

Cleanaway Lucas Heights Landfill Annual Environmental Management Report (AEMR) 2025

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Definitions

AEMR	Annual Environmental Management Report
AEP	Annual Exceedance Probability
AQOMP	Air Quality and Odour Management Plan
CRG	Community Reference Group
DP&E	Department of Planning and Environment (Development consent SSD 6835)
DPI	Department of Primary Industries & Water
EDL	Energy Developments Limited
EIS	Environmental Impact Statement
EP&A Act	Environmental Planning and Assessment Act 1979
EPA	NSW Environment Protection Authority
EPL	Environment Protection Licence
EPR	Environmental Performance Review
ERP	Emergency Response Plan
GMP	Groundwater Management Plan
HDPE	High-density polyethylene
LHRRP	Lucas Heights Resource Recovery Park
LP	Leachate pit
MP	Monitoring Point
OEMP	Operational Environmental Management Plan
PCYC	Police Citizens Youth Club
PIRMP	Pollution Incident Response Management Plan
SSC	Southerland Shire Council
SEAR's	Secretary's Environmental Assessment Requirements
TMP	Traffic Management Plan
VPA	Voluntary Planning Agreement

1. Introduction

This Annual Environmental Management Report (AEMR) has been prepared to detail the environmental performance of the Lucas Heights Resource Recovery Park (LHRRP) located at Little Forest Road, Lucas Heights (including the expanded operations). This report has been prepared as per the requirements detailed in Development Consent SSD6835 (the Consent), which commenced on 23 January 2017. Specifically, this report covers 1 January 2025 to 31 December 2025 (the 2025 reporting period).

Section D9 (a) of the Development Consent requires an AEMR to be submitted to the Secretary by the end of February. Cleanaway requested an extension from NSW Department of Planning, Housing and Infrastructure for the submission of this AEMR.

In accordance with section D9 of the Consent, the AEMR provides a review of the site environmental performance and a summary of environmental monitoring conducted at LHRRP, recommendations for environmental and operational improvements as a result of regulatory inspections and external feedback, as well as Cleanaway internal quality assurance programs and corrective actions.

Following correspondence from the Department of Planning (now known as DPE), dated 27 March 2019, additional information has been added into the AEMR, specifically in relation to:

- Non-compliance/s;
- Independent Environmental Audit (IEA) non-compliance/s and the Action Plan/s related to these non-compliances;
- Incidents;
- Waste Limits; and to
- Address the requirements of the Department of Planning and Environment (DPE) Post Approval (dated 28 June 2019).

This report has been updated to reflect the changes made to the Development Consent SSD6835-Mod- 3, confirmed on 12 June 2025.

2. Non-Compliance Register

Based on the information contained within the 2025 AEMR for the Lucas Heights Landfill, the following non-compliances have been identified

Table 1. Non-compliance register.

No.	Condition	Description	Status	Details	Actions taken to ensure compliance
3	C11A (b)	C11A, The Applicant must update the Site Air Quality and Odour Management Plan required by Condition C11 of this consent to include the Modification Assessments. The updated plan must: (b) be submitted to the Planning Secretary within six months of the determination of SSD- 6835-MOD-2;	Ongoing	Cleanaway updated the AQOMP (Rev 3, 09/09/2021) and submitted it to DPHI on the 04/11/2021. The updated plan has been provided to the EPA for consultation, although Cleanaway is yet to receive any feedback or consultation with respect to the document. We have not achieved the submission timeframe in accordance with this condition.	Cleanaway has submitted the air quality and odour management plan to SSC and EPA following the determination of MOD 2. We are yet to receive feedback from EPA on the document. Cleanaway will facilitate regular meetings with EPA to assist in obtaining the required feedback and consultation so that the document can be finalized and issued to DPHI
4	D4 (f)	Applicant must update the OEMP to incorporate the measures identified in MOD 2.	Ongoing	OEMP has been updated to incorporate the MOD 2 modification assessment but we are yet to receive review responses from SSC which are required prior to submission to of final version to DPHI. We have not achieved the submission timeframe in accordance with Condition D8(d)	Cleanaway will liaise with SSC regularly in order to obtain the required comments so that the updates can be finalized and issued to DPHI..
1	D8 (d)	Within three months of: (a) an audit submitted under Condition D12; (b) an incident report under Conditions D10 and D11; (c) an annual review under Condition D9; and/or (d) a modification to this consent, the Applicant must review, and if necessary, revise the strategies, plans, and programs required under this consent to the satisfaction of the Planning Secretary. Note: This is to ensure the strategies, plans and programs are updated on a regular basis, and incorporate any recommended measures to improve the environmental performance of the site	Ongoing	The relevant documentation has been prepared following MOD 2 and MOD 3. We are awaiting comments from SSC on the OEMP, following which the OEMP can be issued to DPHI. We have not achieved the required submission timeframe.	Cleanaway will liaise with SSC regularly in order to obtain the required comments so that the updates can be finalized and issued to DPHI..

3. Site Background

Cleanaway Lucas Heights Resource Recovery Park is located off Little Forest Rd, Lucas Heights and is approximately 30km South West of the Sydney CBD. The site operates a drop-off for pre-sorted loads of paper and cardboard, steel and aluminium cans, e-waste, scrap metals, limited quantities of sump oil, white goods and vehicle batteries as well as a landfill disposal site accepting up to 970,000 tonnes of general solid waste (putrescible) and asbestos waste per annum based on Development Consent SSD-6835-Mod-3. The site also houses the Lucas Heights Organic Resource Recovery Facility, which collects and processes organic material for recycling into compost.

Cleanaway Pty Ltd acquired the site in December 2021 for SUEZ.

An overview of the location of LHRRP can be seen in Figure 1.



Figure 1. LHRRP location overview

Further to the above information, the following is a summary of the key activities undertaken during 2025, in addition to the normal waste management operations undertaken at the site:



Figure 1. Waste filling commenced at Area H/I



Figure 2. Liner installation at the North Wall Area



Figure 3. Stage 2 excavation at the proposed western Garden Organics area



Figure 4. Installation of gas collection wells at Area C.



Figure 5. Capping works in Area C



Figure 6. Installation and commissioning of 5x new flares and 2x temporary flares

4. Compliance Status Summary

Table 2. Compliance Status Summary.

COMPLIANCE REQUIREMENT	DEVELOPMENT PHASE	STATUS	MONITORING METHODOLOGY	EVIDENCE AND COMMENTS
SCHEDULE B ADMINISTRATIVE CONDITIONS				
OBLIGATION TO MINIMISE HARM TO THE ENVIRONMENT				
B1. In addition to meeting the specific performance criteria established under this consent, the Applicant must implement all reasonable and feasible measures to prevent and/or minimise any harm to the environment that may result from the Development	Operational	Compliant	Environmental management plans and procedures have been established to identify, plan and manage environmental aspects and impacts related to the LHRRP.	Independent Audit, BSI Certification, Environmental Risk Register, Environmental Monitoring Data, PIRMP and ERP.
TERMS OF CONSENT	DEVELOPMENT PHASE	STATUS	MONITORING METHODOLOGY	EVIDENCE AND COMMENTS
B2. The Applicant must carry out the Development in accordance with the:				
(a) EIS and RTS;	Operational	Compliant	The new GO facility is yet to be constructed. Excavation of the new GO area had commenced in 2023. Overtopping of the landfill at Area C was undertaken in 2023. The phasing plan from the EIS was provided to Select Civil, to develop the more detailed fill platform drawings (in consultation with Cleanaway).	Not Applicable
(b) Modification Assessments	Operational	Compliant	Consent MOD-3 approved on 12 June 2025.	
(c) Development plans and drawings in the EIS, RTS and Modification Assessments (see Appendix A)	Operational	Compliant	b) The phasing plan from the EIS was provided to Select Civil, to develop the more detailed fill platform drawings (in consultation with Cleanaway). Upon the expiration of Select Civil's contract at the end of October 2025, Cleanaway's Operation team has taken control of the fill plan.	Reflected in the survey plan submitted to EPA
(d) the Management and Mitigation Measures (see Appendix B); and	Operational	Compliant	The Management and Mitigation Measures (landfill) included in Appendix B of the Consent have been included in the Landfill Operational Environmental Management Plan (OEMP). GO excavation began in January 2023.	Since bringing landfilling operations in house, Cleanaway hold regular planning meetings with relevant contractors for any re-profiling works.
(e) the draft landfill, GO and Post Closure Environmental Management Plans included in the EIS	Development phase	Not Triggered for GO facility	Landfill OEMP Completed and currently under review. GO excavation began in January 2023.	OEMP currently under review.
(f) the draft landfill, GO and Post Closure Environmental Management Plans included in the EIS		Not triggered	N/A	N/A
B3. If there is any inconsistency between the plans and documentation referred to in Condition B2 above, the most recent document must prevail to the extent of the inconsistency. However, the conditions of this consent shall prevail to the extent of any inconsistency.	Pre-Construction	Not triggered	N/A	N/A

B4. The Applicant must comply with any reasonable requirement(s) of the Planning Secretary arising from the Department's assessment of: (a) any reports, plans or correspondence that are submitted in accordance with this consent; and (b) the implementation of any actions or measures contained in these documents.	Noted	N/A	N/A	N/A
LIMITS OF CONSENT	DEVELOPMENT PHASE	STATUS	MONITORING METHODOLOGY	EVIDENCE AND COMMENTS
B5. This consent lapses five years after the date from which it operates unless the Development has physically commenced on the land to which the consent applies before the date on which the consent would otherwise lapse under Section 95 of the EP&A Act.	Operational	Compliant	SUEZ commenced re-profiling in January 2018, Cleanaway continued with reprofiling. Excavation for the GO facility commenced in January 2023.	Re-profiling has commenced.
B6. The Applicant shall not receive more than:				
(a) 970,000 tonnes of general solid waste (putrescible and non-putrescible) and asbestos waste per calendar year on site for landfill disposal;	Operational	Compliant	845,574 tonnes received for 2025 calendar year. The tonnage limit was increased to 970,000 tonnes under SSD-6835-Mod-2.	Mandalay, Monthly Tonnage report.
(b) 10,000 tonnes of recyclable general solid waste (non-putrescible) and batteries per calendar year on site at the Resource Recovery Centre and waste collection point;	Operational	Compliant	Less than 10,000t of recyclables received in 2025.	Mandalay, Monthly Tonnage report.
(c) 100,000 tonnes of garden and wood waste and 2,000 tonnes of manure per calendar year at the GO Facility;	Operational	Compliant	41,885 tonnes received in 2025 calendar year.	Mandalay, Monthly Tonnage report.
(d) the quantity of waste required to meet the final landform profile described in the EIS.	Not Triggered	Not Triggered	N/A	N/A
B7. The receipt, processing, and disposal of waste at the landfill and GO Facility must cease at the end of 2037.	Not Triggered	Not Triggered	N/A	N/A
OTHER CONSENTS AND APPROVALS	DEVELOPMENT PHASE	STATUS	MONITORING METHODOLOGY	EVIDENCE AND COMMENTS
B8. Within 6 months of the date of this consent, the Applicant must modify DA 11- 01-99 to remove the conditions of that consent that relate to the LHRRP. The modification must be in accordance with the Environmental Planning and Assessment Regulation, 2000. The modification is required to ensure all activities undertaken at the LHRRP are covered by this consent only.	Operational	Compliant	Modification was approved by Industry Assessment on 26/8/2019.	Department of Planning, Industry and Environment 2019 approval.
STATUTORY REQUIREMENTS	DEVELOPMENT PHASE	STATUS	MONITORING METHODOLOGY	EVIDENCE AND COMMENTS

B9. The Applicant must ensure that all licences, permits and approval/consents are obtained as required by law and maintained as required throughout the life of the Development. No condition of this consent removes the obligation for the Applicant to obtain, renew or comply with such licences, permits or approval/consents.	Operational	Compliant	Development Consent SSD 6835 - EPL 5065 – covers operations of the landfill. - EPL 12520 – covers operation of the existing Organics facility. - EPL 13114 – was surrendered, EPA approval issued 30 July 2019. - Trade Waste Agreement with Sydney Water - Voluntary Planning Agreement (VPA) with Sutherland Shire Council, The ANSTO Agreement under which Cleanaway lease land owned by ANSTO. Development Consent SSD-6835-Mod-2 was issued on 23/11/2023. Development Consent SSD-6835-Mod-3 was issued on 12/6/2025.	Applicable Licences, permits and approvals/consents are held in on-site operations office.
STRUCTURAL ADEQUACY	DEVELOPMENT PHASE	STATUS	MONITORING METHODOLOGY	EVIDENCE AND COMMENTS
B10. The Applicant must ensure that all new buildings and structures, and any alterations or additions to existing buildings and structures are constructed in accordance with the relevant requirements of the BCA.	Not Triggered	Not Triggered	N/A	N/A
Notes: • Under Part 4A of the EP&A Act, the Applicant is required to obtain construction and occupation certificates for the proposed building works; and • Part 8 of the EP&A Regulation sets out the requirements for the certification of the Development.	Noted	N/A	N/A	N/A
OPERATION OF PLANT AND EQUIPMENT	DEVELOPMENT PHASE	STATUS	MONITORING METHODOLOGY	EVIDENCE AND COMMENTS
B11 The Applicant must ensure that all plant and equipment used for the Development are:				
(a) maintained in a proper and efficient condition; and	Operational	Compliant	Landfill Select Civil was responsible for maintaining plants and equipment used on the landfill till end of Oct 2025. Select Civil used a number of tools including: • Pre-start checklists. • The Plant Assessor. • On-site maintenance workshop for non-major repairs. • Calibration/Inspection and Testing of Equipment Register. Cleanaway have since taken over the maintenance or plant and equipment used on the landfill and use a number of tools including: • Pre-start checklists • The Cleanaway system which tracks required regular maintenance and issues noted in the pre-start checklists. Other contractors (such as John Morris, Mulgoa Quarries) used for engineering projects utilize the following tools: • Pre-start checklists • On-site maintenance workshop for non-major repairs Organics Facility Cleanaway was responsible for maintaining the Organics Facility plant and equipment, Cleanaway used a number of tools including: • Pre-start checklists. • The Cleanaway system which tracks required regular maintenance and issues noted in pre-start checklists. Water treatment plant and leachate treatment plant. Both plants are maintained by JPG Engineering. JPG use a number of tools including: • A Maintenance Leachate Inventory and	Records held in on-site operations office.

			Operations Checklist completed on a daily basis. - Monitoring through SCADA which sends low flow, high level alarm alerts to JPG Engineering. JPG view the SCADA system online and receive emergency updates for example high-level alarms. - JPG provide Cleanaway with the records of maintenance.	
(b) Operated in a proper and efficient manner.	Operational	Compliant	Refer to the above information.	N/A
PROTECTION OF PUBLIC INFRASTRUCTURE	DEVELOPMENT PHASE	STATUS	MONITORING METHODOLOGY	EVIDENCE AND COMMENTS
B12. Prior to the commencement of construction, the Applicant must:				
(a) prepare a dilapidation report of the public infrastructure in the vicinity of the site (including roads, kerbs, footpaths, nature strip, street trees and furniture); and	Development phase	Compliant	A dilapidation report was prepared by AECOM dated 20 April 2017.	Records held in on-site operations office.
(b) submit a copy of this report to the Planning Secretary and Council.	Development phase	Compliant	Dilapidation report submitted to DoP on 7 July 2017.	N/A
B13. The Applicant must:				
(a) repair, or pay the full costs associated with repairing, any public infrastructure that is damaged as a result of the Development;	Not Triggered	Not Triggered	N/A	N/A
and				
(b) relocate, or pay the full costs associated with relocating, any public infrastructure that needs to be relocated as a result of the Development.	Not Triggered	Not Triggered	N/A	N/A
STAGED SUBMISSION OF PLANS OR PROGRAMS	DEVELOPMENT PHASE	STATUS	MONITORING METHODOLOGY	EVIDENCE AND COMMENTS
B14. With the approval of the Planning Secretary, the Applicant may: (a) submit any strategy, plan, or program for the landfill re-profiling and GO Facility construction and operation, required by this consent, on a progressive basis; and/or (b) combine any strategy, plan or program required by this consent.	Development phase	Compliant	Staged submission approved by Planning and Environment 22 February 2018.	Records held in operations office.
DISPUTE RESOLUTION	DEVELOPMENT PHASE	STATUS	MONITORING METHODOLOGY	EVIDENCE AND COMMENTS
B15. In the event that a dispute arises between the Applicant and either Council or a public authority, in relation to an applicable requirement in this consent or relevant matter relating to the Development, either party may refer the matter to the Planning Secretary for resolution. The Planning Secretary's determination of any such dispute must be final and binding on the parties. Note: This condition does not relate to disputes raised regarding matters in the Voluntary Planning Agreement required under Condition 819.	Not Triggered	Not Triggered	N/A	N/A
COMPLIANCE	DEVELOPMENT PHASE	STATUS	MONITORING METHODOLOGY	EVIDENCE AND COMMENTS
B16. The Applicant must ensure that employees, contractors, and sub-contractors are aware of, and comply with, the conditions of this consent relevant to their respective activities.	Operational	Compliant	Employees and contractors would be made aware of the section/s of the Consent relevant to their work through Toolbox Talks and Standard Operational Procedures. HSE systems compliance audit of Select Civil (16/5/2025), weekly site environment and operational inspections.	Record of Toolbox Talks and Procedures are held in the on-site administration office and the Cleanaway shared drive
B17. The Applicant must be responsible for environmental impacts resulting from the actions of all persons that it invites	Noted	N/A	N/A	Near misses and incidents are reported and recorded on Cleanaway's incident

onto the site, including contractors, sub-contractors and visitors.				management portal.
EVIDENCE OF CONSULTATION	DEVELOPMENT PHASE	STATUS	MONITORING METHODOLOGY	EVIDENCE AND COMMENTS
B18. Where consultation with any public authority or community group is required by the conditions of this consent, the Applicant must: :				
(a) consult with the relevant public authority or community group prior to submitting the required documentation to the Planning Secretary for approval, where required;	Operational	Compliant	ANSTO and Sutherland Shire Council are consulted prior to any submission.	CRG meeting records
(b) submit evidence of this consultation as part of the relevant documentation required by the conditions of this consent; and	Operational	Compliant	Consent Modification SSD 6835 MOD 1 approved on 5 June 2018. MOD 2 submitted on 21 December 2022. MOD 2 approved on 23 November 2023. MOD 3 submitted on 26 March 2025. MOD 3 approved on 12 June 2025.	N/A
(c) include the details of any outstanding issues raised by the relevant public authority or community group and an explanation of or agreement between any public authority or community group and the Applicant or any person acting on this Development consent.	Operational	Compliant	No outstanding actions.	N/A
PLANNING AGREEMENT	DEVELOPMENT PHASE	STATUS	MONITORING METHODOLOGY	EVIDENCE AND COMMENTS
B19. Prior to the commencement of construction and prior to receiving increased tonnes of waste in accordance with Condition B6(a), the Applicant must enter into the Voluntary Planning Agreement with Council in accordance with the Letter of Offer dated 15 December 2016.	Development Phase	Compliant	Quarterly meeting held with council.	VPA Meeting records
SCHEDULE C SPECIFIC ENVIRONMENTAL CONDITIONS	DEVELOPMENT PHASE	STATUS	MONITORING METHODOLOGY	EVIDENCE AND COMMENTS
WASTE Receipt, Storage & Handling of Waste.				
C1. The Applicant must only receive waste on site that is authorised for receipt by an EPL.	Operational	Compliant	Unacceptable waste would be rejected and sent to an alternative appropriately licensed facility .	Rejected waste is recorded in Mandalay reports and Myosh portal.
C2. The Applicant must ensure any waste generated on the site during construction is classified in accordance with the EPA's Waste Classification Guidelines, 2014 or its latest version, and disposed of to a facility that may lawfully accept the waste.	Not Triggered	Not Triggered	N/A	N/A

C3. The Applicant must: (a) implement auditable procedures to: i. ensure the site does not accept wastes that are prohibited; ii. screen incoming waste loads; and (b) ensure that: i. all waste types that are controlled under a tracking system have the appropriate documentation prior to acceptance at the site; and ii. staff receive adequate training in order to be able to recognize and handle any hazardous or other prohibited waste.	Operational	Compliant	Weighbridge staff and staff at the public drop off are trained in Waste Acceptance Procedures Incoming loads are visually screened by the weighbridge operator where possible and any waste that is not licensed to be received at the site is rejected. Waste brought to site by the public are sent to the public waste drop-off where Cleanaway staff monitor waste disposed of at the respective drop-off point e.g., general waste, green waste, mattresses, and e-waste. Asbestos must be bagged appropriately to be disposed of on-site, otherwise the load is rejected. A Rejected Load Form is completed for all rejected loads and they are recorded in a rejected load register. The rejected load register maintained at the weighbridge was sighted during the audit. The register included the date, docket number, registration of the vehicle, product (waste type), the reason for not tipping and was signed by the weighbridge attendant. Lucas Heights Landfill does not accept any trackable waste.	Training records
Monitoring	DEVELOPMENT PHASE	STATUS	MONITORING METHODOLOGY	EVIDENCE AND COMMENTS
C4. The Applicant must provide details of the quantity, type and source of wastes received on the site and provide these details to the EPA and the Planning Secretary when requested.	Operational	Compliant	Section 88 Return provided to the EPA monthly. Mandalay reporting system manages waste in and out of site.	WARRP and weighbridge Records
Landfill Operations	DEVELOPMENT PHASE	STATUS	MONITORING METHODOLOGY	EVIDENCE AND COMMENTS
C5. To minimise the potential for odour generation, the Applicant must, unless otherwise agreed in writing by the EPA:				
(a) ensure a maximum of 1 hectare of existing intermediate cover or 2 hectares of existing final capped cover may be stripped in advance of landfilling to form the prepared surface. The prepared surface must have a minimum depth of 300 millimetres;	Operational	Compliant	Former contractor Select Civil Daily site sheets. Cleanaway operations Daily Inspection Form	Records held in on-site operations office.
(b) at any one time a maximum of 2,500 metres squared of the prepared surface may be stripped back to expose previously landfilled waste to form the active tip face; and	Operational	Compliant	Former contractor Select Civil Daily site sheets. Cleanaway operations Daily Inspection Form	Records held in on-site operations office.
(c) the landfill gas field infrastructure must be retained and operating at all times, with the exception of the stripped back prepared surface.	Operational	Compliant	Monthly reports from Energy Development Limited.	Records held in on-site operations office.
Imported Soil	DEVELOPMENT PHASE	STATUS	MONITORING METHODOLOGY	EVIDENCE AND COMMENTS
C6. The Applicant must:				

(a) ensure that only VENM or ENM or other material approved in writing by the EPA is used as fill on the site;	Operational	Compliant	Mandalay	Operational OPDs Approved by EPA prior to delivery.
(b) keep accurate records of the volume and type of fill to be used; and	Operational	Compliant	Mandalay	Operational OPDs Approved by EPA prior to delivery.
(c) make these records available to the Planning Secretary upon request.	Operational	Compliant	Mandalay	Operational OPDs Approved by EPA prior to delivery.
C7. During construction, the Applicant must ensure any material brought on site for use as fill meets the requirements of the relevant Resource Recovery Order and Exemption issued under the Protection of the Environment Operations (Waste) Regulation 2014, to apply that material to land. The Applicant must retain records of all material brought on site for filling purposes and provide the records to the EPA and the Planning Secretary when requested.	Operational	Compliant	Mandalay	Operational OPDs Approved by EPA prior to delivery.
ODOUR & AIR QUALITY Limits	DEVELOPMENT PHASE	STATUS	MONITORING METHODOLOGY	EVIDENCE AND COMMENTS
C8. The Applicant must ensure the Development does not cause or permit the emission of any offensive odour, as defined in the POEO Act.	Operational	Compliant	Odour Patrols. The tip face size is limited. Waste is covered at the end of each day. Odour control measures are in place around the GO receivals area. The leachate and organics dams are aerated. Weather conditions were monitored for when possible odorous works are undertaken. Ongoing installation of additional landfill gas collection wells. EDL, the operators of the gas infrastructure, undertake inspections and identify areas that require additional wells or additional clay cover.	Odour patrol record, Select Civil and Cleanaway Daily inspection record this information.
C9. The Applicant must:				
(a) operate and maintain all facilities within the site in a condition which controls the emission of dust; and	Operational	Compliant	Daily site checks and environmental monitoring undertaken.	Dust gauge monitoring, sweeper, water cart, wheel wash maintenance records.
(b) carry out all reasonable and feasible measures to minimise dust from the site.	Operational	Compliant	Two water carts used, Monthly Dust Monitoring on site, Continuous Dust monitoring linked to weather station.	Dust monitoring records, Select Civil Daily checks (during their period of operation).
C9A. The Applicant must design, construct and operate the landfill gas flares described in SSD-6835 MOD 3 to comply with the NSW EPA's Environmental Guidelines: Solid Waste Landfills 2016 and the Protection of the Environment Operations (Clean Air) Regulation 2021.	Operational	Compliant	EPL updated on Feb 2026	Flares are included in the EPL as approved by EPA
C9B. The Applicant must install, maintain and operate equipment on the site to ensure the development complies with the air emission limits in the EPL.	Operational			
Meteorological Monitoring	DEVELOPMENT PHASE	STATUS	MONITORING METHODOLOGY	EVIDENCE AND COMMENTS

C10. The Applicant must install, operate, and maintain a meteorological weather station on the site that complies with the requirements of an EPL for the site.	Operational	Compliant	Weather Station maintained on site.	All data is available online. Data is downloaded and stored at regular intervals.
Site Air Quality and Odour Management Plan	DEVELOPMENT PHASE	STATUS	MONITORING METHODOLOGY	EVIDENCE AND COMMENTS
C11. The Applicant must prepare a Site Air Quality and Odour Management Plan. The plan must:				
(a) Be prepared by a suitably qualified and experienced person in consultation with the EPA and Council; (b) Be submitted to the Planning Secretary prior to the commencement of construction; (c) list all emission sources across the LHRRP and key performance indicators for each emission type; (d) describe odour and dust monitoring methods, location, frequency, and duration; (e) show the locations of real-time dust monitors on and off-site with appropriate trigger values; (f) report on the performance of the site against the key performance indicators for each emission type; (g) detail proactive mitigation measures for the control of dust and odour impacts; (h) detail the contingency measures to be implemented to respond to complaints or if dust or odour impacts are identified; and (i) include record keeping, a complaint register and compliance reporting.	Development Phase	Compliant	The AQOMP was prepared by SUEZ personnel, now Cleanaway. The AQOMP was submitted to the EPA by email dated 27 October 2017. A letter was received from the EPA dated 21 November 2017 stating that the EPA considers the AQMP has considered the matters required by Condition C11 and providing one comment for SUEZ's consideration (to consider the impacts from uncapped areas and/or lack of vegetative matter on surface areas, and the subsequent potential to contribute to sediment loads in surface waters and windblown dust). The SCC provided feedback on the AQOMP, dated October 2017. The SCC made a number of comments. SUEZ response to the SCC was provided to the auditors and is included in the OEMP. SUEZ reported that SCC did not provide further comments. The final AQOMP was submitted to the department on 9.02.18.	A record of consultation with the EPA, Council and DPE is provided in Section 13 of the AQOMP. The revised AQOMP was provided to EPA and SSC in April 2025. SSC provided comments in September 2025.
C11A, The Applicant must update the Site Air Quality and Odour Management Plan required by Condition C11 of this consent to include the Modification Assessments. The updated plan must:	Operational	Non compliant	Cleanaway updated the AQOMP (Rev 3, 09/09/2021) and submitted it to DPHI on the 04/11/2021. The updated plan has been provided to the EPA for consultation, although Cleanaway is yet to receive any feedback or consultation with respect to the document. We have not achieved the submission timeframe in accordance with this condition.	Cleanaway has submitted the air quality and odour management plan to SSC and EPA following the determination of MOD 2. We are yet to receive feedback from EPA on the document. Cleanaway will facilitate regular meetings with EPA to assist in obtaining the required feedback and consultation so that the document can be finalized and issued to DPHI
(a) be prepared by a suitably qualified and experienced person in consultation with the EPA; (b) be submitted to the Planning Secretary within six months of the determination of SSD- 6835-MOD-2; (c) detail additional mitigation measures which will be employed to prevent future odour emissions at the site; and (d) address the requirements of Condition C11 of this consent.				
Landfill	DEVELOPMENT PHASE	STATUS	MONITORING METHODOLOGY	EVIDENCE AND COMMENTS
C12, The Applicant must conduct an odour audit of the landfill to validate the odour reductions described in the EIS have been achieved at the existing landfill. The odour audit must: be prepared by a suitably qualified and	Development Phase	Compliant	The LHRRP Landfill Odour Audit was conducted by GHD (report dated October 2017) and submitted to SC 25 September 2017. The report was also sent to EPA on	Records are kept in the on-site operations office.

