQC)

11.1 Field Sampling QAQC

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

It was understood that the QAQC procedures and indicators for field sampling procedures within the SOP included items summarised in Table 10-1.

Table 10-1: Sampling QAQC Procedures

QAQC Indicator	Completeness	Comparability	Representativeness	Precision	Accuracy	Status			Procedures and performance
						Yes	No	N/A	
Details of sampling team	X	X				☒	☐	☐	Tertiary qualified, LAA, consistent team.

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

QAQC Indicator	Completeness	Comparability	Representativeness	Precision	Accuracy	Status: Yes	Status: No	Status: N/A	Procedures and performance
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.
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 results from the last 3 years.
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.

11.2 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			Procedures and performance
						Yes	No	N/A	
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.
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.

QAQC Indicator	Completenes	Comparability	Representativ	Precision	Accuracy	Status: Yes	Status: No	Status: N/A	Procedures and performance
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.

11.3 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.	✓

Objective	Performance	Status
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 assessment criteria. Laboratory certificates of analysis provided in **Appendix C** indicate that for the samples collected during the scope of works, sampling techniques, transport procedures and laboratory analysis were satisfactory

In summary, the QA/QC indicators all complied with the ALS 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.

12 Quarterly Environmental Assessment

12.1 Monitoring Point Summary

Based on the results of field measurements and NATA laboratory results conducted by ALS, the following summaries were noted for the Q3 2025 monitoring period;

- Groundwater monitoring wells located across the site reported elevated concentrations of key indicators of leachate above the site assessment criteria, specifically ammonia. Groundwater wells were located across the Site including upgradient, adjacent to and downgradient of the landfill cells. The elevated results were generally consistent with the available historical data;
- Out of all the groundwater monitoring well locations, monitoring point BH1c reported the highest concentrations analytes associated with leachate. Results have historically remained elevated and in exceedance of the SAC;
- The leachate tank LP1 reported elevated results of key leachate analytes which was considered to be characteristic of untreated leachate. As the leachate is contained and treated, this may be considered satisfactory;
- Onsite surface water dam SWP1 generally reported results within the Site Assessment Criteria with no significant changes;
- Offsite surface water of Rocklow Creek generally reported conditions characteristic of a tidal river system. Concentrations of key analytes associated with landfill leachate within the creek were

generally reported below adopted the ecological protection trigger values. However, concentrations of ammonia were reported above the ecological stressor value at each sample point;
- Dust monitoring reported no exceedances
- Surface gas monitoring did not detect any methane above the allowable limit across the site surface transects or within onsite buildings;
- No overflow events occurred within the Q3 quarterly monitoring period; and
- Review of the gas flare reports prepared by LGI reported gas flare temperatures slightly below the minimum requirement of 760 degrees Celsius as specified within EPL 5984. The temperatures have remained relatively steady since October 2024.

12.2 Environmental Management

12.2.1 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).

12.3 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 surface water and groundwater monitoring results from up and down gradient of the land fill cells and offsite sampling locations within Rocklow Creek.

Ensure the integrity of the landfill cap is maintained. This is to avoid additional surface infiltration during rainfall events and the release of landfill gasses. Continue to monitor surface methane gas in order to assess the capping integrity of the landfill cells.

12.4 Monitoring Program

The Site's EPL's and monitoring regime should be reviewed annually by SCC and the NSW EPA.

Review of the quarterly monitoring results indicated no significant change in environmental conditions at the Site. Key indicators of leachate were reported within the groundwater monitoring locations across the Site. 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.

13 Conclusions

Based on the findings obtained during this quarterly 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. Depth to groundwater was <5mBGL. 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 quarterly monitoring period reported exceedances above the assessment criteria for; ammonia, heavy metals and nitrate within groundwater wells across the Site. The analytes were considered to be key indicators of leachate. The exceedances were within range of historical values with no significant changes in concentrations;
- Offsite sample locations within Rocklow Creek generally reported concentrations of analytes below the SAC. However, concentrations of ammonia were generally reported slightly above the ecological stressor value;
- Surface gas methane monitoring of the landfill cap 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;
- Gas Flare temperatures were reported below the required KPI of 760 degrees Celsius;
- Based on the data reviewed for the quarterly monitoring period, contaminants associated with the landfill cell, leachate dam/s and general site uses were present within groundwater and consistent with the historical data;
- 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.

14 References

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15 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.

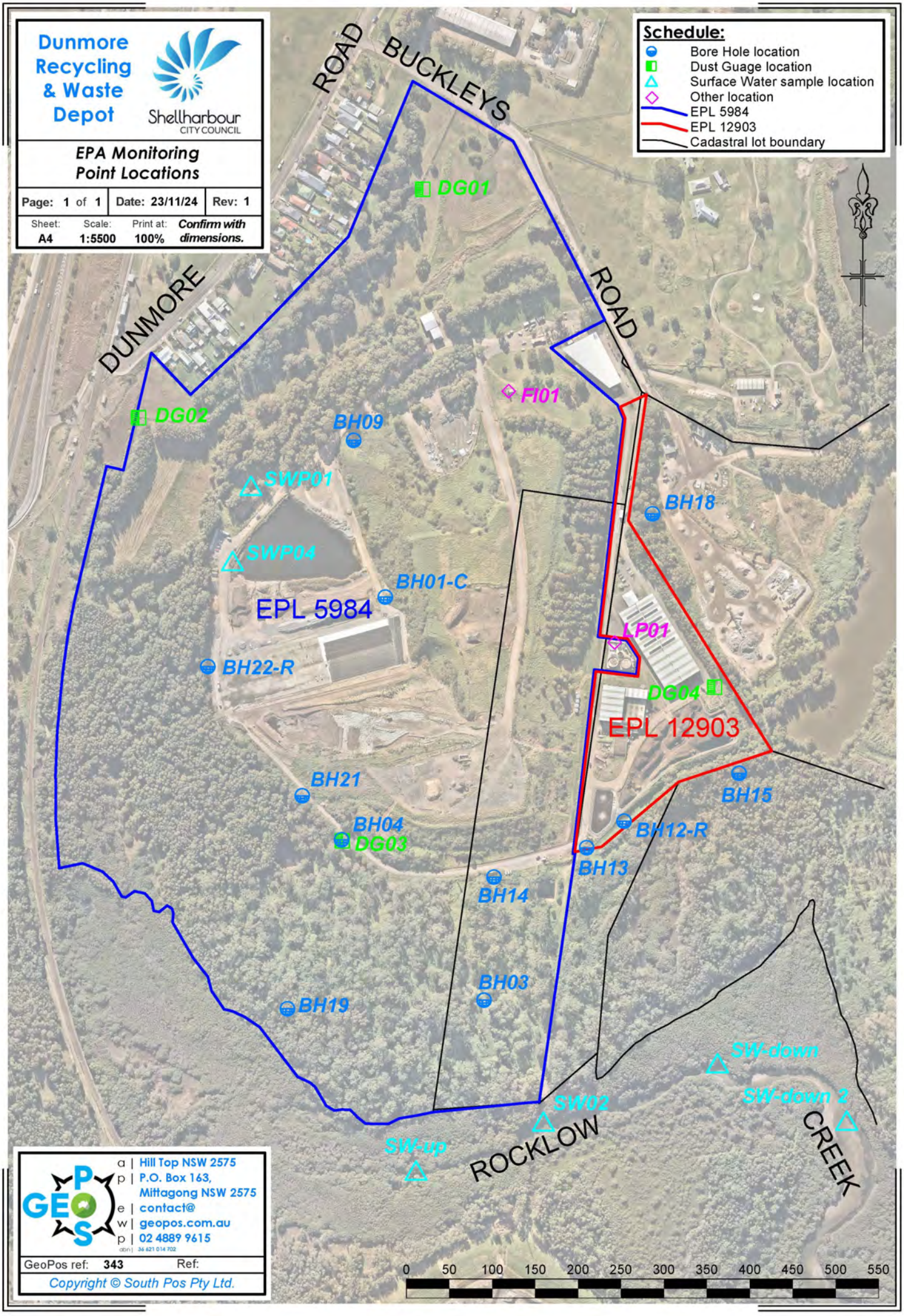
Limitations also apply to analytical methods used in the identification of substances (or parameters). These limitations may be due to non-homogenous material being sampled (i.e. the sample to be analysed may not be representative), low concentrations, the presence of 'masking' agents and the restrictions 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


Dunmore Recycling & Waste Depot
Shellharbour CITY COUNCIL
EPA Monitoring Point Locations
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Date: 23/11/24
Rev: 1
Sheet: A4
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Confirm with dimensions.
Schedule:
Bore Hole location
Dust Guage location
Surface Water sample location
Other location
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EPL 12903
Cadastral lot boundary
BUCKLEYS ROAD
DUNMORE ROAD
ROCKLOW CREEK
DG01
DG02
DG03
DG04
FI01
LP01
BH09
SWP01
SWP04
BH01-C
BH18
BH22-R
BH21
BH04
BH15
BH12-R
BH13
BH14
BH03
BH19
SW-down
SW-down 2
SW02
SW-up
EPL 5984
EPL 12903
0 50 100 150 200 250 300 350 400 450 500 550
GeoPos
a | Hill Top NSW 2575
p | P.O. Box 163, Mittagong NSW 2575
e | contact@
w | geopos.com.au
p | 02 4889 9615
abn | 36 621 014 702
GeoPos ref: 343
Ref:
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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 OF RESULTS

TABLE 14-1: Total Concentration Results

Quarterly Water Monitoring Results - June 2025 : 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	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	
				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	-
EW2502854001	BH1c	Groundwater	3	Jun 2025	876	117			206	0.12		11.60	0.2	268.00	< 0.01	< 0.01	158	2,300	2,300	< 1					7.00	6,870	25.0	2.88	-
EW2502854002	BH3	Groundwater	5	Jun 2025	105	159			38	0.08		2.35	0.1	11.20	0.13	12.70	22	385	385	201					7.10	1,440	18.6	2.78	-
EW2502854003	BH4	Groundwater	6	Jun 2025	64	128			30	0.13		2.91	< 0.1	2.16	< 0.01	0.38	12	326	326	167					7.10	1,070	19.4	4.00	-
EW2502854004	BH9	Groundwater	18	Jun 2025	419	219			75	0.89		0.89	0.4	110.00	0.10	0.15	68	1,690	1,690	< 1					7.00	4,060	18.3	2.90	-
EW2502854005	BH12r	Groundwater	17	Jun 2025	178	177			26	0.41		4.36	0.2	4.02	0.20	10.30	24	430	430	120					6.70	1,560	21.9	4.07	-
EW2502854006	BH13	Groundwater	10	Jun 2025	248	152			26	0.48		3.02	0.2	17.60	0.02	7.64	31	614	614	57					6.80	1,930	22.2	3.88	-
EW2502854007	BH14	Groundwater	11	Jun 2025	207	155			23	0.25		4.99	0.5	2.35	0.04	16.40	21	405	405	129					6.70	1,610	21.6	4.22	-
EW2502854008	BH15	Groundwater	7	Jun 2025	248	102			113	0.25		4.40	0.2	9.58	0.02	0.07	18	290	290	365					7.00	1,870	17.2	0.75	-
EW2502854010	BH18	Groundwater	25	Jun 2025	13	61			7	0.09		1.44	0.2	0.97	< 0.01	< 0.01	10	202	202	4					6.70	441	21.2	2.08	-
EW2502854009	BH19r	Groundwater	16	Jun 2025	37	84			40	0.04		0.24	0.1	0.77	< 0.01	0.21	11	278	278	67					7.30	741	19.1	4.28	-
EW2502854011	BH21	Groundwater	23	Jun 2025	331	148			20	0.52		1.43	0.4	3.80	< 0.01	0.73	31	679	679	269					7.10	2,430	22.9	2.74	-
EW2502854012	BH22	Groundwater	24	Jun 2025	204	95			13	0.67		22.10	0.4	7.54	0.02	0.02	35	395	395	220					6.60	1,660	19.7	2.13	-
EW2502852001	SWP1	Surfacewater	1	Jun 2025	156	82	53	242	5	0.12	1.30	< 0.05	0.5	1.70	0.14	0.54	18	382	382	324	5.22	51.8	17	26.80	8.00	1180	15.0		-
EW2502852003	SWC_up	Surfacewater	20	Jun 2025	1,420	62	118	948	34		1.28	0.18	< 0.1	0.26	0.02	0.19	10	137	137	256	7.80	76.0	9	9.80	7.30	41100			-
EW2502852002	SWC_2	Surface Water	19	Jun 2025		69			39		1.16	0.18	0.3	0.26	0.02	0.19	10	134	134	273	7.31	71.4	8		7.30	35000			-
EW2502852004	SWC_down	Surfacewater	21	Jun 2025	1,800	67	137	1,120	40		1.11	0.14	< 0.1	0.18	0.02	0.18	10	127	127	292	8.11	77.6	6	8.40	7.30	42600			-
EW2502852005	SWC_down_2	Surfacewater	22	Jun 2025	2,360	74	156	1,280	50		1.09	0.14	< 0.1	0.22	0.02	0.17	10	128	128	332	7.79	75.6	8	8.10	7.30	43800			-
EW2502853001	Leachate Storage Tank LP1	Leachate	2	Jun 2025	644	156			203	0.12	0.84		< 0.1	0.31	< 0.10	332.00	166	262	262	94	8.59	92.5			8.20	5,240	18.3		-

TABLE 14-2: Ammonia Results
June 2025 Quarter 3: 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)	Ecological Stressor Value	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	mg/L	
EW2501281001	Groundwater	**BH1c**	3/06/2025	7.00	0.20	2.18	3.91	**268.00**	> TV
EW2501281002		**BH3**	3/06/2025	7.10		2.18	3.91	**11.20**	> TV
EW2501281003		**BH4**	3/06/2025	7.10		1.99	3.20	**2.16**	> TV
EW2501281004		**BH9**	3/06/2025	7.00		2.18	3.91	**110.00**	> TV
EW2501281005		**BH12r**	3/06/2025	6.70		2.26	4.24	**4.02**	> TV
EW2501281006		**BH13**	3/06/2025	6.80		2.26	4.24	**17.60**	> TV
EW2501281007		**BH14**	3/06/2025	6.70		2.33	4.55	**2.35**	> TV
EW2501281008		**BH15**	3/06/2025	7.00		2.33	4.55	**9.58**	> TV
EW2501281009		**BH18**	3/06/2025	7.30		1.99	3.20	**0.77**	> TV
EW2501281010		**BH19r**	3/06/2025	6.70		2.43	5.07	**0.97**	> TV
EW2501281011		**BH21**	3/06/2025	7.10		2.09	3.56	**3.80**	> TV
EW2501281012		**BH22**	3/06/2025	6.60		1.99	3.20	**7.54**	> TV
EW2501285001	Onsite Dam	**SWP1**	2/06/2025	8.00		1.18	1.32	**1.70**	> TV
EW2501285003	Rocklow Creek Surface Water	**SWC_up**	2/06/2025	7.30		1.99	3.20	**0.26**	> TV
EW2501285002		**SWC_2**	2/06/2025	7.30		1.99	3.20	**0.26**	> TV
EW2501285004		**SWC_down**	2/06/2025	7.30		1.88	2.84	**0.18**	<TV
EW2501285005		**SWC_down_2**	2/06/2025	7.30		1.88	2.84	**0.22**	>TV

TABLE 14-3: Duplicate Groundwater Sample Results and RPD Data

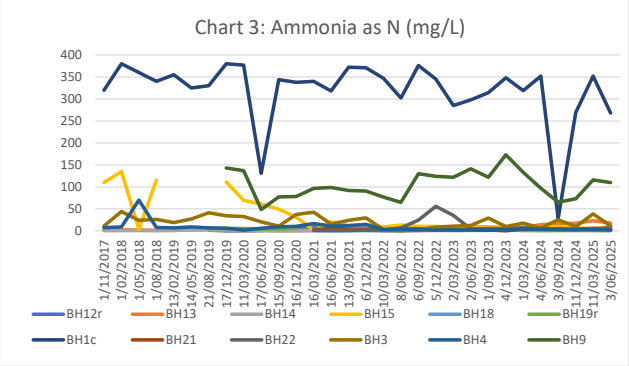
Lab Report No.				EW2502854010	EW2502854013	RPD
Sample No.				BH18	GWDuplicate	
Sample type				Groundwater	GWQC	
EPA No,				25	QC1	
Date Sampled				3/06/2025	3/06/2025	
Analyte	Units	PQL	5 x PQL	Result	Result	
Chloride	mg/L	1	5	13	13	0.00
Calcium	mg/L	1	5	61	61	0.00
Potassium	mg/L	1	5	7	7	0.00
Manganese	mg/L	0.001	0.005	0.090	0.091	1.10
Dissolved Iron	mg/L	0.05	0.25	1.44	1.46	1.38
Fluoride	mg/L	0.1	0.5	0.20	0.20	0.00
Ammonia as N	mg/L	0.01	0.05	0.97	0.97	0.00
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	10	10	0.00
Bicarbonate Alkalinity as CaCO3	mg/L	1	5	202	199	1.50
Total Alkalinity as CaCO3	mg/L	1	5	202	199	1.50
Sulfate as SO4 - Turbidimetric	mg/L	1	5	4	2	66.67
pH	pH	0.01	0.05	6.70	6.70	0.00
Electrical Conductivity (Non Compensated)	µS/cm	1	5	441	441	0.00
Temperature	°C	0.1	0.5	21.2	21.2	0.00
Standing Water Level	mbgl	-		2.08	2.08	0.00

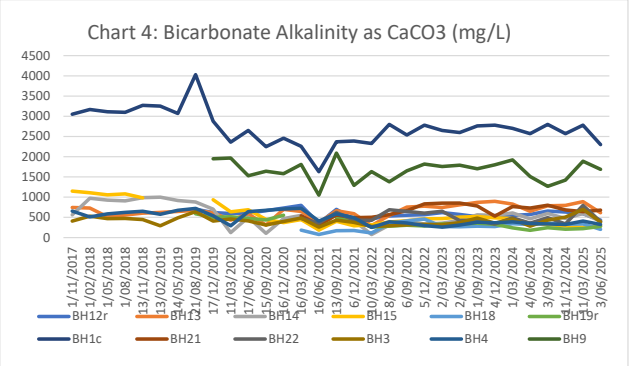
TABLE 14-4: Duplicate Surface Water Results and RPD Data

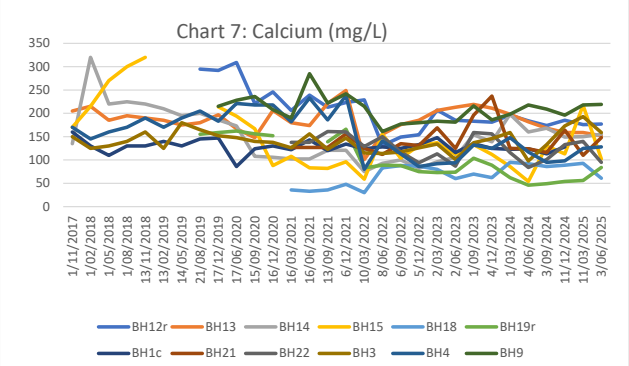
Lab Report No.						RPD
Sample No.				SWC_2	SWDuplicate	
Sample type						
EPA No,						
Date Sampled				2/06/2025	2/06/2025	
Analyte	Units	PQL	5 x POL	Result	Result	
Calcium	mg/L	1	5	69	65	5.97
Potassium	mg/L	1	5	39	37	5.26
Total Iron	mg/L	0.05	0.25	1.16	1.16	0.00
Dissolved Iron	mg/L	0.05	0.25	0.18	0.16	11.76
Fluoride	mg/L	0.1	0.5	0.3	< 0.1	100.00
Ammonia as N	mg/L	0.01	0.05	0.26	0.22	16.67
Nitrite as N	mg/L	0.01	0.05	0.02	0.02	0.00
Nitrate as N	mg/L	0.01	0.05	0.19	0.19	0.00
Nitrite + Nitrate as N	mg/L	0.01	0.05	0.21	0.21	0.00
Total Organic Carbon	mg/L	1	5	10	10	0.00
Sulfate as SO4 - Turbidimetric	mg/L	1	5	273	273	0.00
Dissolved Oxygen	mg/L	0.01	0.05	7.31	7.31	0.00
pH	pH	0.01	0.05	7.30	7.30	0.00

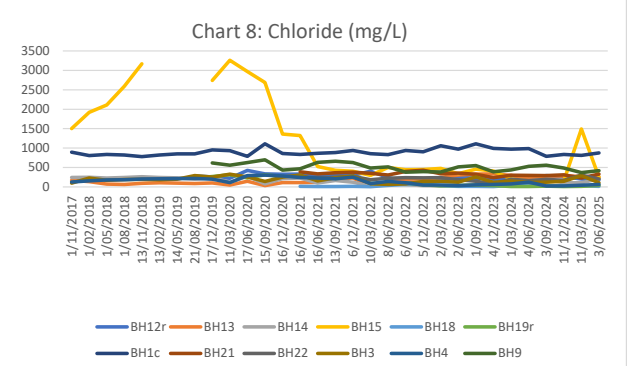
CHARTS

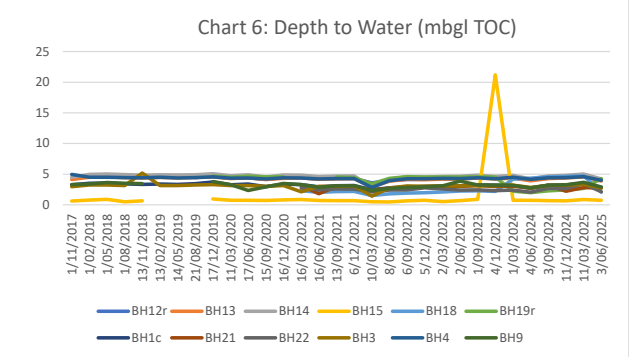
Charts 3-18: Groundwater Charts

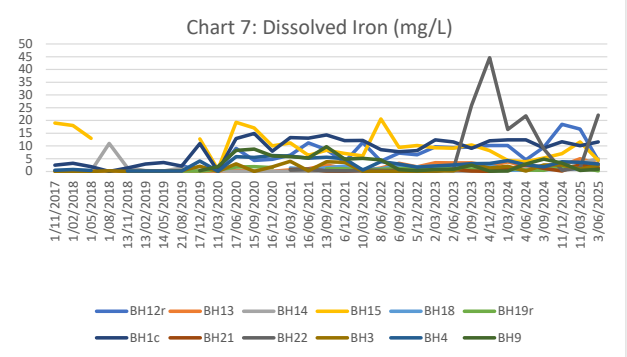


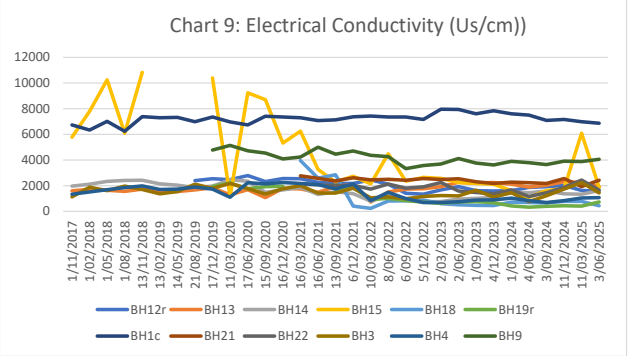


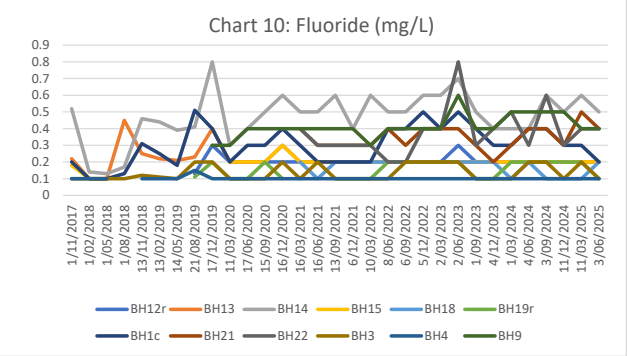












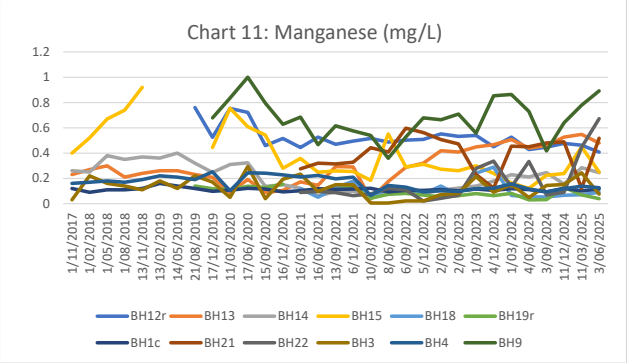


Chart 11: Manganese (mg/L)
BH12r BH13 BH14 BH15 BH18 BH19r
BH1c BH21 BH22 BH3 BH4 BH9

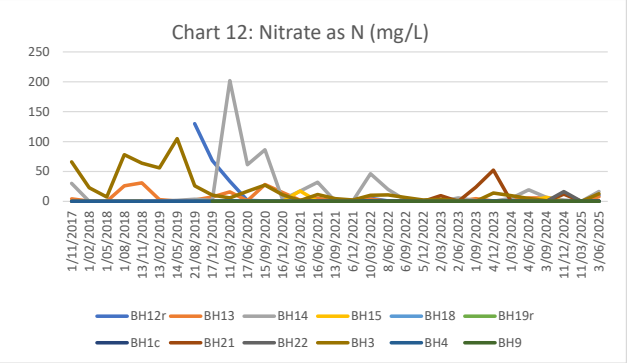


Chart 12: Nitrate as N (mg/L)
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BH1c BH21 BH22 BH3 BH4 BH9

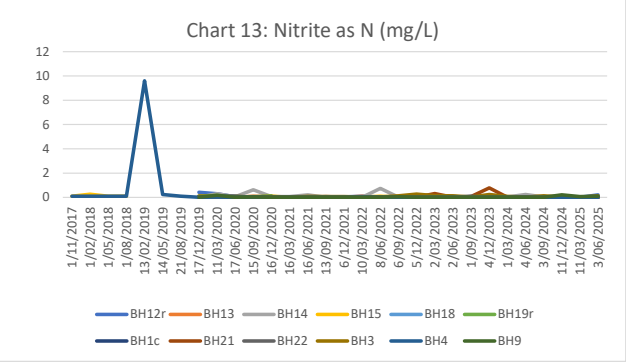
Chart 13: Nitrite as N (mg/L)
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BH1c BH21 BH22 BH3 BH4 BH9

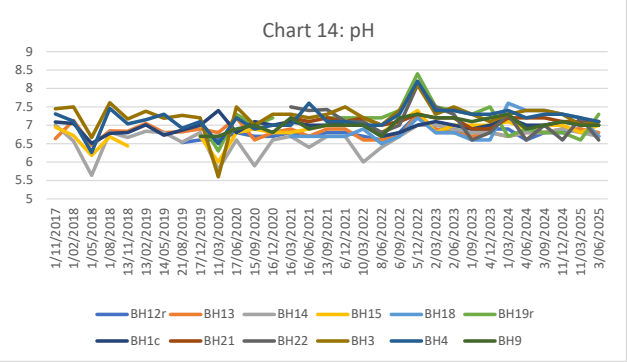


Chart 14: pH
BH12r BH13 BH14 BH15 BH18 BH19r
BH1c BH21 BH22 BH3 BH4 BH9

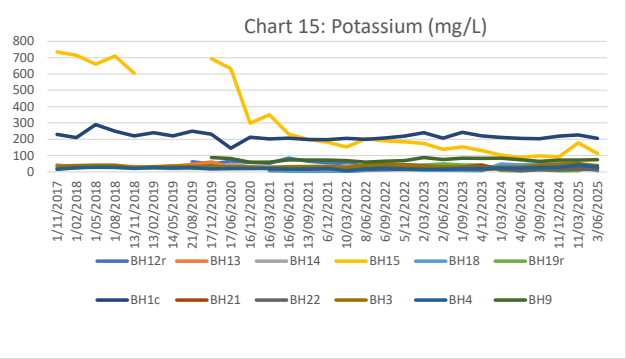


Chart 15: Potassium (mg/L)
BH12r BH13 BH14 BH15 BH18 BH19r
BH1c BH21 BH22 BH3 BH4 BH9

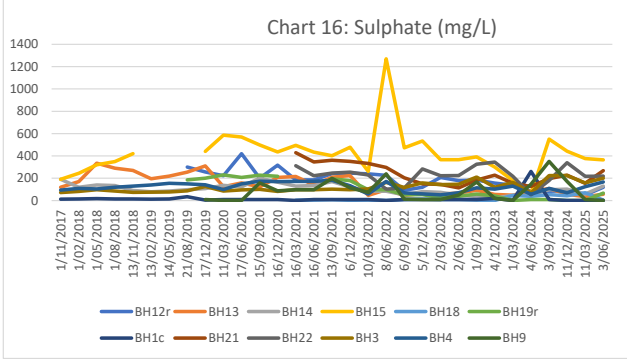


Chart 16: Sulphate (mg/L)
BH12r BH13 BH14 BH15 BH18 BH19r
BH1c BH21 BH22 BH3 BH4 BH9

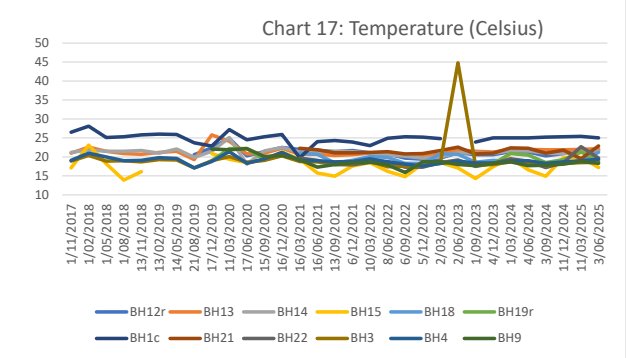


Chart 17: Temperature (Celsius)
BH12r BH13 BH14 BH15 BH18 BH19r
BH1c BH21 BH22 BH3 BH4 BH9

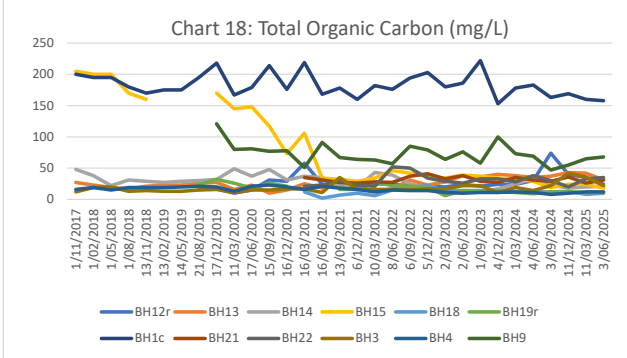
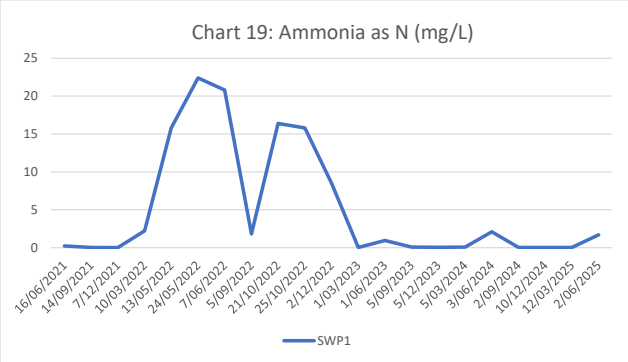
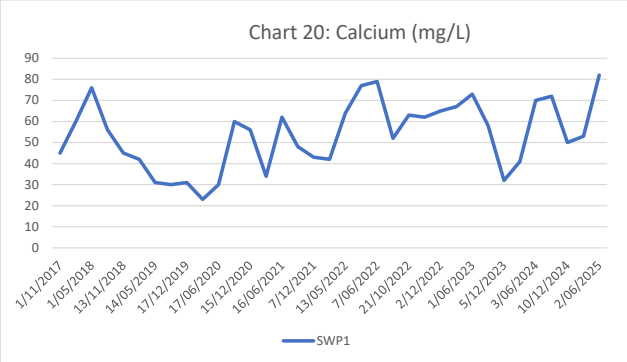
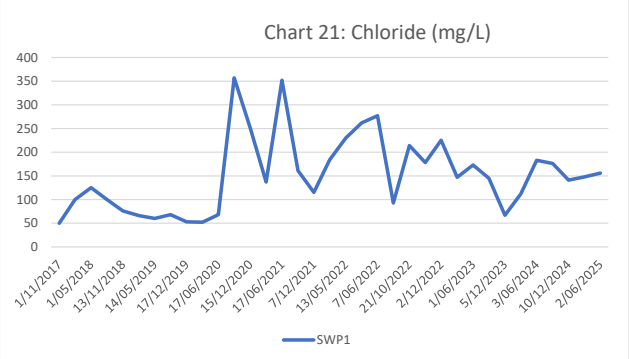


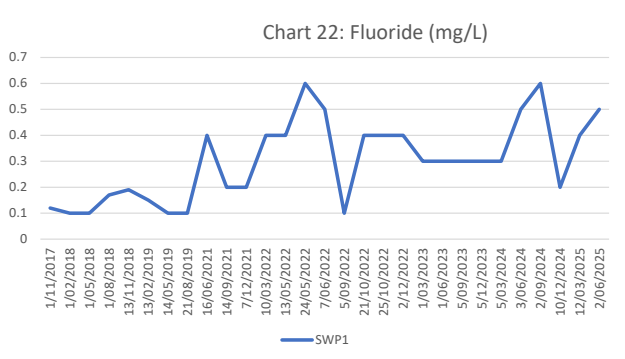
Chart 18: Total Organic Carbon (mg/L)
BH12r BH13 BH14 BH15 BH18 BH19r
BH1c BH21 BH22 BH3 BH4 BH9

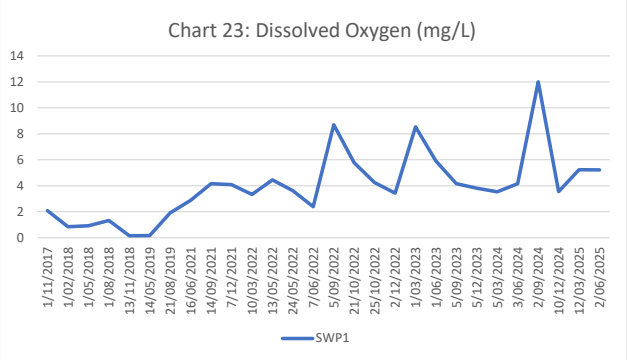
Charts 19-34: Onsite Surface Water Charts

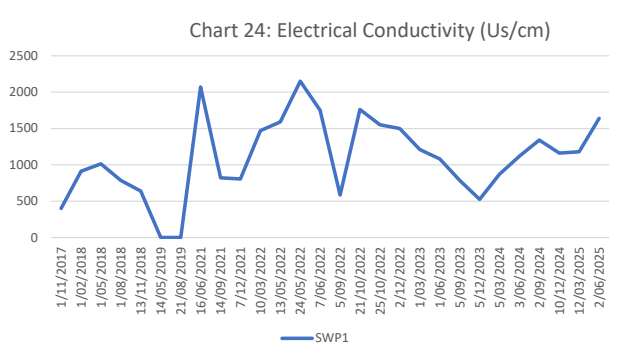


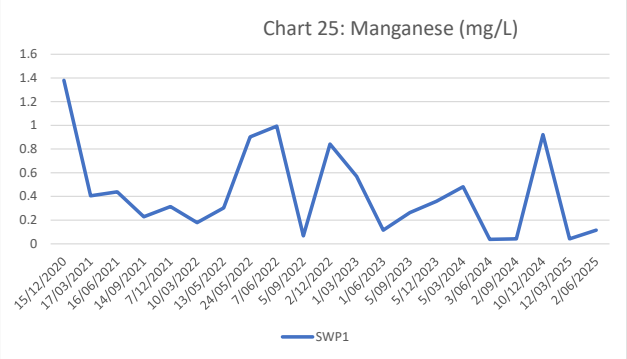


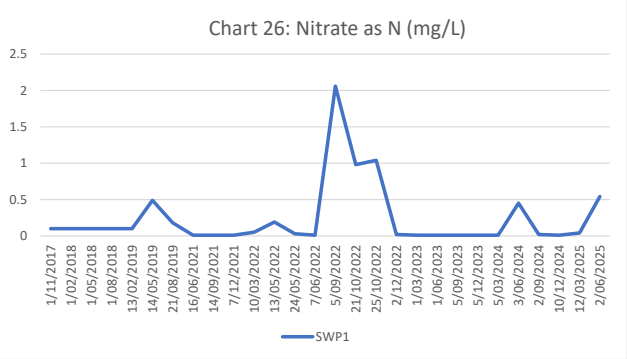












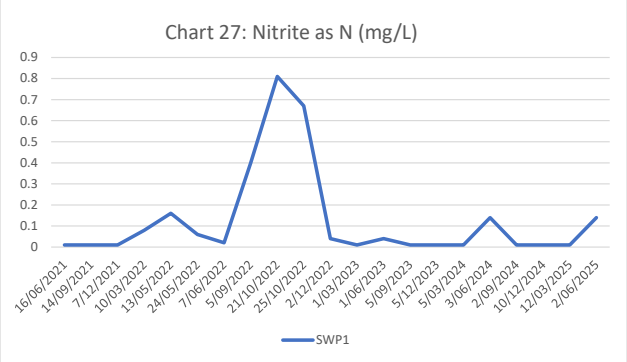


Chart 27: Nitrite as N (mg/L)
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
16/06/2021
14/09/2021
7/12/2021
10/03/2022
13/05/2022
24/05/2022
7/06/2022
5/09/2022
21/10/2022
25/10/2022
2/12/2022
1/03/2023
1/06/2023
5/09/2023
5/12/2023
5/03/2024
3/06/2024
2/09/2024
10/12/2024
12/03/2025
2/06/2025
SWP1