experienced person in consultation with the EPA and Council; be submitted to the EPA, Council, and the Planning Secretary at least one month prior to the commencement of landfill re-profiling; include collection and analysis of odour samples in accordance with the EPA's Approved Methods for Sampling and Analysis of Air Pollutants in NSW; and identify mitigation measures with a timeline for implementation, where the odour reductions identified in the EIS are not being achieved.			25 September 2017.	
GO Facility	DEVELOPMENT PHASE	STATUS	MONITORING METHODOLOGY	EVIDENCE AND COMMENTS
C13. All organic material and waste must be stored at the GO Facility in accordance with the requirements of an EPL for the site, including limits on the height of stockpiles and use of breathable membrane covers on compost bunkers.	Not triggered	Not triggered	N/A	N/A
C14. The Applicant must conduct an odour audit of the GO Facility to validate the odour data used in SSD-6835-MOD-2. The odour audit must:	Not triggered	Not triggered	N/A	N/A
(a) be prepared by a suitably qualified and experienced person in consultation with the EPA and Council; (b) be submitted to the EPA, Council and the Planning Secretary within 12 months of commencement of operation of the GO Facility, as described in SSD-6835-MOD-2; (c) include collection and analysis of odour samples in accordance with the EPA's Approved Methods for Sampling and Analysis of Air Pollutants in NSW; (d) validate the efficiencies of the odour controls, specifically the tunnel pasteurisation technology used for the active composting stage; (e) validate the odour data for freshly turned material; (f) demonstrate that the final design achieves an equivalent or better performance than stated in the Modification Assessment, supported by dispersion modelling in accordance with EPA's Approved Methods for Sampling and Analysis of Air Pollutants in NSW, if required; and (g) identify additional mitigation measures with a timeline for implementation, where odour performance significantly differs from the predictions in the Modification Assessments.	Not triggered	Not triggered	N/A	N/A
GREENHOUSE GAS	DEVELOPMENT PHASE	STATUS	MONITORING METHODOLOGY	EVIDENCE AND COMMENTS
C22. The Applicant must implement all reasonable and feasible measures to minimise energy use on site and greenhouse gas emissions produced on site.	Operational	Compliant	Cleanaway reports its energy use and greenhouse gas emissions under the National Greenhouse Gas and Energy Reporting Scheme (NGERS). This is done at the corporate level with input from the facilities. The main method in which Cleanaway minimises greenhouse	Monthly reports from EDL.

			gas emissions is through the efficient operation of the gas infrastructure. The gas infrastructure installed on site collects landfill gas and converts it into electricity. Instances where conversion of landfill gas to electricity is not possible the landfill gas is flared. Lights in the office area have been switched to LEDs and a solar powered light is in use at the public drop off area.	
LEACHATE Landfill — Dual Gas and Leachate Trench	DEVELOPMENT PHASE	STATUS	MONITORING METHODOLOGY	EVIDENCE AND COMMENTS
C23. The Applicant must design and install a dual gas and leachate management trench near the perimeter of the re-profiled landfill to intercept sideways movement of leachate. The trench must: be designed in accordance with the requirements of the EPA; be approved by the EPA, prior to construction of the trench and landfill re- profiling; include extraction risers along the length of the trench to allow extraction and transfer of leachate to the existing ring main; and be installed in accordance with a CEMP, prepared by a suitably qualified person and submitted to the EPA at least one month prior to construction of the trench	Development Phase	Compliant	CEMP, Part 1 – Landfill Related Construction works only, Dual Gas and Leachate Trench construction works, dated July 2017, and The Dual Gas and Leachate Trench Concept Design, to the EPA on the 20.07.17. The EPA provided a letter response, dated 10.10.17, which stated that the EPA has approved the installation. CEMP for GO was approved in 2021 and resubmitted to DPIE in Jan 2025 with the changes of MOD2.	Records held in on-site operations office.
Landfill Gas Infrastructure	DEVELOPMENT PHASE	STATUS	MONITORING METHODOLOGY	EVIDENCE AND COMMENTS
C24. The Applicant must maintain and operate the landfill gas infrastructure on the site, at all times. The Applicant must retain and operate the gas collection system within the prepared surface (stripped back cover) as much as practicable.	Operational	Compliant	EDL maintain gas infrastructure. A new contractor LMS, has taken over the maintenance of gas infrastructure starting in Jan 2026. Quarterly surface gas and subsurface gas monitoring as per Landfill EPL (EPL 5056). Monthly building gas monitoring conducted.	Monthly Reports from EDL. Landfill gas monitoring data and reports.
Operating Conditions	DEVELOPMENT PHASE	STATUS	MONITORING METHODOLOGY	EVIDENCE AND COMMENTS
C25. Accumulated sludge and sediment formed during leachate storage at the site must be disposed of to a special waste area at the LHRRP, separate from the active tip face.	Operational	Not triggered	No disposal in 2025	N/A
C26. The Applicant must manage all water that comes into contact with waste at the GO Facility as leachate. Leachate generated at the GO Facility may only be reused in the composting process on site or disposed to sewer in accordance with a Trade Waste Agreement or as otherwise agreed in writing with the EPA.	Not Triggered	Not Triggered	N/A	N/A
Leachate Monitoring	DEVELOPMENT PHASE	STATUS	MONITORING METHODOLOGY	EVIDENCE AND COMMENTS
C28. The Applicant must routinely monitor leachate volumes from all sources to evaluate the need to re-calibrate the leachate model included in the EIS, and to ensure adequate storage, treatment and disposal capacity is maintained at all times. The leachate model must be recalibrated if ongoing monitoring demonstrates that leachate is being generated more than can be routinely managed at the site, or at least	Operational	Compliant	Monitoring of leachate volume is maintained by JPG. Leachate Model was last recalibrated by GHD in October 2023and submitted in 2024 AEMR	Monthly reports from JPG.

every five years. The Applicant must report the results of ongoing monitoring and status of the modelling in the Annual Review required under Condition D9.				
C29. The Applicant must implement any recommended measures identified by leachate model calibrations to maintain adequate storage, treatment, and disposal capacity for the LHRRP at all times.	Operational	Compliant	Recalibration every 5 years.	N/A – next calibration is 2028 or as required.
SURFACE WATER & GROUNDWATER Discharge Limits	DEVELOPMENT PHASE	STATUS	MONITORING METHODOLOGY	EVIDENCE AND COMMENTS
C30. The Development must comply with Section 120 of the POEO Act, which prohibits the pollution of waters, except as expressly provided for in an EPL.	Operational	Compliant	Sampling undertaken according to the requirements of EPL 5065.	Results submitted to EPA in Annual Return indicate that water quality is normally compliant with EPL limits. One isolated occasion was identified, where suspended solids exceeded the limits, although this was addressed promptly and subsequent events were all within the required limits
GO Facility	DEVELOPMENT PHASE	STATUS	MONITORING METHODOLOGY	EVIDENCE AND COMMENTS
C31. The Applicant must ensure excess water collected in the leachate dams at the GO Facility during high rainfall periods is transported off-site and disposed of lawfully or discharged to sewer in accordance with a Trade Waste Agreement.	Operational	Compliant	Leachate from the GO facility has been sent to the onsite leachate treatment facility	As approved in the landfill EPL
C32. The Applicant must prepare and submit a detailed design for managing surface water from the western and eastern operational areas at the GO Facility detailed in SSD-6835-MOD-2. The design must: (a) be approved by the EPA prior to commencement of operation of the GO Facility; (b) demonstrate that surface water runoff from roofs (including the covered maturation area) does not come into contact with waste; (c) describe a program for ongoing monitoring of the water quality at the GO facility, including discharge of surface water to Mill Creek.	Not Triggered	Not Triggered	N/A	N/A
Mill Creek	DEVELOPMENT PHASE	STATUS	MONITORING METHODOLOGY	EVIDENCE AND COMMENTS
C33. The Applicant must prepare an Aquatic Habitat Monitoring Plan to monitor the stream health of Mill Creek within the site. The plan must: (a) be prepared by a suitably qualified and experienced person in consultation with DPE Water; (b) be submitted to the Planning Secretary prior to construction of the GO Facility; (c) describe the monitoring locations, frequency and parameters to be measured; and (d) detail the measures to be implemented if monitoring indicates the habitat quality of Mill Creek is decreasing as a result of activities on the site	Not Triggered	Not Triggered	The Aquatic Habitat Monitoring Plan was prepared in April 2021, submitted and approved by the Department in June 2021. The revised AHMP has been submitted to DPHI in Jan 2025	Monitoring report for Spring 2023 and Autumn 2024 attached in Appendix I
C34. The Applicant must prepare a Mill Creek Stream Rehabilitation, Stabilisation and Vegetation Management Plan. The plan must: (e) be prepared by a suitably qualified and experienced person in consultation with DPE Water; (f) be submitted to the Planning	Operational	Compliant	The Mill Creek Stream Rehabilitation, Stabilisation and Vegetation Management Plan was prepared by GHD, submitted to DPHI in April 2021. The revised MCSRSVM has been submitted to DPHI in Jan 2025	

Secretary prior to construction of the GO Facility; (g) be prepared in accordance with DPE Water Guidelines for Controlled Activities on Waterfront Land; detail proposed stream realignment works including details of the measures to minimise water quality impacts; (h) detail the proposed rehabilitation and stabilization of the stream including methods and staging of works; detail opportunities to maximise the width of riparian zones, particularly in the final landform design, and detail the vegetation types, maintenance, monitoring and performance criteria for the rehabilitation works; and (i) be updated to include any changes to the rehabilitation objectives and staging approved in the Post Closure Plan for the site, required under Condition C40.				
Groundwater Management Plan C35. The Applicant must prepare or update a Groundwater Management Plan for the site. The plan must: (a) be prepared by a suitably qualified and experienced person, in consultation with the EPA and DPE Water; (b) be submitted to the Planning Secretary, prior to the commencement of construction; (c) detail the groundwater monitoring network including location and frequency of monitoring, the parameters for testing, relevant criteria, and trigger levels for action; (d) include a protocol for investigation, notification, and mitigation of any exceedances of the identified trigger levels; and (e) describe the measures that could be implemented to respond to identified groundwater contamination.	Operational	Compliant	SUEZ has prepared a Groundwater Management Plan (GMP), dated 31.01.18. The plan was prepared by Douglas Partners, in consultation with the EPA and DPI. SUEZ met with DPI Water for a consultation meeting on the 28.07.17. Further comments provided by DPIE Water in March 2020. GMP was submitted to DPIE as part of the revised OEMP on 4 November 2021. Revised GMP submitted to DPIE and a "no comments" notice received on 14 Aug 2024.	Ground Water monitoring results are reported to the EPA in the Annual Return. Results are also published to the Cleanaway Environmental Management website.
Groundwater Monitoring	DEVELOPMENT PHASE	STATUS	MONITORING METHODOLOGY	EVIDENCE AND COMMENTS
C36. The Applicant must monitor groundwater from the extensive bore network established at and within proximity to the LHRP, as in accordance with the requirements of the EPL for the site and groundwater management plan required under Condition C35.	Operational	Compliant	Two additional groundwater monitoring bores installed to the west of the facility in 2023 Quarterly licensed monitoring.	Ground Water monitoring results are reported to the EPA in the annual return. Results are also published to the Cleanaway Environmental Management website.
Bunding	DEVELOPMENT PHASE	STATUS	MONITORING METHODOLOGY	EVIDENCE AND COMMENTS
C37. Dangerous Goods, as defined by the Australian Dangerous Goods Code, must be stored and handled strictly in accordance with: a) all relevant Australian Standards; b) for liquids, the NSW EPA's Storing and Handling of Liquids: Environmental Protection – Participants Manual. c) In the event of an inconsistency between the requirements of condition C37(a) and C37(b), the most stringent requirement must prevail to the extent of the inconsistency.	Operational	Compliant	IBCs are placed on bunds, empty IBCs of waste paint are stored undercover and banded in the drop off area.	Site inspections

FINAL LANDFORM, REHABILITATION & CLOSURE	DEVELOPMENT PHASE	STATUS	MONITORING METHODOLOGY	EVIDENCE AND COMMENTS
Final Landform				
C38. The Applicant must rehabilitate the site to achieve the final landform shown in Appendix C, in accordance with the criteria in the EPA's Environmental Guidelines: Solid Waste Landfills, 2016, or its latest version.	Not triggered	Not Triggered	N/A	N/A
C39. The Applicant must ensure the height of the final landform does not exceed 179.9 metres Australian Height Datum (AHD) post- settlement of the waste mass and final capping, as described in the EIS.	Not triggered	Not Triggered	N/A	N/A
Post-Closure Plan	DEVELOPMENT PHASE	STATUS	MONITORING METHODOLOGY	EVIDENCE AND COMMENTS
C40. The Applicant must amend the draft Post-Closure Plan for the site, to the satisfaction of the Planning Secretary. The plan must: be prepared by a suitably qualified and experienced person; be submitted to the EPA and the Planning Secretary 12 months prior to the planned closure of the landfill and GO facility on the site; be approved by the EPA, Council, ANSTO and the Planning Secretary, prior to commencement of the final phase of landfill capping and rehabilitation works; detail the requirements for on-going management of the capped waste mass; describe monitoring and management measures to ensure integrity of the cap; describe on-going leachate and surface water management, odour and dust control; detail landfill gas monitoring and maintenance; identify future land uses on the site, developed in consultation with Council, ANSTO, the Cronulla Model Aero Club and local recreational and sporting groups; include a rehabilitation management plan, including, but not limited to: rehabilitation works as generally depicted in Appendix C; criteria for evaluating the effectiveness of the rehabilitation; a program and schedule to monitor the effectiveness of the rehabilitation; a program and schedule for routine maintenance of the rehabilitation; any remedial actions necessary to ensure the success of the rehabilitation; a weed management plan; and incorporate the post closure requirements detailed in the VPA	Not Triggered	Not Triggered	N/A	N/A
VISUAL AMENITY	DEVELOPMENT PHASE	STATUS	MONITORING METHODOLOGY	EVIDENCE AND COMMENTS
C41. The Applicant must undertake screen planting as shown on the plan in Appendix D to minimise the visual impacts of the Development. The planting must be undertaken within 6 months of the date of this consent, or as otherwise agreed with the Planning Secretary, subject to agreement with ANSTO for works on ANSTO's land. Evidence of implementation of the planting must be provided to the satisfaction of the Planning Secretary,	Not Triggered	Not Triggered	N/A	N/A

within one month of completing the planting.				
C42. The Applicant must progressively hydro-mulch and grass completed landfill areas to minimise the visual impacts of the Development.	Operational	Compliant	Areas D, E, A B, and G have been seeded.	Site inspection and observation.
C42A. The Applicant must ensure any lighting associated with the operation of the landfill: (a) complies with the latest version of AS 4282 (INT) - Control of Obtrusive Effects of Outdoor Lighting; and (b) is mounted, screened and directed in such a manner that it does not create a nuisance to surrounding properties or the public road network.	Operational	Compliant	Lighting meets the requirements.	
BIODIVERSITY Construction	DEVELOPMENT PHASE	STATUS	MONITORING METHODOLOGY	EVIDENCE AND COMMENTS
C43 The Applicant must prepare a Vegetation and Fauna Management Plan to minimise impacts on biodiversity during construction of the GO Facility, to the satisfaction of the Planning Secretary. The plan must: (a) be prepared by a suitably qualified and experienced ecologist; (b) be submitted to the Planning Secretary, prior to the commencement of construction of the GO Facility; (c) include a vegetation clearing protocol and pre-clearance surveys; (d) detail specific procedures for protecting native vegetation, including the Coastal Upland Swamp, and fauna adjacent to construction areas, including the access track near the GO Facility, the sediment pond and the verge adjacent to Heathcote Road; (e) detail erosion and sediment controls and weed management procedures; and (f) include procedures for seed collection and translocation of key species, including (g) <i>Allocasuarina diminuta</i> subsp. <i>Mimica</i> and <i>Acacia bynoeana</i> .	Not Triggered	Not Triggered	The Vegetation and Fauna Management Plan was prepared in April 2021, submitted and approved by the Department in June 2021. Revised VFMB submitted to DPHI in Jan 2025.	N/A
C44. The Applicant must appoint a qualified and experienced ecologist to be present on site during native vegetation clearing for construction of the GO Facility and realignment of Mill Creek.	Development phase	Compliant	Vegetation clearing for the construction was undertaken over 2 days, the 23 rd and 24 th of January 2023.	Supervised by a GHD ecologist.
Biodiversity Offset Strategy	DEVELOPMENT PHASE	STATUS	MONITORING METHODOLOGY	EVIDENCE AND COMMENTS
C45. The Applicant must purchase and retire the ecosystem and species credits listed in Table 1, in accordance with EHG's Frameworks for Biodiversity Assessment 2014 and the NSW Biodiversity Offsets Policy for Major Projects 2014, to the satisfaction of the Planning Secretary. The credits must be purchased and retired prior to construction of the relevant facility listed in Table 1,	Developmental Phase	Compliant	Biodiversity credits were purchased in 2022 for the GO Facility.	Biodiversity credits

Table 1: Biodiversity Offset Strategy

Facility	No. of Credits	Offset Type
GO Facility	185 ecosystem	Red Bloodwood – Scribbly Gum heathy woodland on sandstone plateaux
	97 species	Eastern Pygmy-possum
Former ARRT Facility	143 ecosystem	Red Bloodwood – Scribbly Gum heathy woodland on sandstone plateaux
	88 species	Eastern Pygmy-possum
	5154 species	<i>Allocasuarina diminuta subsp. mimica</i>

Note: the areas referred to in Table 1 are shown on the figures in Appendix A.				
C46. The Applicant must not commence construction of a facility listed in Table 1, until the Biodiversity Offset Strategy for that facility has been implemented, to the satisfaction of the Planning Secretary.	Developmental Phase	Compliant	Excavation for the GO Facility commenced in January 2023, biodiversity credits were purchased for the GO Facility in 2022.	Biodiversity credits
C47. The Applicant must ensure the biodiversity offsets are secured by a conservation mechanism, which protects and manages the land in perpetuity, to the satisfaction of the Planning Secretary.	Operational	Compliant	The biodiversity offset strategy was approved by DPIE on 30 November 2022	Biodiversity credits
TRANSPORT AND ACCESS	DEVELOPMENT PHASE	STATUS	MONITORING METHODOLOGY	EVIDENCE AND COMMENTS
Construction Traffic Management Plan				
C48. The Applicant must prepare a Construction Traffic Management Plan for construction of the GO facility. The plan must: be prepared by a suitably qualified and experienced expert, in consultation with Council and TfNSW; be submitted to the Planning Secretary, prior to the commencement of construction of the GO Facility; detail the measures to be implemented to ensure road safety and network efficiency during construction; detail heavy vehicle routes, access, and parking arrangements; include a Driver Code of Conduct to: • minimise the impacts of construction works on the local and regional road network; • minimise conflicts with other road users; • ensure truck drivers use specified routes; include a program to monitor the effectiveness of these measures; and if necessary, detail procedures for notifying residents and the community, of any potential disruptions to routes.	Not Triggered	Not Triggered	The Construction Traffic Management Plan was prepared in May 2021, submitted and approved by the Department in June 2021. The revised CTMP for GO has been submitted to DPHI in Jan 2025	N/A
Intersection Safety Review	DEVELOPMENT PHASE	STATUS	MONITORING METHODOLOGY	EVIDENCE AND COMMENTS
C49. The Applicant must conduct a safety review of the Little Forest Road and New Illawarra Road intersection in the years 2020 and 2025 to ensure the on-going safe and efficient performance of the intersection. The safety reviews must be prepared to the satisfaction of the Planning Secretary and must: be prepared by an independent traffic expert; be undertaken in consultation with Council and TfNSW and in accordance with relevant guidelines; (c) be approved by the Planning Secretary and TfNSW, by	Not triggered	Compliant	Report submitted on 27 Jan 2021 rather than by end of 2020. Approval from DPHI received on 17 Feb 2021. Report submitted on 8 December 2025	

the end of 2020 and 2025; analyse vehicle movements and delays during peak periods; establish intersection performance and the need for any intersection upgrade works; and include a program for implementation of intersection upgrade works, if required.				
C50 The Applicant must implement the recommendations of the safety reviews, including any required intersection upgrades, to the satisfaction of the Planning Secretary and TfNSW. The timing and payment for implementation of any required intersection upgrades must be agreed with the Planning Secretary and TfNSW.	Operational	Compliant	No upgrading works have been proposed.	The 2025 review did not make any recommendations for upgrades.
Operating Conditions	DEVELOPMENT PHASE	STATUS	MONITORING METHODOLOGY	EVIDENCE AND COMMENTS
C51. The Applicant must ensure: a) all staff vehicles, plant and equipment are parked on site and do not park on the public road network; b) all loading and unloading of materials is carried out on site; c) all trucks entering or leaving the site with loads have their loads covered; d) vehicles do not track dirt onto the public road network; e) and heavy vehicles use designated routes to minimise impacts on the local and regional road network.	Operational	Compliant	There is no offsite parking. Street sweeper in regular use, site inspections, traffic control, signage, weighbridge operators monitor vehicles entering and leaving site.	Site inspections undertaken consider these aspects. A couple of complaints were recorded with respect to material tracking, although Cleanaway was actively undertaking sediment tracking management activities. These instances were recorded as complaints but we do not consider this reflective of normal operational conditions with respect to this condition.
Parking	DEVELOPMENT PHASE	STATUS	MONITORING METHODOLOGY	EVIDENCE AND COMMENTS
C52. The Applicant must provide sufficient parking facilities for site personnel and heavy vehicles on the site, to ensure traffic associated with the site does not utilise public and residential streets or public parking facilities.	Operational	Compliant	Weighbridge operator direct vehicles to correct location, public drop off area manned to direct traffic.	Site inspections.
NOISE Hours of Work	DEVELOPMENT PHASE	STATUS	MONITORING METHODOLOGY	EVIDENCE AND COMMENTS
C53. The Applicant must comply with the hours detailed in Table 2, unless otherwise agreed in writing by the EPA or the Planning Secretary.	Operational	Compliant	Controlled by weighbridge opening hours. Temporary approval for landfill to extend it's hours of operation from 3am-5pm has been granted by DPE and EPA till the 10 June 2023. Cleanaway continued to accept waste at 3am until 11 June 2024. Cleanaway operate within the hours of work delineated in the table below.	Weighbridge records, temporary approval from DPE and EPA.
Table 2: Hours of Work	DEVELOPMENT PHASE	STATUS	MONITORING METHODOLOGY	EVIDENCE AND COMMENTS

Table 2| Hours of Work

Facility	Activity	Day	Time
Landfill	Construction	Monday – Friday Saturday - Sunday	7 am - 5 pm 8 am - 5 pm
	Operation	Monday – Friday Saturday Sunday	5 am - 5 pm 6 am - 5 pm 8 am - 5 pm
	Other operations ¹	Monday – Sunday	Anytime
GO Facility	Construction	Monday – Friday Saturday - Sunday	7 am - 5 pm 8 am - 5 pm
	Operation	Monday – Friday Saturday - Sunday	6 am - 5 pm 8 am - 5 pm
	Other operations ²	Monday – Sunday	Anytime

Notes:

(1) Other landfilling operations includes only security guard control, machinery maintenance and/or repairs, site infrastructure maintenance and/or repairs (landfill gas and leachate), and emergency management activities related to site safety, emergency repairs and site infrastructure repairs

(2) Other GO operations includes only repair works, machinery maintenance and repairs, loading tunnels, final product preparation manufacture (but does not include shredding) and emergency management activities related to site safety, emergency repairs and site infrastructure repairs. Unloading tunnels is only permitted during the hours of operations listed under 'GO Facility – Operation' in Table 2.

Operational Noise Limits	DEVELOPMENT PHASE	STATUS	MONITORING METHODOLOGY	EVIDENCE AND COMMENTS
C54. The Applicant must ensure noise from the site does not exceed the noise limits in Table 3.	Operational	Compliant	No excessive noise generated.	Annual noise survey undertaken

Table 3: Noise Limits dB(A)

No.	Location	Day Leq(15min)	Evening Leq(15min)	Night Leq(15min)	Night L1(1min)
R1	Engadine	35	35	35	45
R2	Barden Ridge	35	35	35	45
R3	Menai	35	35	35	45
R6	Gandangara	37	37	37	45
R7	Gandangara North	35	35	35	45
R8	The Ridgeway	35	35	35	35

Note: To identify a noise receiver location, refer to the figure in Appendix H.