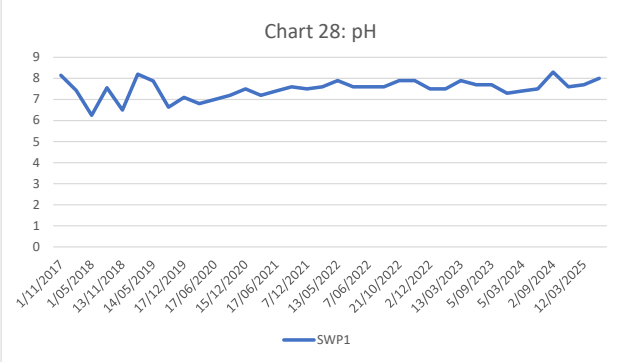


Chart 28: pH
9
8
7
6
5
4
3
2
1
0
1/11/2017
1/05/2018
13/11/2018
14/05/2019
17/12/2019
17/06/2020
15/12/2020
17/06/2021
7/12/2021
13/05/2022
7/06/2022
21/10/2022
2/12/2022
13/03/2023
5/09/2023
5/03/2024
2/09/2024
12/03/2025
SWP1

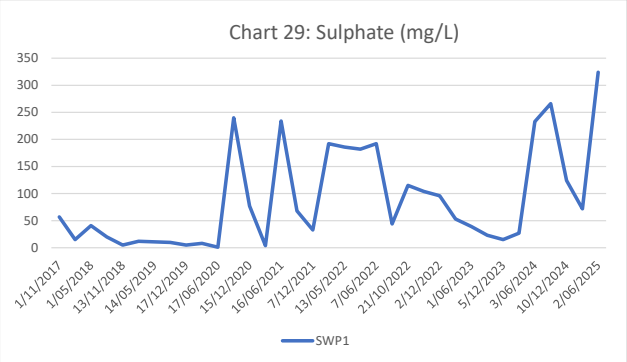


Chart 29: Sulphate (mg/L)
350
300
250
200
150
100
50
0
1/11/2017
1/05/2018
13/11/2018
14/05/2019
17/12/2019
17/06/2020
15/12/2020
16/06/2021
7/12/2021
13/05/2022
7/06/2022
21/10/2022
2/12/2022
1/06/2023
5/12/2023
3/06/2024
10/12/2024
2/06/2025
SWP1

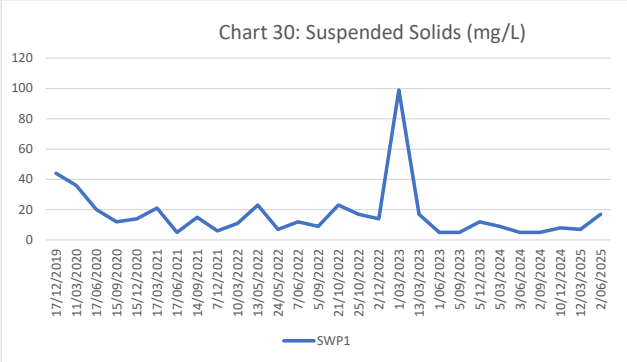


Chart 30: Suspended Solids (mg/L)
120
100
80
60
40
20
0
17/12/2019
11/03/2020
17/06/2020
15/09/2020
15/12/2020
17/03/2021
17/06/2021
14/09/2021
7/12/2021
10/03/2022
13/05/2022
24/05/2022
7/06/2022
5/09/2022
21/10/2022
25/10/2022
2/12/2022
1/03/2023
13/03/2023
1/06/2023
5/09/2023
5/12/2023
5/03/2024
3/06/2024
2/09/2024
10/12/2024
12/03/2025
2/06/2025
SWP1

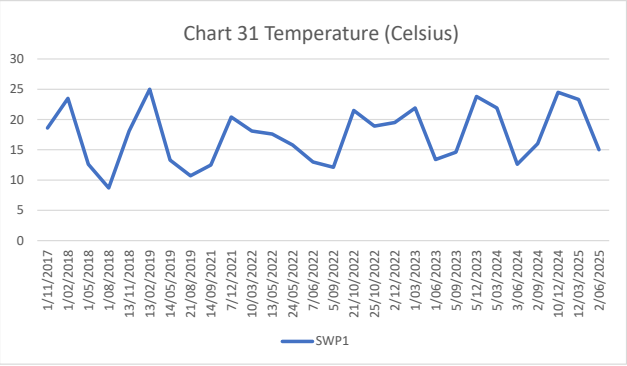


Chart 31 Temperature (Celsius)
30
25
20
15
10
5
0
1/11/2017
1/02/2018
1/05/2018
1/08/2018
13/11/2018
13/02/2019
14/05/2019
21/08/2019
14/09/2021
7/12/2021
10/03/2022
13/05/2022
24/05/2022
7/06/2022
5/09/2022
21/10/2022
25/10/2022
2/12/2022
1/03/2023
1/06/2023
5/09/2023
5/12/2023
5/03/2024
3/06/2024
2/09/2024
10/12/2024
12/03/2025
2/06/2025
SWP1

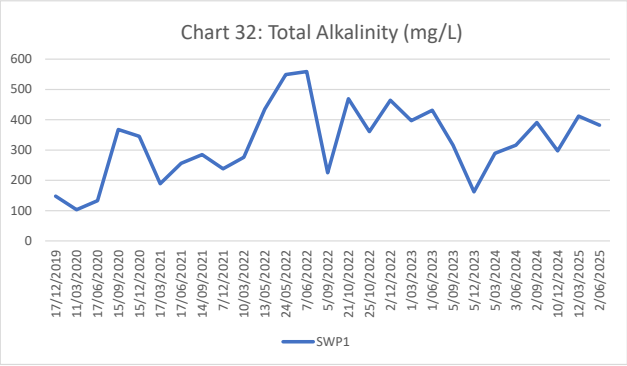


Chart 32: Total Alkalinity (mg/L)
600
500
400
300
200
100
0
17/12/2019
11/03/2020
17/06/2020
15/09/2020
15/12/2020
17/03/2021
17/06/2021
14/09/2021
7/12/2021
10/03/2022
13/05/2022
24/05/2022
7/06/2022
5/09/2022
21/10/2022
25/10/2022
2/12/2022
1/03/2023
1/06/2023
5/09/2023
5/12/2023
5/03/2024
3/06/2024
2/09/2024
10/12/2024
12/03/2025
2/06/2025
SWP1

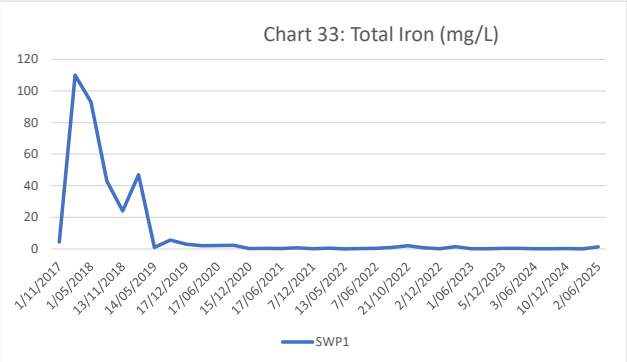


Chart 33: Total Iron (mg/L)
120
100
80
60
40
20
0
1/11/2017
1/05/2018
13/11/2018
14/05/2019
17/12/2019
17/06/2020
15/12/2020
17/06/2021
7/12/2021
13/05/2022
7/06/2022
21/10/2022
2/12/2022
1/06/2023
5/12/2023
3/06/2024
10/12/2024
2/06/2025
SWP1

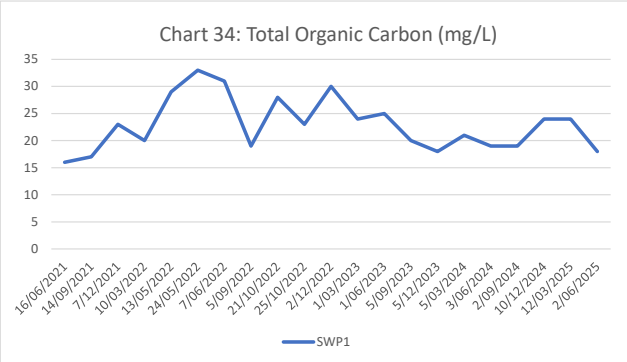
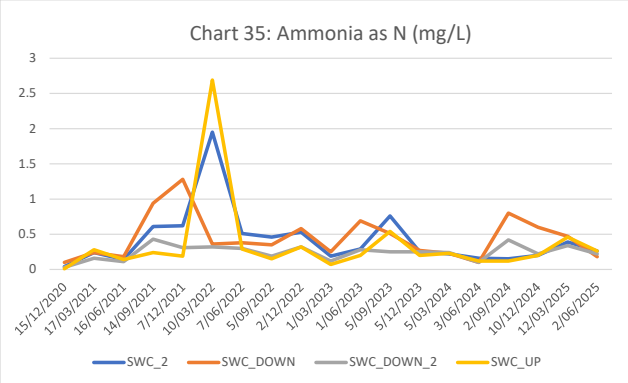
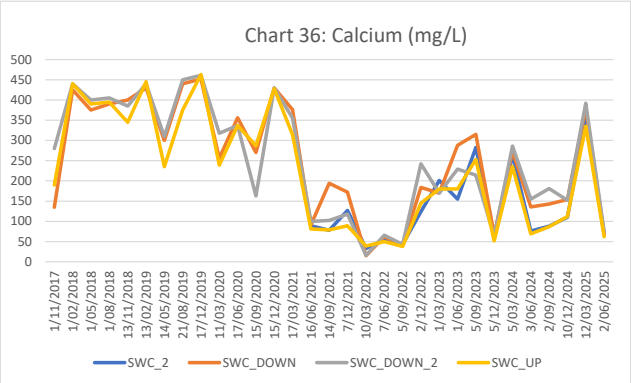
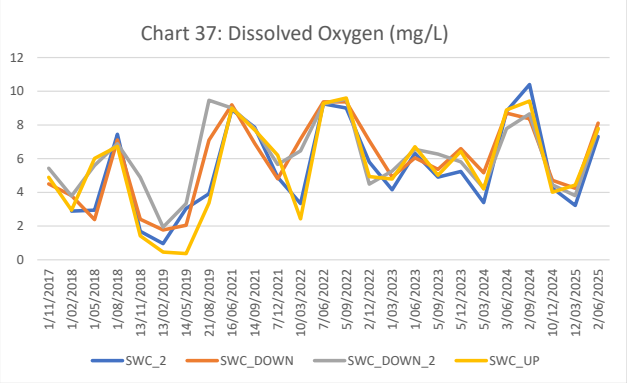


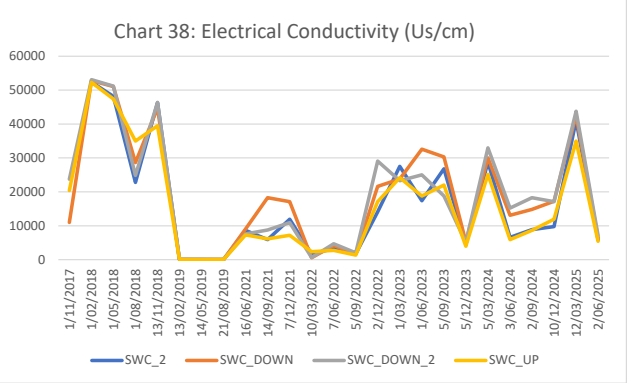
Chart 34: Total Organic Carbon (mg/L)
35
30
25
20
15
10
5
0
16/06/2021
14/09/2021
7/12/2021
10/03/2022
13/05/2022
24/05/2022
7/06/2022
5/09/2022
21/10/2022
25/10/2022
2/12/2022
1/03/2023
1/06/2023
5/09/2023
5/12/2023
5/03/2024
3/06/2024
2/09/2024
10/12/2024
12/03/2025
2/06/2025
SWP1

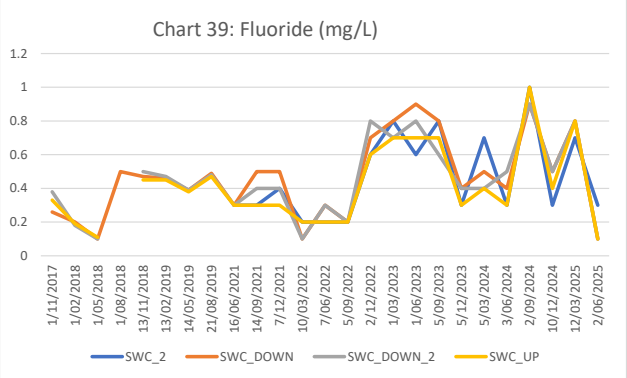
Charts 35-46: Rocklow Creek Surface Water Charts

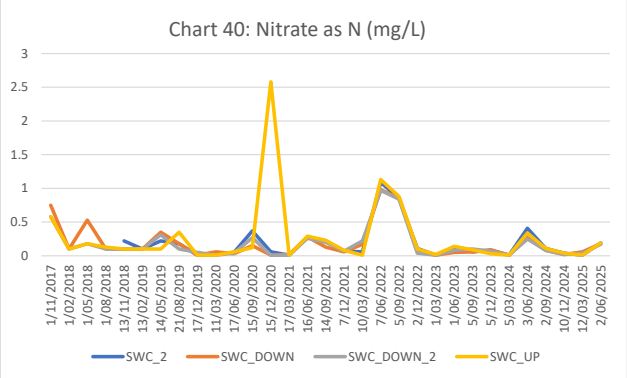


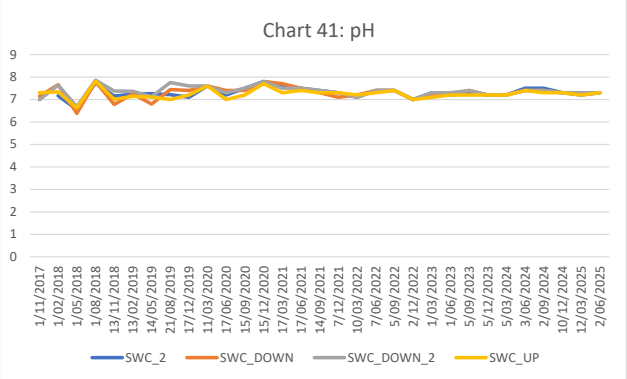


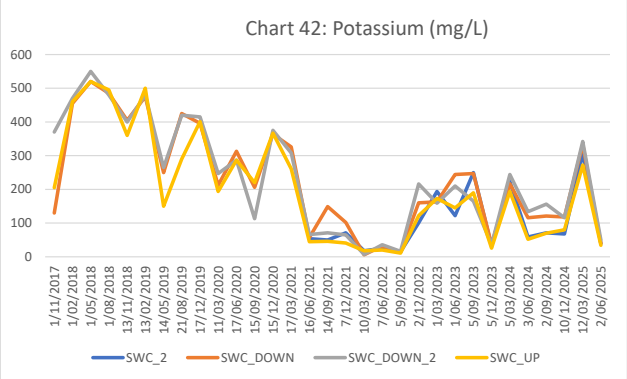












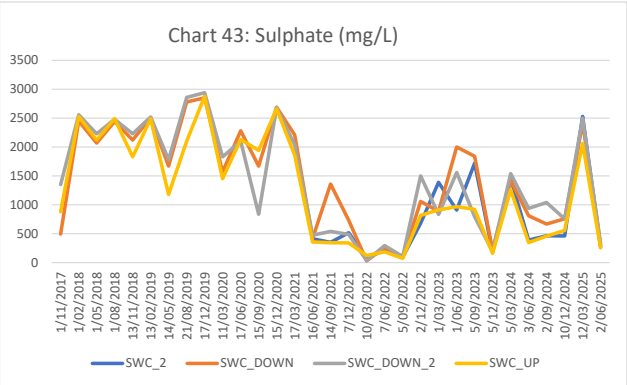


Chart 43: Sulphate (mg/L)
3500
3000
2500
2000
1500
1000
500
0
1/11/2017
1/02/2018
1/05/2018
1/08/2018
13/11/2018
13/02/2019
14/05/2019
21/08/2019
17/12/2019
11/03/2020
17/06/2020
15/09/2020
15/12/2020
17/03/2021
16/06/2021
14/09/2021
7/12/2021
10/03/2022
7/06/2022
5/09/2022
2/12/2022
1/03/2023
1/06/2023
5/09/2023
5/12/2023
5/03/2024
3/06/2024
2/09/2024
10/12/2024
12/03/2025
2/06/2025
SWC_2
SWC_DOWN
SWC_DOWN_2
SWC_UP

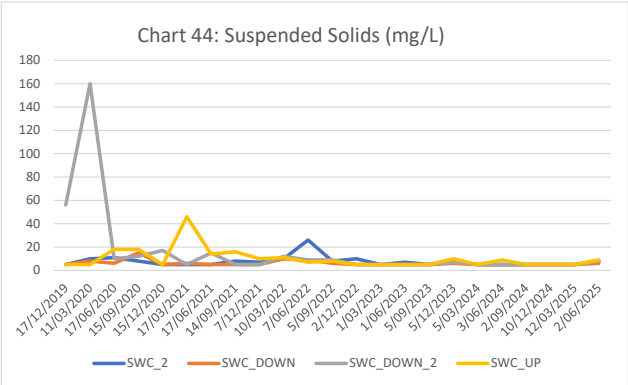


Chart 44: Suspended Solids (mg/L)
180
160
140
120
100
80
60
40
20
0
17/12/2019
11/03/2020
17/06/2020
15/09/2020
15/12/2020
17/03/2021
17/06/2021
14/09/2021
7/12/2021
10/03/2022
7/06/2022
5/09/2022
2/12/2022
1/03/2023
1/06/2023
5/09/2023
5/12/2023
5/03/2024
3/06/2024
2/09/2024
10/12/2024
12/03/2025
2/06/2025
SWC_2
SWC_DOWN
SWC_DOWN_2
SWC_UP

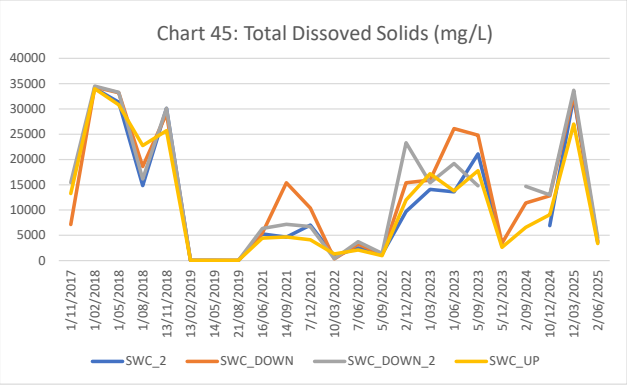


Chart 45: Total Dissoved Solids (mg/L)
40000
35000
30000
25000
20000
15000
10000
5000
0
1/11/2017
1/02/2018
1/05/2018
1/08/2018
13/11/2018
13/02/2019
14/05/2019
21/08/2019
16/06/2021
14/09/2021
7/12/2021
10/03/2022
7/06/2022
5/09/2022
2/12/2022
1/03/2023
1/06/2023
5/09/2023
5/12/2023
2/09/2024
10/12/2024
12/03/2025
2/06/2025
SWC_2
SWC_DOWN
SWC_DOWN_2
SWC_UP

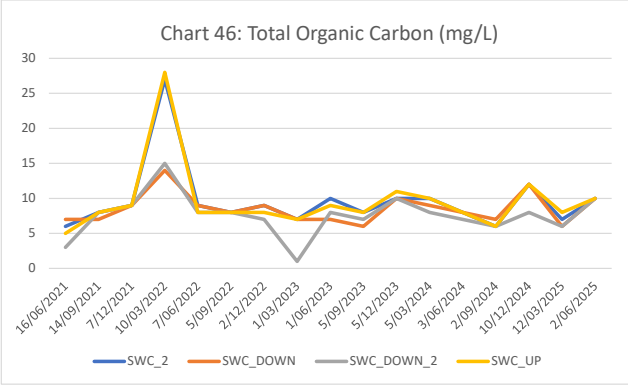
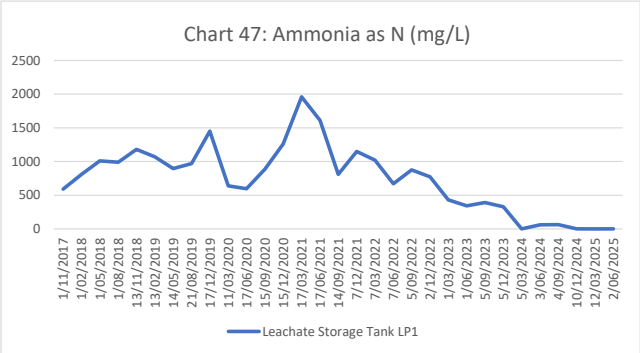
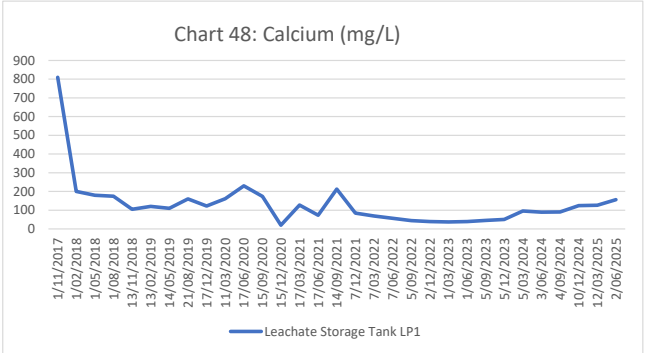
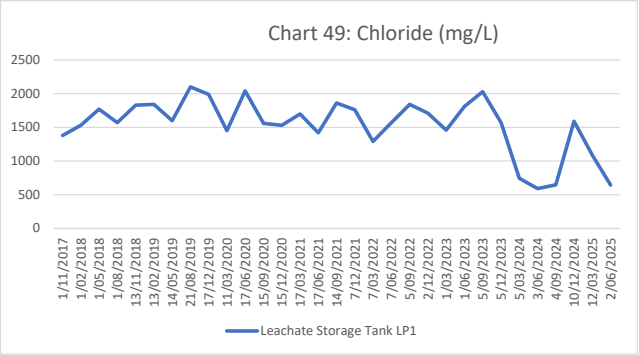


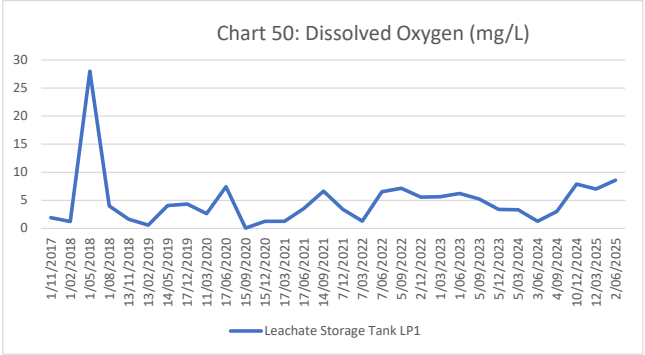
Chart 46: Total Organic Carbon (mg/L)
30
25
20
15
10
5
0
16/06/2021
14/09/2021
7/12/2021
10/03/2022
7/06/2022
5/09/2022
2/12/2022
1/03/2023
1/06/2023
5/09/2023
5/12/2023
5/03/2024
3/06/2024
2/09/2024
10/12/2024
12/03/2025
2/06/2025
SWC_2
SWC_DOWN
SWC_DOWN_2
SWC_UP

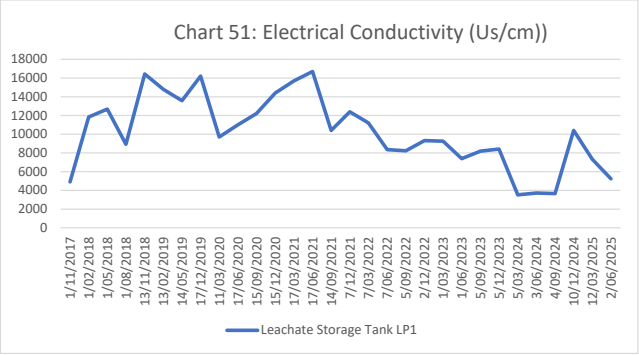
Charts 47-61 Leachate Water Quality Charts

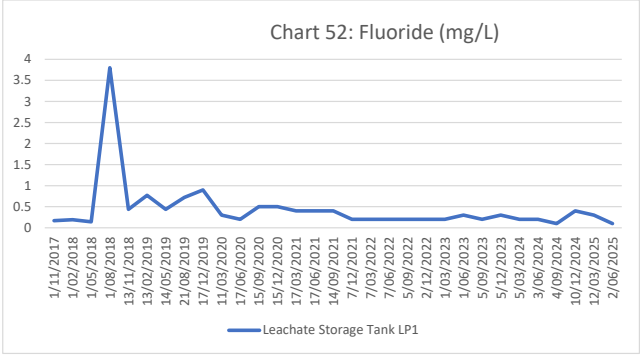


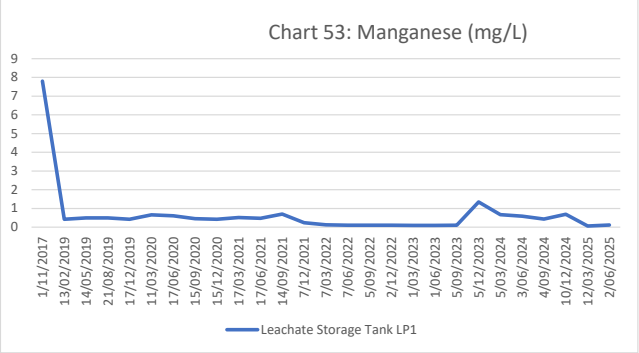


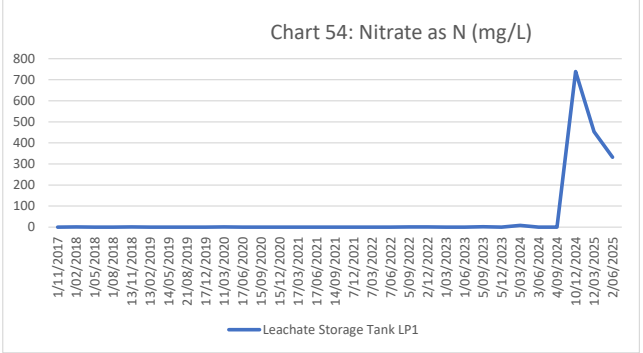












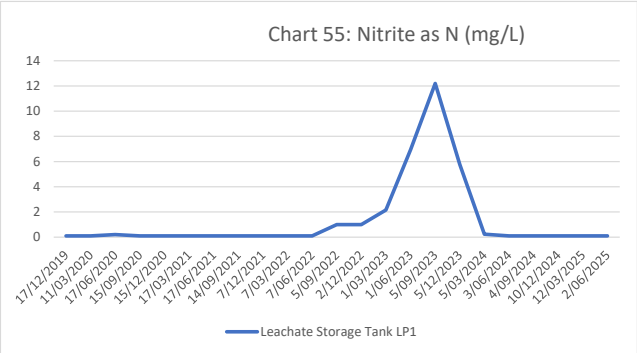


Chart 55: Nitrite as N (mg/L)
Leachate Storage Tank LP1

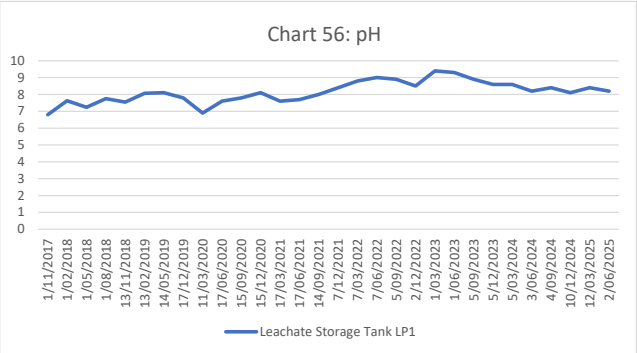


Chart 56: pH
Leachate Storage Tank LP1

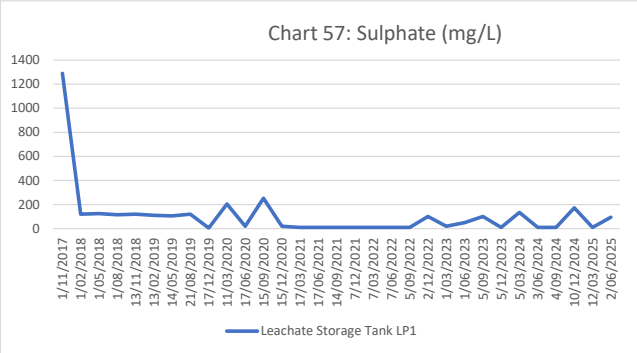


Chart 57: Sulphate (mg/L)
Leachate Storage Tank LP1

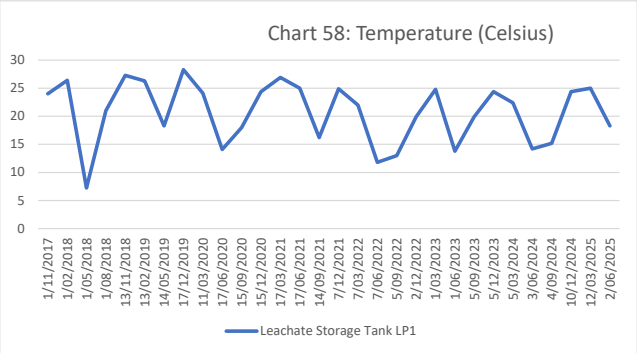


Chart 58: Temperature (Celsius)
Leachate Storage Tank LP1

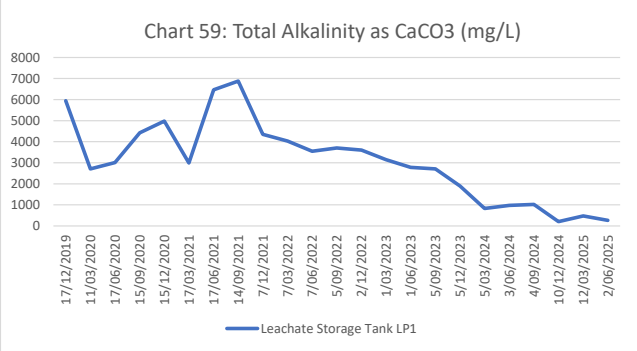


Chart 59: Total Alkalinity as CaCO3 (mg/L)
Leachate Storage Tank LP1

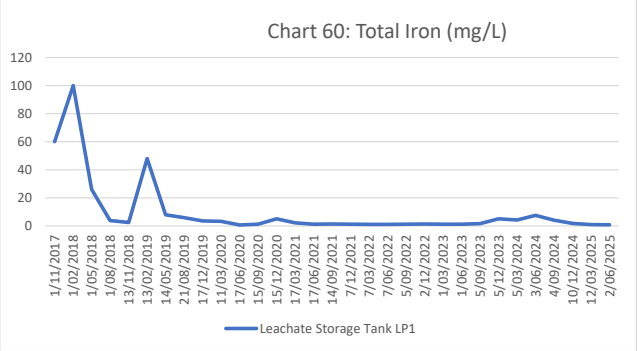


Chart 60: Total Iron (mg/L)
Leachate Storage Tank LP1

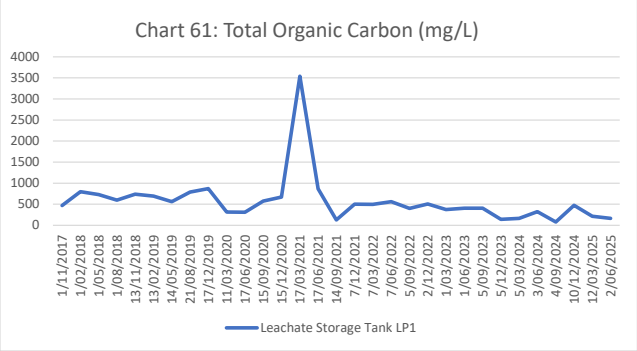
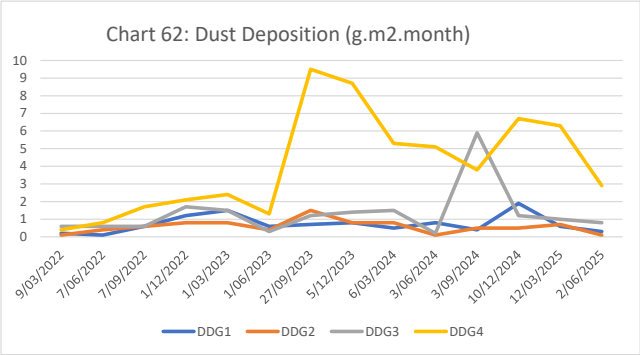


Chart 61: Total Organic Carbon (mg/L)
Leachate Storage Tank LP1

Chart 62 Dust Deposition Chart



APPENDICES

Appendix A:

EPL 5984 Sampling Point Summary (NSW EPA, 10/02/2022. Updated 22/05/2025)

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

CHAIN OF CUSTODY

Mandatory Fields

Page ___of___

CLIENT CODE:	SHECIT	*PROJECT MANAGER:	Ryan Stirling	SAMPLER:	SAMPLED BY ALS
*CLIENT:	Shellharbour City Council	*PM MOBILE:		SAMPLER MOBILE:	02 4225 3125
OFFICE: (Invoiced Office)	Shellharbour	ALS QUOTE # (Client PL if blank)	WO/030/19 TENDER	PURCHASE ORDER NO.:	156810
PROJECT NO./PROJECT:	Dunmore Quarterly Ground Waters EPL			SITE:	Dunmore
*INVOICE TO: (client default if nil)	Financial@shellharbour.nsw.gov.au			☐ CC Invoice to PM	
*EMAIL REPORTS TO: (default to PM if blank)	Ryan.stirlingshellharbour.nsw.gov.au, Glenn.holdenshellharbour.nsw.gov.au, Mitchell.copasshellharbour.nsw.gov.au, lab@enrs.com.au				

CoC #: (if applicable)

BIOSECURITY

Country of O (if not Austra

Environmental Division
Wollongong
Work Order Reference
EW2502854

Telephone : 02 42253125

*** STORAGE REQUIREMENTS** *Please check box.* →
Standard Storage time from receipt of samples:
Waters - 3 weeks
Soils - 2 months

☐ Standard Storage
☐ Extended Storage
Specify Disposal Date:
Note: Extended storage incurs a fee and requires a signed agreement.

*** TURNAROUND** *Please check box* -->
(Not all tests can be expedited, contact Client Services for more information)

☐ 5+ days (no surcharge)
☐ 3 day (+15%)
☐ 2 day (+30%)
☐ 1 day (+50%)

***ANALYSIS REQUIRED**
(NB. ALS Quote No. and/or Analysis Suite Codes must be listed to attract suite/quoted price)
Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).
Mark an X in the boxes below analysis to indicate the parameter listed above to be tested on that sample.

Comments:

ALS Use Only / Lab ID	Sample ID	Depth	Date/Time	No. Bottles	MATRIX: Soil/Solids(S) Water(W) Sediments (SD), Dust (D), Product (P), Biota (B), Biosolid (BS)	Ammonia NT-04 (NO2 & NO3)	TOC	NT-2A (Alka, So4, Cl, Fl) Filtered Ca, K	Dissolved Fe & Mn	Field Tests pH, EC, Temp & SWL	Send to Eurofins						Lab QC (additional bottles req.) Dup	Lab QC MS	Additional Information (Comment on hazards - e.g., asbestos, known high contamination)
	BH1C		3.6.25 9:50	4	W	X	X	X	X	X							☐	☐	
	BH3		13:45	4	W	X	X	X	X	X							☐	☐	
	BH4		13:00	4	W	X	X	X	X	X							☐	☐	
	BH9		9:50	4	W	X	X	X	X	X							☐	☐	
	BH12R		11:46	4	W	X	X	X	X	X							☐	☐	
	BH13		12:05	4	W	X	X	X	X	X							☐	☐	
	BH14		12:30	4	W	X	X	X	X	X							☐	☐	
	BH15		11:23	4	W	X	X	X	X	X							☐	☐	
	BH19R		13:14	4	W	X	X	X	X	X							☐	☐	
	BH18		8:50	4	W	X	X	X	X	X									
	BH21		10:30	4	W	X	X	X	X	X									
	BH22		10:50	4	W	X	X	X	X	X									
	Duplicate		8:50	4	W	X	X	X	X	X									
	Triplicate		8:50	4	W						X						☐	☐	

Receipt Detail (Lab Use ONLY)
Chilling Method: Ice: Frozen / Melted; Ice Bricks: Frozen / Thawed; None
Sample Temp at Receipt: 4.5 °C 3.8 °C 3.5 °C
Security Seal Intact (circle): Yes / No / NA(None)
Carrier Details: ☐ Courier/Post ☐ Client
Con Note #: ALS
Packaging: (Circle) Hard Esky, Foam Esky, Box/Bag/Other
Count: # 2 # #

Relinquished by: Robert Dalis Signature: Date/Time: 3.6.25
Relinquished by: Signature: Date/Time:
Received by: Amelia Signature:
Received by: Signature: Date/Time: 3/6/25

CERTIFICATE OF ANALYSIS

Work Order	: **EW2502854**	Page	: 1 of 8
Client	: **SHELLHARBOUR CITY COUNCIL**	Laboratory	: Environmental Division NSW South Coast
Contact	: Vivienne Morrow	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	: 02 42253125
Project	: Dunmore Quarterly Groundwaters EPL	Date Samples Received	: 03-Jun-2025 15:31
Order number	: 166321	Date Analysis Commenced	: 03-Jun-2025
C-O-C number	: ----	Issue Date	: 13-Jun-2025 12:32
Sampler	: Robert DaLio		
Site	: DUNMORE LANDFILL TENDER		
Quote number	: EW24SHECIT0001 (RFT 2024/81) Tender		
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.