Noise generated on the site is to be measured in accordance with the relevant procedures and exemptions (including certain meteorological conditions) of the EPA's NSW Industrial Noise

Noise Management	DEVELOPMENT PHASE	STATUS	MONITORING METHODOLOGY	EVIDENCE AND COMMENTS
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C55. The Applicant must implement the noise management measures described in the OEMPs for the LHRRP and GO Facility to ensure noise from the site complies with the limits in Table 3.	Operational	Compliant	Select Civil Daily Site inspections for landfill. GO not triggered.	Annual noise survey undertaken in October 2025 for the 2025 monitoring period as recommended by the noise monitoring consultant.
Noise Monitoring	DEVELOPMENT PHASE	STATUS	MONITORING METHODOLOGY	EVIDENCE AND COMMENTS
C56. The Applicant must monitor noise from the site to demonstrate compliance with the noise limits in Table 3. The monitoring must be: undertaken annually, or to address genuine noise complaints that are related to the site as determined by the EPA or the Planning Secretary; in accordance with the NSW Industrial Noise Policy, and reported to the EPA and the Planning Secretary within one month of completing the monitoring, including details of management actions taken and the effectiveness of the actions to address any exceedances of the limits in Table 3.	Operational	Compliant	Select Civil Daily Site inspection and 3 rd party consultant engaged to complete Noise Monitoring.	Annual noise survey undertaken on 9th October 2025, the report finalised on 20 th October 2025 and the report submitted to the EPA and the Planning Secretary on 4 th November 2025.
LITTER & PEST CONTROL	DEVELOPMENT PHASE	STATUS	MONITORING METHODOLOGY	EVIDENCE AND COMMENTS
C57. The Applicant must:				
(a) ensure all waste loads are covered;	Operational	Compliant	Weighbridge operators inspect loads.	Visual inspection upon arrival
(b) inspect and clear the site (and if necessary, surrounding area) of litter arising from the Development on a daily basis; and	Operational	Compliant	Select Civil Daily Site inspections.	Inspection Reports.
(c) maintain the site in a clean and tidy state at all times.	Operational	Compliant	Select Civil Daily Site inspections and litter pickets regularly engaged.	Inspection Reports.
C58. The Applicant must:				
(a) implement measures to manage pests, vermin and declared noxious weeds on site; and	Operational	Compliant	Routine exterminator inspections and baiting.	Pest exterminator reports.
(b) inspect the site routinely to ensure the measures are effective, and pests, vermin or noxious weeds are not present on site in sufficient numbers to pose an environmental hazard or cause the loss of amenity in the surrounding area.	Operational	Compliant	Routine exterminator inspections and baiting	Pest exterminator reports ongoing weed management
Note: For the purposes of this condition, noxious weeds are those species subject to an order declared under the Noxious Weed Act 1993.				
HERITAGE	DEVELOPMENT PHASE	STATUS	MONITORING METHODOLOGY	EVIDENCE AND COMMENTS
Unexpected Finds Protocol				
C59. If Aboriginal objects are uncovered during construction, work in the immediate area must stop and the Regional Operations Group of the EHG Council and the Registered Aboriginal Parties are to be consulted.	Not Triggered	Not Triggered	N/A	N/A
C60. If any archaeological relics are uncovered during the course of the work, then all works must cease immediately in that area and the EHG Heritage Branch contacted. Depending on the possible significance of the relics, an archaeological assessment and an excavation permit under the NSW Heritage Act 1977 may be required	Not Triggered	Not Triggered	N/A	N/A

before further works can continue in that area.				
Site Impact Recording	DEVELOPMENT PHASE	STATUS	MONITORING METHODOLOGY	EVIDENCE AND COMMENTS
C61. Within one month of the date of this consent, the Applicant must submit Site Impact Recording TfNSW to EHG for the four previously impacted Aboriginal heritage sites, AHIMS 52-2-1108, 52-2-1029, 52-2-1030 and 52-2-1031, as described in the EIS.	Pre-Construction	Compliant	Site has been inspected no further action required.	These were submitted to OEH Heritage 7 April 2017.
FIRE PREVENTION & MANAGEMENT	DEVELOPMENT PHASE	STATUS	MONITORING METHODOLOGY	EVIDENCE AND COMMENTS
C62. The Applicant must:				
(a) design and construct the GO Facility buildings to meet the fire safety requirements of the BCA; and	Not Triggered	Not Triggered	N/A	N/A
(b) maintain a 10-metre-wide Asset Protection Zone around the northern and western sides of the GO Facility buildings.	Not Triggered	Not Triggered	N/A	N/A
C63. The Applicant must prepare an Emergency Response Plan for the site detailing procedures to be implemented in the event of a fire on or near the site. The Emergency Response Plan must:	Operational	Compliant	ERP was last revised on the 8/1/2021.	Completed administrative updates in 2025 from SUEZ to Cleanaway.
(a) be prepared by a suitably qualified and experienced expert in consultation with Council and the NSW Rural Fire Service;	Operational	Compliant	Completed	
(b) be submitted to the Planning Secretary within three months of the date of this consent, or an alternative timing as otherwise agreed with the Planning Secretary; and	Operational	Compliant	Revised ERP approved by DPIE on 4/11/2022.	Operations Office.
(c) detail emergency access and egress routes, including an alternative access route, escape routes, refuge areas, assembly points and evacuation procedures.	Operational	Compliant	Annual Review of ERP.	Operations Office.
C64 The Applicant must ensure construction and operation of the flares described in SSD-6835-MOD-3 complies with: a) the relevant provisions of Planning for Bushfire Protection (NSW RFS, 2019) b) the construction standards and asset protection zone requirements recommended in the Lucas Heights Resource Recovery Park Flare Installation Modification Report prepared by GHD dated 26 March 2025.	Operational	Compliant	Works completed	
SCHEDULE D				
ENVIRONMENTAL MANAGEMENT, REPORTING, AUDITING AND COMMUNITY ENGAGEMENT	DEVELOPMENT PHASE	STATUS	MONITORING METHODOLOGY	EVIDENCE AND COMMENTS
ENVIRONMENTAL MANAGEMENT				
Construction Environmental Management Plan				

D1. The Applicant must prepare a Construction Environmental Management Plan (CEMP) for the Development, to the satisfaction of the Planning Secretary. The Plan must:	Pre-construction	Compliant and Not Triggered	CEMP for Dual Leachate and Gas Trench submitted to DoP on 17.7.18. CEMP for GO approved by DPIE on 13/9/2021. Revised CEMP submitted to DPHI in Jan 2025	
(a) be prepared in consultation with Council and be approved by the Planning Secretary prior to construction of the Development;	Pre-construction	Compliant	SSC comments included in the CEMP.	
(b) identify the statutory approvals that apply to the site;	Pre-construction	Compliant	N/A	N/A
(c) outline all environmental management practices and procedures to be followed during construction;	Pre-construction	Compliant	N/A	N/A
(d) describe all activities to be undertaken on the site during construction, including a clear indication of construction stages;	Pre-construction	Compliant	N/A	N/A
(e) detail how 'the environmental performance of the construction works will be monitored, and what actions will be taken to address identified adverse environmental impacts;	Pre-construction	Compliant	N/A	N/A
(f) describe the roles and responsibilities for all relevant employees involved in construction works; and	Pre-construction	Compliant	N/A	N/A
(g) include the management plans under Condition D2 of this consent.	Pre-construction	Compliant	N/A	N/A
D2. As part of the CEMP for the Development, required under Condition D1 of this consent, the Applicant must include the following:	Pre-construction	N/A	N/A	N/A
(a) a construction management plan for the dual gas and leachate trench prepared in consultation with EPA (Condition C23);	Operational	Compliant	Site inspections, management meeting with Select Civil.	No works in 2025
(b) an erosion and sediment control plan;	Operational	Compliant	N/A	N/A
(c) a vegetation and fauna management plan (Condition C43); and	Operational	Compliant	N/A	N/A
(d) a construction traffic management plan (Condition C48).	Operational	Compliant	N/A	N/A
D3. The Applicant must carry out construction of the Development in accordance with the CEMP approved by the Planning Secretary and as revised and approved by the Planning Secretary from time to time), unless otherwise agreed by the Secretary.	Operational	Compliant	For leachate and gas cutoff trench: Site inspections, management meeting For the Organics area: site inspection, management meeting with Morris Civil.	Approval from DoP.
Operational Environmental Management Plan	DEVELOPMENT PHASE	STATUS	MONITORING METHODOLOGY	EVIDENCE AND COMMENTS
D4. The Applicant must amend the draft Operational Environmental Management Plan (OEMP) for the Landfill, GO Facility, to the satisfaction of the Planning	Pre-construction	Compliant and Not Triggered for GO	The LHRRP OEMP, dated 13.10.17 and relates to activities associated with landfilling and re-profiling.	N/A

Secretary. The Plans must:		Facility	GO Facility has not been installed, DPE approved this staged preparation of the OEMPs in a letter dated 22.02.18. Revised landfill OEMP submitted on 4/11/2021. Landfill OEMP is under review from Council and Planning	
(a) be prepared in consultation with Council and be approved by the Planning Secretary prior to operation of the Development;	Pre-construction	Compliant	The OEMP was submitted to the DPE via email on the 23.08.17. Revised landfill OEMP submitted on 4/11/2021. Landfill OEMP is under review from Council and Planning	N/A
(b) identify the statutory approvals that apply to the site;	Pre-construction	Compliant	The OEMP states that it has been prepared to address the following statutory requirements: SSD 6835; EPL 5065; ANSTO Lease; VPA.	N/A
(c) outline all environmental management practices and procedures to be followed during operation:	Pre-construction	Compliant	The OEMP includes a number of sections on the environmental management of the Site including surface water, leachate, landfill gas, odour, dust, litter, noise, weeds, traffic, and emergency preparedness.	Site Records, EPA Annual Returns.
(d) detail how the environmental performance of the Development will be monitored, and what actions will be taken to address identified adverse environmental impacts; and	Pre-construction	Compliant	Daily site inspections, Environmental Monitoring as per EPL.	Site Records, EPA Annual Returns.
(e) include the management plans under Condition D5 of this consent.		Compliant	OEMP for overtopping approved by DPIE. OEMP for GO not triggered.	
(f) incorporate the measures identified in the Modification Assessments in accordance with the timing specified in Condition D8(d).	Operational	Non compliant	OEMP has been updated to incorporate the MOD 2 and MOD 3 modification assessment but we are yet to receive review responses from SSC for MOD 3 which are required prior to submission to of final version to DPHI We have not achieved the submission timeframe in accordance with Condition D8(d)	Cleanaway will liaise with SSC regularly in order to obtain the required comments so that the updates can be finalized and issued to DPHI..
D5. As part of the OEMP's for the Development, required under Condition D4 of this consent, the Applicant must include the following:				
(a) site air quality and odour management plan (Condition C11);	Pre-construction	Compliant	Odour Patrols, Dust Monitoring, Site inspections.	Records held in operations office.
(b) detailed design of the surface management at the GO Facility (Condition C32);	Not Triggered	Not Triggered	N/A	N/A
(c) aquatic habitat monitoring plan (Condition C33);	Not Triggered	Not Triggered	N/A	N/A
(d) Mill Creek stream rehabilitation, stabilisation and vegetation management plan (Condition C34);	Not Triggered	Not Triggered	N/A	N/A
(e) groundwater management plan (Condition C35); and	Not Triggered	Not Triggered	N/A	N/A

(f) emergency response plan (Condition C63).	Operational	Compliant	Refer to C35	N/A
D6. The Applicant must operate the Development in accordance with the OEMP's approved by the Planning Secretary (and as revised and approved by the Planning Secretary from time to time), unless otherwise agreed by the Planning Secretary.	Operational	Compliant	OEMP in operation, OEMP is undergoing updates to reflect the current management systems.	OEMP in operation
Management Plan Requirements	DEVELOPMENT PHASE	STATUS	MONITORING METHODOLOGY	EVIDENCE AND COMMENTS
D7. The Applicant must ensure the Management Plans required under this consent are prepared in accordance with any relevant guidelines, and include: (a) detailed baseline data; (b) a description of: the relevant statutory requirements (including any relevant approval, licence, or lease conditions); any relevant limits or performance measures/criteria; and the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the Development or any management measures; (c) a description of the measures that will be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria; (d) a program to monitor and report on the: impacts and environmental performance of the Development; and effectiveness of any management measures (see (c) above); (e) a contingency plan to manage any unpredicted impacts and their consequences; (f) a program to investigate and implement ways to improve the environmental performance of the Development over time; (g) a protocol for managing and reporting any: incidents; complaints; non-compliances with statutory requirements; and exceedances of the impact assessment criteria and/or performance criteria; and a protocol for periodic review of the plan. Note: The Planning Secretary may waive some of these requirements if they are unnecessary or unwarranted for particular management plans. (h) A protocol for periodic review of the plan	Operational	Compliant	CWY Systems Audits, BSI Certification Audits.	BSI Certification.
Revisions to Strategies, Plans and Programs	DEVELOPMENT PHASE	STATUS	MONITORING METHODOLOGY	EVIDENCE AND COMMENTS
D8. Within three months of:				
(a) an audit submitted under Condition D12;	Not Triggered	Not Triggered	N/A	N/A

(b) an incident report under Conditions D10 and D11;	Not Triggered	Not Triggered	N/A	N/A
(c) an annual review under Condition D9; and/or	Not Triggered	Not Triggered	N/A	N/A
(d) a modification to this consent,	Operational	Non Compliant	The relevant documentation has been prepared following MOD 2 and MOD 3. We are awaiting comments from SSC on the OEMP, following which the OEMP can be issued to DPHI. We have not achieved the required submission timeframe.	Cleanaway will liaise with SSC regularly in order to obtain the required comments so that the updates can be finalized and issued to DPHI..
The Applicant must review, and if necessary, revise the strategies, plans, and programs required under this consent to the satisfaction of the Planning Secretary. Note: This is to ensure the strategies, plans and programs are updated on a regular basis, and incorporate any recommended measures to improve the environmental performance of the site.	N/A	N/A	N/A	N/A
REPORTING	DEVELOPMENT PHASE	STATUS	MONITORING METHODOLOGY	EVIDENCE AND COMMENTS
Annual Review				
D9_ By the end of each calendar year, and annually thereafter, the Applicant must review the environmental performance of the site, to the satisfaction of the Planning Secretary. This review must:	Operational	Compliant	Preparation and submission of the report is managed by the Cleanaway Due Diligence Calendar.	Internal audit prepared submitted to DoP and placed on public Website.
Be submitted to the Planning Secretary by the end of February each year	Operational	Compliant	This AEMR.	AEMR submitted via Planning Portal.
Describe the operations that were carried out in the past year	Operational	Compliant	Section 3	N/A
Analyse the monitoring results and complaints records of the site over the past year, including a comparison of these results against the: Relevant statutory requirements, limits, or performance measures/criteria Monitoring results of previous years Predictions in the EIS;	Operational	Compliant	Section 6-9	N/A
Identify any non-compliance over the last year, and describe what actions were (or are being) taken to ensure compliance	Operational	Compliant	Section 2	N/A
Identify any trends in the monitoring data	Operational	Compliant	Section 6-9	N/A
Identify any discrepancies between the impacts predicted in the EIS and the actual impacts of the site and analyse the potential cause of any significant discrepancies; and	Operational	Compliant	Section 6-9	N/A
Describe what measure will be implemented over the next year to improve the environmental performance of the site	Operational	Compliant	Section 11	N/A
Incident Reporting	DEVELOPMENT PHASE	STATUS	MONITORING METHODOLOGY	EVIDENCE AND COMMENTS
D10. Upon detecting an exceedance of the limits/performance criteria in this consent or the occurrence of an incident that causes (or may cause) material harm to the environment, the Applicant shall immediately (or as soon as practical thereafter) notify the Secretary and any	Operational	Compliant	No exceedances of the limits/performance criteria occurred for the reporting period of 2025	N/A

other relevant agencies of the exceedance/incident.				
D11 Within seven days of the date of the incident, the Applicant: must provide the Planning Secretary and any relevant agencies with a detailed report on the incident. and such further reports as may be requested.	Operational	Compliant	No incidents for 2025.	N/A
INDEPENDENT ENVIRONMENTAL AUDIT	DEVELOPMENT PHASE	STATUS	MONITORING METHODOLOGY	EVIDENCE AND COMMENTS
D12. Within one year of the date of this consent, and every three years thereafter, unless the Planning Secretary directs otherwise, the Applicant must commission and pay the full cost of an Independent Environmental Audit of the site. The audit must: be carried out by a suitably qualified, experienced and independent audit team whose appointment has been endorsed by the Planning Secretary; assess the environmental performance of the site, and its effects on the surrounding environment; determine whether the site is complying with the relevant standards, performance measures and statutory requirements; review the adequacy of the Environmental Management Plans for the site, compliance with this consent, and any other licences and consents; and, if necessary, recommend measures or actions to improve the environmental performance of the site, and/or any plan/program required under this consent.	Operational	Compliant	Preparation and submission of the report is managed by the Cleanaway Due Diligence Calendar. An Independent Audit was prepared by Ethos Environmental Pty Ltd and submitted to the Department in 2024. The next audit will be done in May 2027.	N/A
D13. Within three months of commissioning the audit, or as otherwise agreed by the Planning Secretary, the Applicant must submit a copy of the audit report to the Planning Secretary with a response to all recommendations contained in the audit report.	Operational	Compliant	As above.	Report submitted to DoP within the required time frame
COMMUNITY ENGAGEMENT	DEVELOPMENT PHASE	STATUS	MONITORING METHODOLOGY	EVIDENCE AND COMMENTS
Community Reference Group				
D14. The Applicant must establish and maintain a Community Reference Group (CRG) to maintain regular communication with the local community regarding activities on the site, any environmental impacts, monitoring results and management actions. The CRG must include representatives from the local community, recreational and sporting clubs, ANSTO, Council and the Applicant. The CRG must meet on a quarterly basis.	Operational	Compliant	Due Diligence Calendar.	Meeting Records.
Access to Information	DEVELOPMENT PHASE	STATUS	MONITORING METHODOLOGY	EVIDENCE AND COMMENTS
D15. The Applicant must make the following information publicly available on its website and keep the information up to date.	Operational	Compliant	Annual Review of Consent.	Document can be viewed at: https://www.cleanaway.com.au/about-us/environmental-management/

(a) the EIS, RTS, CEMP and OEMPs; (b) current statutory consents, approvals and licences for the site; (c) approved strategies, plans and programs; (d) a summary of all monitoring data for the site as required under this consent; (e) a complaint register, updated on an annual basis; (f) Annual Reviews, Independent Environmental Audits and the Applicant's response to the recommendations; and (g) any other matter required by the Planning Secretary.				
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5. Independent Environmental Audit (IEA) report 2024, Non – Conformance Close Out

From the Independent Environmental Audit of the Project Approval and Environment Protection Licences, which was undertaken in 2024 a total of 91 conditions were assessed, with 13 Non-Conformances as below.

Table 3. Summary of Recommendations and Corrective Actions from the 2024 Independent Environmental Audit.

Table 14 Summary of IEA recommendations Source	Recommendation	CWY Plan	Expected Completion Date
Site observations & Condition C58	2024 IEA REC 01: Develop and implement the annual weed control program for 2024	Weed survey was conducted in the first week of August 2024 and weed control needs identified will be implemented by end of 2024.	Completed in Jan 2025
Site observations & Condition C37	2024 IEA REC 02: Review and assess the integrity of the concrete bund containing the waste oil tank at the back of the public drop off area	The bund is functioning as expected. The roof installation decision has been paused as Cleanaway is in the process of preparing a further DA modification application which may require the waste oil tank to be removed or relocated. Once this is finalised, Cleanaway can determine if installing the roof in the current location is required or whether the tank will be removed or relocated.	December 2026
Incident review	2024 IEA REC 03: Ensure that monitoring at EPA Point 1 is undertaken within 24 hours of discharge as required by EPL Condition M2.3.	Noted. CWY has always ensured that the EPA Point 1 is monitored during wet weather discharge in compliance with EPL Condition M2.3. Please refer to the Responses to Table 7 below	On-going
Incident review	2024 IEA REC 04: Include further details in incident reports to capture all aspects of the incident, such as sources of contamination and / or causes of the incident, to allow for effective identification of corrective and preventative measures	Noted. CWY will include more details in the investigation report. Please refer to the Responses to Table 7 below	On-going
Incident review	2024 IEA REC 05: Ensure all incidents and exceedances of concentration limits are recorded in Cleanaway's incident management system so that they are appropriately investigated, and a record is retained.	CWY has implemented a system called "MYOSH" for incident management and record keeping. Please refer to the Responses to Table 7 below	Implemented
Incident review & Condition D10	2024 IEA REC 06: Implement a process to ensure DPHI and any other relevant agencies are notified immediately of any incident that causes (or may cause) material harm to the environment or	CWY has implemented a system called "MYOSH" for incident management and record keeping. Please refer to the Responses to Table 7 below	Implemented

	any exceedance of limits or performance criteria in the Consent.		
Complaint review	2024 IEA REC 07: Implement checks to ensure that all complaints received are included in the complaints reporting presented in the AEMR, including multiple complaints received from the same complainant	A complaint register had been included in the AEMR. CWY to review the procedure in handling repeated complaints from the same complainant.	Implemented
Complaint review & Condition D9	2024 IEA REC 08: Include within the discussion of complaints in the AEMR, details of any actions taken as an outcome of complaints received	CWY always closes out complaints after the issue has been addressed in MYOSH. We shall ensure these are included in the AEMR going forward.	Implemented
Surface water management performance & Condition C30	2024 IEA REC 09: Conduct a review by an expert of Erosion and Sediment Control and Management at the site and implement additional controls to improve water quality in water discharging from the site such as to Mill Creek and the clean water drain to the north of the landfill area. 2024 IEA REC 10: Implement additional erosion and sediment controls at the western GO Facility area, near the access road across Mill Creek to prevent sediment from entering Mill Creek	GHD had conducted a site review in Feb 2025 and the additional erosion and sediment controls recommended have been implemented	Implemented
Surface water management performance & Condition C30	2024 IEA REC 11: Reinstate periodic (rainfall based) surface water monitoring at locations along Mill Creek upstream and downstream of the LHRRP to better understand the performance of the Landfill in managing their impacts on the Creek. Consider aligning these with the monitoring locations chosen for the Aquatic Habitat monitoring	The Soil and Water Management Plan and Monitoring Program has been updated and implemented onsite	Implemented
OEMP review & Condition D4	2024 IEA REC 12: Update the OEMP to incorporate the measures identified in the MOD 2 Modification Assessment and to remove activities and references related to the ARRT and submit to DPHI for approval	The OEMP has been updated and has been submitted to SSC to provide comments. Cleanaway will facilitate regular discussion with SSC to resolve this in the next reporting period	September 2026

OEMP review & Condition D6	2024 IEA REC 13: Update the OEMP to remove references to SUEZ and to reflect Cleanaway's management system, structure, key roles and responsibilities, internal audit and review processes and complaint and incident management and reporting. 2024 IEA REC 14: Undertake a thorough and detailed review of the OEMP to improve its readability, including consolidating sections to remove duplication. For example, complaint management is discussed in Section 6.5.2 and Section 7.14, incident reporting is discussed in Section 5 (EPA reporting) and Section 6.4 (DPHI reporting), staffing is discussed in Section 4 and Section 7.10 2024 IEA REC 15: Update the OEMP to discuss the consultation undertaken in preparation of the OEMP as required by Condition D4. Consider including evidence of this consultation as an appendix to the OEMP. 2024 IEA REC 16: Update Noise section of OEMP to reflect MOD 2 including adding noise limits and monitoring location for new receiver R8, The Ridgeway, and updated landfill operation hours.	The updated OEMP Cleanaway has issued to SSC has addressed the issues raised in IEA REC 13 – 16. It will address legibility, consistency and duplication. It will also provide current management system, structure, key roles and responsibilities of key personnel. The updated OEMP also covers both internal audit and review processes, including reporting and management of complaints and incidents. Cleanaway will facilitate regular discussion with SSC to resolve this in the next reporting period.	September 2026
AQOMP review & Condition C11A	2024 IEA REC 17: Update the AQOMP in accordance with Condition 11A, including ensuring consultation with the EPA, and submit to DPHI. 2024 IEA REC 18: Update the AQOMP to remove references to SUEZ and to ensure roles and responsibilities align with Cleanaway staff 2024 IEA REC 19: Update the AQOMP to reference all of the EPL conditions that are relevant to odour including: EPL Condition U1.1 which relates to implementing and maintaining the measures to reduce risk of odours outlined in the PRP review report; and Condition E5 which requires that gas field infrastructure is installed and maintained to minimise the emission of odours 2024 IEA REC 20: Consider including additional discussion of landfill gas management and references to the landfill gas monitoring program. 2024 IEA REC 21: Update Section 9 (table 7) of the AQOMP to make it clear that the 4 g/m2/month	AQOMP has been updated by Cleanaway to address REC 17 –23 and submitted to SSC and EPA. The updated plan ensures accuracy of names and responsibilities of personnel, and the correct locations of monitoring points. It will also reflect Cleanaway ownership of the site, and our strategy for maintaining gas infrastructure. The elevated TSP (Rec 23) could be an artifact effect of malfunction at the weather station. The weather station is frequently serviced by the provider when faults are recognised. Cleanaway can implement a monthly maintenance check of the TSP to address the monitor issue. The updated AQOMP will guide Cleanaway in ensuring effective air emission management and compliance with Condition E5. Cleanaway has received comments from SSC and will facilitate regular discussion with EPA to resolve this in the next reporting period.	September 2026

	depositional dust criteria is an annual average. Similarly, the 90 µg/m3 Total Suspended Particulate (TSP) criteria is also an annual average. Reporting in the AEMR should reflect this understanding. 2024 IEA REC 22: Update the AQOMP to discuss the change in location of Dust Gauge 1 and to show the location of the new gauge. 2024 IEA REC 23: Investigate the cause of the frequent TSP monitor outages to ensure continuous monitoring of TSP is undertaken as per the AQOMP		
GMP update and Conditions C35	2024 IEA REC 24: Resolve issue over requirement for a Water Access Licence and obtain DPHI approval of GMP. 2024 IEA REC 25: Include reference to where in the GMP each requirement has been addressed. In addition, include reference to Condition D8 which includes a number of triggers for updating the strategies, plans and programs required under SSD 6835. 2024 IEA REC 26: Update the GMP to reflect approved works including the GO facility and removal of ARRT facility and to reference the modified Consent and most up to date EPL, noting the changes to Condition C36 for additional monitoring. 2024 IEA REC 27: Update the GMP to include EPL and AEMR reporting requirements.	The GMP had been updated and submitted while waiting for the audit report. DPHI had accepted the report with no further comments on 14 August 2024. For REC 24, the updated report proposed the Water Access Licence issue be dealt with separately as it is not within the scope of the GMP. For REC 25, the requirements on Condition C35 are included in Section 1 but no need to repeat Condition D8 as it is not specific for the GMP. For REC 26, the GMP has been updated to include changes in relation to MOD 2. For REC 27, the monitoring requirements are included in Section 5.	Completed
Groundwater Monitoring & Condition C36	2024 IEA REC 28: Undertake a more detailed interpretation and analysis of groundwater monitoring results against the groundwater trigger levels adopted in the GMP. Undertake Mann-Kendall Trend Analysis on an annual basis to determine if there are statistically significant trends at the monitoring points as outlined in the GMP and provide a discussion of this analysis in the AEMR	As recommended in the GMP, data trends will be considered in determining the significance of exceedances. As there was no exceedance in 2024, data trend analysis was not required. However, a simple review of the trend has been included in the 2024 report.	Completed
Aquatic Habitat Monitoring Plan (AHMP)	2024 IEA REC 29: Update the AHMP to reflect MOD 2 and remove discussion of the ARRT Facility 2024 IEA REC 30: Consult with the GHD aquatic ecologist on whether not commencing the monitoring prior to construction has had a significant effect on the baseline data and whether any changes are required to	Revised AHMP has been submitted to DPIE in Jan 2025. The aquatic ecologist confirmed that there is no impact. Please refer to the report in Appendix I.	Completed

	the aquatic habitat monitoring program to account for this such as additional monitoring		
Mill Creek Stream Rehabilitation, Stabilisation and Vegetation Management Plan review	2024 IEA REC 31: Update the Mill Creek Stream Rehabilitation, Stabilisation and Vegetation Management Plan to reflect MOD 2 and remove discussion of the ARRT Facility	The revised MCSRSVMP has been submitted to DPHI in Jan 2025.	Completed
Soil and Water Management Plan and Monitoring Program review.	2024 IEA REC 32: Update the Soil and Water Management and Monitoring Plan to reflect current site conditions, controls, and operating practices. 2024 IEA REC 33: Revise the Soil and Water Management and Monitoring Plan to include performance indicators for Mill Creek and broaden the water quality monitoring program so that impacts to Mill Creek can be measured. This should consider additional monitoring locations along Mill Creek, additional analytes including metals and additional frequency, for example when there is rain but no discharge from site. 2024 IEA REC 34: Update Figure 0.2 of the Soil and Water Management and Monitoring Plan 'Indicative locations of monitoring points' (26/09/2017) with a better plan showing the actual monitoring locations. 2024 IEA REC 35: Include a detailed plan within the Soil and Water Management and Monitoring Plan showing the drainage lines and defining the type and location of controls to mitigate impacts to Mill Creek. 2024 IEA REC 36: Update the Reporting and Review section of the Soil and Water Management and Monitoring Plan to include AEMR reporting requirements. The AEMR should include details of the overflow and discharge events that occurred during the year and the rainfall that was received prior to these events as well as a discussion of the measures that were taken to avoid and minimise water pollution	The Soil and Water Management Plan and Monitoring Program has been reviewed, updated and implemented.	Completed
GO Facility Construction Environmental Management Plan (CEMP) review	2024 IEA REC 37: Update the GO Facility CEMP to remove references to SUEZ and reflect Cleanaway's management system, including roles and responsibilities and references, training, project website, and	The revised CEMP has been submitted to DPHI in Jan 2025.	Completed

	complaint and incident management and reporting. 2024 IEA REC 38: Update the GO Facility CEMP to reflect MOD 2 and remove discussion of the ARRT Facility 2024 IEA REC 39: Include a revision history / document control box within the GO Facility CEMP.		
VFMP review	2024 IEA REC 40: Update the VFMP to reflect MOD 2 and remove discussion of the ARRT Facility.	The revised VFMP has been submitted to DPHI in Jan 2025	Completed
Erosion and Sediment Control Plan review	2024 IEA REC 41: Update the Erosion and Sediment Control Plan to reflect MOD 2 and remove discussion of the ARRT Facility.	The revised Erosion and Sediment Control Plan has been submitted to DPHI in Jan 2025	Completed
CTMP review & Condition C48	2024 IEA REC 42: Update the CTMP to include procedures for notifying residents and the community of any potential disruptions to routes. 2024 IEA REC 43: Update the CTMP to reflect MOD 2 and remove discussion of the ARRT Facility	The revised CTMP has been submitted to DPHI in Jan 2025.	Completed
Condition C30	2024 IEA REC 44: Ensure all exceedances are appropriately reported in the Annual Returns to the EPA and in the AEMRs.	Noted. Exceedances are routinely reported to the EPA and are being included in the Annual Returns from the next one.	On-going
Condition C45 and C46	2024 IEA REC 45: Seek retrospective approval from the decision maker that the alternative ecosystem credits purchased and retired meet the offset rules and satisfy the requirements of Condition C45. 2024 IEA REC 46: Seek retrospective approval from DPHI on the revised Biodiversity Offset Strategy.	The Biodiversity Offset Strategy had been approved by DPHI and credits retired. Additional justification notes prepared by GHD has been submitted to DPHI in Jan 2025.	On-going
Condition C53	2024 IEA REC 47: Ensure that the operating hours specified by the Consent are adhered to.	Noted. CWY shall continue to closely monitor operational hours.	On-going
Condition 56	2024 IEA REC 48: Ensure annual noise monitoring and monitoring undertaken to address noise complaints is provided to DPHI within one month of completing the monitoring.	Noted. Annual noise monitoring report had been included in the AEMR. The noise monitoring was completed in October 2025 and submitted within the one month timeline.	On-going.
Condition D8	2024 IEA REC 49: Implement a process to ensure management plans are reviewed (and revised if necessary) following a reportable incident, Annual Review, and/or Modification to the consent. Ensure the review process is documented, in particular where plans are reviewed but do not require revision.	CWY has a culture of schedule reviews of its management plans and environmental risk register.	On-going

Condition D11	2024 IEA REC 50: Implement a process to ensure a detailed report is provided to DPHI within seven days of any reportable incident or exceedance	Noted.	On-going
Condition C10	2024 IEA REC 51: Ensure any future outages of the weather station that result in continuous monitoring not being undertaken are reported in the Annual Return to the EPA.	Noted.	On-going
Condition 58	2024 IEA REC 52: Update the Weed Management Plan to reflect the change in administration of the weed control program between SSC and Cleanaway and ensure this is reflected in the Action Plan responsibilities.	The Weed Management Plan has been updated to address these findings	Completed
Condition D9	2024 IEA REC 53: Include discussion of TSP monitoring results in AEMR.	Noted.	On-going
Opportunity for Improvement			
Source	Opportunity		
B16, B17 and D2	2024 IEA OFI 01: Implement processes to ensure that employees, contractors, and sub-contractors are made aware of modifications to the Consent. 2024 IEA OFI 02: Introduce measures to encourage reporting by contractors of environmental incidents, (including minor incidents) to Cleanaway	Noted. Noted.	On-going
D2	2024 IEA OFI 03: Update Appendix B of the GO Facility CEMP to include the most up to date CEMP for the Dual Gas and Leachate Trench construction works.	The revised CEMP has been submitted to DPHI in Jan 2025.	Completed

6. Actions from previous annual reports

Table 4 summarises the actions identified from previous annual reports.