- 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 High Flow and 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	03-Jun-2025 09:50	03-Jun-2025 13:45	03-Jun-2025 13:00	03-Jun-2025 09:30	03-Jun-2025 11:46
Compound	CAS Number	LOR	Unit		EW2502854-001	EW2502854-002	EW2502854-003	EW2502854-004	EW2502854-005
					Result	Result	Result	Result	Result
EA005FD: Field pH									
pH	----	0.1	pH Unit		7.0	7.1	7.1	7.0	6.7
EA010FD: Field Conductivity									
Conductivity @ 25oC	----	1	µS/cm		6870	1440	1070	4060	1560
EA116: Temperature									
Temperature	----	0.5	°C		25.0	18.6	19.4	18.3	21.9
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		2300	385	326	1690	430
Total Alkalinity as CaCO3	----	1	mg/L		2300	385	326	1690	430
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		<1	201	167	<1	120
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		876	105	64	419	178
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		117	159	128	219	177
Potassium	7440-09-7	1	mg/L		206	38	30	75	26
EG020F: Dissolved Metals by ICP-MS									
Manganese	7439-96-5	0.001	mg/L		0.115	0.076	0.126	0.892	0.408
Iron	7439-89-6	0.05	mg/L		11.6	2.35	2.91	0.89	4.36
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		0.2	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		268	11.2	2.16	110	4.02
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	0.13	<0.01	0.10	0.20
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		<0.01	12.7	0.38	0.15	10.3

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH1C	BH3	BH4	BH9	BH12R
				Sampling date / time	03-Jun-2025 09:50	03-Jun-2025 13:45	03-Jun-2025 13:00	03-Jun-2025 09:30	03-Jun-2025 11:46
Compound	CAS Number	LOR	Unit		EW2502854-001	EW2502854-002	EW2502854-003	EW2502854-004	EW2502854-005
					Result	Result	Result	Result	Result
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.01	**12.8**	**0.38**	**0.25**	**10.5**
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		**158**	**22**	**12**	**68**	**24**
QWI-EN 67.11 Sampling of Groundwaters									
Standing Water Level	----	0.01	m AHD		**2.88**	**2.78**	**4.00**	**2.90**	**4.07**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	BH13	BH14	BH15	BH19R	BH18
			Sampling date / time	03-Jun-2025 12:05	03-Jun-2025 12:30	03-Jun-2025 11:23	03-Jun-2025 13:19	03-Jun-2025 08:50
Compound	CAS Number	LOR	Unit	EW2502854-006	EW2502854-007	EW2502854-008	EW2502854-009	EW2502854-010
				Result	Result	Result	Result	Result
EA005FD: Field pH								
pH	----	0.1	pH Unit	6.8	6.7	7.0	7.3	6.7
EA010FD: Field Conductivity								
Conductivity @ 25oC	----	1	µS/cm	1930	1610	1870	741	441
EA116: Temperature								
Temperature	----	0.5	°C	22.2	21.6	17.2	19.1	21.2
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	614	405	290	278	202
Total Alkalinity as CaCO3	----	1	mg/L	614	405	290	278	202
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	57	129	365	67	4
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	248	207	248	37	13
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	152	155	102	84	61
Potassium	7440-09-7	1	mg/L	26	23	113	40	7
EG020F: Dissolved Metals by ICP-MS								
Manganese	7439-96-5	0.001	mg/L	0.480	0.245	0.250	0.039	0.090
Iron	7439-89-6	0.05	mg/L	3.02	4.99	4.40	0.24	1.44
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	17.6	2.35	9.58	0.77	0.97
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	0.02	0.04	0.02	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	7.64	16.4	0.07	0.21	<0.01

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH13	BH14	BH15	BH19R	BH18
				Sampling date / time	03-Jun-2025 12:05	03-Jun-2025 12:30	03-Jun-2025 11:23	03-Jun-2025 13:19	03-Jun-2025 08:50
Compound	CAS Number	LOR	Unit		EW2502854-006	EW2502854-007	EW2502854-008	EW2502854-009	EW2502854-010
					Result	Result	Result	Result	Result
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**7.66**	**16.4**	**0.09**	**0.21**	<0.01
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		**31**	**21**	**18**	**11**	**10**
QWI-EN 67.11 Sampling of Groundwaters									
Standing Water Level	----	0.01	m AHD		**3.88**	**4.22**	**0.75**	**4.28**	**2.08**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	BH21	BH22	Duplicate	----	----
			Sampling date / time	03-Jun-2025 10:30	03-Jun-2025 10:50	03-Jun-2025 08:50	----	----
Compound	CAS Number	LOR	Unit	EW2502854-011	EW2502854-012	EW2502854-013	--------	--------
				Result	Result	Result	----	----
EA005FD: Field pH								
pH	----	0.1	pH Unit	**7.1**	**6.6**	**6.7**	**----**	**----**
EA010FD: Field Conductivity								
Conductivity @ 25oC	----	1	µS/cm	**2430**	**1660**	**441**	**----**	**----**
EA116: Temperature								
Temperature	----	0.5	°C	**22.9**	**19.7**	**21.2**	**----**	**----**
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	**679**	**395**	**199**	**----**	**----**
Total Alkalinity as CaCO3	----	1	mg/L	**679**	**395**	**199**	**----**	**----**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**269**	**220**	**2**	**----**	**----**
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**331**	**204**	**13**	**----**	**----**
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**148**	**95**	**61**	**----**	**----**
Potassium	7440-09-7	1	mg/L	**20**	**13**	**7**	**----**	**----**
EG020F: Dissolved Metals by ICP-MS								
Manganese	7439-96-5	0.001	mg/L	**0.517**	**0.672**	**0.091**	**----**	**----**
Iron	7439-89-6	0.05	mg/L	**1.43**	**22.1**	**1.46**	**----**	**----**
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	**3.80**	**7.54**	**0.97**	**----**	**----**
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	**0.02**	<0.01	**----**	**----**
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	**0.73**	**0.02**	<0.01	**----**	**----**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH21	BH22	Duplicate	----	----
				Sampling date / time	03-Jun-2025 10:30	03-Jun-2025 10:50	03-Jun-2025 08:50	----	----
Compound	CAS Number	LOR	Unit		EW2502854-011	EW2502854-012	EW2502854-013	--------	--------
					Result	Result	Result	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.73**	**0.04**	<0.01	**----**	**----**
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		**31**	**35**	**10**	**----**	**----**
QWI-EN 67.11 Sampling of Groundwaters									
Standing Water Level	----	0.01	m AHD		**2.74**	**2.13**	**2.08**	**----**	**----**

Inter-Laboratory Testing

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

(WATER) ED093F: Dissolved Major Cations

(WATER) EP005: Total Organic Carbon (TOC)

(WATER) EK055G: Ammonia as N by Discrete Analyser

(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) EG020F: Dissolved Metals by ICP-MS

(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

Mandatory Fields

Page ___of___

CoC #: *(if applicable)*

CLIENT CODE:	**SHECIT**	***PROJECT MANAGER:**	**Ryan Stirling**	SAMPLER:	**SAMPLED BY ALS**
***CLIENT:**	**Shellharbour City Council**	***PM MOBILE:**		SAMPLER MOBILE:	**02 4225 3125**
OFFICE: *(Invoiced Office)*	**Shellharbour**	ALS QUOTE # *(Client PL if blank)*	**WO/030/19 TENDER**	PURCHASE ORDER NO.:	**156810**
PROJECT NO./PROJECT:	**Dunmore Quarterly Surface Waters EPL**			SITE:	**Dunmore**
***INVOICE TO:** *(client default if nil)*	Financial@shellharbour.nsw.gov.au			☐ CC Invoice to PM	

BIOSECURITY

Country of Origin: *(if not Australia)*

*EMAIL **REPORTS TO:** *(default to PM if blank)* Ryan.stirlingshellharbour.nsw.gov.au, Glenn.holdenshellharbour.nsw.gov.au, Mitchell.copasshellharbour.nsw.gov.au, lab@enrs.com.au

*** STORAGE REQUIREMENTS**
Please check box →
Standard Storage time from receipt of samples:
Waters - 3 weeks
Soils - 2 months

☐ Standard Storage
☐ Extended Storage

Specify Disposal Date:

Note: Extended storage incurs a fee and requires a signed agreement.

*** TURNAROUND**
Please check box →
(Not all tests can be expedited, contact Client Services for more information)

☐ 5+ days (no surcharge)
☐ 3 day (+15%)
☐ 2 day (+30%)
☐ 1 day (+50%)

***ANALYSIS REQUIRED**
(NB. ALS Quote No. and/or Analysis Suite Codes must be listed to attract suite/quoted price)
Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).
Mark an X in the boxes below analysis to indicate the parameter listed above to be tested on that sample.

Environmental Division Wollongong
Work Order Reference
EW2502852

Telephone : 02 42253125

Comments:

ALS Use Only Lab ID	Sample ID	Depth	Date/Time	No. Bottles	MATRIX: Soil/Solid(S) Water(W) Sediments (SD), Dust (D), Product (P), Biota (B), Biosolid (BS)	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	Field Test pH, EC, DO & Temp					Lab QC (additional bottles req.) Dup	Lab QC (additional bottles req.) MS	Additional Information (Comment on hazards - e.g., asbestos, known high contamination)
	SWP1		2.6.23 10:15	4		X	X	X	X	X			X					☐	☐	
	SWC_2		9:18				X		X		X	X	X					☐	☐	
	SWC_UP		8:55				X		X	X	X	X	X					☐	☐	
	SWC_DOWN		8:25				X		X	X	X	X	X					☐	☐	
	SWC_DOWN_2		8:35				X		X	X	X	X	X					☐	☐	
	Duplicate		9:18				X		X	X	X	X	X					☐	☐	
																		☐	☐	
																		☐	☐	
																		☐	☐	
																		☐	☐	

Receipt Detail (Lab Use ONLY)

Chilling Method: Ice: Frozen / Melted — Ice Bricks: Frozen / Thawed — None

Sample Temp at Receipt: 4.8 °C 6.0 °C 5.6 °C

Security Seal Intact (circle): Yes / No / NA(None)

Carrier Details: ☐ Courier/Post ☐ Client

Con Note #: ALS

Packaging: (Circle) Hard Esky / Foam Esky / Box/Bag/Other

Count: # 1 # #

Relinquished by:	Robert Dahiz	Signature:		Date/Time:	2.6.23
Relinquished by:		Signature:		Date/Time:	
Received by:	Anita	Signature		Date/Time:	2-6-25
Received by:		Signature		Date/Time:	

CERTIFICATE OF ANALYSIS

Work Order	: **EW2502852**	Page	: 1 of 7
Client	: **SHELLHARBOUR CITY COUNCIL**	Laboratory	: Environmental Division NSW South Coast
Contact	: Vivienne Morrow	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	: 02 42253125
Project	: Dunmore Quarterly Surface Water EPL	Date Samples Received	: 02-Jun-2025 14:07
Order number	: 166321	Date Analysis Commenced	: 02-Jun-2025
C-O-C number	: ----	Issue Date	: 12-Jun-2025 14:37
Sampler	: Robert DaLio		
Site	: DUNMORE LANDFILL TENDER		
Quote number	: EW24SHECIT0001 (RFT 2024/81) Tender		
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.

- 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.
- 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	02-Jun-2025 10:15	02-Jun-2025 09:18	02-Jun-2025 08:55	02-Jun-2025 08:25	02-Jun-2025 08:35
Compound	CAS Number	LOR	Unit	EW2502852-001	EW2502852-002	EW2502852-003	EW2502852-004	EW2502852-005
				Result	Result	Result	Result	Result
EA005FD: Field pH								
pH	----	0.1	pH Unit	8.0	7.3	7.3	7.3	7.3
EA010FD: Field Conductivity								
Conductivity @ 25oC	----	1	µS/cm	1640	5820	5390	6280	7160
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	----	3580	3360	3900	4490
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	17	8	9	6	8
EA045: Turbidity								
Turbidity	----	0.1	NTU	26.8	----	9.8	8.4	8.1
EA116: Temperature								
Temperature	----	0.5	°C	15.0	----	----	----	----
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	382	134	137	127	128
Total Alkalinity as CaCO3	----	1	mg/L	382	134	137	127	128
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	324	273	256	292	332
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	156	----	1420	1800	2360
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	82	69	62	67	74
Magnesium	7439-95-4	1	mg/L	53	----	118	137	156
Sodium	7440-23-5	1	mg/L	242	----	948	1120	1280
Potassium	7440-09-7	1	mg/L	5	39	34	40	50
EG020F: Dissolved Metals by ICP-MS								
Iron	7439-89-6	0.05	mg/L	<0.05	0.18	0.18	0.14	0.14
EG020T: Total Metals by ICP-MS								

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	02-Jun-2025 10:15	02-Jun-2025 09:18	02-Jun-2025 08:55	02-Jun-2025 08:25	02-Jun-2025 08:35
Compound	CAS Number	LOR	Unit		EW2502852-001	EW2502852-002	EW2502852-003	EW2502852-004	EW2502852-005
					Result	Result	Result	Result	Result
EG020T: Total Metals by ICP-MS - Continued									
Manganese	7439-96-5	0.001	mg/L		0.116	----	----	----	----
Iron	7439-89-6	0.05	mg/L		1.30	1.16	1.28	1.11	1.09
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		0.5	0.3	<0.1	<0.1	<0.1
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		1.70	0.26	0.26	0.18	0.22
EK055G-NH4: Ammonium as N by DA									
Ammonium as N	14798-03-9_N	0.01	mg/L		----	0.26	0.26	0.18	0.22
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		0.14	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		0.54	0.19	0.19	0.18	0.17
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		0.68	0.21	0.21	0.20	0.19
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		18.8	----	48.1	59.4	76.0
ø Total Cations	----	0.01	meq/L		19.1	----	54.9	64.4	73.5
ø Ionic Balance	----	0.01	%		0.87	----	6.59	4.01	1.71
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		18	10	10	10	10
EP025FD: Field Dissolved Oxygen									
Dissolved Oxygen	----	0.01	mg/L		5.22	7.31	7.80	8.11	7.79
Dissolved Oxygen - % Saturation	----	0.1	% saturation		51.8	71.4	76.0	77.6	75.6

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	Duplicate	----	----	----	----
				Sampling date / time	02-Jun-2025 09:18	----	----	----	----
Compound	CAS Number	LOR	Unit		EW2502852-006	--------	--------	--------	--------
					Result	----	----	----	----
EA005FD: Field pH									
pH	----	0.1	pH Unit		7.3	----	----	----	----
EA010FD: Field Conductivity									
Conductivity @ 25oC	----	1	µS/cm		5830	----	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		3670	----	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		7	----	----	----	----
EA045: Turbidity									
Turbidity	----	0.1	NTU		9.5	----	----	----	----
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		130	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		130	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		273	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		1680	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		65	----	----	----	----
Magnesium	7439-95-4	1	mg/L		127	----	----	----	----
Sodium	7440-23-5	1	mg/L		1020	----	----	----	----
Potassium	7440-09-7	1	mg/L		37	----	----	----	----
EG020F: Dissolved Metals by ICP-MS									
Iron	7439-89-6	0.05	mg/L		0.16	----	----	----	----
EG020T: Total Metals by ICP-MS									
Iron	7439-89-6	0.05	mg/L		1.16	----	----	----	----
EK040P: Fluoride by PC Titrator									

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	Duplicate	----	----	----	----
			Sampling date / time	02-Jun-2025 09:18	----	----	----	----
Compound	CAS Number	LOR	Unit	EW2502852-006	--------	--------	--------	--------
				Result	----	----	----	----
EK040P: Fluoride by PC Titrator - Continued								
Fluoride	16984-48-8	0.1	mg/L	<0.1	----	----	----	----
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	**0.22**	----	----	----	----
EK055G-NH4: Ammonium as N by DA								
Ammonium as N	14798-03-9_N	0.01	mg/L	**0.22**	----	----	----	----
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	**0.19**	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**0.21**	----	----	----	----
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	**55.7**	----	----	----	----
ø Total Cations	----	0.01	meq/L	**59.0**	----	----	----	----
ø Ionic Balance	----	0.01	%	**2.91**	----	----	----	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	**10**	----	----	----	----
EP025FD: Field Dissolved Oxygen								
Dissolved Oxygen	----	0.01	mg/L	**7.31**	----	----	----	----
Dissolved Oxygen - % Saturation	----	0.1	% saturation	**71.4**	----	----	----	----

Inter-Laboratory Testing

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

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

CHAIN OF CUSTODY

Mandatory Fields

Page ___of___

CLIENT CODE:	**SHECIT**	***PROJECT MANAGER:**	**Ryan Stirling**	SAMPLER:	**SAMPLED BY ALS**
***CLIENT:**	**Shellharbour City Council**	***PM MOBILE:**		SAMPLER MOBILE:	**02 4225 3125**
OFFICE: *(Invoiced Office)*	**Shellharbour**	ALS QUOTE # *(Client PL if blank)*	**WO/030/19 TENDER**	PURCHASE ORDER NO.:	**156810**
PROJECT NO./PROJECT:	**Dunmore Quarterly Leachate EPL**			SITE:	**Dunmore**

CoC #: *(if applicable)*

***INVOICE** TO: *(client default if nil)* Financial@shellharbour.nsw.gov.au ☐ CC Invoice to PM

BIOSECURITY

Country of Origin: *(if not Australia)*

***EMAIL REPORTS** TO: *(default to PM if blank)* Ryan.stirlingshellharbour.nsw.gov.au, Glenn.holdenshellharbour.nsw.gov.au, Mitchell.copasshellharbour.nsw.gov.au, lab@enrs.com.au

*** STORAGE REQUIREMENTS**
Please check box. →
Standard Storage time from receipt of samples:
Waters - 3 weeks
Soils - 2 months

☐ Standard Storage
☐ Extended Storage
Specify Disposal Date:
Note: Extended storage incurs a fee and requires a signed agreement.

*** TURNAROUND**
Please check box →
(Not all tests can be expedited, contact Client Services for more information)

☐ 5+ days (no surcharge)
☐ 3 day (+15%)
☐ 2 day (+30%)
☐ 1 day (+50%)

***ANALYSIS REQUIRED**
(NB. ALS Quote No. and/or Analysis Suite Codes must be listed to attract suite/quoted price)
Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).
Mark an X in the boxes below analysis to indicate the parameter listed above to be tested on that sample.

Environmental Division Wollongong
Work Order Reference
EW2502853

Telephone : 02 42253125

Comments:

ALS Use Only Lab ID	Sample ID	Depth	Date/Time	No. Bottles	MATRIX: Soil/Solid(S) Water(W) Sediments (SD), Dust (D), Product (P), Biota (B), Biosolid (BS)	Ammonia	NT-2A (Alka, So4, Cl, Fl) Filtered Ca, K	TOC	NT-04 (NO2, NO3)	Total Fe & Mn	Field Test pH, EC, DO & Temp							Lab QC (additional bottles req.) Dup	Lab QC (additional bottles req.) MS	Additional Information (Comment on hazards - e.g., asbestos, known high contamination)
	Leachate - LP1		2.6.25. 11:35	4	W	X	X	X	X	X	X							☐	☐	
																		☐	☐	
																		☐	☐	
																		☐	☐	
																		☐	☐	
																		☐	☐	
																		☐	☐	
																		☐	☐	
																		☐	☐	
																		☐	☐	

Receipt Detail (Lab Use ONLY)
Chilling Method: Ice: Frozen / Melted — Ice Bricks: Frozen / Thawed — None
Sample Temp at Receipt: 4.8 °C 6.0 °C 5.6 °C
Security Seal Intact (circle): Yes / No / NA(None)
Carrier Details: ☐ Courier/Post ☐ Client
Con Note # ALS
Packaging: (Circle) Hard Esky Foam Esky Box/Bag/Other
Count # 1 # # #

Relinquished by: Robert Parks Signature: Date/Time: 2.6.25
Received by: Aneta Signature Date/Time: 2.6.25

Relinquished by: Signature: Date/Time:
Received by: Signature: Date/Time:

CERTIFICATE OF ANALYSIS

Work Order	: **EW2502853**	Page	: 1 of 4
Client	: **SHELLHARBOUR CITY COUNCIL**	Laboratory	: Environmental Division NSW South Coast
Contact	: Vivienne Morrow	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	: 02 42253125
Project	: Dunmore Quarterly Leachate EPL	Date Samples Received	: 02-Jun-2025 14:10
Order number	: 166321	Date Analysis Commenced	: 02-Jun-2025
C-O-C number	: ----	Issue Date	: 12-Jun-2025 14:37
Sampler	: Robert DaLio		
Site	: DUNMORE LANDFILL TENDER		
Quote number	: EW24SHECIT0001 (RFT 2024/81) Tender		
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.

- EK057G: LOR raised for NO2 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 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 LP1	----	----	----	----
				Sampling date / time	02-Jun-2025 11:35	----	----	----	----
Compound	CAS Number	LOR	Unit		EW2502853-001	--------	--------	--------	--------
					Result	----	----	----	----
EA005FD: Field pH									
pH	----	0.1	pH Unit		**8.2**	----	----	----	----
EA010FD: Field Conductivity									
Conductivity @ 25oC	----	1	µS/cm		**5240**	----	----	----	----
EA116: Temperature									
Temperature	----	0.5	°C		**18.3**	----	----	----	----
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		**262**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		**262**	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**94**	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**644**	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**156**	----	----	----	----
Potassium	7440-09-7	1	mg/L		**203**	----	----	----	----
EG020T: Total Metals by ICP-MS									
Manganese	7439-96-5	0.001	mg/L		**0.117**	----	----	----	----
Iron	7439-89-6	0.05	mg/L		**0.84**	----	----	----	----
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		<0.1	----	----	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.31**	----	----	----	----
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		**332**	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	Leachate LP1	----	----	----	----
				Sampling date / time	02-Jun-2025 11:35	----	----	----	----
Compound	CAS Number	LOR	Unit		EW2502853-001	--------	--------	--------	--------
					Result	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**332**	**----**	**----**	**----**	**----**
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		**166**	**----**	**----**	**----**	**----**
EP025FD: Field Dissolved Oxygen									
Dissolved Oxygen	----	0.01	mg/L		**8.59**	**----**	**----**	**----**	**----**
Dissolved Oxygen - % Saturation	----	0.1	% saturation		**92.5**	**----**	**----**	**----**	**----**

Inter-Laboratory Testing

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

(WATER) ED093F: Dissolved Major Cations
(WATER) EP005: Total Organic Carbon (TOC)
(WATER) EK055G: Ammonia as N by Discrete Analyser
(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) EG020T: Total Metals by ICP-MS
(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) – Dust Samples

CHAIN OF CUSTODY

Mandatory Fields

Page 1 of 1

CoC #: *(if applicable)*

CLIENT CODE:	**SHECIT**	***PROJECT MANAGER:**	**Ryan Stirling**	SAMPLER:	**SAMPLED BY ALS**
***CLIENT:**	**Shellharbour City Council**	***PM MOBILE:**		SAMPLER MOBILE:	**02 4225 3125**
OFFICE: *(Invoiced Office)*	**Shellharbour**	ALS QUOTE # *(Client PL if blank)*	**WO/030/19 TENDER**	PURCHASE ORDER NO.:	~~154040~~
PROJECT NO./PROJECT:	**Dunmore Dust**			SITE:	**Dunmore**
***INVOICE** TO: *(client default if nil)*	Financial@shellharbour.nsw.gov.au			☐ CC Invoice to PM	
*EMAIL **REPORTS** TO: *(default to PM if blank)*	Ryan.stirlingshellharbour.nsw.gov.au, Glenn.holdenshellharbour.nsw.gov.au, Mitchell.copasshellharbour.nsw.gov.au, lab@enrs.com.au				

BIOSECURITY

Country of Origin: *(if not Australia)*

Environmental Division Wollongong
Work Order Reference
EW2502846

Telephone : 02 42253125

*** STORAGE REQUIREMENTS** *Please check box →*
Standard Storage time from receipt of samples:
Waters - 3 weeks
Soils - 2 months

☐ Standard Storage
☐ Extended Storage
Specify Disposal Date:
Note: Extended storage incurs a fee and requires a signed agreement.

*** TURNAROUND** *Please check box →*
(Not all tests can be expedited, contact Client Services for more information)

☐ 5+ days (no surcharge)
☐ 3 day (+15%)
☐ 2 day (+30%)
☐ 1 day (+50%)

***ANALYSIS REQUIRED**
(NB. ALS Quote No. and/or Analysis Suite Codes must be listed to attract suite/quoted price)
Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).
Mark an X in the boxes below analysis to indicate the parameter listed above to be tested on that sample.

Comments:

ALS Use Only Lab ID	Sample ID	Depth	Date/Time	No. Bottles	MATRIX: Soil/Solid(S) Water(W) Sediments (SD), Dust (D), Product (P), Biota (B), Biosolid (BS)	A04 (Ash, CM TIS)	Lab QC (additional bottles req.) Dup	Lab QC (additional bottles req.) MS	Additional Information (Comment on hazards - e.g., asbestos, known high contamination)
	DDG1		2.6.25 13:18	1	D	X	☐	☐	
	DDG2		13:05	1	D	X	☐	☐	
	DDG3		12:20	1	D	X	☐	☐	
	DDG4		9:55	1	D	X	☐	☐	
							☐	☐	
							☐	☐	
							☐	☐	
							☐	☐	
							☐	☐	
							☐	☐	
							☐	☐	

Receipt Detail (Lab Use ONLY)
Chilling Method: Ice: Frozen / Melted — Ice Bricks: Frozen / Thawed — None
Sample Temp at Receipt: °C °C °C
Security Seal Intact *(circle)*: Yes / No / NA(None)
Carrier Details: ☐ Courier/Post ☐ Client
Con Note #: A+S
Packaging: *(Circle)* Hard Esky Foam Esky Box/Bag/Other
Count # # # 1

Relinquished by:	Michael Santos	Signature:	Date/Time: 2-6-25 15:20	Received by: Ameta	Signature: Date/Time: 2/6/25
Relinquished by:		Signature:	Date/Time:	Received by:	Signature: Date/Time:

CERTIFICATE OF ANALYSIS

Work Order	: **EW2502846**	Page	: 1 of 3
Client	: **SHELLHARBOUR CITY COUNCIL**	Laboratory	: Environmental Division NSW South Coast
Contact	: Vivienne Morrow	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	: 02 42253125
Project	: Dunmore Landfill Dust	Date Samples Received	: 02-Jun-2025 15:58
Order number	: 166321	Date Analysis Commenced	: 06-Jun-2025
C-O-C number	: ----	Issue Date	: 16-Jun-2025 11:46
Sampler	: Michael Santos		
Site	: DUNMORE LANDFILL TENDER		
Quote number	: EW24SHECIT0001 (RFT 2024/81) Tender		
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.

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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.

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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 conducted by ALS Newcastle, NATA Accreditation No. 825, Site No. 1656.
- Dust 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 deposition units e.g., g/m².mth where the sampling procedure is not NATA accredited.
- Sampling completed by ALS Wollongong in accordance with in-house sampling method EN/66.1 Sampling and Siting of Dust Deposition Gauges.
- The dust gauges for samples 001, 003, and 004 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. No algaecide correction has been applied to EA139 Soluble Matter or EA142 Total Solids results (where applicable).
- 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 02/05/2025 - 02/06/2025**	**DDG2 02/05/2025 - 02/06/2025**	**DDG3 02/05/2025 - 02/06/2025**	**DDG4 02/05/2025 - 02/06/2025**	**----**
			Sampling date / time	02-Jun-2025 13:18	02-Jun-2025 13:05	02-Jun-2025 12:20	02-Jun-2025 09:55	----
Compound	*CAS Number*	*LOR*	*Unit*	**EW2502846-001**	**EW2502846-002**	**EW2502846-003**	**EW2502846-004**	**--------**
				Result	Result	Result	Result	----
EA120: Ash Content								
Ash Content	----	0.1	g/m².month	**0.3**	**0.1**	**0.3**	**1.8**	**----**
Ash Content (mg)	----	2	mg	**5**	**2**	**7**	**34**	**----**
EA125: Combustible Matter								
Combustible Matter	----	0.1	g/m².month	<0.1	<0.1	**0.5**	**1.1**	**----**
Combustible Matter (mg)	----	2	mg	<2	<2	**10**	**20**	**----**
EA141: Total Insoluble Matter								
Total Insoluble Matter	----	0.1	g/m².month	**0.3**	**0.1**	**0.8**	**2.9**	**----**
Total Insoluble Matter (mg)	----	2	mg	**5**	**2**	**17**	**54**	**----**

Inter-Laboratory Testing

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

(AIR) EA125: Combustible Matter

(AIR) EA120: Ash Content

(AIR) EA141: Total Insoluble Matter

Appendix D:
Surface Gas (Methane) Field Sheets

ALS Landfill Emissions Report

Client: Shellharbour City Council
Date: 18/06/2025
Site: Dunmore
Sampler(s) Michael Santos & Aneta Prosaroski

Transact / Location	Point	GPS North	GPS East	CH4 Conc (ppm)	Comments
A					**No Safe Access Overgrown needs clearing**
B	1	6168 222	302 435	2.8	
B	2	6168 244	302 440	3.4	
B	3	6168 262	302 441	2.7	
B	4	6168 277	302 441	2.9	
C	1	6168 429	302 378	2.8	
C	2	6168 394	302 387	2.9	
C	3	6168 356	302 399	2.8	
C	4	6167 312	302 411	2.9	
C	5	6167 269	302 419	5.5	
C	6	6168 231	302 422	2.7	
C	7	6168 192	302 424	2.7	
C	8	6167 146	302 419	2.7	
C	9	6168 098	302 412	2.7	
C	10	6168 065	302 409	2.9	
C	11	6168 037	302 403	3.2	
C	12	6168 013	302 409	4.4	
C	13	6167 993	302 400	4.5	
D	1	6168 135	302 395	2.8	
D	2	6168 153	302 398	2.8	
D	3	6168 181	302 400	2.8	
D	1	6168 203	302 397	3.3	
D	2	6168 221	302 396	2.8	
D	3	6168 235	302 394	2.8	
D	1	6168 248	302 394	3.0	
D	2	6168 262	302 392	3.2	
E	1	6168 261	302 371	2.8	
E	2	6168 242	302 367	2.9	
E	3	6168 225	302 366	2.8	
E	4	6168 208	302 368	2.8	
E	5	6168 193	302 367	3.1	
F	1	6168 166	302 327	3.0	
F	2	6168 182	302 323	3.1	
F	3	6168 204	302 325	3.5	
F	4	6168 228	302 324	2.9	
F	5	6168 244	302 323	2.8	
F	6	6168 259	302 324	2.8	
G	1	6168 409	302 252	2.8	
G	2	6168 417	302 282	2.7	
G	3	6168 437	302 312	2.7	
G	4	6168 451	302 340	2.7	
H	1	6168 505	302 482	2.6	
H	2	6168 487	302 376	2.7	
H	3	6168 479	302 318	2.7	
H	4	6168 451	302 278	2.7	
H	5	6168 422	302 250	2.7	
H	6	6168 395	302 223	2.7	
H	7	6168 351	301 182	2.7	
H	8	6168 312	301 142	2.7	
H	9	6168 263	302 098	2.7	
H	10	6168 240	302 082	2.7	
H	11	6168 210	302 080	2.7	
H	12	6168 158	302 071	2.7	
H	13	6168 094	302 066	3.5	
H	14	6168 046	302 89	7.0	
H	15	6168 008	302 133	10.5	
H	16	6167 975	302 163	7.2	
H	17	6167 944	302 187	5.9	
H	18	6167 912	302 222	5.5	
H	19	6167 885	302 254	3.6	
H	20	6167 873	302 299	2.7	

H	21	6167 875	302 3458	3.3	
H	22	6167 883	302 399	5.1	
H	23	6167 895	302 085	2.2	
H	24	6167 907	302 482	2.7	
H	25	6168 468	302 531	2.6	
H	26	6168 428	302 551	2.6	
H	27	6168 389	302 557	2.6	
H	28	6168 355	302 553	2.6	
H	29	6168 327	302 549	2.6	
H	30	6168 361	302 539	2.6	
H	31	6168 259	302 553	2.6	
H	32	6168 189	302 581	2.6	
H	33	6168 141	302 611	2.6	
H	34	6168 113	302 628	2.6	
H	35	6168 073	302 615	2.6	
H	36	6168 100	302 571	2.6	
H	37	6168 138	302 549	2.7	
H	38	6168 164	302 532	2.6	
I	1	6168 160	302 104	2.7	
I	2	6168 161	302 131	2.7	
I	3	6168 165	302 159	2.7	
J	1	6168 342	302 197	2.7	
J	2	6168 305	302 207	2.7	
J	3	6168 279	302 218	2.7	
J	4	6167 254	302 224	2.7	
J	5	6167 230	302 234	2.7	
K	1	6168 529	302 394	2.7	
K	2	6168 546	302 446	2.7	
K	3	6168 596	302 429	2.7	
K	4	6168 582	302 388	2.7	
K	5	6168 553	302 378	2.6	
L	1	6168 753	302 336	2.6	
L	2	6168 713	302 309	2.6	
L	3	6168 678	302 279	2.6	
L	4	6168 644	302 246	2.6	
L	5	6168 604	302 229	2.6	
L	6	6168 572	302 199	2.6	
Compressor Shed	1			5.9	
Office	1			3.3	
Community Recycling Centre	1			2.7	
OLD Weighbridge	1			2.7	
OLD Weighbridge Toilet	1			6.6	
Revolve Shop	1			2.6	
Building Truckwash	1			2.7	
New Weighbridge	1			2.7	
Methane Blank (Pre testing)				2.6	Taken at entrance to Dunmore site before main gate
Methane Blank (Post testing)				2.7	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.

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

Appendix F:

Calibration Certificates

CERTIFICATION OF CALIBRATION

Issued by: QED Environmental Systems Inc.

Calibration certificate number **24RA-66602**

Instrument **Laser One** **Serial Number** **41519**

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	0.0	0.00	0.00	0.00	0.00
1000	2.9	2.6	2.6	2.6	2.60	0.30	0.03	0.03
1000	10.1	9.7	9.7	9.7	9.70	0.40	0.04	0.04
1000	102.0	103.0	103.0	103.0	103.00	1.00	0.10	0.10
1000	1006.0	1030.0	1030.0	1030.0	1030.00	24.00	2.40	2.40

Uncertainty	2.40	%
Max % error	2.40	% 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	0.0	0.0	0.0	0.00	0.00	0.00	0.00
100.00	2.19	2.2	2.2	2.2	2.20	0.01	0.01	0.01
100.00	5.00	5.0	5.0	5.0	5.00	0.00	0.00	0.00
100.00	15.00	15.2	15.2	15.2	15.20	0.20	0.20	0.20
100.00	50.00	54.9	54.9	54.9	54.90	4.90	4.90	4.90
100.00	100.00	98.5	98.5	98.5	98.50	1.50	1.50	1.50

Uncertainty	4.90	%
Max % error	4.90	% 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	2.10	2.10	2.10	2.10	2.10	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 Inc.

Environmental conditions during calibration

Temp.	22.5	C
Pressure	998.3	mBar

Gas bottles used for calibration

Gas	Cylinder number	Expiry date	Gas
Synthetic Air	301134	5/10/2029	Synthetic Air
3 ppm	DT0043950	12/19/2032	CH4
10 ppm	DT0011388	1/28/2033	CH4
100ppm	DT0055243	10/18/2028	CH4
1000 ppm	CC64714	9/27/2028	CH4
1.0% Vol	DT0008070	5/24/2029	CH4
2.2% vol	CC499453	6/4/2029	CH4
5.0% vol	4830367Y	5/31/2029	CH4
15% vol	3349204Y	6/12/2029	CH4
50% vol	CC708175	1/22/2029	CH4
100% vol	HP-T-105403	8/22/2028	CH4

Calibration results: Pass

Calibration date: 21/02/2025
DD/MM/YYYY

Next scheduled calibration: 21/02/2026
DD/MM/YYYY

Issued by: Christopher Fleenor

Appendix G:
Gas Flare Reports

CLEAN ENERGY & CARBON ABATEMENT

PEOPLE ENGINEERING A CLEAN ENERGY, ZERO CARBON FUTURE.