Table 4. Actions from previous annual reports

Annual Report Reference	Action identified	Cleanaway Plan	Expected Completion Date
AEMR 2024 – Action 1	Identify any discrepancies between the impacts predicted in the EIS and the actual impacts of the site and analyse the potential cause of any significant discrepancies;	This has been actioned inspections 6-9 of this AEMR	Completed
AEMR 2024 – Action 2	Include approved limits for the rate of vehicle movements and identify any non-compliance against rates during the reporting period.	SSD 6835 only provides tonnage limits. Cleanaway engaged a consultant to undertake an intersection safety review in 2025, which considers vehicle movements during peak periods. The intersection safety study was submitted to DPHI.	N/A
AEMR 2024 – Action 3	Include a table that identifies actions as an outcome of previous Annual Reviews.	This table has been included in this AEMR to resolve this action	Completed
AEMR 2024 – Action 4	One noise complaint remained open (requiring mitigation measures) at the end of the reporting period. Provide details of how this is actioned in the next Annual Review.	Cleanaway has undertaken further monitoring rounds, which included unattended noise loggers to determine compliance of the leachate treatment plant with noise limits. The report concluded that noise was within compliance limits. We also confirmed with EPA that they have previously completed noise logging. EPA confirmed this had been undertaken and they had determined that there was no further action. Cleanaway is still in contact with the resident but has considered this matter closed based on current information.	Completed

7. Environmental Incident Reports

Table 5. Environmental Incidents Occurring at the Site in 2025.

Title	Incident Date	Agencies notified	Regulatory outcomes	Did a non-compliance occur?	Details	Measures Implemented
Elevated TSS from the Stormwater Treatment Plant	2/7/2025	EPA	Nil	Yes	The 50mg/L total suspended solids concentration limit was exceeded for Monitoring Point 21 (DS001 – Stormwater Treatment Plant) at 73mg/L during a wet weather discharge event. This was due to the stormwater treatment plant a failure of the flocculant dosing system.	The treatment plant was turned off once the result was detected and the plant was inspected and reviewed to improve the treatment of sediment before discharging. Discharge results since the 2/7/2025 event have been compliant. Regular inspections of the treatment plant will be conducted, paying close attention to the flocculant and coagulant dosing rates for treating the sediment.

8. Complaints

Cleanaway receives environmental complaints from the following sources:

- Direct complaint from a member of public.
- Community Hotline - Complaints and Feedback operated 24 hours 7 days a week.
- Environmental Protection Authority (EPA).

A total of 13 odour complaints, 2 sediment tracking complaints, 2 noise complaints, 1 litter complaint and 2 complaints related to other matters were received during 2025, giving a total of 20 complaints for 2025.

Table 6. Summary of complaints during 2025.

Incident Date	Reported Date	Type	Complainant Address	Alleged Location of Complaint	Status	Details
27/01/2025	4/02/2025	Other	Not provided	Leachate Treatment Plant	Closed	Alleged liquid waste from pumps/ponds near the golf course flowing to Mill Creek. Resident was contacted and it was confirmed that the liquid was not related to the Leachate Treatment Plant.
5/02/2025	5/02/2025	Other	Bradman Road, Barden Ridge	Lucas Heights Landfill	Closed	Sand and dust complaint. Site is applying appropriate dust mitigation measures on roads. Resident was contacted and the complaint has been closed off, no further actions required.
14/02/2025	14/02/2025	Other	Sutherland Shire Council	Lucas Heights Landfill	Closed	Litter and weeds observed in the Lucas Heights Conservation Area. Litter picking and weed spraying completed.
26/02/2025	26/02/2025	Odour	Barden Ridge	Lucas Heights Landfill	Closed	Odour complaint received from resident, resident was contacted on 26/2 and follow up email on 28/2.
26/02/2025	28/02/2025	Odour	Not provided	Lucas Heights Landfill	Closed	Received from the EPA. Very strong odour. Site operations were normal. No faults reported.

27/02/2025	28/02/2025	Odour	Thurlgona Road, Engadine	Lucas Heights Landfill	Closed	Received from the EPA. Strong odour in Engadine from the Lucas Heights waste facility. Site operations were normal, no faults reported.
1/03/2025	5/02/2025	Odour	Old Illawarra Road and David Road, Barden Ridge	Lucas Heights Landfill	Closed	Received from the EPA. Very strong odour impacting the resident. Site operations were checked and all appeared normal. No feedback was requested.
30/03/2025	31/03/2025	Noise	47 Ella Avenue, Barden Ridge	Leachate Treatment Plant	Closed	Noise received at the residence.
10/04/2025	15/04/2025	Odour	Not provided	Lucas Heights Landfill	Closed	Strong odour, like rotten fish detected. No feedback requested.
22/04/2025	5/05/2025	Odour	Barden Ridge	Lucas Heights Landfill	Closed	Strong garbage odour received from resident.
29/04/2025	5/05/2025	Odour	Barden Ridge	Lucas Heights Landfill	Closed	Very bad odour observed around 7:00am.
29/04/2025	5/05/2025	Odour	Kilborn Pl, Menai	Lucas Heights Landfill	Closed	Odour complaint received from resident.
5/05/2025	5/05/2025	Noise	47 Ella Avenue, Barden Ridge	Leachate Treatment Plant	Closed	Noise complaint received from the resident.
25/05/2025	27/05/2025	Odour	Engadine Leisure Centre	Lucas Heights Landfill	Closed	Received from the EPA.
28/05/2025	28/05/2025	Odour	Not provided	Lucas Heights Landfill	Closed	Strong smell from the tip. Anonymous, no feedback requested.
12/08/2025	13/08/2025	Odour	Allies Road where Shire Christian School and Lucas Heights Public School are located.	Lucas Heights Landfill	Closed	Received from the EPA. Temperature inversion present with rainy weather conditions, normal tip face operations.

29/08/2025	2/09/2025	Sediment Tracking	New Illawarra Road, Lucas Heights	Lucas Heights Landfill	Closed	Complaints made to Council and referred to the EPA. Extremely wet weather during the month of August 2025. Wheelwash and street sweeper were operating as required.
17/09/2025	18/09/2025	Odour	Lucas Heights	Lucas Heights Landfill	Closed	Bad odour for the last few days, described as a rubbish/strong smell. No feedback requested.
24/09/2025	24/09/2025	Odour	Lucas Heights	Lucas Heights Landfill	Closed	Stronger and more frequent garbage odour over the last couple of months, unusually wet winter period and temperature inversions present, no faults and operations observed.
13/11/2025	13/11/2025	Sediment Tracking	Lucas Heights	Lucas Heights Landfill	Closed	New Illawarra road has rocks, rubbish and mud from the trucks. Litter picking along New Illawarra road and Heathcote road, wheelwash operational. Response provided to the resident.

All complaints received were logged within the site complaints register and within the Cleanaway MYOSH Safety Management Software. Following receiving a complaint, it is investigated to determine the validity; actions are assigned to improve performance and feedback is provided. Figure 2 below shows the complaints by location during 2025 and Figure 3 shows the total complaints received 2021-2025.

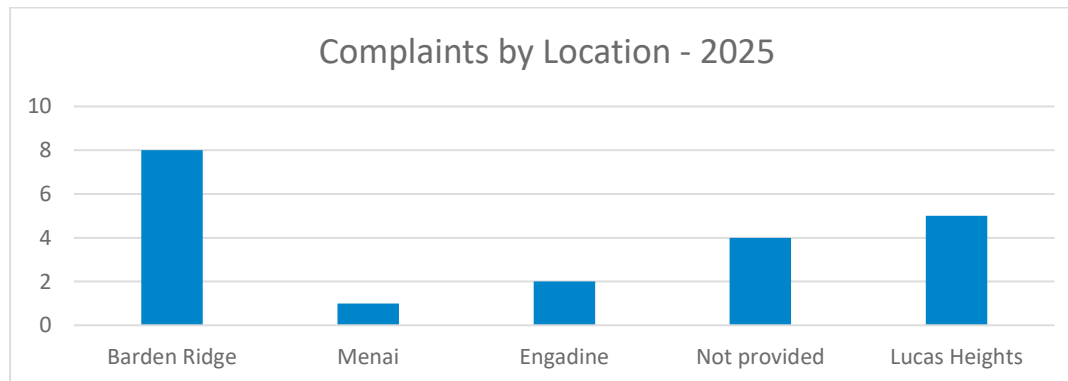


Figure 7. Complaints by location - 2025.

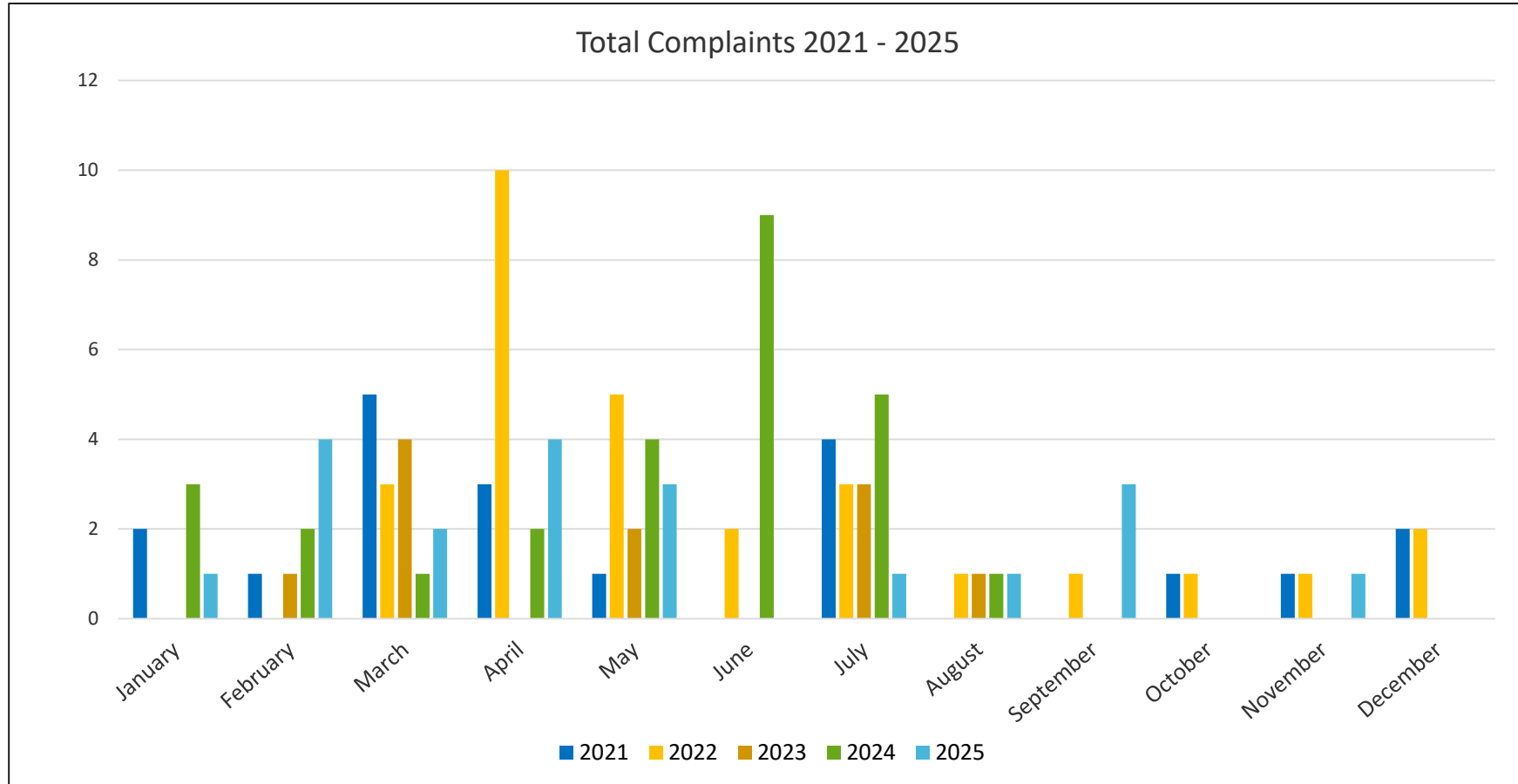


Figure 8. Total complaints 2021-2025.

9. Assessment Criteria

This AEMR has been undertaken in accordance with Development Consent SSD 6835, Condition D9 and the following associated licences and/or Management Plans:

- DA SSD 6835, EPL 5065, ERP OEMP, PIRMP, AQOMP, GMP, Surface and sub surface gas monitoring plan, TMP, CRG, and VPA.

10. Environmental Monitoring

10.1. Landfill Gas Management

10.1.1. Subsurface Gas

A monitoring program was submitted to the NSW EPA in 2006. The program has since been accepted and referenced in the EPL 5065 section M8.2.

Subsurface Gas Monitoring is therefore conducted in accordance with EPL Section P1.1. Any exceedances above 1.25% volume/volume are reported to the NSW EPA within 24 hours of results being received. Note, the exceedance level was lowered to 1% (v/v) methane on 7 December 2017.

Subsurface Gas Methane Monitoring Results for 2025

Table 7. 2025 subsurface gas monitoring results.

	Mar-2025	May-2025	Sep-2025	Dec-2025	Min	Avg	Max
MB036	<0.1	0	0.7	<0.1	<0.1	0.7	0.7
MB037	<0.1	0	0.7	<0.1	<0.1	0.7	0.7
MB036-1	<0.1	0.5	0.7	<0.1	<0.1	0.6	0.7
MB037-1	<0.1	0.5	0.7	<0.1	<0.1	0.6	0.7
MB042	<0.1	0	0.7	<0.1	<0.1	0.7	0.7
MB043	*	0	0.7	<0.1	<0.1	0.7	0.7
MB046	<0.1	0	0.6	<0.1	<0.1	0.6	0.6
MB047	<0.1	0	0.6	<0.1	<0.1	0.6	0.6
MB048	<0.1	0	0.7	0.1	0.1	0.4	0.7
MB049	<0.1	0.4	0.6	<0.1	<0.1	0.5	0.1

Note:

- All results are in percentage (%)
- '*' – Well head was missing a cap

Results Analysis:

All subsurface methane results recorded for the monitoring period of 2025 were below the NSW EPA licence limit of 1% volume/volume.

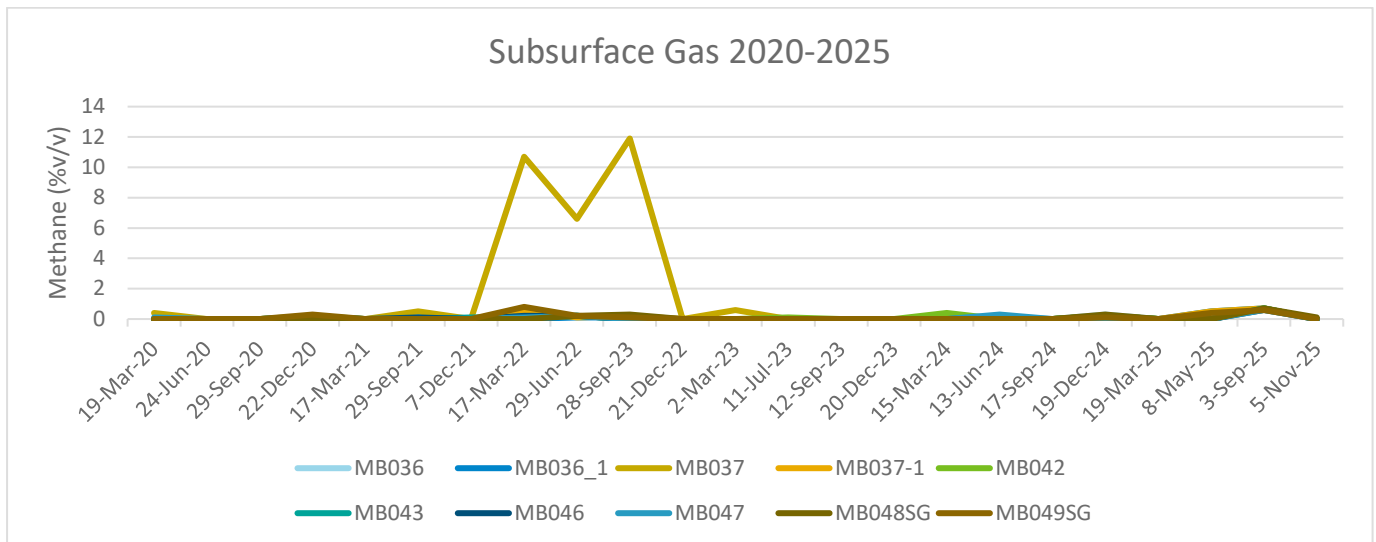


Figure 9. Subsurface Gas Methane Results 2020-2025

10.1.2. Surface Gas

Surface landfill gas emissions are monitored quarterly in accordance with the Landfill Gas Surface Monitoring Program February 2006 and EPL 5065 Section M8.1. Monitoring was undertaken by the Cleanaway Environmental Technician from January 2025 – March 2025 and by a third party contractor, WSP, from September 2025 to December 2025.

Samples of the atmosphere are taken 5 cm above the landfill surface in a grid pattern across the site, and depressions and fissures are also targeted. The threshold for corrective action is 500 ppm of methane. If an odour is detected during the monitoring, the odour is tracked upwind to the source of the odour where it is further monitored and noted for investigation.

If any exceedance of the threshold is found, then the site contractors EDL and Select Civil were informed and remediation works took place on the source of the exceedance. If the exceedance is repeated and the source is still not rectified, then more detailed investigation and monitoring will be undertaken. It is a requirement of the EPL that the NSW EPA is notified within 24 hours of a result over 500 ppm on the intermediate and final cap areas of the landfill.

Gas accumulation monitoring is conducted monthly to ensure landfill gas concentrations do not accumulate to unsafe levels within onsite buildings. If any exceedance of the threshold level is detected, then necessary actions are taken to mitigate and ensure the safety of staff and customers on site. During the monitoring period of 2025, no methane was detected above the threshold level of 5,000ppm.

Surface Gas in 2025 was conducted in March, June, September and December. All areas except for the March 2025 monitoring event detected locations of elevated methane, these exceedances were reported accordingly to the NSW EPA and have been remediated.

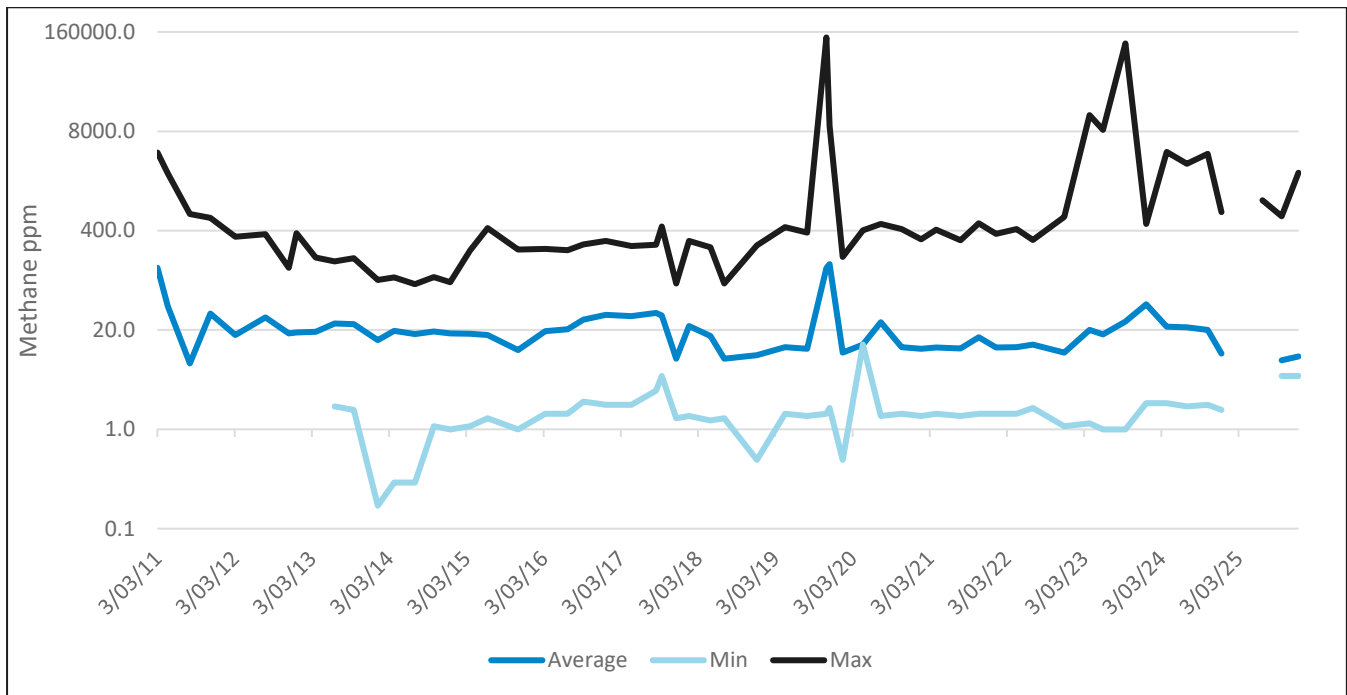


Figure 10. Minimum, Average and Maximum results for landfill surface gas, March 2012 - December 2025.

Any areas of high methane concentration were reported to EDL for an initial review and possible works that may be undertaken to reduce the methane concentration. In 2025, this included adjusting the gas extraction wells in the vicinity of the location with high methane and remediating the surface cap with additional clay or bentonite. The maximum and average values were not determined during the March and June 2025 monitoring events due to a technical fault that did not allow for the data to be exported. These are monitored on a quarterly basis and results are provided Appendix C.

10.2. Groundwater, Leachate & Surface Water Monitoring

10.2.1. Surface Water

Surface Water EIS Predictions:

With the implementation of the proposed mitigation and management measures, it is not expected that the proposal would result in an unacceptable impact in terms of sediment discharge to downstream waterways.

Activities associated with the proposal would not result in a major increase in potable water demand.

Stormwater discharged from the site is not expected to have any unacceptable impacts on flooding conditions downstream.

Re-profiling and re-capping of areas would reduce the potential risk of leachate entering the surface water system hence would not deteriorate receiving water quality.

The surface water assessment addresses the SEARs and concludes that the proposal would meet the following objectives:

- No significant impacts on the community or environment

- Prevention of surface water contamination
- Minimising sediment generation and transport off the proposal site
- Minimising soil erosion
- No significant impacts to downstream flow conditions
- Maximise use of collected water on site for dust suppression and irrigation
- Maintenance of haul roads etc.
- Keep surface water drains free of litter

Surface Water Statutory Requirements:

The EPL 5065 requires the collection of samples within 24 hours of a discharge at MC1.

Wet weather surface water monitoring is undertaken as required by the Environment Team and/or contractor JPG. Depending on the sample point location, wet weather samples are analysed for the parameters below.

Surface water samples are analysed for the following analytes:

- pH (field or laboratory)
- Potassium
- Electrical Conductivity (field or laboratory)
- TSS
- TDS
- TOC
- Ammonia as N
- Dissolved Oxygen (field or laboratory)
- Total Phenols

Discharge Point at Mill Creek (MC1) EPA Licence point 1 (2023-2025)

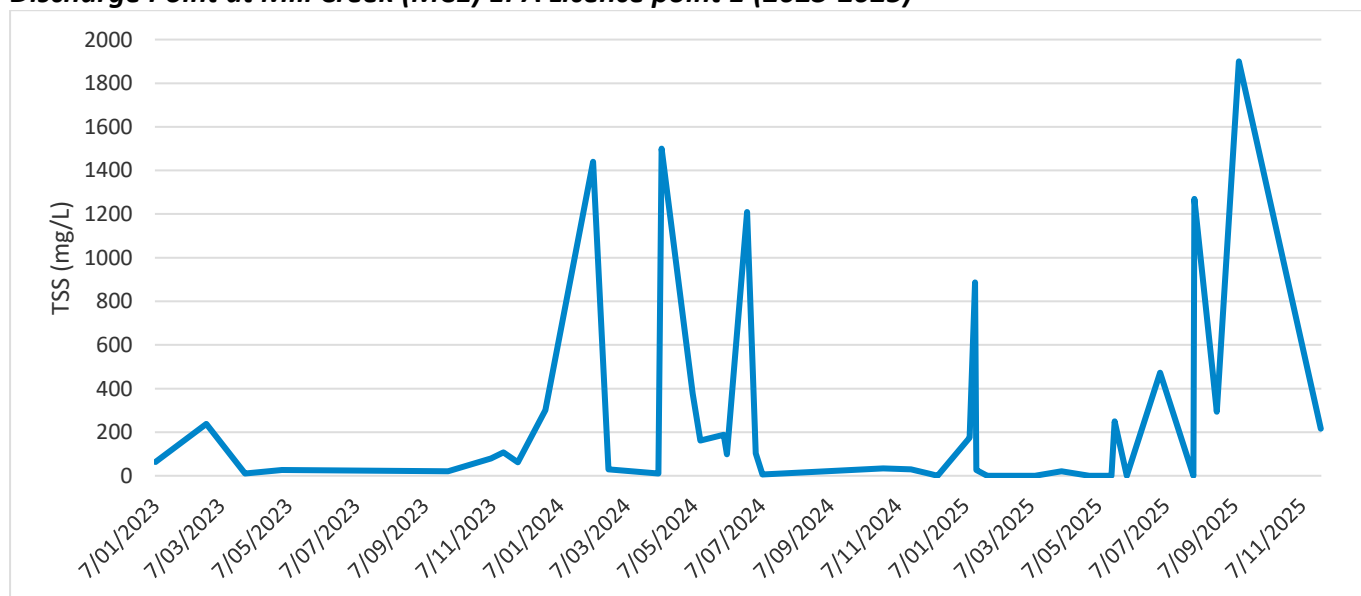


Figure 11. Total Suspended Solids (TSS) at Mill Creek Discharge Point MC1 (EPA Licence Point 1), 2023–2025

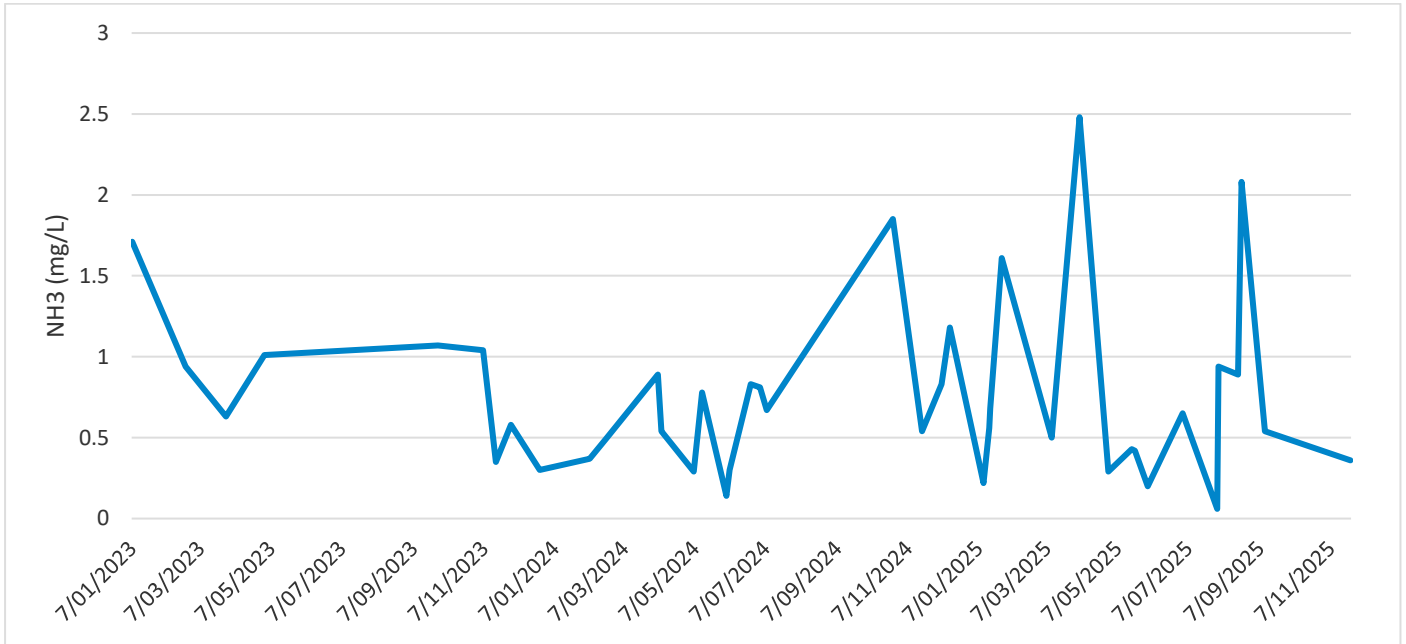


Figure 12. Ammonia at Mill Creek Discharge Point MC1 (EPA Licence Point 1), 2023–2025

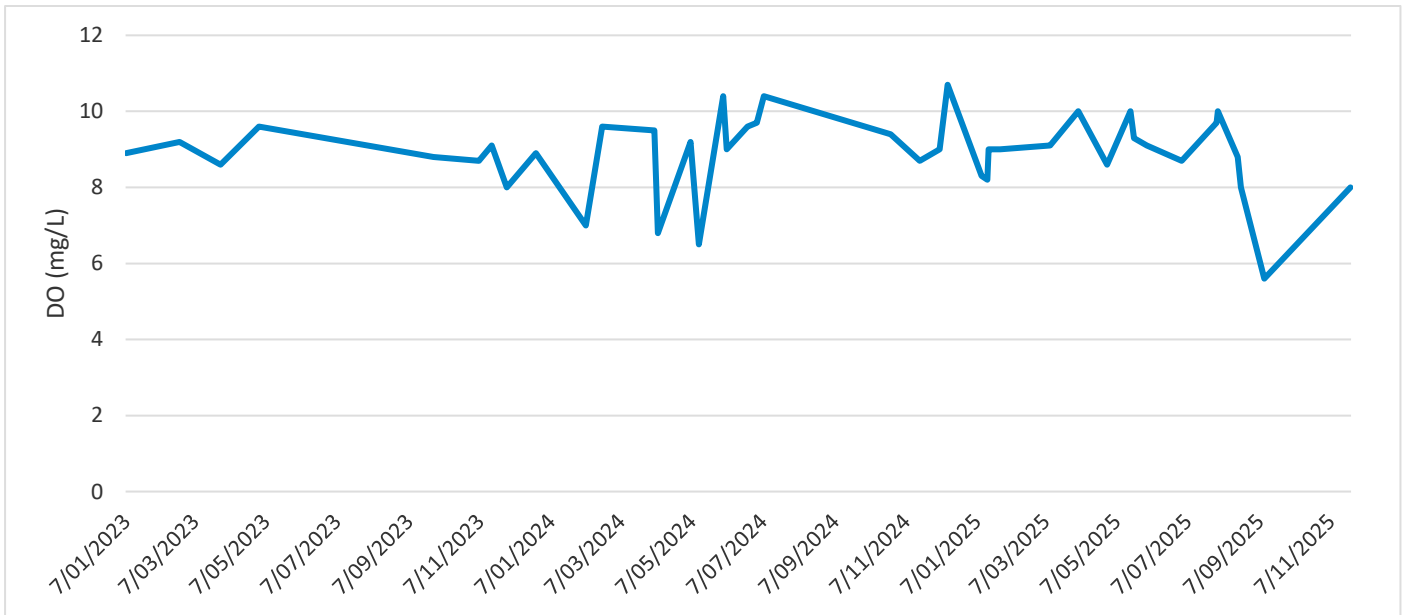


Figure 13. Dissolved oxygen at Mill Creek Discharge Point MC1 (EPA Licence Point 1), 2023–2025

Stormwater Treatment Plant DS001 EPA Licence Point 21 (2023-2025)

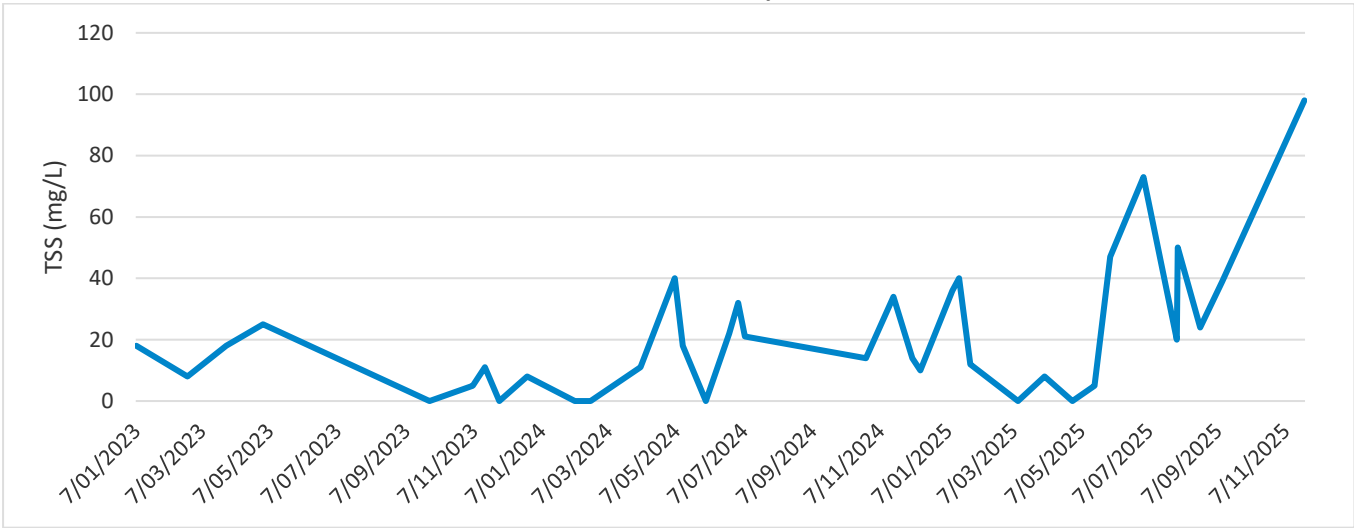


Figure 14. Total Suspended Solids (TSS) at Stormwater Treatment Plant DS001 (EPA Licence Point 21), 2023–2025

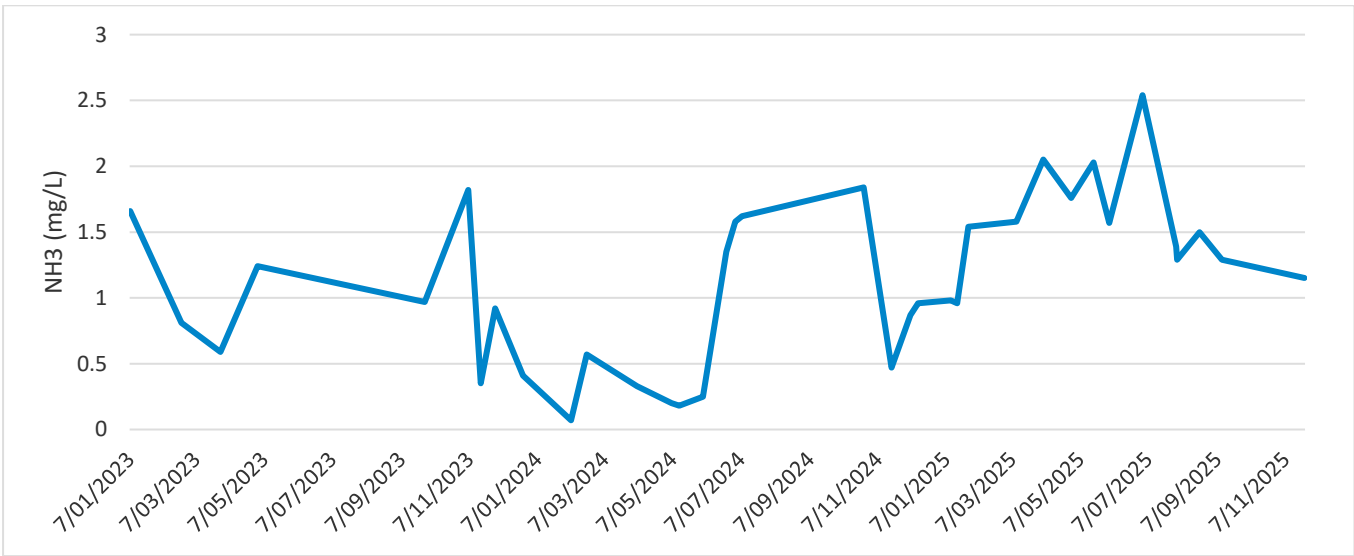
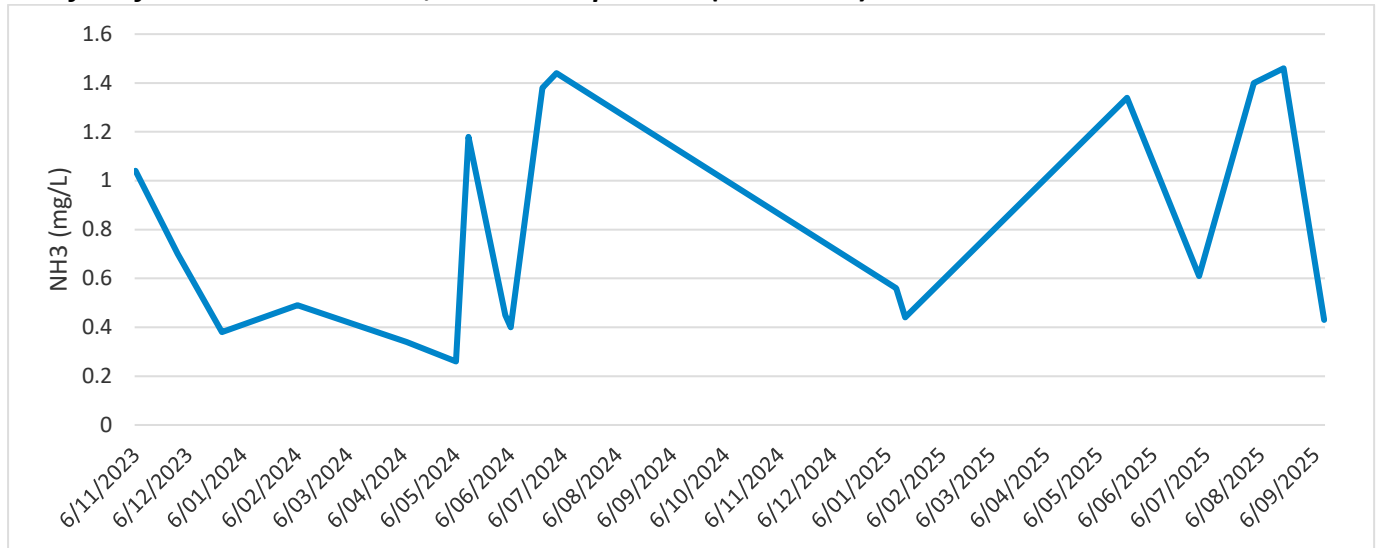
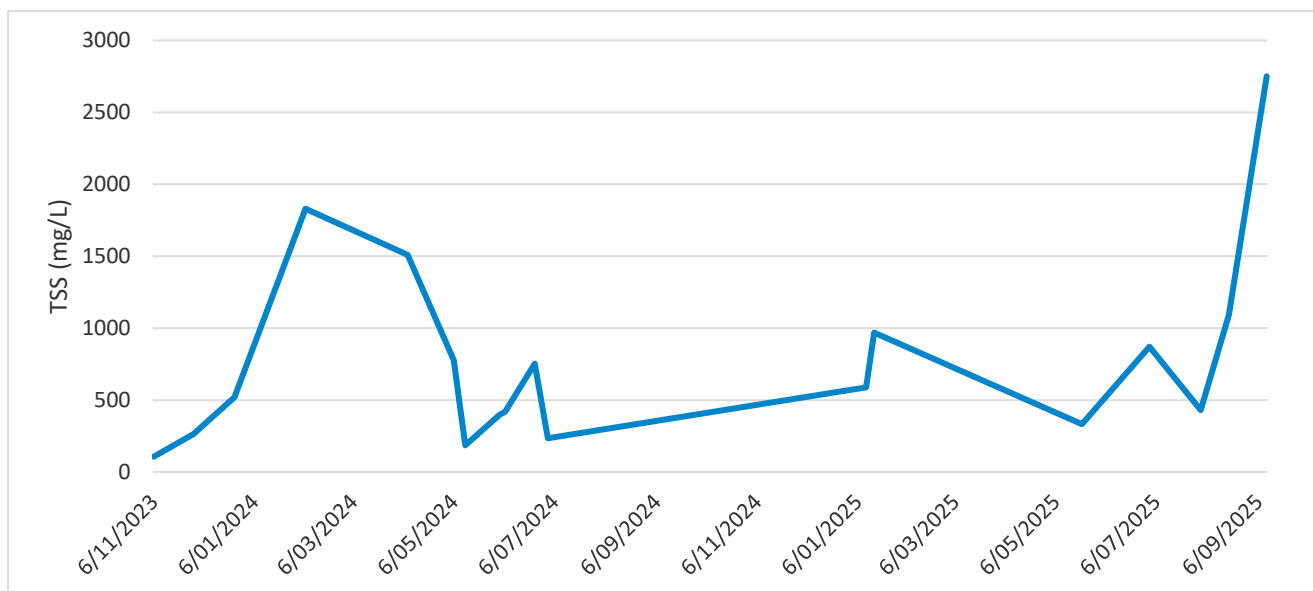
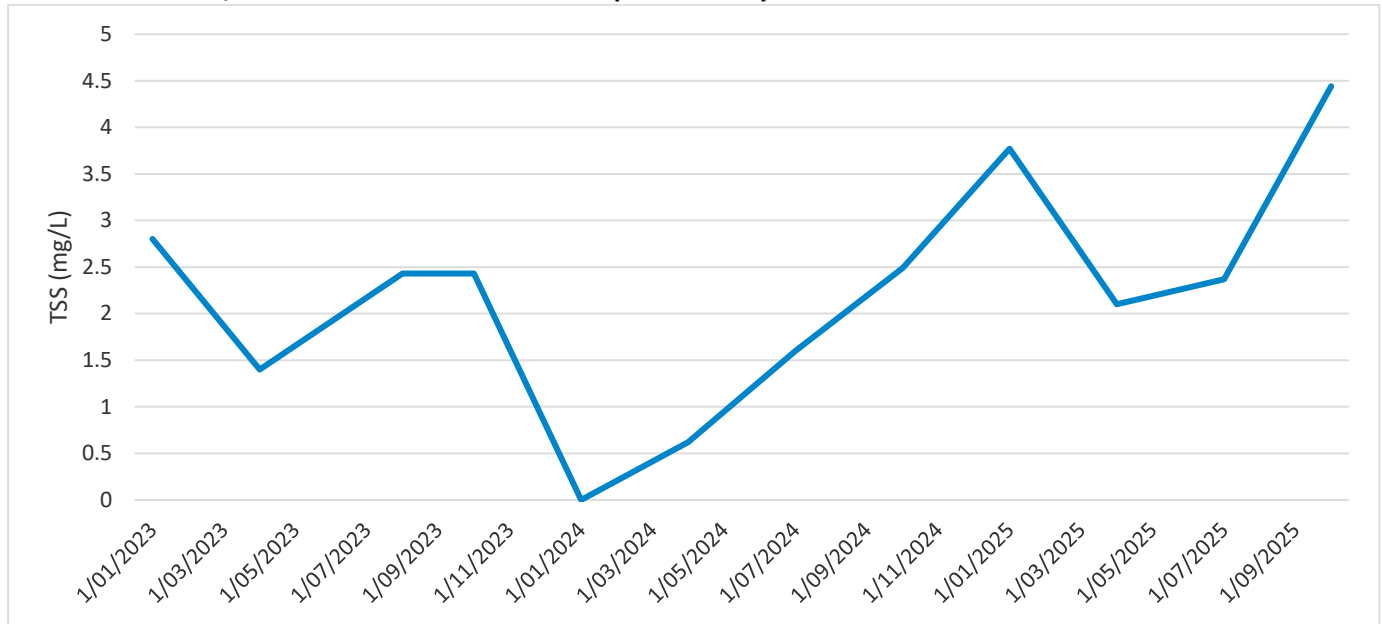
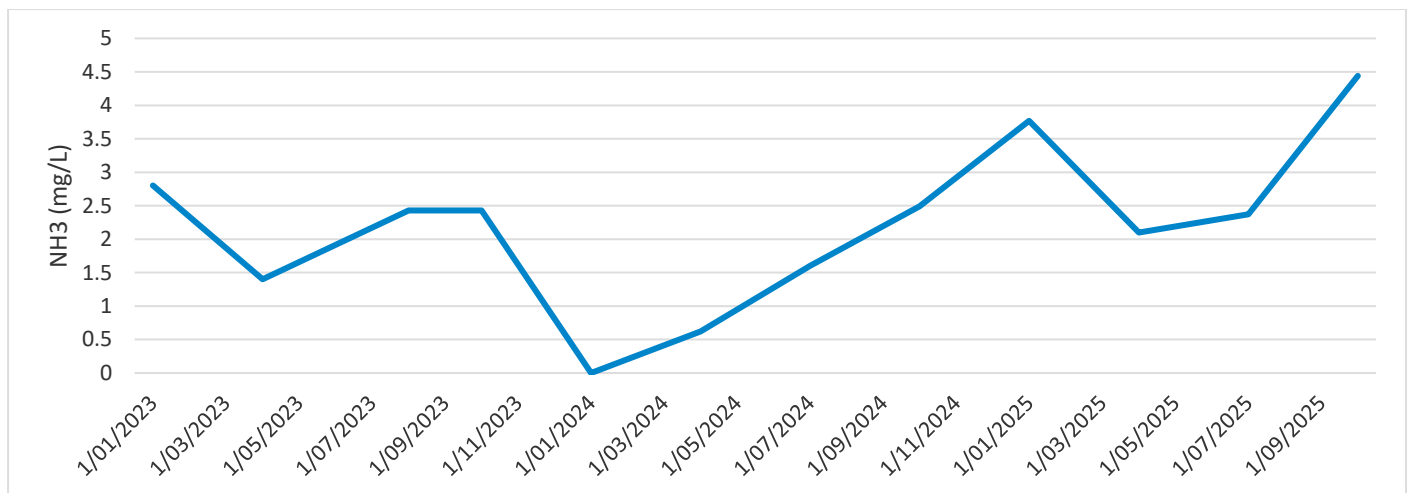


Figure 15. Ammonia at Stormwater Treatment Plant DS001 (EPA Licence Point 21), 2023–2025

Overflow from Sediment Dam 5, OF001 EPA point 22 (2023-2025)**Figure 16. Ammonia at Overflow from Sediment Dam 5, OF001 (EPA Licence Point 22), 2023–2025****Figure 17. Total Suspended Solids (TSS) at Overflow from Sediment Dam 5, OF001 (EPA Licence Point 22), 2023–2025****Note - From the EPA licence:**

While the licence TSS limit for point 22 is 50 mg/L, condition L2.5 states the licensee is taken not to have breached the licence total suspended solids concentration limits for Point 1 and Point 22 if:

- the overflow is caused by a rainfall event; and
- the licensee has taken all practical measures to avoid and minimise water pollution.

Sediment Dam 5, SD005 EPA Licence Point 23 (2023-2025)**Figure 18. Total Suspended Solids (TSS) at Sediment Dam 5, OF001 (EPA Licence Point 22), 2023–2025****Figure 19. Ammonia at Sediment Dam 5, OF001 (EPA Licence Point 22), 2023–2025****Results Analysis:**

MP - MC1 (Discharge to waters) is monitored during a discharge event. The results were similar to previous years for all analytes apart from the following:

During a rainfall event the 50 mg/l suspended solids limit does not apply. There were 10 suspended solid results above 50mg/l during the year 2025, due to overflows caused by rainfall (i.e. extreme weather events in 2025).

There were no ammonia results exceeding the limit of 2.5 mg/L.

In the past MC1 was sampled on a time-based frequency, leading to samples being taken during times of no flow, thus low oxygen. In line with the EPL condition samples are only taken during times when there is flow being contributed by the landfill surface area.

MP - DS001 (Pumped discharge from storm water treatment plant) is sampled when the storm water treatment plant is operating. Out of the 14 samples taken, there were two exceedances of the suspended solids and no exceedances of ammonia during the 2025 reporting period.

MP - OF001 (Overflow from sediment dam) is sampled within 24 hours of discharge. There were 7 discharges during the year, all had suspended solids concentration above 50mg/L. However, these events occurred during wet weather and thus the high values are not unusual and were within the licence limits (i.e. especially during sustained extreme weather conditions).

Ammonia results for the seven discharge samples were below the license limit of 2.5mg/L.

MP - SD005 (Sedimentation Dam) is monitored quarterly regardless of rainfall events. There are no analyte concentration limits on this sampling point.

10.2.2. Groundwater

Groundwater EIS Predictions:

Existing groundwater monitoring data suggests that the combination of the in-situ geology and current leachate collection system is resulting in concentrations of parameters in groundwater which are below the level where impacts on the surrounding groundwater and surface water systems may occur. As similar conditions would be maintained with the proposal, it is expected that there would be no unacceptable impacts from the proposed landfilling activities at the LHRRP.

The Stage 5 landfill leachate collection system and control measures have been designed and installed in accordance with best practice to facilitate preferential capture of leachate from up gradient landfill areas and further minimise the potential for impacts to underlying groundwater. The existing groundwater drainage system located beneath Stage 5 provides additional capacity for interception of groundwater in the unlikely event that adverse groundwater impacts are detected.

The proposed reprofiling of the landform and subsequent capping is expected to reduce overall infiltration to the landfill, resulting in reduced potential for impacts on underlying groundwater and down gradient receptors.

Despite this, it is important that leachate levels within the landfill are monitored and actively managed to minimise the possibility of leachate entering groundwater.

Groundwater Statutory Requirements:

All groundwater bores are sampled on a quarterly basis by an external contractor. Analysis of all groundwater bores are consistent from year to year with no significant fluctuations of analytes.

As required by SSD 6835 C35 a Groundwater Management Plan (GMP) be prepared by a suitably qualified and experienced person, in consultation with the EPA and DPI Water.

A GMP was prepared for the site by Douglas Partners in consultation with EPA and DPI Water and subsequently submitted to DP&E 19 October 2017.

As required by the GMP additional groundwater monitoring bores have been installed to the North of the site MB048 and MB049. Attempts to refurbish MB022 were not successful.

A revised GMP prepared by GHD has been submitted to DPHI, no further comments have since been received from the DPHI on 14 August 2024.

As recommended by the GMP, a Mann-Kendall Trend Analysis was conducted, this was used to assess the presence of a trend in a dataset over time. The results will be discussed in the following section.

Results Analysis:

The results and overall trends for groundwater were largely consistent in 2025 with that of previous monitoring events.

No ammonia exceedances were detected during the March, May, September and November 2025 monitoring. The Mann-Kendall trend analysis suggests that there is a statistically significant upward trend in MB034 and MB044 for ammonia. MB044 is located upgradient of the landfill and part of a cluster of 3 groundwater bores, MB008 and MB045. MB008 shows a trend that is probably increasing while MB045 indicated no trend due to insufficient statistical evidence to confirm a true trend. MB034 is part of a cluster of 4 groundwater bores located downgradient of the site. Based on the lack of a statistically significant trend in the surrounding bores, it may be suggested that the trend identified in MB034 and MB044 may require further investigation. Total organic carbon (TOC) results for 2025 were similar to historical data with bores such as MB038, MB044, MB306 showing slightly elevated results. The analysis found that the following bores show a statistically significant increasing trend; MB038, MB044 and MB306.

Standing water levels have remained largely consistent for groundwater bores at bore locations such as MB038, MB040 and MB046 which appear to be decreasing over time. However, there is variation within the results which can be attributed to seasonal changes.

To support the analysis, Mann Kendall analysis was performed on selected analytes across groundwater monitoring locations by Consulting Earth Scientists Pty Ltd (CES). A compiled summary of the results provided by CES is included in Appendix J.