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
30.1 million m3	285 thousand tonnes (t CO2e - environmental benefit)	141 thousand Australian Carbon Credit Units (ACCUs)	4.8 million seedlings planted for 10 years (t CO2e)	5,282 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.
- While there is no regulatory requirement to capture biogas, ACCUs enable additional carbon abatement by making it commercially viable to upgrade and expand the biogas capture system under the Emissions Reduction Fund (ERF). This empowers LGI to install and operate a viable flaring project.
- Since 2013, LGI has installed a bespoke biogas management system with an LGI made 1000 m³/hr 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 May 2025

Site:	Dunmore	**Report issue date:**	16/05/2025
Report month:	April 2025	**Prepared by:**	Calvin Neale
Prepared for:	Shellharbour City Council	**Reviewed by:**	Joesph Mikhail

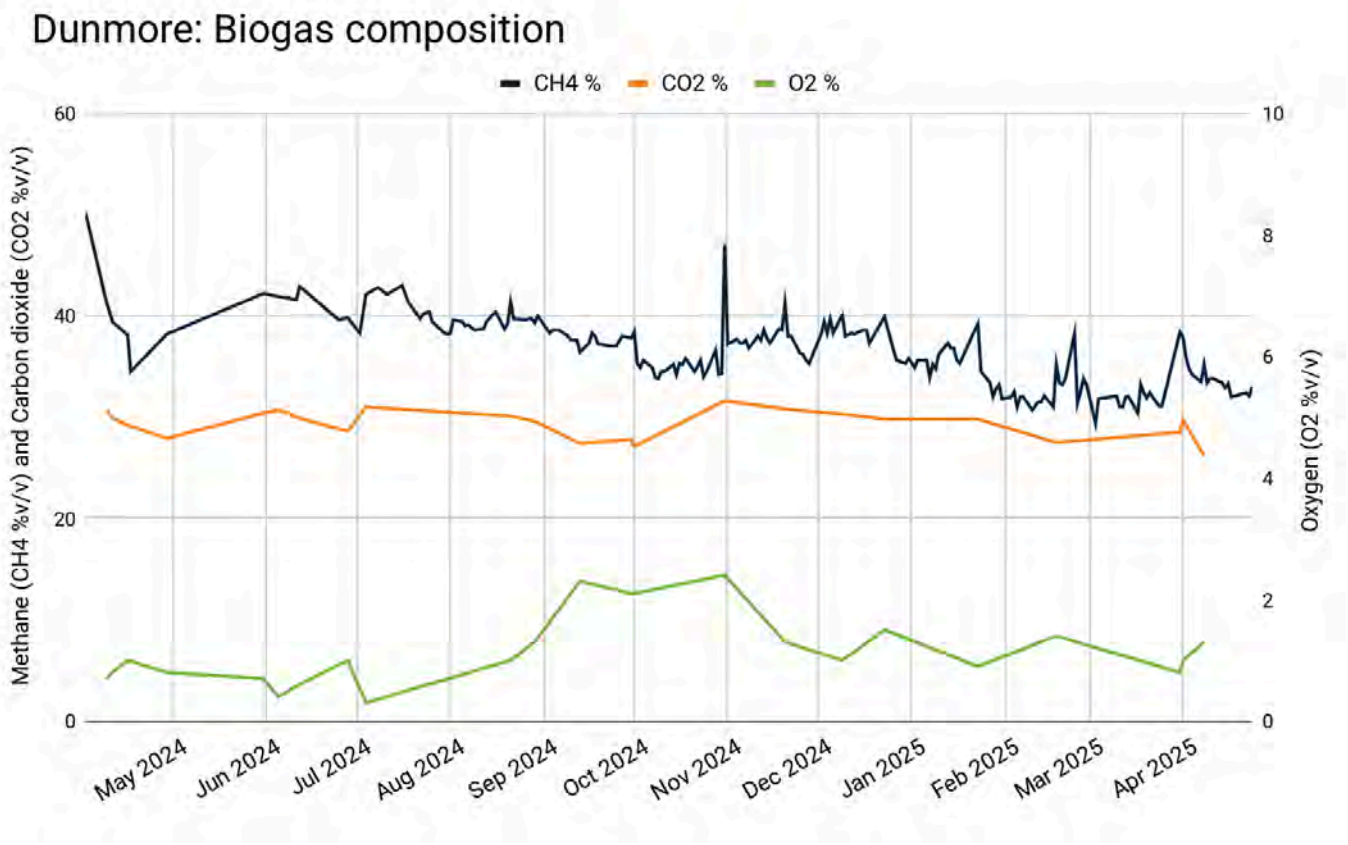
Comments on changes to existing system:	**December 2022** - LGI installed a pneumatic bore pump in a j-trap, allowing for greater reliability of condensate management in the main gas line. **May 2023** - LGI installed a series of 3 pneumatic bore pumps at various wells with evacuated leachate being returned 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. **October 2024 -** LGI Repaired a submain that was damaged in day to day operations. LGI conducting repair works on the flare (asset team for further information). **March 2025 -** LGI conducted a site visited and has marked out a further 14-18 wells in the recently completed Cell. LGI to start works around the 19th of May 2025 if all approval processes are completed.
Recommendations:	LGI recommends continued regular communication with Council regarding leachate management, site performance and future planning. Future Gas Field expansion works viable for the site. LGI recommends continuous communication to ensure this can be strategically undertaken.

Comments on operation / maintenance:	Availability - 99.94 % Down Time: 0.41 h 0.41h - Forced Outage Internal Field tuned: - 29/04/2025 - 08/04/2025 - 01/04/2025

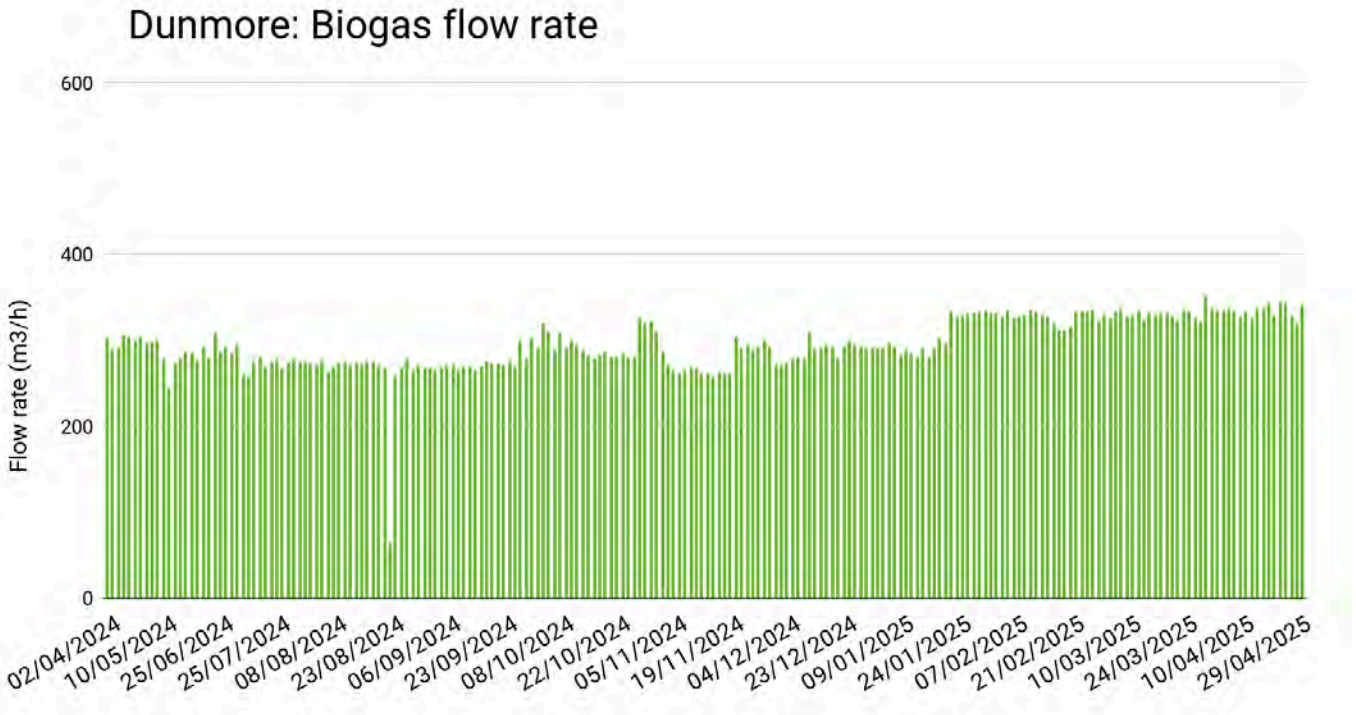
Flare Operational Data:

Date	CH4 (%v/v)	CO2 (%v/v)	O2 (%v/v)	FLOW (m3/h)	STACK TEMP (°C)	CUMULATIVE FLOW (m^3)
01/04/2025	37.9	29.7	1	321	684	29,813,788
08/04/2025	35.2	26.2	1.3	338	682	29,871,985
22/04/2025	32.4	-	-	329	680	29,982,803
29/04/2025	33	28.1	1.5	320	662	30,042,857
Average	34.63	28.00	1.27	327	677	-

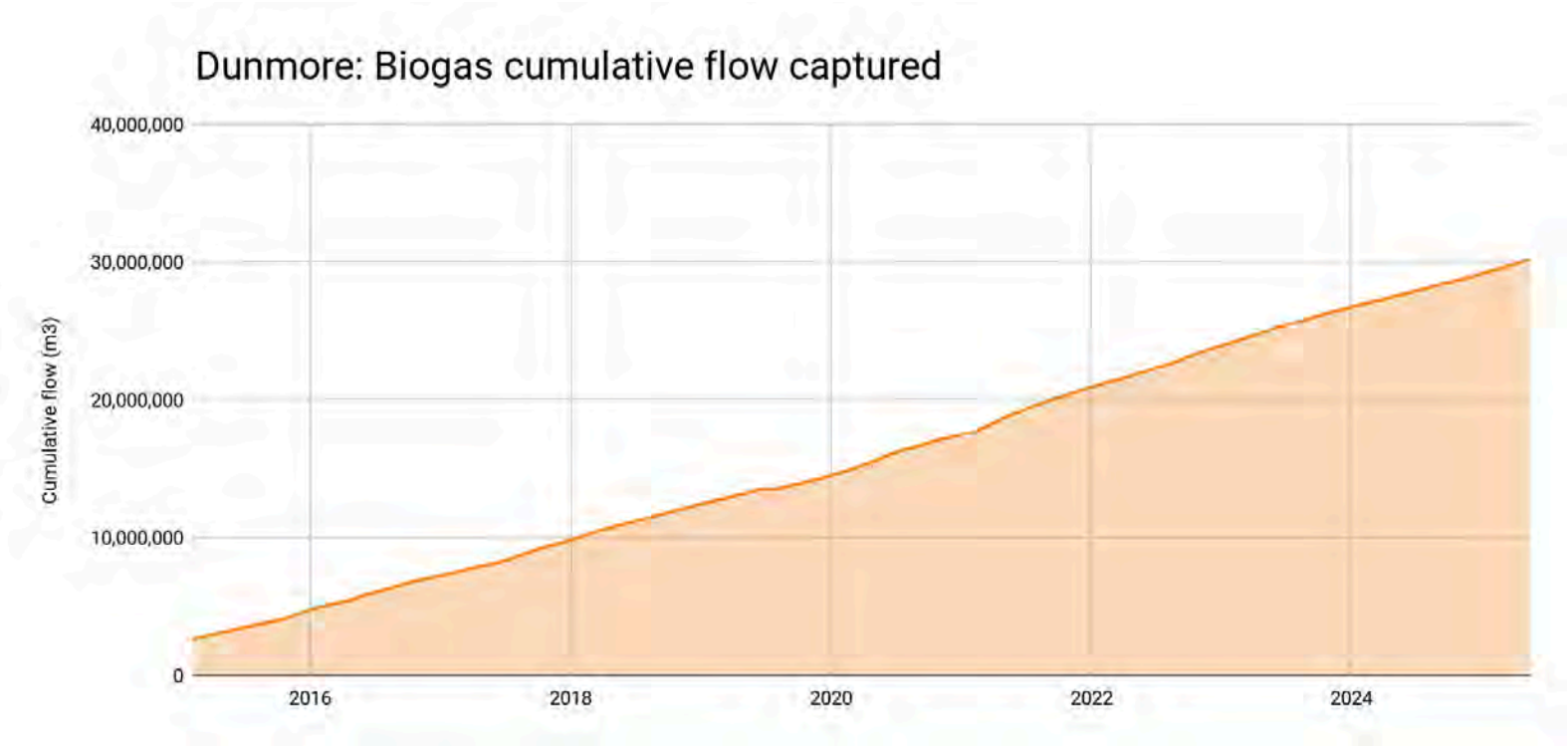
Dunmore- Methane, Carbon Dioxide & Oxygen



Dunmore - Flow Rate



Dunmore - Cumulative Flow



30,055,625 m3 of combusted landfill gas from the beginning of the project up to 1 May 2025 represents:

- 285,456 tonnes of CO2 equivalent (total methane abated by gas capture system to date).
- 4,757,605 seedlings planted for 10 years
- 5,282 (cars off the road for the last 12 months)
- 141,543 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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Archived commentary:

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 the Council. • **September 2016** - LGI disconnected the extended gas capture system to assist the 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.

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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
30.3 million m3	288 thousand tonnes (t CO2e - environmental benefit)	141 thousand Australian Carbon Credit Units (ACCUs)	4.8 million seedlings planted for 10 years (t CO2e)	5,334 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.
- While there is no regulatory requirement to capture biogas, ACCUs enable additional carbon abatement by making it commercially viable to upgrade and expand the biogas capture system under the Emissions Reduction Fund (ERF). This empowers LGI to install and operate a viable flaring project.
- Since 2013, LGI has installed a bespoke biogas management system with an LGI made 1000 m³/hr 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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*Results achieved to 1 June 2025

Site:	Dunmore	**Report issue date:**	17/06/2025
Report month:	May 2025	**Prepared by:**	Calvin Neale
Prepared for:	Shellharbour City Council	**Reviewed by:**	Joesph Mikhail

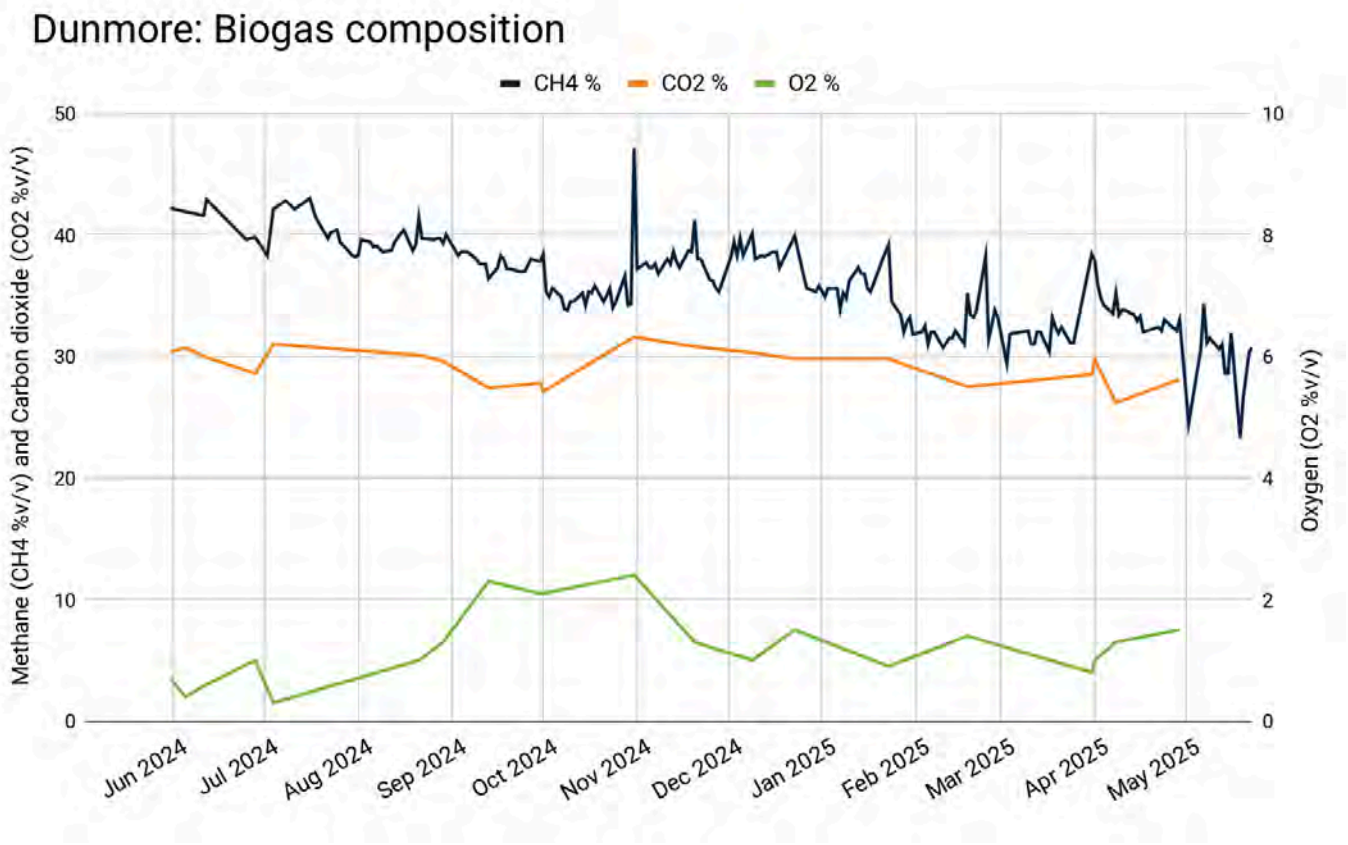
Comments on changes to existing system:	**December 2022** - LGI installed a pneumatic bore pump in a j-trap, allowing for greater reliability of condensate management in the main gas line. **May 2023** - LGI installed a series of 3 pneumatic bore pumps at various wells with evacuated leachate being returned 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. **October 2024 -** LGI Repaired a submain that was damaged in day to day operations. LGI conducting repair works on the flare (asset team for further information). **March 2025 -** LGI conducted a site visited and has marked out a further 14-18 wells in the recently completed Cell. LGI to start works around the 19th of May 2025 if all approval processes are completed. **May 2025 -** New Installation works begun
Recommendations:	LGI recommends continued regular communication with Council regarding leachate management, site performance and future planning. Future Gas Field expansion works viable for the site. LGI recommends continuous communication to ensure this can be strategically undertaken.