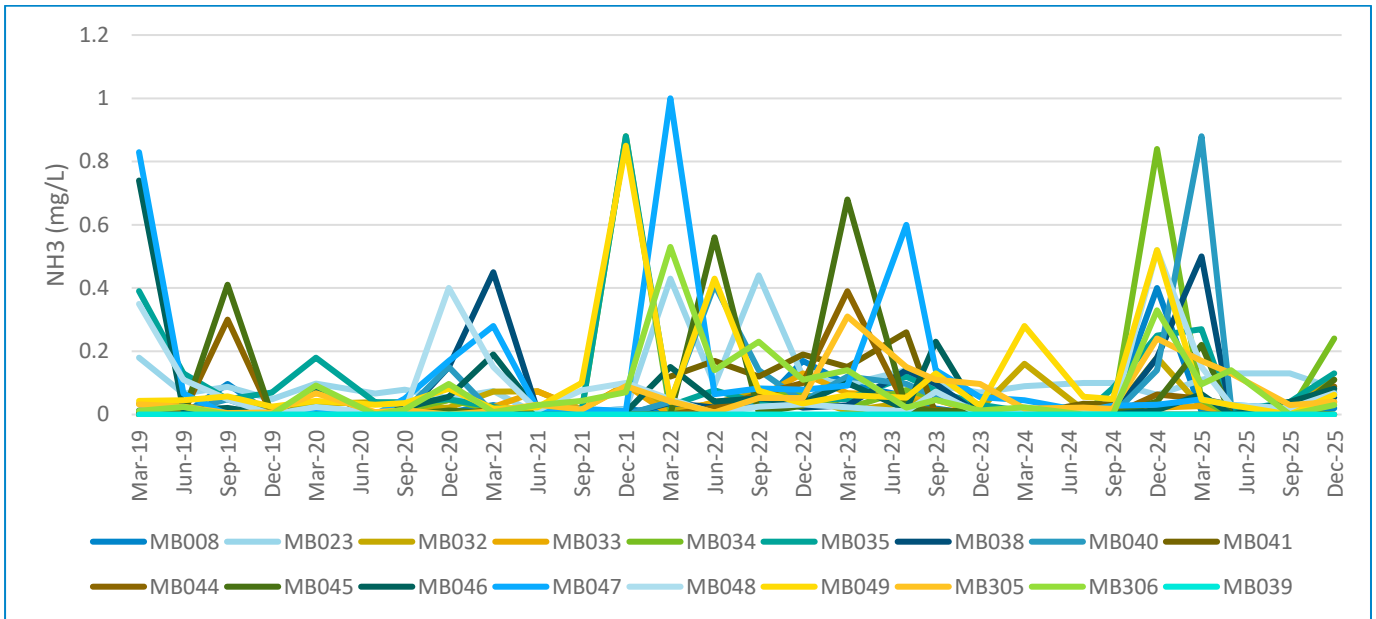


Figure 20. Sitewide groundwater ammonia 2019-2025

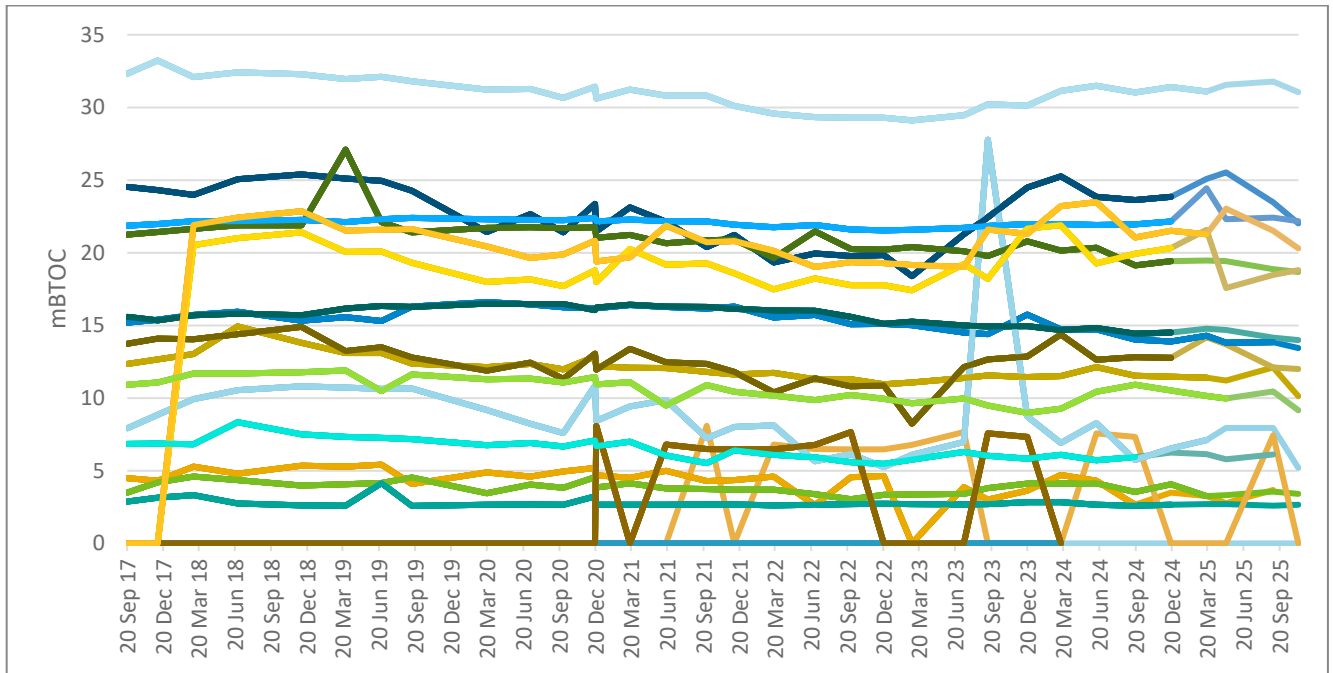


Figure 21. Sitewide standing water level 2018-2025

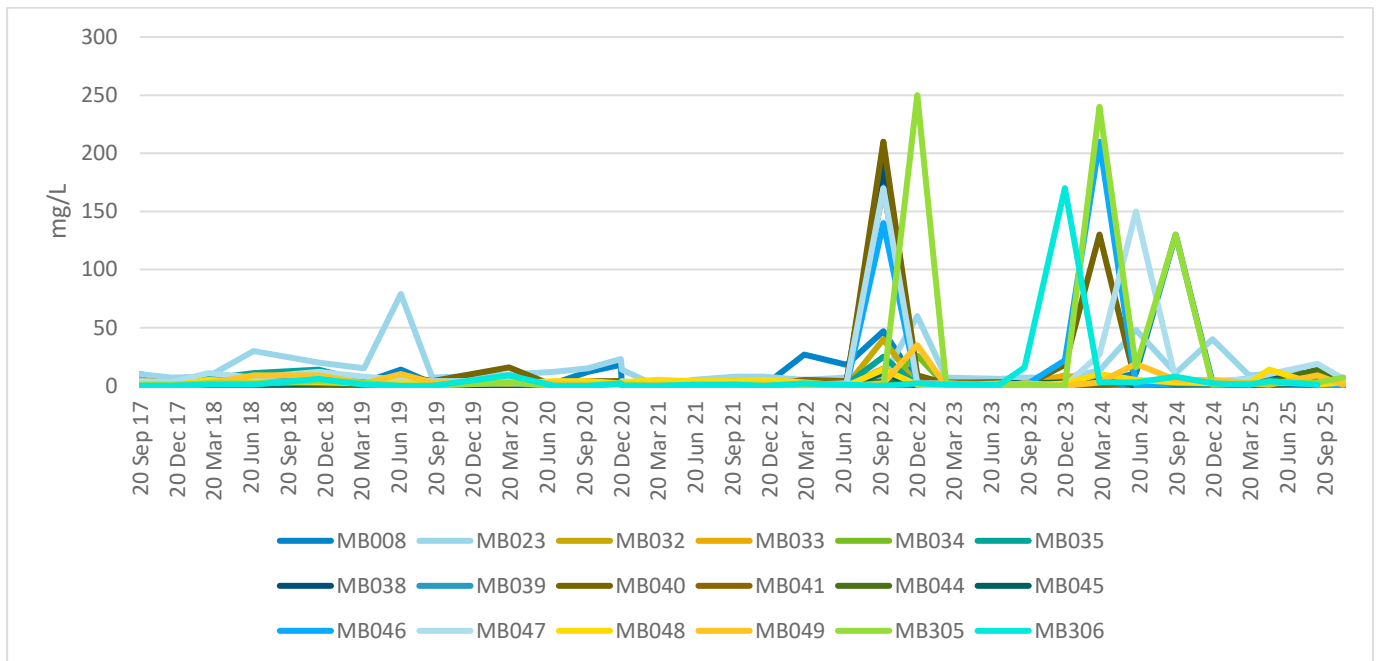


Figure 22. Sitewide groundwater total organic carbon 2017-2025

10.2.3. Leachate

Leachate EIS Predictions:

The leachate assessment and water balance model indicate that the proposal would:

- Provide a final landform which increases the proportion of rainfall which would run off the surface.
- Provide a final landform which would decrease the proportion of rainfall which would infiltrate into the waste.
- Overall, generate less leachate than the current site arrangement. Through the reduction in leachate generation and the improvement of the cap and final landform, the proposal would also reduce the potential to impact the environment through surface water and groundwater.

The existing leachate management system has the capacity to manage the volumes of leachate estimated to be generated in the modelled average rainfall and wet rainfall years through the use of emergency leachate containment in the double lined emergency leachate containment dam and Cell 5.3. These containment structures were designed for this purpose.

The leachate assessment addresses the SEARs and concludes that the proposal would meet the following objectives:

- No significant impacts on the community or environment.
- Prevention of groundwater pollution by leachate.

- Prevention of surface water pollution by leachate, including Mill Creek.
- Prevention of the degradation of local amenity.

Leachate Statutory Requirements:

Leachate flow monitoring is required to be monitored continuously and reported quarterly, under EPL 5065 for each location which is listed below.

Table 8. Leachate flow monitoring locations.

EPL Identification No.	Descriptions
41	Leachate flow monitoring – LH2 leachate flow meter
42	Leachate flow monitoring – LH1 leachate flow meter
43	Leachate flow monitoring – Harrington's Quarry leachate flow meter

Leachate collected within the dams is transferred to LH1 where the leachate is sent through a liquid treatment facility which treats the liquid before it is discharged to sewer under a Trade Waste Agreement with Sydney Water.

Leachate volumes are monitored on a quarterly basis by an external contractor.

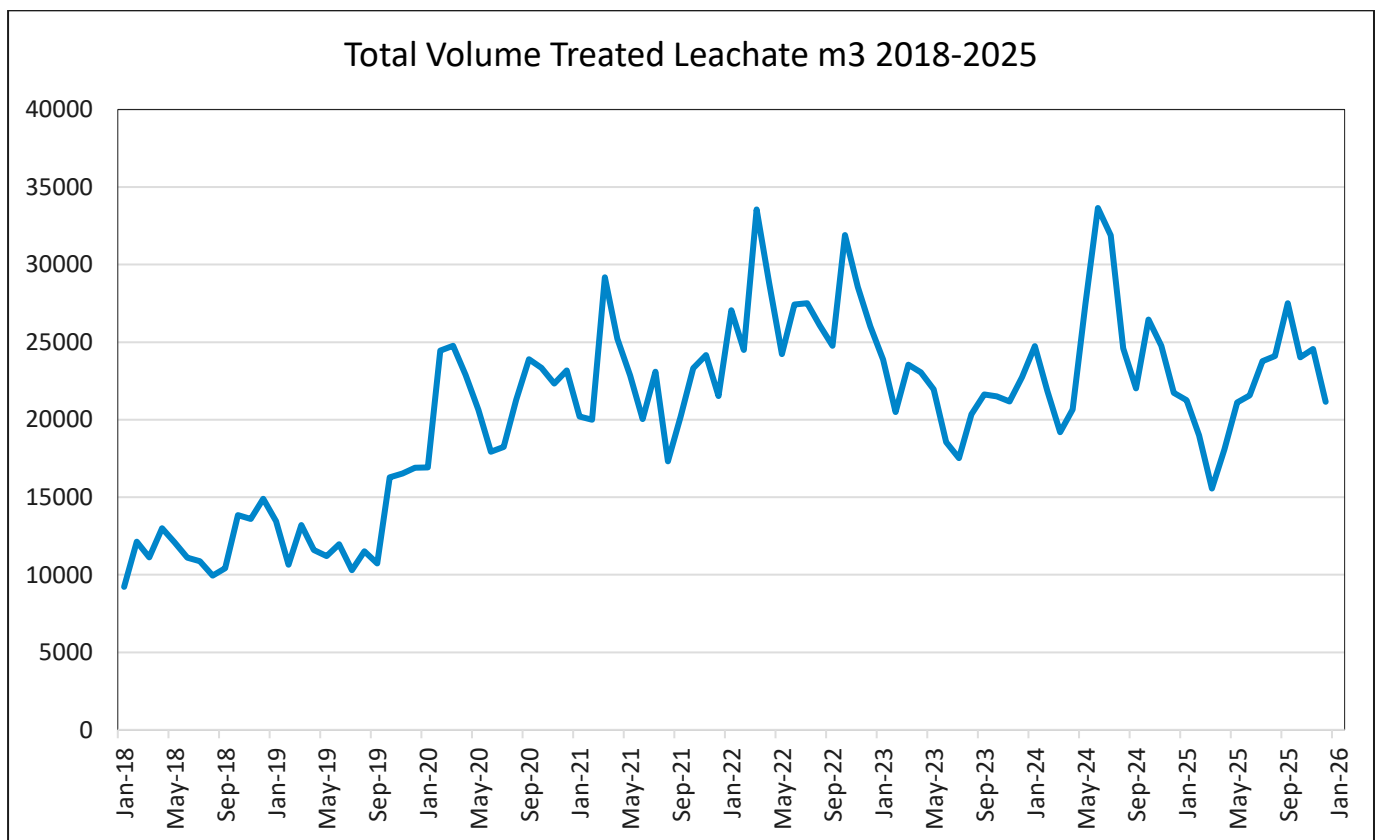


Figure 23. Total Volume of Leachate Treated from 2018-2024

Results Analysis:

Leachate extraction has been reasonably stable over recent years, this is expected to lower with the improvement of the cap and final landform. Actual results are provided Appendix F.

For the year 2025, there was 1171.9mm of rainfall on the landfill with the long-term average of 1199.6mm (2021-2025) and the treated leachate volume was 261,661m³ for the year.

The leachate water balance model in EIS predicts an average volume of 247,060 m³ and a wet volume of 307,563 m³. The actual volume of leachate generated in 2025 wasn't significantly higher than the water balance model.

10.3. Noise

Note, preparation works for the construction of the GO facility commenced in January 2023.

EIS Noise Predictions:

Construction activities are predicted to comply with the 'Interim Construction Noise Guideline' (DECC 2009) construction noise management levels at all sensitive receivers both during standard and outside of standard recommended hours. The nearest sensitive receivers are over 300m from the proposal site. Due to the distance from the proposal site, construction vibration impacts are not anticipated at any sensitive receivers.

The noise levels, assuming all equipment to be operational at the landfill and GO Facility (a conservative assumption), are predicted to comply with all noise criteria. The road traffic noise levels from the proposal are also predicted to comply with the noise criteria at sensitive receivers along the traffic routes.

This assessment addresses the SEARs and concludes that the proposal would meet the following objectives:

- No significant impacts on the community or environment
- Prevent the degradation of local amenity
- Prevent noise pollution.

From EIS, Predicted operational noise levels:

Receiver	Noise criteria dB(A)		Predicted noise level, LAeq(15min) dB(A)
	Day	Night	
R1 Engadine	45	37	31-32
R2 Barden Ridge	47	38	29
R3 Menai	45	37	26-27
R4 ANSTO	65	-	40-48
R5 ANSTO Motel	65	40	36-40
R6 Gandangara	45	37	37
R7 Gandangara North	45	37	31-34
R8 The Ridge Sports Complex	55	-	35

Figure 24. Noise measurement locations on 9th October 2025.

Location	Minimum Level L _{AMin}	Estimated Site Noise Contribution L _{Aeq, 15min}	Noise limit L _{Aeq, 15min}	Complies
R1	40	< 30	35	Yes
R2	45	< 35	35	Yes
R3	35	< 25	35	Yes
R6	41	< 31	37	Yes
R7	36	< 26	35	Yes
R8	45	< 35	35	Yes

Given that no noise from the site was audible at any time at locations R1, R2, R3, R6, R7, or R8, the estimated noise from the LHRRP complies with the consent conditions at all locations.

Figure 25. Noise measurement results from 9th October 2025.

Results Analysis:

The report concluded:

The Lucas Heights Resource Recovery Park is required to conduct annual compliance noise monitoring as outlined in Development Consent SSD 6835. This report details the annual monitoring that took place on Thursday 9 October 2025.

Noise contributions from the LHRRP at the surrounding residential receivers have been measured and assessed. The assessment indicates that all the relevant noise requirements of the Development Consent have been complied with.

10.4. Dust

Cleanaway conducts monthly dust deposition monitoring around the boundary of the site using dust deposition gauges which collect dust over approximately one month (i.e. 30 days $\pm$ 2 days). The samples are analysed, and a one-month deposition rate is calculated. NSW EPA assessment criteria allows an annual average dust deposition rate of 4 g/m² month for total insoluble solids.



Figure 26. Lucas Heights Resource Recovery Park Dust Gauge Locations.

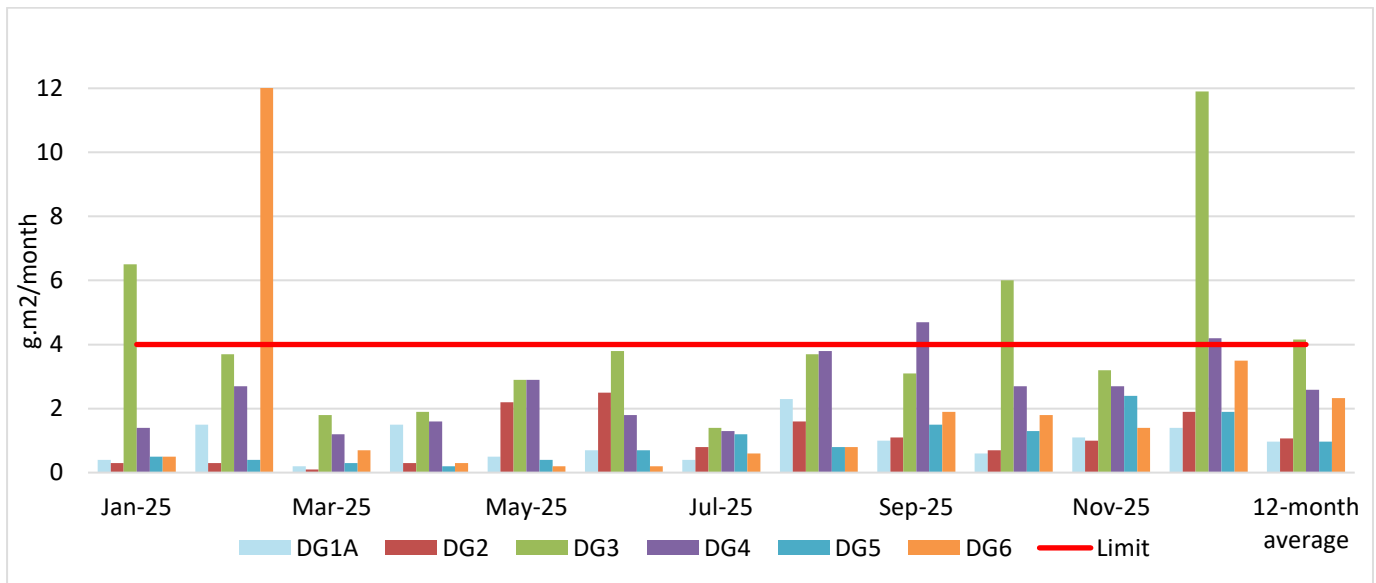


Figure 27. Dust Deposition at Lucas Heights 2025.

Results Analysis:

On average, dust gauge3 records the highest dust deposition over the 12 month period, recording a 12-month average of 4.16g.m2/month which is slightly greater than the annual average of 4 g.m2/month. This has led to the site reviewing the traffic management and dust suppression measures around these dust gauges of interest. There were 6 instances where insoluble solids exceeded the annual average of 4 g/m2.month EPA guideline. Dust gauge 1 was relocated and renamed DG1A to increase accessibility and meet the requirements set in AS/NZS 3580.10.1 for dust gauge placement in 2024. Dust gauge 6 located to the west of the landfill recorded the highest insoluble solids result at 12g.m2/month in February. Upon investigation, it is believed that a bird may have deposited soil in the dust gauge whilst perched on the edge. Clumps of soil were observed in the funnel during the sampling. Dust gauge 3 recorded 3 instances of elevated dust results in January, October and December and dust gauge 4 recorded 2 instances elevated dust. These elevated results have been attributed to the challenging combination of warm and dry weather and increased traffic along the roads near the dust gauge locations. The site has dust mitigation measures in place such as water trucks for dust suppression, sweepers to clean roads. Noting that the risk of off site impacts from dust is considered low.

11. Waste Limits

Cleanaway has provided the updated waste volumes for 2024 below:

B6. The Applicant shall not receive more than:	2024
(a) 970,000 tonnes of general solid waste (putrescible and non- putrescible) and asbestos waste per calendar year on site for landfill disposal;	845,573.84 tonnes

(b). 10,000 tonnes of recyclable general solid waste (non-putrescible) and batteries per calendar year on site at the Resource Recovery Centre and waste collection point;	409.09 tonnes
(c) 100,000 tonnes of garden and wood waste and 2,000 tonnes of manure per calendar year at the GO Facility;	41,884.51 tonnes Garden and wood waste 0 tonnes Manure

12. Improvement Programs

Several improvements to the environmental management of the LHRRP have been implemented during this reporting period. These improvements were implemented as a result of findings by Cleanaway's ongoing inspections and monitoring as well as findings identified by regulatory inspections.

Examples of these improvements include:

- Installation of final cap in Area C.
- Additional gas collection wells in Area C.
- Installation of additional flares
- Mill Creek diversion and associated works completed
- Excavation of the new garden Organics Facility on going
- North wall liner stage 1 and 2 completed
- Upgrading of the Leachate Treatment Plant SBR2 completed

Improvements that will be implemented during the next reporting period include:

- More final cap will be installed in Area C
- Completion of the gas collection system in Area C and F
- Excavation at the new Garden Organics (GO) Facility continues
- Continue the liner installation at the North wall.
- Upgrading of the Stormwater Treatment Plant.
- Upgrading of the Leachate Treatment Plant SBR 1 continues

13. Conclusions

Based on the results of environmental monitoring undertaken at LHRRP, the overall environmental performance in this reporting period can be demonstrated to be well managed. This is supported by the fact that there were seven less complaints recorded in this reporting period compared to 2024.

Landfill gas management continued to perform effectively, with all subsurface gas results remaining below EPA limits and surface exceedances promptly investigated and remediated. Odour impacts were primarily associated with seasonal weather conditions such as temperature inversions, with no systemic failures identified during complaint investigations. Reflecting the year's exceptionally wet conditions, suspended solids exceedances occurred but were generally within licence allowances for high rainfall events and effectively managed. Groundwater quality remained generally consistent with long-term trends, noise monitoring confirmed full compliance with operational limits, and dust levels were largely acceptable aside from localised elevations linked to traffic and dry weather. There were a number of projects completed in 2025, such as additional cap, additional gas wells and flares, which will further enhance landfill gas and odour control on site.

APPENDIX A – DEVELOPMENT PLANS

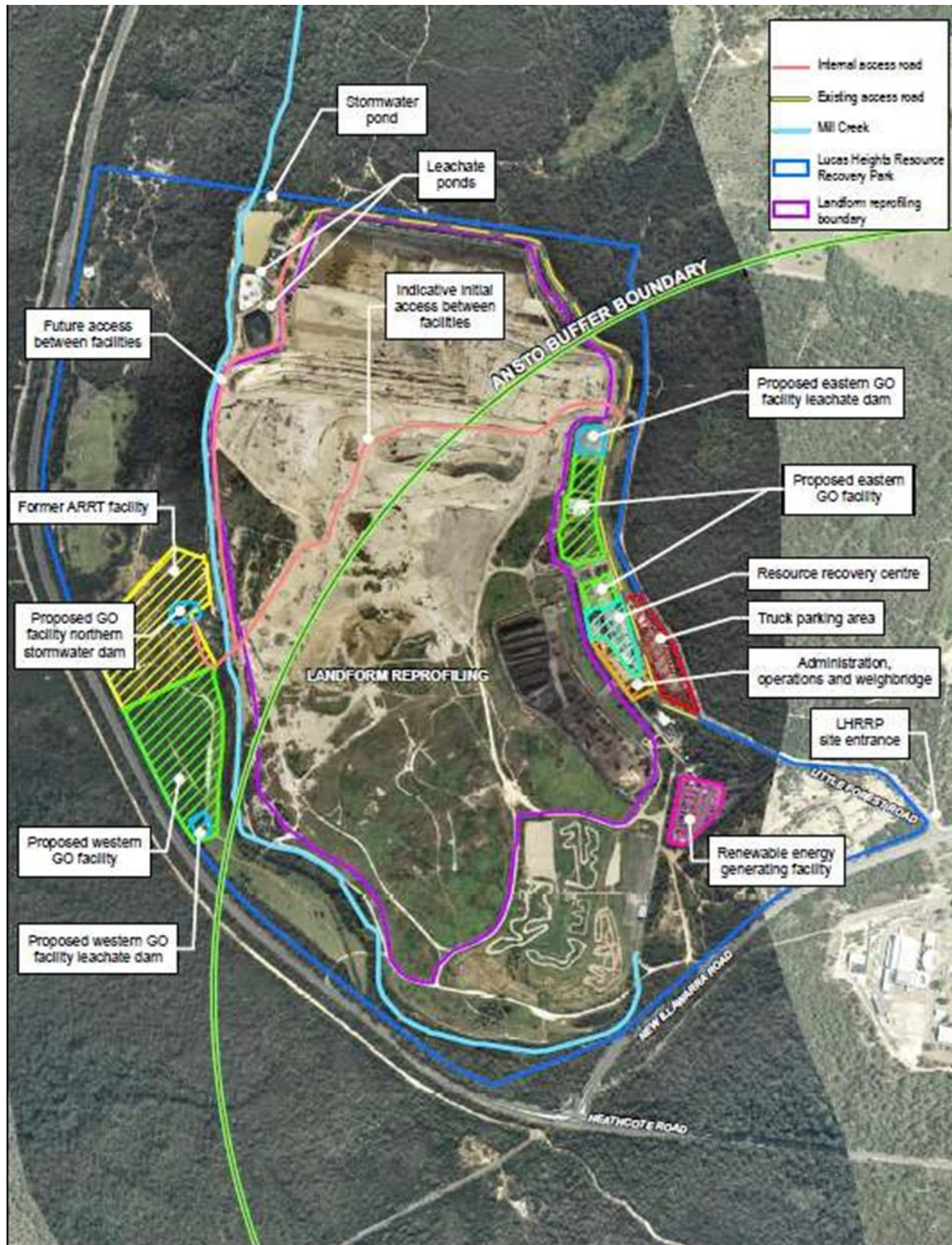


Figure 28. Site Map of existing infrastructure following MOD 2.

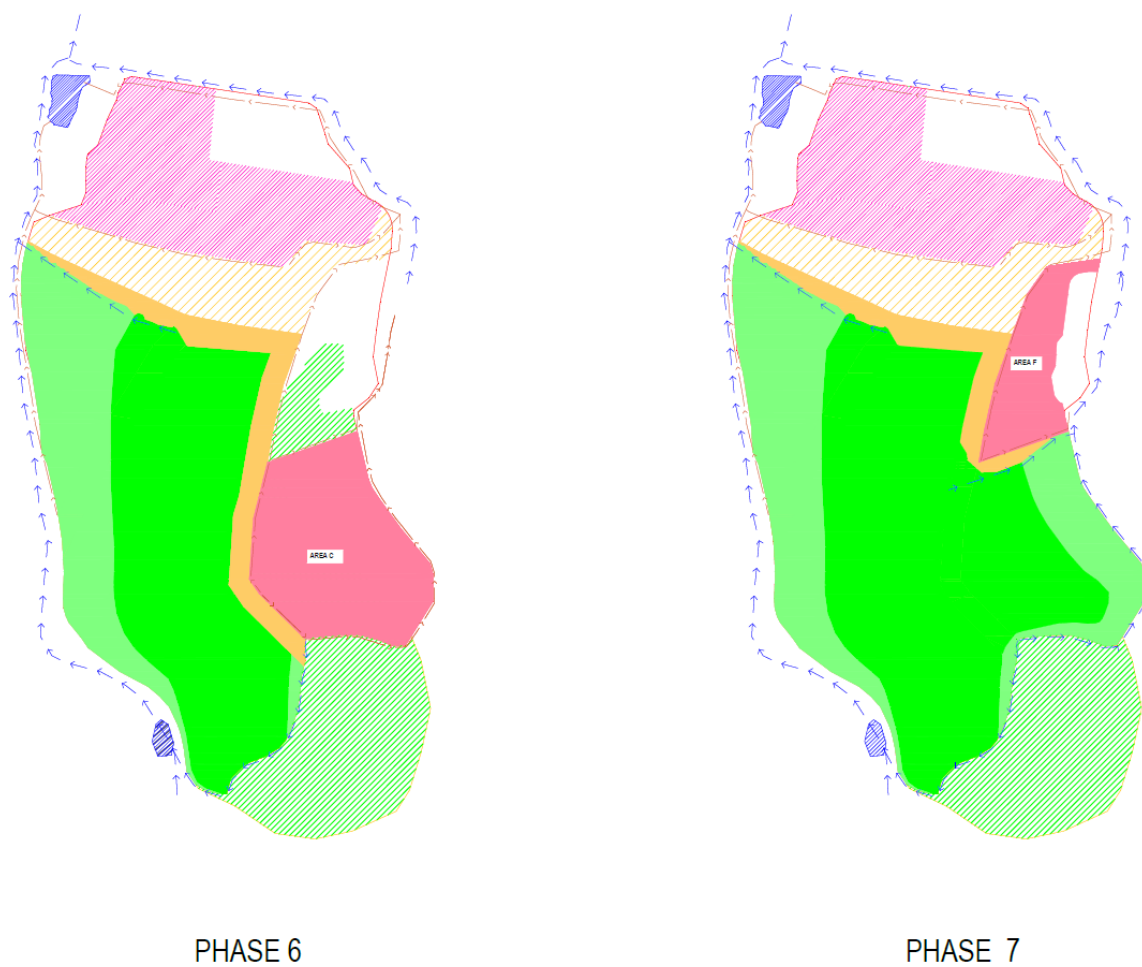


Figure 29. Re-profiling of existing landfill (shows landfilling on top of already capped areas)

APPENDIX B – Management and mitigation measures

Table 9. Construction mitigation sub-plan for the landfill and GO facility as part of the CEMP.

Potential issue	Mitigation and management measures
Waste management	– Prepare a waste management sub-plan for the landfill and GO facility as part of the CEMP
Traffic, transport and access	– Undertake a Community information and awareness program during construction – Prepare a Traffic Management Plan for the construction phase of the proposal including the following key measures: • Consultation with TfNSW and SSC to ensure that general signposting of construction access roads are appropriate and provide adequate warning of heavy vehicle and construction activity • Distribute construction activity warning notices to advise local road users of scheduled construction activities • Provide advance notice of road/lane closures and advice on alternative routes (if required) • Whenever practical, promote the use internal and haulage access roads rather than public roads by construction vehicles • Manage the transportation of construction materials to maximise vehicle loads and minimise vehicle movements in consultation with TfNSW and SSC and the NSW Police Service
Noise	– Select plant and equipment to minimise noise emissions where possible whilst maintaining efficiency of function. Fit residential grade silencers and maintain all noise control equipment in good order – Restrict noisy activities to daylight hours – Use reverse quackers with a low decibel output rather than beepers for excavators and wheel loaders
Visual	– Implement 'early works' rehabilitation and maintenance measures, including substantial woodland and understory planting to screen the LHRRP from ANSTO land and adjacent roads including along Heathcote Road and around the boundary of the existing PCYC area – Apply hydromulch on exposed batter areas
Dust	– Prepare a dust management plan sub-plan as part of the CEMP
Soils and surface water	– Develop erosion and sediment control plan or soil and water management plan for the GO facility – Continue surface water monitoring as prescribed in EPL 5065 – Develop a soil and water management plan for the GO facility and incorporate into the construction contractor's environmental management plans – Continue use of existing measures in place to minimise demand for potable water including reuse of water captures in site basins for dust suppression – Construct the GO facility so that there is no increase in potable water demand in addition to current demands – Excavated slopes of the Western GO facility would not exceed those recommended by Douglas Partners (2:1 and 1:1) – Plant equipment used at the GO facility would be rubber tired if possible. Tracked equipment would be avoided.
Groundwater	– Develop appropriate site management practices and emergency response procedures to be detailed in a construction and environmental management plan (CEMP) for the GO facility to minimise water quality impacts associated with construction activities. This will include

Potential issue	Mitigation and management measures
	procedures, and relevant guidance to prevent, or respond to, leaks and spills from site activities and waste/chemical storage. - Seepage from the walls of the excavation for the Western GO facility would be managed using a perimeter drainage system. Capacity would be made in the design to separate groundwater seepage, if seepage became adversely impacted over time from landfill leachate, based on monitoring. - Undertake groundwater monitoring to verify that the GO facility is not adversely impacting the surrounding environment. This monitoring would be in accordance with Section 5.4 of <i>LHRRP Modification – Organics Facility: Groundwater Assessment</i> (GHD, 2023). - Adopt the trigger action response plan (TARP) described in Table 5.2 of <i>LHRRP Modification – Organics Facility: Groundwater Assessment</i> (GHD, 2023) to prevent and mitigate potential impacts to the downgradient receptor (Mill Creek) as a result of GO facility construction.
Contamination	- After development approval and prior to the Western GO facility development, conduct targeted soil sampling and subsequent lead analysis on the area which is adjacent to, and proposed to extend onto SICTA - As recommended in the groundwater assessment, install new monitoring wells around the Western GO facility prior to construction - Monitor these wells during construction of the Western GO facility to provide early indication of any additional impacts from construction or operation on the proposal site - Undertake a general site inspection in conjunction with the soil sampling and well installation to identify any visual or olfactory signs of potential contamination on the proposal site, primarily in the form of stockpiled materials or previously unknown land use activities. - If unexpected material (including waste materials or evidence of filling) is encountered during construction, seek advice from an appropriately qualified Environmental Consultant in regard to the management of this material - Develop and detail in the CEMP appropriate site management practices and emergency response procedures prior to construction to minimise water quality impacts associated with GO facility construction - If required by the planning authorities, prepare a Statutory Site Audit report to approve any remediation works required to make the land suitable for construction of the Western GO facility. - Where fractured zones and high permeability joints are encountered during excavation for Western GO facility, an additional hydraulic barrier or grouting may be required to reduce permeability and seepage pending an inspection and recommendation from a suitably qualified geotechnical engineer or hydrogeologist. - The leachate pond for the Western GO facility will have a leachate barrier system to minimise the potential for groundwater contamination. A detailed design will be prepared for the lining system and is expected to include, at a minimum: - HDPE geomembrane liner, acting as a low permeability layer in the pond. The geomembrane liner material would be of a similar standard to the geomembrane materials used for the lining of landfill cells. - A geonet geotextile drainage composite, acting as a drainage layer beneath the geomembrane liner. Any flow within the composite material will flow to a sump, where it can be removed and tested if required. This system would prevent the build-up of any water beneath the liner, reducing any driving head for leachate to enter the groundwater and preventing uplift of the liner. - Any existing unsuitable material within the works footprint of the Eastern GO facility will be removed and suitably disposed of, including the Biocell material and soils from within the existing leachate pond area - EMN material will be used for backfilling and earthworks - The Eastern GO facility leachate pond will have a leachate barrier system to minimise the potential for groundwater contamination. A detailed design will be prepared for the lining system and is expected to include, at a minimum: - HDPE geomembrane liner, acting as a low permeability layer in the pond. The geomembrane liner material would be of a similar standard to the geomembrane materials used for the lining of landfill cells. 800 mm compacted clay layer, with saturated hydraulic conductivity of less than 1×10^{-9} m/s.
Hazards and risk	Undertake a detailed safety study to confirm the safety exclusion zone from SICTA operations and identify any hazards associated with constructing and operating a facility in the proposed location

Potential issue	Mitigation and management measures
Fire prevention and management	- Propose suitable mitigation measures to be incorporated in building design and construction - Apply the relevant fire safety requirements of the Building Code of Australia to any buildings, including provision of smoke detectors, fire extinguishers, fire blankets, fire hose reels and sprinklers where applicable - Design the buildings on site to meet the requirements of the Planning for Bushfire Protection guidelines to protect staff and minimise the potential for building damage, including provision of a 10 m APZ. - Identify and incorporate appropriate construction standards for buildings and refuge areas during the detailed design phase. - Ensure that bushfire management procedures are included in the CEMP. This would include: - Requirements for emergency access and egress including nomination of an alternative access route. - Formal preparedness procedures for staff and contractors to maintain awareness of and respond to escalating forecast fire danger - Formal pre-rehearsed procedures for staff and contractors to respond to a formal bushfire warning being issued by emergency services, including identification of escape routes and refuge areas - Ensure that the GO facility design development makes provision for safe, efficient and effective access in accordance with Fire safety guideline - Access for fire brigade vehicles and firefighters (Fire and Rescue NSW, 2019) - Develop the general design of the GO facility with consideration to the FRNSW guideline – Fire safety in waste facilities (Fire and Rescue NSW, 2020)
Biodiversity	General - Ensure that all workers are provided with an environmental induction prior to starting work on site. This would include information on the ecological values of the proposal site, protection measures to be implemented to protect biodiversity and penalties for breaches - Prepare a flora and fauna management sub-plan as part of the CEMP incorporating recommendations below, and expanding where necessary - Put in place measures to suppress dust during clearing and construction Flora species - Collect seeds of the <i>Acacia bynoeana</i> individual in the appropriate season (September to January) prior to vegetation clearing occurring. Plant seeds in the nursery and use any individuals grown for onsite plantings. Propagate <i>Acacia</i> species from scarified seed or using boiling water treatment (Wrigley and Fagg 2007) - Carefully remove the <i>Acacia bynoeana</i> individual and transfer it to the on-site nursery, along with soil adjacent to the individual which may include a long-term soil seed bank (Benson and Macdougall 1996). Replant it at the proposed offset site or another suitable location - Collect seeds and propagules of <i>Allocasuarina diminuta</i> subsp. <i>mimica</i> in March prior to vegetation clearing occurring. Plant seeds in the nursery and use any individuals grown for on site plantings. - Collect ramets of <i>Allocasuarina diminuta</i> subsp. <i>mimica</i> and associated soil prior to vegetation clearing and transfer them to the on-site nursery for propagation and replanting. Undertake replanting in areas that are not likely to be impacted by future development, including the proposed offset site. Plant ramets along the realigned Mill Creek where the ironstone soil is present. Do not plant <i>Allocasuarina littoralis</i> near these plants as this species can shade out <i>Allocasuarina diminuta</i> subsp. <i>mimica</i> and mycorrhizal associations may be different. Carry out any removal and replanting with input from the SSC bushcare staff. - Prepare a management plan for the collection of seed and translocation of plants as part of the CEMP for the proposal and include monitoring and assessment of the success of the program Vegetation clearing - Limit disturbance of vegetation to the minimum necessary to construct the proposal - Ensure that vehicles are appropriately washed prior to work on site to prevent the potential spread of Cinnamon Fungus (<i>Phytophthora cinnamomi</i>) and Myrtle Rust (<i>Pucciniales fungi</i>) in accordance with the national best practice guidelines for <i>Phytophthora</i> (DEH 2006) and the Myrtle Rust factsheet (DPI 2011c) for hygiene control - Where the proposal footprint adjoins native vegetation mark the limits of clearing and install fencing around the construction footprint area prior to the commencement of construction activities to avoid unnecessary vegetation and habitat removal

Potential issue	Mitigation and management measures
	- Place stockpiles of fill or vegetation within existing cleared areas (and not within areas of adjoining native vegetation) - Install sediment fences to prevent transfer of sediments into adjacent vegetation Weeds - Actively manage weeds during the construction phase of the proposal, including managing and disposing of weeds that were recorded within the proposal footprint. Manage any noxious weeds in accordance with the NW Act - Clean vehicles and other equipment to be used on site to minimise seeds and plant material entering the proposal site and prevent the introduction of further exotic plant species or disease - Incorporate control measures in the design of the proposal to limit the spread of weed propagules downstream of study area. Use sediment control devices, such as silt fences, to assist in reducing the potential for spreading weeds Fauna habitat - Implement protocols to prevent introduction or spread of chytrid fungus following Office of Environment and Heritage Hygiene protocol for the control of disease in frogs (DECCW 2008) - Ensure that a trained ecologist is present during the clearing of native vegetation or removal of potential fauna habitat to avoid impacts on resident fauna and to salvage habitat resources as far as is practicable - When undertaking clearing surveys: - Stage the vegetation clearing, commencing in the south of the GO facility and progressing northwards to increase the opportunity for fauna to vacate the proposal site and move into areas of 'secure' habitat to evade injury - Mark any hollow-bearing trees to be felled prior to clearing of vegetation. Remove hollow bearing trees in accordance with a hollow-bearing tree management protocol which includes the presence of a qualified ecologist or wildlife expert experienced in the rescue of fauna - Ensure that habitat features (fallen logs and tree hollows) removed from site are salvaged and relocated within adjacent areas of vegetation - Undertake inspections of native vegetation for resident fauna and/or nests or other signs of fauna occupancy - Defer vegetation removal and associated construction activity in areas occupied by more mobile threatened fauna until the fauna has vacated the proposal footprint - Ensure that an ecologist is present during works along Mill Creek to rescue and relocate any frogs to other locations along Mill Creek. Undertake any handling of frogs with respect to the Office of Environment and Heritage Hygiene protocol for the control of disease in frogs (DECCW 2008) Water quality and aquatic habitats - Prepare erosion and sediment control plans in accordance with Volume 2b of Managing Urban Stormwater: Soils and Construction (DECC 2008). Establish erosion and sediment control plans prior to the commencement of construction and update and managed them throughout as relevant to the activities during the construction phase - Regularly inspect erosion and sediment control measures particularly after rainfall events, to ensure their ongoing functionality. - Reinstate stabilised surfaces as quickly as practicable after construction - Apply water to exposed surfaces that are causing dust generation, which may include unpaved roads, stockpiles, hardstand areas and other exposed surfaces (for example recently graded areas) - Ensure that vehicles follow appropriate speeds to limit dust generation - Store all stockpiled material in bunded areas and keep them away from waterways to avoid sediment entering the waterways - Make spill kits available to construction vehicles and put in place a management protocol for accidental spills - Eradicate Plague Minnow (if present) prior to decommissioning to ensure that it is not released into local waterways as a result of draining of dams. Use humane methods and obtain an appropriate licence from NSW Primary Industries (Animal Welfare branch and Fishing and Aquaculture branch) - Salvage large woody debris removed from the realigned creek and place it in the new alignment to maintain habitat values

Potential issue	Mitigation and management measures
	Construct the new section of the creek to mimic a natural ecosystem and revegetate with locally endemic species. Consideration should be given to using propagated <i>Allocasuarina diminuta</i> subsp. <i>mimica</i>
Landuse	Submit a planning proposal to enable proposed activities under the SLEP.
Heritage	- Develop and included in the CEMP an unexpected finds procedure. This would outline the procedures to follow if unexpected Aboriginal objects or non-Aboriginal relics were uncovered during construction - Submit Site Impact Recording Forms for the previously impacts sites, AHMS 52-2-1108, 52-2-1029, 52-2-1030 and 52-2-1031 to OEH
Riparian corridors	Provide a minimum of 875 m2 of riparian offsets for the permitted activities
Socio-economic	- Implement measures to reduce the potential for amenity impacts during construction, as identified in the relevant chapters of the EIS - Maintain ongoing engagement with the community during construction. Develop a stakeholder engagement plan would be developed for the proposal construction phase. This would include how information would be disseminated, communication channels including for feedback on the proposal and protocols for responses to feedback or enquiries

Table 2 Operational mitigation and management measures

Potential issue	Mitigation and management measures
Waste management	- Include waste handling procedures, waste processing procedures, quality control procedures and protocols (including sampling and testing) and finished product storage and handling requirements in OEMPs - Carry out sampling and testing in accordance with the requirements of relevant resource recovery orders - Apply for specific resource recovery orders if required
Traffic, transport and access	- Perform a safety review in both 2020 and 2025 on the safety of the intersection of New Illawarra Road and Little Forest Road - Review signposted and non-signposted speed restrictions along the road network and where necessary, provide additional signposting of speed limitations - Consult with schools and school bus services to determine and mitigate if any school bus service use roads within the study area - Install appropriate traffic control and warning signs for areas identified to have existing potential safety risks - Consult with the NSW Police Service to mitigate impacts of heavy (multi-dimensional) vehicles on the roads - Project induction training for truck and vehicle operators - Manage queuing and prevent long queues at site entrance - Actively monitor area and have in place traffic control - Delay trucks when required - Manage dispatch timing for vehicles from Cleanaway controlled facilities - Require Cleanaway owned waste delivery vehicles to travel on arterial or sub-arterial roads rather than local roads (with the exception of Little Forest Road). - Discourage customer transfer trailers and B doubles from travelling on local roads
Noise	LHRRP - Limit waste receipt hours - Select plant and equipment to minimise noise emissions where possible whilst maintaining efficiency of function. Fit residential grade silencers and maintain all noise control equipment in good order

Potential issue	Mitigation and management measures
	– Maintain all machinery and equipment in proper working order in accordance with manufacturer's requirements – Do not operate heavy machinery outside site operating hours – Include noise component in site inductions GO facility – Select plant and equipment to minimise noise emissions where possible whilst maintaining efficiency of function. Fit residential grade silencers and maintain all noise control equipment in good order – Restrict operations to designated areas – Restrict noisy activities to daylight hours – Use reverse quackers with a low decibel output rather than beepers for excavators and wheel loaders – Utilise favourable routes for accessing and exiting the facility to ensure avoidance of residential areas where possible
Visual	– Grass the final capping layer as the reprofiling works occur to further minimise visual impacts – Ensure filling does not exceed proposed final landform heights – Maintain fences and other site infrastructure – Maintain Little Forest Road – Provide screen and screen maintenance – Progressively rehabilitation and revegetation.
Odour	Landfill reprofiling – Strip back the areas of the existing landfill (south of existing active landfill area) in segments with approximately 1 ha of cover stripped in advance of the active tipping area. Of this area ensure that approximately 2,500 m² would be less than one day old to minimise the emission of odours from the stripped surface. • Strip back the existing areas which are capped and revegetated and do not expose previously landfilled waste • Strip back the existing areas of intermediate cover (south of the existing active landfilling area) and do not expose previously landfilled waste – Each morning further strip back the equivalent to a day's waste disposal operations (to minimise the potential for the perching of leachate) and place waste directly over this area. Ensure that there is no exposed waste during the night when the potential for odour issues off site is higher LHRRP – Cover odorous wastes as soon as possible after delivery in accordance with the requirements of the site's environment protection licence – Minimise the size of the active landfill face, taking into account the practicalities, safety, access, traffic management, etc. – Inspect and monitor the capping layer regularly – Train staff (internal and contractors) on odour management strategy and all relevant procedures – Install and operate a landfill gas collection system progressively to minimise odour as a result of landfill gas seepage GO facility – Conduct random monitoring and inspections of incoming vehicles to determine waste composition – Order manures in accordance with production schedules and blend with compost only in favourable weather conditions at any given time – Train staff (internal and contractors) on odour management strategy and all relevant procedures – Only allow up to 40,000 tonnes of composting material to be stored on site (includes receipt, shredding, active composting and maturation stage) at any one time at the western GO – Measure oxygen and moisture content of compost (active phases) and control with aeration and moisture addition

Potential issue	Mitigation and management measures
Dust	LHRRP - Do not undertake dust generating activities during adverse weather conditions - Cease operations if unsafe (for example, during strong winds) - Monitor monthly dust deposition at six boundary locations on site - Limit vehicles to specified routes around the site and ensure speed limits are adhered to - Use dust suppression techniques such as watering to maintain moist conditions on exposed areas and unsealed roadways GO facility - Cover or enclose vehicles during transport around the site - Spray windrows, final compost storage areas and loading areas, particularly prior to transportation and turning - Cease operations if unsafe (for example, during strong winds) - Operate water cart(s) on trafficable areas as required
Soils and surface water	- Continue to use of existing measures in place to minimise demand for potable water including reuse of water captures in site basins for dust suppression - Where possible, minimise exposed areas over which sediment would be generated through maintenance of both natural and artificial ground cover such as grass or erosion control cover products - Discharge disturbed area drainage lines into a sediment basin designed in accordance with 'the Blue Book' Volume 1 (Landcom, 2005) and Volume 2b (DECC, 2008) - Divert clean upstream runoff around the actively worked areas of the proposal site to avoid mixing clean stormwater with runoff from disturbed areas - Manage vehicle movements to minimise generation and transport of sediment - Appropriately manage material stockpiles including locating them as far as possible from drainage lines - Continue general flood management practices including keeping drainage lines free of waste and debris and monitoring drainage lines during periods of heavy rainfall - Continue monitoring surface water quality in accordance with licences - Undertake further investigation of the habitat condition and macroinvertebrate populations to confirm the preliminary findings. It is recommended that this work be undertaken every three years commencing soon after reprofiling works commence in Area E. - Progressively revegetate completed reprofiling areas - Design and operate sediment dams and sediment traps to promote sedimentation - Maintain erosion and sediment control measures until the site is stabilised - Maintain drains to prevent weed build up - The water balance model prepared for the Modification assessment would be calibrated (one off) after 1 year of continuous operation, based on collection of actual site information. If the revised predictions of the water balance no longer satisfy the design criteria, site operations would be adjusted accordingly - Undertake regular water quality monitoring in accordance with the GO facility OEMP, including any requirements in the site's EPL or Consent Conditions including quarterly monitoring of the northern stormwater dam and the analytes identified in Section 4.4 of LHRRP Modification – Organics Facility: Water Assessment (GHD, 2023) - Adopt the trigger action response plan (TARP) described in Section 4.4 of LHRRP Modification – Organics Facility: Water Assessment (GHD, 2023) - Calibrate the water balance model prepared for the LHRRP Modification – Organics Facility: Water Assessment (GHD, 2023) assessment after one year of operation of the GO facility and then every three years if the yearly recalibration shows consistency with the original modelling, based on collection of actual site information. If the revised predictions of the water balance no longer satisfy the design criteria, adjust the site operations accordingly.
Groundwater	- Develop a monitoring system to assess the landfill collection system during re-profiling. This may include one or a combination of the following: - Ongoing assessment of the leachate generation volumes within the Stage 1 to 4 landfill areas during re-profiling

Potential issue	Mitigation and management measures
	• Ongoing assessment of the operation efficiency of the basal drainage system in Stage 1 to 4 of the landfill. This may represent some practical difficulties in given the drainage system is buried beneath waste • Characterisation and monitoring of leachate levels at the base of the landfill during re-profiling works to assess the potential for changes to leachate levels • Characterisation of changes in the hydraulic properties of the Stage 1 to 4 landfill areas during the re-profiling works • An improved collection system if water balance discrepancies are interpreted and/or overall changes in leachate levels and yields are observed and taking into account groundwater quality data. – Continue ongoing leachate management until such time as the leachate volume monitoring and or leachate and water quality monitoring suggest that risks are no longer significant – Confirm trigger levels for groundwater quality for monitoring wells around the LHRRP on which further investigations would be undertaken. – Include operational procedures and practices designed to minimise the production and spillage of impacted water and/or fluids used in operational activities in the OEMP's – Continue current groundwater monitoring activities (refer Table 13.3 for details). If impacts occur during operation or post closure carry out further investigation and implement remedial measures which may include: • Additional investigations to isolate the source of impact and characterise the significance of the impact relative to key target criteria for the protection of surrounding sensitive systems. • Implementation of additional control measures to prevent ongoing impact. This may include: – Installation of additional monitoring wells to assess the emergence of significant impacts that may not be considered presently significant – Installation of additional wells to capture and treat impacted groundwater. This may include treating the water separately or incorporating the system into the existing leachate management system – It would be possible to use the Stage 5 groundwater drainage system located beneath the liner to intercept any impacted water – Undertake groundwater monitoring to verify that the GO facility is not adversely impacting the surrounding environment. This monitoring would be in accordance with Section 5.4 of <i>LHRRP Modification – Organics Facility: Groundwater Assessment</i> (GHD, 2023). – Adopt the trigger action response plan (TARP) described in Table 5.2 of <i>LHRRP Modification – Organics Facility: Groundwater Assessment</i> (GHD, 2023) to prevent and mitigate potential impacts to the downgradient receptor (Mill Creek) as a result of GO facility operation.
Leachate	– Continue ongoing monitoring of leachate volumes extracted from LHRRP landfill and other sources – Periodically review the leachate water balance model – Monitor groundwater and surface water impacts, as required by the proposal site EPL – Ongoing monitoring of surface water and leachate as required by EPL – Review of leachate levels daily – Inspect the site and review pumping/discharge records daily – Update standard operating procedures as site develops – Maintain relevant emergency procedures – Take action as leachate volumes and levels increase – Document corrective and preventative actions taken – Undertake regular inspections and repairs of infrastructure including removal of sludge from dams and maintenance of pumps and aerators – Compact and cover waste with daily and intermediate cover material to minimise infiltration of stormwater and further leachate generation – Remove leachate from a number of gas extraction wells using air lift pumps, flowing by gravity to the leachate collection dam

Potential issue	Mitigation and management measures
	– Maintain the leachate collection dam (holding capacity of 10 ML) to allow for the collection of leachate from the western ring main, central ring main, eastern ring main, Area 5-1 and Areas 5-2/5-3 – Maintain further emergency leachate containment dam (containment capacity of 9.2 ML) to contain leachate in extended wet weather events – Actively manage leachate levels in the containment dams so that they have sufficient capacity to cope with leachate arising from wet weather events
Hazards and risk	Dangerous Goods – Transport Dangerous Goods to site and store in accordance with the Australian Dangerous Goods Code – Implement appropriate safe work procedures for the safe handling of the Dangerous Goods, including spill prevention and clean up requirements – Store and use any smaller quantities of Dangerous Goods (aerosols, paints, cleaners etc.) that may be used on site in accordance with the Australian Dangerous Goods Code, including appropriate labelling, separation where necessary and disposal – Implement all safeguards identified in the hazard identification process through the development and implementation of a comprehensive safety management system for the operation of the proposal or via an update of the existing safety management procedures for the existing site, taking into account any new requirements specific to the proposal Emergency preparedness – Regularly review and update the ERP
Fire prevention and management	– Manage the areas adjoining Heathcote Road adjacent to buildings as a specific APZ. – Implement bushfire management procedures as outlined in the LHRRP OEMP, including: • Requirements for emergency access and egress including nomination of an alternative access route. • Establishing an alternative access and egress route to the north-east through the existing cleared and developed areas • Implementing formal preparedness procedures for staff and contractors to maintain awareness of and respond to escalating forecast fire danger – Regularly rehearse procedures for staff and contractors to respond to respond to a formal bushfire warning being issued by emergency services, including identification of escape routes and refuge areas – Inspect and maintained all fire protection systems in accordance with AS1851-2012 Routine Service of Fire Protection Systems and Equipment. – Maintain waste stockpiles (including any garden organics or paper based waste material) in a tidy manner prior to processing and make efforts to limit exposure to ignition sources – Maintain waste storage areas in accordance with NSW Fire and Rescue Fire Safety Guideline Fire safety in waste facilities – Undertake hot works in accordance with Cleanaway's hot work procedure and permit system as per existing operations procedures to minimise the potential for flammable materials to be ignited – Regularly maintain all mechanical components associated with the raw material delivery, shredding and mixing processes would also be undertaken to prevent overheating – Manage fires in accordance with emergency response procedures. If the fire cannot be extinguished immediately, contact local emergency services to provide assistance – Develop the following for the GO facility prior to commencement of operations: • an Emergency Response Plan (ERP) in accordance with HIPAP No. 1 (NSW Government, 2011a) and HIPAP No. 2 (NSW Government, 2011b) • an Emergency Services Information Package (ESIP) in accordance with Fire safety guideline – Emergency services information package and tactical fire plans (Fire and Rescue NSW, 2019) – Develop the ERP and ESIP for the GO facility with consideration to the FRNSW guideline – Fire safety in waste facilities (Fire and Rescue NSW, 2020)
Biodiversity	Vegetation and weeds

Potential issue	Mitigation and management measures
	– Manage noxious weeds on an ongoing basis according to legislative requirements. – Continue suppression of dust within the landfill and GO facility – Manage water quality Feral animals – Provide ongoing control of feral animals – Minimise sources of food and habitat for pest species Post closure – vegetation and weeds – Sow exposed soil with native seed immediately to prevent colonisation by weeds. – Use locally sourced native species – Incorporate propagated individuals of <i>Allocasuarina diminuta</i> subsp. <i>mimica</i> from the site into the landscaping plan. – Manage noxious weeds according to legislative requirements – Monitor and manage revegetation areas, including planted <i>Allocasuarina diminuta</i> subsp. <i>mimica</i>, as per the EMP
Greenhouse gas	– Investigate opportunities to increase the methane capture rate on an ongoing basis, as the landfill gas system is progressively modified to accommodate the new final landfill profile during the entire operational life of the proposal. – Continue to work with the landfill gas management contractor to refine the gas extraction and oxidation system in identified major emissions contributing areas. – Consider implementation of greenhouse gas mitigation strategies such as implementation of energy efficient practices, installation of solar panels and use of biofuels – Install gas extraction wells in completed areas to control gas migration – Progressively install gas extraction wells in operational areas as the landfill develops – Prepare and regularly review the emergency plan and emergency procedures – Implement a program for scheduled monitoring of landfill gas (surface and subsurface)
Litter and illegal dumping	– Support Regional Illegal Dumping (RID) squads – Engage with stakeholders regarding illegal dumping – Undertake internal audits – Establish a Litter and Illegal Dumping fund

APPENDIX C – Surface Gas Monitoring Data

Table 10. Surface gas monitoring data (ppm).