Comments on operation / maintenance:	Availability - 100.00 % Down Time: 0.00 h Field tuned: - 28/05/2025

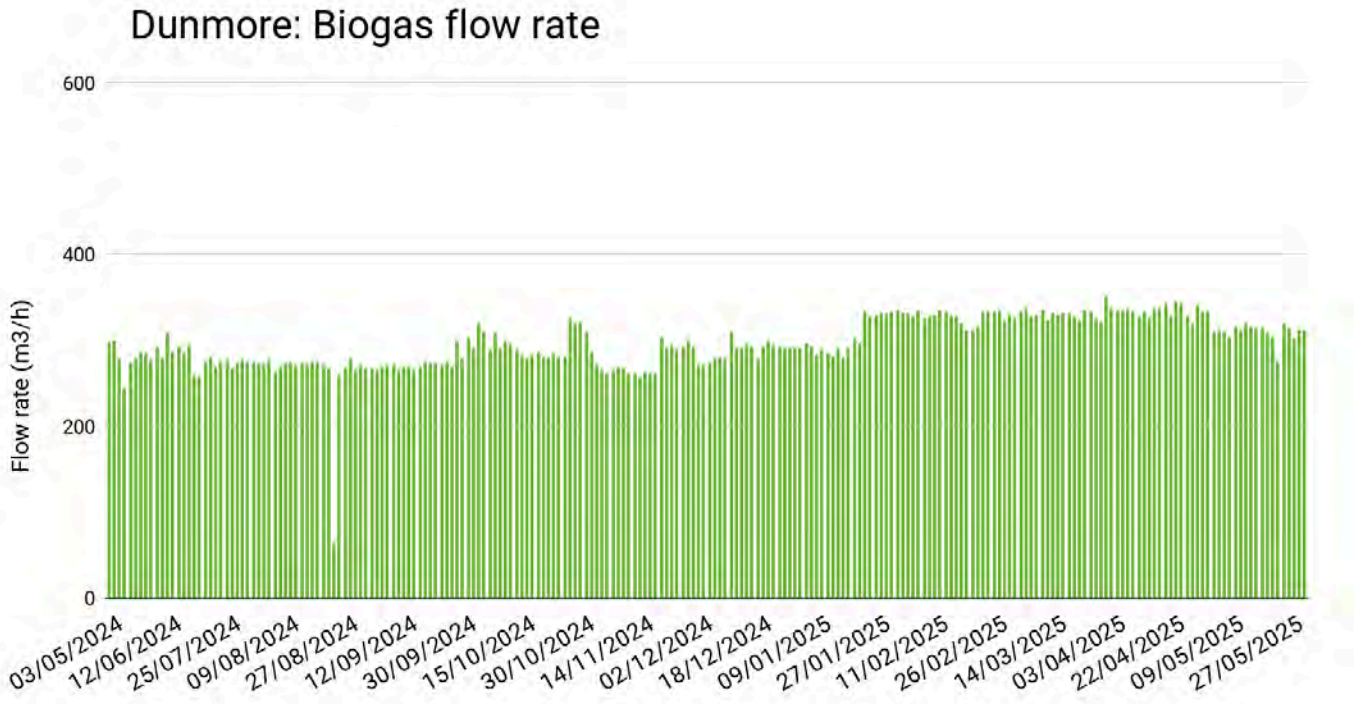
Flare Operational Data:

Date	CH4 (%v/v)	CO2 (%v/v)	O2 (%v/v)	FLOW (m3/h)	STACK TEMP (°C)	CUMULATIVE FLOW (m³)
02/05/2025	24.5	-	-	334	662	30,065,566
08/05/2025	31.1	-	-	310	643	30,112,180
22/05/2025	30.4	-	-	304	674	30,218,711
28/05/2025	34.6	28.5	0.8	302	-	30,262,409
Average	30.15	28.50	0.80	313	660	-

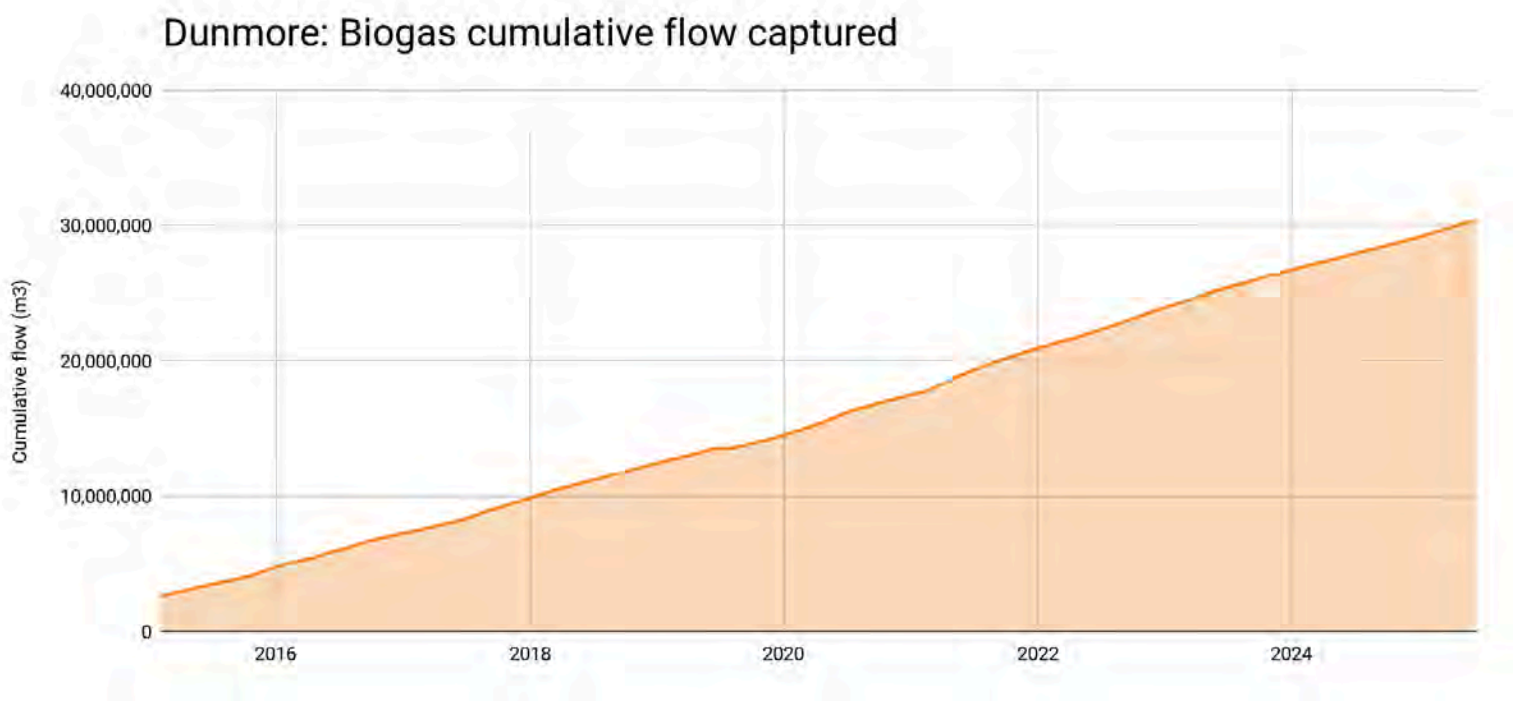
Dunmore- Methane, Carbon Dioxide & Oxygen



Dunmore - Flow Rate



Dunmore - Cumulative Flow



30,289,319 m3 of combusted landfill gas from the beginning of the project up to 1 June 2025 represents:

- 287,676 tonnes of CO2 equivalent (total methane abated by gas capture system to date).
- 4,794,597 seedlings planted for 10 years
- 5,334 (cars off the road for the last 12 months)
- 141,543 Australian Carbon Credit Units (ACCUs)

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

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Archived commentary:

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Results Achieved since the Project Commenced*

BIOGAS CAPTURED	CARBON ABATEMENT	ACCUs CREATED	SEEDLINGS PLANTED	CARS OFF THE ROAD
30.6 million m3	291 thousand tonnes (t CO2e - environmental benefit)	141 thousand Australian Carbon Credit Units (ACCUs)	4.8 million seedlings planted for 10 years (t CO2e)	5,563 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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*Results achieved to 1 July 2025

Site:	Dunmore	**Report issue date:**	17/07/2025
Report month:	June 2025	**Prepared by:**	Calvin Neale
Prepared for:	Shellharbour City Council	**Reviewed by:**	Joesph Mikhail

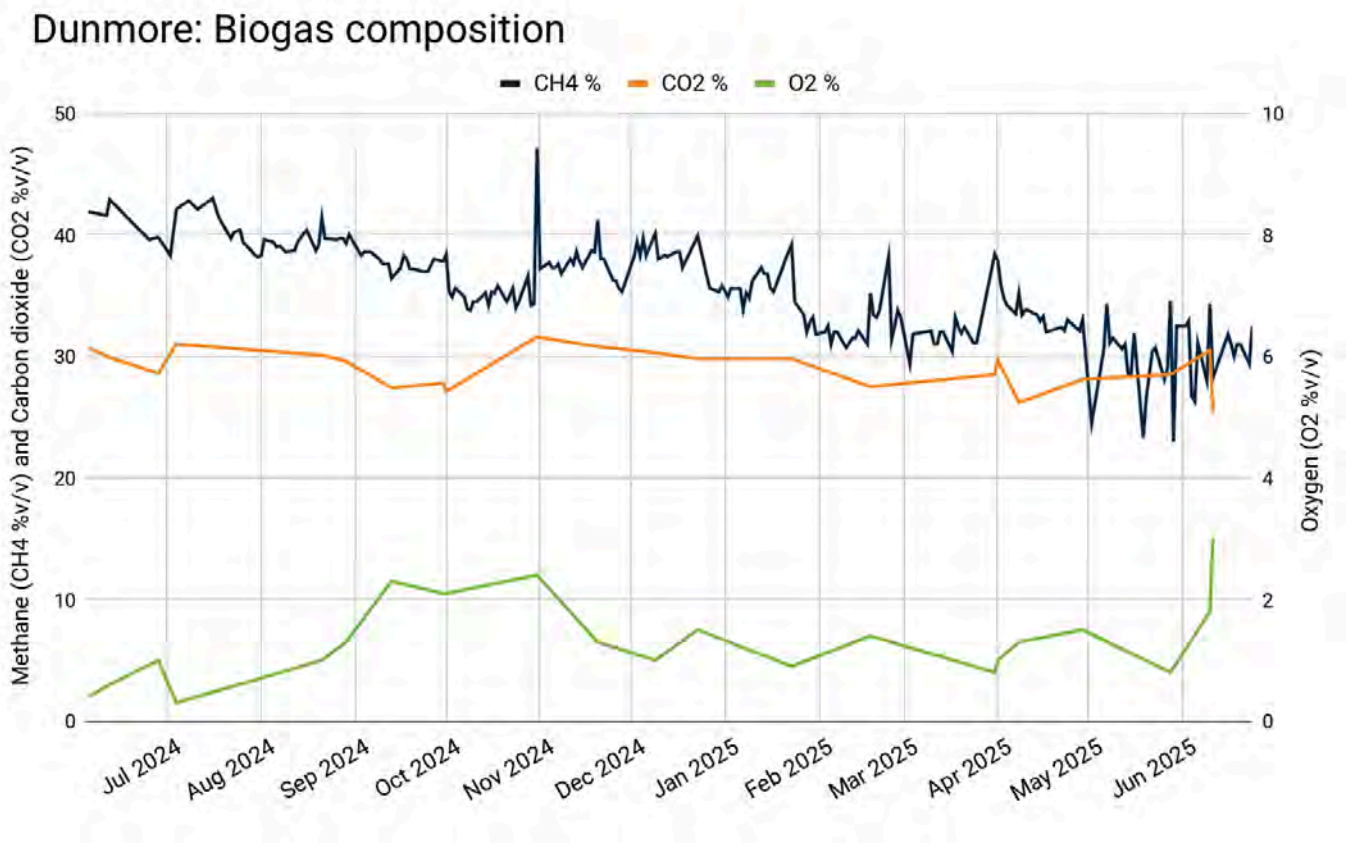
Comments on changes to existing system:	**October 2024 -** LGI Repaired a submain that was damaged in day to day operations. LGI conducting repair works on the flare (asset team for further information). **March 2025 -** LGI conducted a site visited and has marked out a further 14-18 wells in the recently completed Cell. LGI to start works around the 19th of May 2025 if all approval processes are completed. **May 2025 -** New Installation works begun **June 2025 -** Project completed, 16 wells installed and connected. Increase in flow was achieved.
Recommendations:	LGI recommends continued regular communication with Council regarding leachate management, site performance and future planning. Future Gas Field expansion works viable for the site. LGI recommends continuous communication to ensure this can be strategically undertaken.

Comments on operation / maintenance:	Availability - 98.26 % Down Time: 12.50 h 3.08h - Biogas Outage 7.25h - Forced Outage External Field tuned: - 10/06/2025 - 11/06/2025 - 30/06/2025

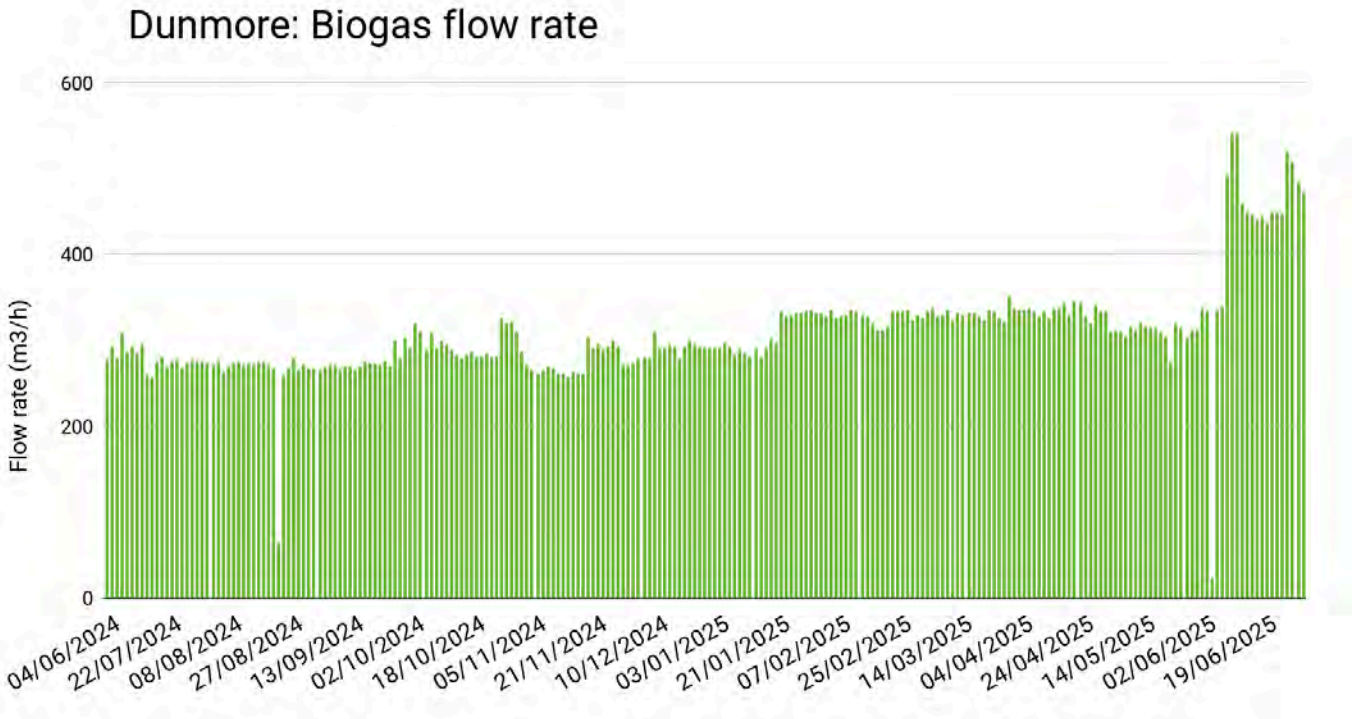
Flare Operational Data:

Date	CH4 (%v/v)	CO2 (%v/v)	O2 (%v/v)	FLOW (m3/h)	STACK TEMP (°C)	CUMULATIVE FLOW (m^3)
02/06/2025	32.5	-	-	338	705	30,299,273
10/06/2025	34.3	30.5	1.8	540	720	30,374,770
11/06/2025	28.2	25.4	3	540	672	30,399,833
30/06/2025	31.2	28.8	1.2	484	633	30,599,417
Average	31.55	28.23	2.00	476	683	-

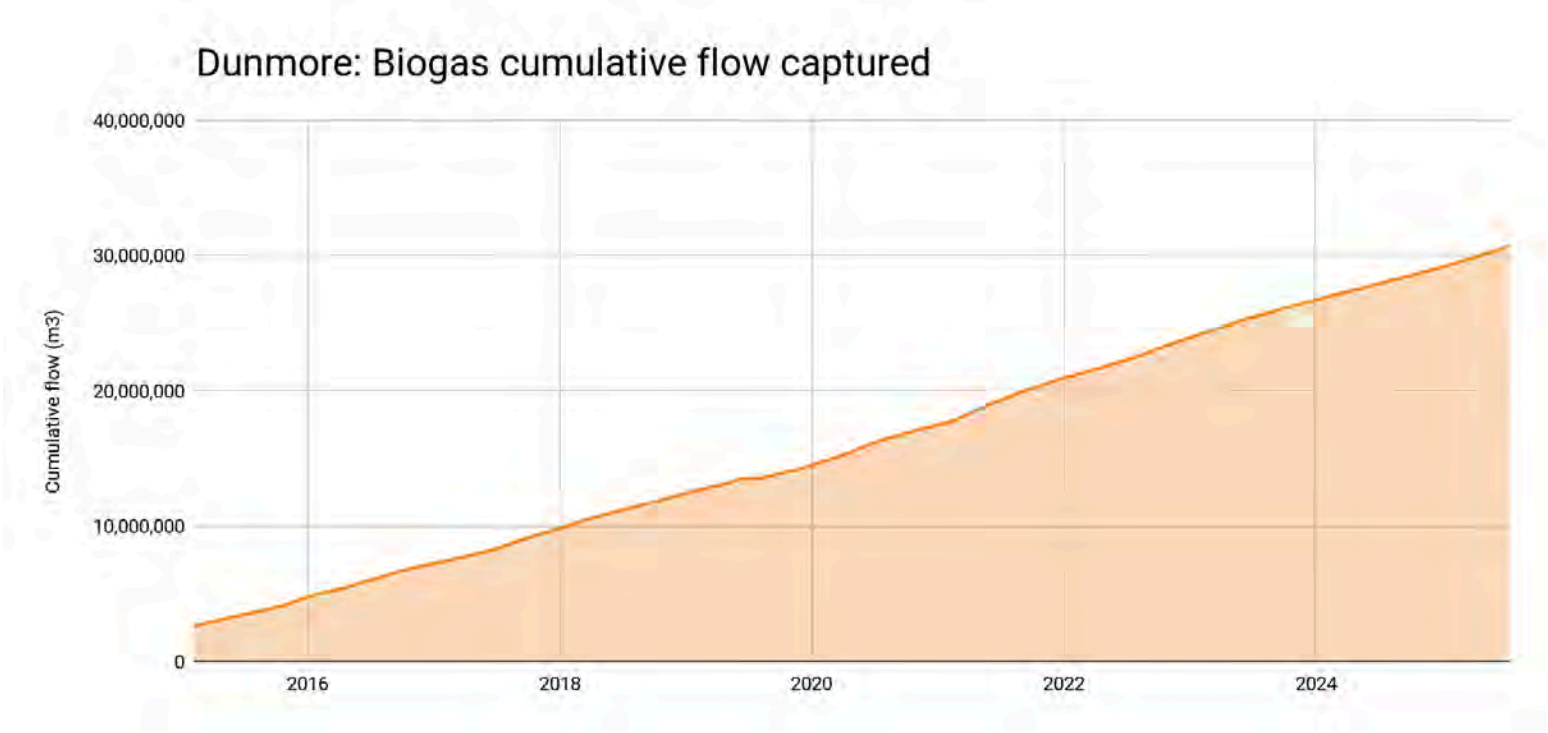
Dunmore- Methane, Carbon Dioxide & Oxygen



Dunmore - Flow Rate



Dunmore - Cumulative Flow



30,606,478 m3 of combusted landfill gas from the beginning of the project up to 1 July 2025 represents:

- 290,688 tonnes of CO2 equivalent (total methane abated by gas capture system to date).
- 4,844,801 seedlings planted for 10 years
- 5,563 (cars off the road for the last 12 months)
- 141,543 Australian Carbon Credit Units (ACCUs)

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

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