Date	Average	Min	Max
3/03/11	130.0	0.0	4,225.0
21/04/11	41.0	0.0	2,240.0
4/08/11	7.3	0.0	662.0
8/11/11	32.7	0.0	589.0
6/03/12	17.2	0.0	333.0
26/07/12	29.3	0.0	359.0
13/11/12	18.1	0.0	130.0
20/12/12	18.6	0.0	370.0
20/03/13	18.9	0.0	177.0
18/06/13	24.4	2.0	158.0
16/09/13	23.9	1.8	173.8
8/01/14	14.7	0.1	90.1
27/03/14	19.4	0.2	98.1
3/07/14	17.7	0.2	79.6
1/10/14	19.1	1.1	98.2
17/12/14	18.1	1.0	84.2
20/03/15	17.9	1.1	220.0
11/06/15	17.1	1.4	431.2
2/11/15	10.9	1.0	225.8
11/03/16	19.3	1.6	231
24/06/16	20.4	1.6	221
7/09/16	27.4	2.3	264
21/12/16	31.6	2.1	294
21/04/17	30.4	2.1	251
16/08/17	33.5	3.2	261
12/09/17	31.1	5	454.7
20/11/17	8.38	1.4	81.4
19/01/18	22.42	1.5	294
30/04/18	16.7	1.3	241.3
5/07/18	8.38	1.4	81.4
6/12/18	9.37	0.4	257.5
18/04/19	11.9	1.6	446.4
1/08/19	11.4	1.5	377.7
31/10/19	129.2	1.6	135590.7
15/11/19	145.8	1.9	9409.9
16/01/20	10.1	0.4	181.4
20/04/20	12.9	12.9	401.8
14/07/20	25.4	1.5	491.4
21/10/20	11.9	1.6	421
22/01/21	11.4	1.5	309.2
2/04/2021	11.81	1.6	413.2
27/07/2021	11.47	1.5	298.3

21/10/2021	16	1.6	497.7
10/01/2022	11.78	1.6	362.1
18/04/2022	11.86	1.6	421
4/07/2022	12.86	1.9	301.2
29/11/2022	10.11	1.1	603
29/3/2023	20.1	1.2	13000
31/5/2023	17.6	1	8400
15/9/2023	25.7	1	113000
22/12/2023	43.6	2.2	489
28/03/2024	22.1	2.2	4300
1/07/2024	21.59	2	3000
8/10/2024	20.02	2.1	4063
12/12/2024	9.81	1.8	700

APPENDIX D – Groundwater Ammonia Monitoring Data

Table 11. Groundwater Ammonia Monitoring Data.

	Mar-18	Jun-18	Sep-18	Dec-18	Mar-19	Jun-19	Sep-19	Dec-19	Mar-20	Jul-20	Sep-20	Dec-20	Mar-21	Jun-21	Sep-21	Dec-21	Mar-22	Jun-22	Sep-22	Dec-22	Mar-23	Jul-23	Sep-23	Dec-23	Mar-23	Jul-24	Sep-24	Dec-24
MB008	<0.005	0.016	<0.005	<0.005	<0.005	<0.005	0.097	<0.050	0.02	<0.005	<0.005	0.007	0.03	<0.005	0.01	0.017	0.005	0.021	0.024	0.17	0.096	0.058	0.019	<0.005	0.006	0.028	0.014	0.4
MB023	0.12	0.053	0.14	0.09	0.18	0.066	0.088	0.048	0.098	0.066	0.078	0.051	0.074	<0.005	0.01	0.017	0.43	0.094	0.44	0.12	0.095	0.14	0.093	0.069	0.09	0.1	0.1	0.062
MB032	0.066	0.12	0.085	0.024	0.034	0.027	0.008	0.011	0.034	0.039	0.02	0.022	0.072	0.073	0.016	0.094	0.016	0.035	0.071	0.058	0.011	0.038	0.075	0.017	0.16	0.015	0.006	0.18
MB033	0.022	0.087	0.051	0.011	<0.01	0.005	<0.005	<0.005	0.083	<0.005	0.014	0.046	0.024	0.073	0.016	0.094	<0.005	0.04	0.054	0.13	0.067	0.062	0.047	0.006	0.009	<0.005	<0.005	*
MB034	0.008	0.047	0.012	<0.005	0.007	<0.005	<0.005	<0.050	0.025	<0.005	0.014	0.046	0.015	<0.005	0.011	0.88	0.007	0.005	0.06	0.065	0.02	0.077	0.052	0.01	0.006	<0.005	0.007	0.84
MB035	3.5	0.46	0.86	0.72	0.39	0.13	0.048	0.069	0.18	0.039	0.039	0.048	0.024	<0.005	0.011	0.88	0.028	0.076	0.037	0.048	0.049	0.12	0.075	0.031	0.01	<0.005	0.084	0.25
MB038	0.017	0.025	0.026	0.009	0.013	0.011	<0.005	<0.005	<0.005	<0.005	<0.005	0.15	0.45	0.013	<0.005	<0.005	0.037	0.022	0.06	0.022	0.029	0.14	0.097	<0.005	<0.005	0.021	<0.005	0.18
MB040	0.016	0.02	0.039	0.1	0.01	0.012	0.048	<0.005	0.016	0.006	0.012	0.15	0.005	0.013	<0.005	<0.005	0.04	0.41	0.14	0.042	0.12	0.097	0.056	0.013	0.008	0.01	<0.005	0.14
MB041															0.044		0.12	0.17	0.12	0.19	0.15	0.26	nt	nt	nt	0.034	0.032	nt
MB044	<0.005	0.019	0.032	<0.005	0.006	0.006	0.3	<0.005	0.012	<0.005	0.006	<0.005	0.016	0.013	<0.005	<0.005	<0.005	0.022	0.063	0.1	0.39	0.021	0.015	0.005	0.006	0.023	<0.005	0.063
MB045	<0.005	0.016	0.039	<0.005	<0.005	<0.005	0.41	<0.005	0.013	<0.005	<0.005	0.013	0.005	0.011	0.008	<0.005	<0.005	0.56	0.007	0.028	0.68	0.019	0.011	0.012	<0.005	0.008	<0.005	0.041
MB046	0.015	0.02	0.032	0.27	0.74	0.014	0.021	<0.005	0.076	<0.005	0.021	0.056	0.19	0.011	0.009	0.008	0.15	0.041	0.051	0.036	0.1	0.016	0.23	<0.005	0.014	<0.005	<0.005	0.014
MB047	0.04	0.012	0.031	0.11	0.83	0.066	<0.005	<0.005	0.019	<0.01	0.05	0.17	0.28	0.019	0.018	0.011	1	0.064	0.083	0.078	0.092	0.6	0.14	0.055	0.045	0.011	0.028	0.031
MB048	<0.005	0.012	0.016	0.014	0.35	0.11	0.048	<0.005	0.024	0.007	0.009	0.4	0.15	0.014	0.076	0.1	0.048	0.005	0.025	0.032	0.023	0.01	0.072	<0.005	0.014	0.01	<0.005	0.52
MB049	0.02	0.029	0.045	0.056	0.043	0.045	0.057	0.025	0.043	0.031	0.036	0.082	0.019	0.023	0.1	0.85	0.04	0.43	0.075	0.035	0.061	0.053	0.13	0.027	0.28	0.056	0.049	0.52
MB305	0.054	0.048	0.049	0.12	0.032	0.025	0.005	0.007	0.067	0.008	0.014	<0.005	0.011	0.031	0.016	0.09	0.042	0.007	1.5	0.052	0.31	0.15	0.11	0.097	0.019	0.022	0.018	0.24
MB306	0.037	0.068	0.013	0.033	0.012	0.024	<0.005	<0.005	0.092	<0.005	0.016	0.097	0.008	0.03	0.043	0.07	0.53	0.14	0.23	0.11	0.14	0.022	0.046	0.013	0.023	<0.005	<0.005	0.33

APPENDIX E – Groundwater Standing Water Level and Total Organic Carbon Monitoring Data

Table 12. Groundwater Standing Water Level and Total Organic Carbon Monitoring Data.

Sample Location:	Date Sampled:	Standing Water Level (mBTOC)	Total Organic Carbon (mg/L)
MB008	20 Sep 17	15.19	10
	06 Dec 17	15.38	4
	07 Mar 18	15.72	1
	27 Jun 18	15.95	7
	05 Dec 18	15.33	2
	27 Mar 19	15.56	3
	26 Jun 19	15.30	14
	11 Sep 19	16.30	2
	19 Dec 20	16.18	18
	19 Mar 20	16.6	2
	08 Jul 20	16.45	2
	29 Sep 20	16.26	12
	22 Dec 20	16.18	1
	17 Mar 21	16.40	<1
	17 Jun 21	16.28	3
	28 Sep 21	16.16	<1
	07 Dec 21	16.30	<1
	17 Mar 22	15.54	27
	29-Jun-22	15.73	18
	28-Sep-22	15.09	47
	21-Dec-22	15.10	3
	02-Mar-23	15.02	2
	12-Jul-23	14.51	2
	11-Sep-23	14.39	3
	20-Dec-23	15.75	3
	14-Mar-24	14.73	3
	12-Jun-24	14.73	11
	18-Sep-24	14.02	130
	18-Dec-24	13.9	3
MB023	19-Sep-17	7.93	10
	05-Dec-17	8.84	7
	06-Mar-18	9.92	8
	26-Jun-18	10.55	30
	04-Dec-18	10.82	20
	26-Mar-19	10.73	15
	25-Jun-19	10.64	79
	11-Sep-19	10.65	7
	18-Dec-19	10.85	23
	18-Mar-20	9.18	9.9
	07-Jul-20	8.24	12
	29-Sep-20	7.60	15
	21-Dec-20	8.43	14
	05-Feb-21	9.42	nt
	16-Mar-21	9.87	5

Sample Location:	Date Sampled:	Standing Water Level (mBTOC)	Total Organic Carbon (mg/L)
	16-Jun-21	7.23	8
	28-Sep-21	8.02	8
	08-Dec-21	8.13	5
	16-Mar-22	5.66	7
	29-Jun-22	6.13	8
	28-Sep-22	5.25	60
	20-Dec-22	6.09	7
	02-Mar-23	6.98	6
	12-Jul-23	27.78	7
	12-Sep-23	8.74	7
	21-Dec-23	6.92	13
	15/03/2024	8.27	48
	12/06/2024	5.75	11
	18/09/2024	6.53	40
	18-Dec-24	7.1	9
MB032	20-Sep-17	12.36	5
	05-Dec-17	12.65	2
	07-Mar-18	13.04	<1
	26-Jun-18	14.93	2
	05-Dec-18	13.80	2
	27-Mar-19	13.10	2
	26-Jun-19	13.10	5
	11-Sep-19	12.37	1
	19-Dec-19	12.86	2
	19-Mar-20	12.13	1
	08-Jul-20	12.34	1
	30-Sep-20	11.97	2
	22-Dec-20	12.20	1
	16/03/2021	12.09	1
	17-Jun-21	12.07	2
	28-Sep-21	11.79	2
	08-Dec-21	11.63	<1
	17-Mar-22	11.73	<1
	28-Jun-22	11.30	<1
	27-Sep-22	11.29	40
	20-Dec-22	10.95	<1
	03-Mar-23	11.08	2
	11-Jul-23	11.38	1
	15-Aug-23	11.56	2
	11-Sep-23	11.44	1
	19-Dec-23	11.52	3
	14-Mar-24	12.12	3
	20-Jun-24	11.54	2
	18-Sep-24	11.46	2
	18-Dec-24	11.4	3
MB033	20-Sep-17	4.49	2
	05-Dec-17	4.31	1
	07-Mar-18	5.29	1
	26-Jun-18	4.80	2
	05-Dec-18	5.34	2

Sample Location:	Date Sampled:	Standing Water Level (mBTOC)	Total Organic Carbon (mg/L)
	27-Mar-19	5.27	2
	26-Jun-19	5.42	2
	11-Sep-19	4.10	1
	19-Dec-19	5.20	2
	19-Mar-20	4.88	<1
	08-Jul-20	4.59	1
	30-Sep-20	4.96	1
	22-Dec-20	4.69	1
	16/03/2021	4.50	<1
	17-Jun-21	4.99	2
	28-Sep-21	4.29	2
	08-Dec-21	4.36	1
	17-Mar-22	4.60	<1
	28-Jun-22	2.63	<1
	27-Sep-22	4.56	15
	20-Dec-22	4.65	1
	03-Mar-23	0	2
	11-Jul-23	3.86	1
	11-Sep-23	3.01	1
	14-Mar-24	3.63	9
	20-Jun-24	4.7	2
	18-Sep-24	4.32	2
	18-Dec-24	2.67	3
MB034	20-Sep-17	3.50	1
	05-Dec-17	4.20	1
	07-Mar-18	4.60	<1
	26-Jun-18	4.36	2
	05-Dec-18	3.97	2
	27-Mar-19	4.08	<1
	26-Jun-19	4.15	<1
	11-Sep-19	4.54	1
	19-Dec-19	4.55	1
	19-Mar-20	3.45	<1
	08-Jul-20	4.05	<1
	30-Sep-20	3.83	<1
	22-Dec-20	3.84	<1
	16/03/2021	4.13	<1
	17-Jun-21	3.79	1
	28-Sep-21	3.73	<1
	08-Dec-21	3.70	<1
	17-Mar-22	3.70	<1
	28-Jun-22	3.39	<1
	15-Jul-22	3.04	-
	27-Sep-22	3.34	26
	20-Dec-22	3.36	<1
	03-Mar-23	3.41	1
	11-Jul-23	3.8	1
	11-Sep-23	4.11	<1
	19-Dec-23	4.11	3
	14-Mar-24	4.13	2

Sample Location:	Date Sampled:	Standing Water Level (mBTOC)	Total Organic Carbon (mg/L)
	20-Jun-24	3.54	2
	18-Sep-24	4.06	1
	18-Dec-24	3.25	3
MB035	20-Sep-17	2.87	2
	05-Dec-17	3.15	1
	07-Mar-18	3.32	6
	26-Jun-18	2.75	11
	05-Dec-18	2.62	14
	27-Mar-19	2.59	4
	26-Jun-19	4.15	4
	11-Sep-19	2.58	1
	19-Dec-19	3.24	3
	19-Mar-20	2.65	1
	08-Jul-20	2.68	<1
	30-Sep-20	2.67	1
	22-Dec-20	2.66	<1
	16/03/2021	2.65	<1
	17-Jun-21	2.67	1
	28-Sep-21	2.68	1
	08-Dec-21	2.69	<1
	17-Mar-22	2.61	<1
	28-Jun-22	2.66	1
	27-Sep-22	2.70	25
	20-Dec-22	2.72	<1
	03-Mar-23	2.71	1
	11-Jul-23	2.69	1
	11-Sep-23	2.71	<1
	19-Dec-23	2.83	3
	14-Mar-24	2.83	7
	18-Sep-24	2.67	1
	20-Jun-24	2.60	2
	18-Dec-24	2.67	1
MB038	20-Sep-17	24.54	1
	05-Dec-17	24.32	1
	07-Mar-18	23.99	1
	26-Jun-18	25.06	1
	04-Dec-18	25.39	1
	26-Mar-19	25.10	1
	25-Jun-19	24.95	1
	11-Sep-19	24.26	1
	18-Dec-19	23.36	1
	18-Mar-20	21.43	1
	07-Jul-20	22.66	1
	29-Sep-20	21.41	1
	21-Dec-20	21.47	1
	17/03/2021	23.12	1
	16-Jun-21	22.12	1
	29-Sep-21	20.40	1
	07-Dec-21	21.22	1
	16-Mar-22	19.33	1

Sample Location:	Date Sampled:	Standing Water Level (mBTOC)	Total Organic Carbon (mg/L)
	28-Jun-22	19.94	4
	28-Sep-22	19.78	190
	20-Dec-22	19.84	2
	03-Mar-23	18.39	2
	11-Jul-23	21.28	3
	12-Sep-23	22.43	2
	19-Dec-23	24.48	3
	14-Mar-24	25.26	2
	12-Jun-24	23.84	3
	18-Sep-24	23.62	4
	18-Dec-24	23.84	4
MB039		nt	nt
		nt	nt
		nt	nt
	04-Dec-18	nt	nt
	26-Mar-19	nt	nt
	25-Jun-19	nt	nt
	11-Sep-19	nt	nt
	18-Dec-19	nt	nt
	18-Mar-20	nt	nt
	18-Mar-20	nt	nt
	29-Sep-20	nt	nt
	21-Dec-20	nt	nt
	15-Mar-21	nt	nt
	16-Jun-21	nt	nt
	29-Sep-21	nt	nt
	07-Dec-21	nt	nt
	16-Mar-22	nt	nt
	28-Jun-22	nt	nt
	27-Sep-22	nt	nt
	20-Dec-22	nt	nt
	03-Mar-23	nt	nt
	11-Jul-23	nt	nt
	12-Sep-23	nt	nt
	19-Dec-23	nt	nt
	14-Mar-24	nt	nt
	12-Jun-24	nt	nt
	18-Sep-24	nt	nt
	18-Dec-24	nt	nt
MB040	20-Sep-17	13.73	2
	06-Dec-17	14.09	1
	06-Mar-18	14.05	1
	26-Jun-18	14.40	1
	04-Dec-18	14.90	12
	26-Mar-19	13.24	3
	25-Jun-19	13.50	9
	11-Sep-19	12.79	4
	18-Dec-19	13.06	4
	18-Mar-19	11.89	16
	07-Jul-20	12.43	<1

Sample Location:	Date Sampled:	Standing Water Level (mBTOC)	Total Organic Carbon (mg/L)
	29-Sep-20	11.32	4
	21-Dec-20	11.96	3
	17/03/2021	13.39	1
	16-Jun-21	12.46	2
	29-Sep-21	12.36	<1
	07-Dec-21	11.81	1
	16-Mar-22	10.40	<1
	28-Jun-22	11.36	1
	27-Sep-22	10.81	210
	20-Dec-22	10.88	9
	03-Mar-23	8.24	2
	11-Jul-23	12.13	2
	11-Sep-23	12.67	<1
	19-Dec-23	12.86	18
	14-Mar-24	14.37	130
	12-Jun-24	12.63	2
	18-Sep-24	12.81	4
	18-Dec-24	12.78	4
MB041		nt	nt
		nt	nt
		nt	nt
		nt	nt
	05-Dec-18	nt	nt
	27-Mar-19	nt	nt
	26-Jun-19	nt	nt
	11-Sep-19	nt	nt
	18-Dec-19	nt	nt
	18-Mar-20	nt	nt
	07-Jul-20	nt	nt
	29-Sep-20	nt	nt
	21-Dec-20	nt	nt
	17-Mar-21	nt	nt
	17-Jun-21	nt	nt
	29-Sep-21	8.09	4
	07-Dec-21	nt	nt
	16-Mar-22	6.80	5
	28-Jun-22	6.50	4
	27-Sep-22	6.47	170
	20-Dec-22	6.47	3
	03-Mar-23	6.78	3
	11-Jul-23	7.66	3
	11-Sep-23	nt	nt
	19-Dec-23	nt	nt
	14-Mar-24	nt	nt
	12-Jun-24	7.58	4
	18-Sep-24	7.32	4
	18-Dec-24	DRY	
MB044	20-Sep-17	21.24	<1
	06-Dec-17	21.43	<1
	07-Mar-18	21.65	<1

Sample Location:	Date Sampled:	Standing Water Level (mBTOC)	Total Organic Carbon (mg/L)
	27-Jun-18	21.89	1
	05-Dec-18	21.88	2
	27-Mar-19	27.10	1
	26-Jun-19	22.10	1
	11-Sep-19	21.40	<1
	19-Dec-19	21.76	2
	19-Mar-20	21.72	1
	08-Jul-20	21.76	<1
	29-Sep-20	21.69	2
	22-Dec-20	21.02	<1
	16/03/2021	21.22	<1
	17-Jun-21	20.65	<1
	28-Sep-21	20.85	<1
	07-Dec-21	20.93	<1
	17-Mar-22	19.61	<1
	29-Jun-22	21.47	<1
	28-Sep-22	20.26	4
	21-Dec-22	20.22	<1
	02-Mar-23	20.39	<1
	12-Jul-23	20.1	2
	11-Sep-23	19.78	1
	20-Dec-23	20.78	3
	14-Mar-24	20.14	2
	12-Jun-24	20.34	3
	18-Sep-24	19.13	1
	18-Dec-24	19.43	2
MB045	20-Sep-17	15.58	1
	06-Dec-17	15.34	1
	07-Mar-18	15.69	<1
	27-Jun-18	15.81	1
	05-Dec-18	15.70	2
	27-Mar-19	16.16	4
	26-Jun-19	16.34	2
	11-Sep-19	16.27	1
	19-Dec-19	16.05	2
	19-Mar-20	16.50	<1
	08-Jul-20	16.48	<1
	29-Sep-20	16.47	<1
	22-Dec-20	16.22	<1
	16/03/2021	16.42	<1
	17-Jun-21	16.30	1
	28-Sep-21	16.27	<1
	07-Dec-21	16.15	<1
	17-Mar-22	16.03	<1
	29-Jun-22	16.01	<1
	28-Sep-22	15.59	11
	21-Dec-22	15.11	<1
	02-Mar-23	15.26	<1
	12-Jul-23	15	2
	11-Sep-23	14.93	<1

Sample Location:	Date Sampled:	Standing Water Level (mBTOC)	Total Organic Carbon (mg/L)
	21-Dec-23	14.95	3
	14-Mar-24	14.68	8
	12-Jun-24	14.82	<1
	18-Sep-24	14.43	2
	12-Jun-24	14.5	2
MB046	19-Sep-17	21.86	2
	05-Dec-17	21.97	2
	06-Mar-18	22.17	3
	26-Jun-18	22.18	3
	04-Dec-18	22.27	12
	26-Mar-19	22.10	2
	25-Jun-19	22.30	1
	11-Sep-19	22.40	1
	18-Dec-19	22.40	2
	18-Mar-20	22.30	2
	07-Jul-20	22.27	<1
	29-Sep-20	22.23	1
	21-Dec-20	22.15	1
	17/03/2021	22.28	<1
	16-Jun-21	22.17	1
	29-Sep-21	22.15	<1
	07-Dec-21	21.93	1
	16-Mar-22	21.76	<1
	28-Jun-22	21.91	<1
	28-Sep-22	21.61	140
	21-Dec-22	21.54	<1
	02-Mar-23	21.58	<1
	12-Jul-23	21.71	1
	12-Sep-23	21.85	<1
	21-Dec-23	21.97	22
	15-Mar-24	21.97	210
	20-Jun-24	21.91	<1
	18-Sep-24	21.95	2
	18-Dec-24	22.15	2
MB047	19-Sep-17	32.32	4
	05-Dec-17	33.23	3
	06-Mar-18	32.08	11
	26-Jun-18	32.42	7
	04-Dec-18	32.29	12
	26-Mar-19	31.96	8
	25-Jun-19	32.10	5
	11-Sep-19	31.80	4
	18-Dec-19	31.42	<1
	18-Mar-20	31.23	4
	07-Jul-20	31.28	1
	29-Sep-20	30.66	<1
	21-Dec-20	30.62	4
	17-Mar-21	31.22	1
	16-Jun-21	30.80	2
	29-Sep-21	30.80	<1

Sample Location:	Date Sampled:	Standing Water Level (mBTOC)	Total Organic Carbon (mg/L)
	07-Dec-21	30.10	2
	16-Mar-22	29.58	1
	28-Jun-22	29.33	2
	28-Sep-22	29.28	170
	21-Dec-22	29.28	2
	02-Mar-23	29.11	2
	20-Apr-23	29.47	-
	12-Jul-23	30.21	2
	12-Sep-23	30.12	<1
	21-Dec-23	31.15	27
	15-Mar-24	31.49	150
	20-Jun-24	31.03	5
	18-Sep-24	31.4	4
	18-Dec-24	31.1	6
MB048	-	nt	nt
	-	nt	nt
	07-May-18	20.52	5
	26-Jun-18	21.01	3
	04-Dec-18	21.40	3
	26-Mar-19	20.07	2
	25-Jun-19	20.09	2
	11-Sep-19	19.32	2
	18-Dec-19	18.79	2
	18-Mar-20	18.00	2
	07-Jul-20	18.16	4
	30-Sep-20	17.71	4
	21-Dec-20	17.99	3
	16/03/2021	20.25	5
	16-Jun-21	19.19	4
	28-Sep-21	19.26	4
	08-Dec-21	18.58	5
	16-Mar-22	17.48	3
	29-Jun-22	18.23	<1
	28-Sep-22	17.76	14
	20-Dec-22	17.77	1
	02-Mar-23	17.42	<1
	12-Jul-23	19.23	2
	12-Sep-23	18.22	<1
	21-Dec-23	21.67	2
	15-Mar-24	21.9	10
	20-Jun-24	19.27	5
	18-Sep-24	19.92	3
	18-Dec-24	20.33	2
MB049	-	nt	nt
	-	nt	nt
	07-May-18	21.92	2
	26-Jun-18	22.42	9
	04-Dec-18	22.86	9
	26-Mar-19	21.54	2
	01-May-19	21.58	10

Sample Location:	Date Sampled:	Standing Water Level (mBTOC)	Total Organic Carbon (mg/L)
	25-Jun-19	21.62	3
	11-Sep-19	20.83	2
	18-Dec-19	20.44	2
	18-Mar-20	19.65	2
	07-Jul-20	19.89	1
	30-Sep-20	19.39	1
	21-Dec-20	19.68	1
	16-Mar-21	21.86	<1
	16-Jun-21	20.72	1
	28-Sep-21	20.82	1
	08-Dec-21	20.12	<1
	16-Mar-22	19.03	<1
	29-Jun-22	19.35	2
	28-Sep-22	19.28	35
	20-Dec-22	19.16	<1
	02-Mar-23	19.02	<1
	12-Jul-23	21.61	2
	12-Sep-23	21.29	<1
	21-Dec-23	23.2	3
	15-Mar-24	23.48	19
	12-Jun-24	21.05	5
	18-Sep-24	21.52	5
	18-Dec-24	21.28	2
MB305	11-Sep-23	13.14	4
	20-Sep-17	10.91	1
	05-Dec-17	11.08	1
	06-Mar-18	11.69	2
	26-Jun-18	11.69	2
	04-Dec-18	11.77	4
	27-Mar-19	11.90	3
	25-Jun-19	10.48	<1
	11-Sep-19	11.62	<1
	18-Dec-19	11.45	2
	18-Mar-20	11.30	3
	07-Jul-20	11.33	<1
	30-Sep-20	11.08	<1
	22-Dec-20	10.95	1
	16/03/2021	11.09	<1
	16-Jun-21	9.48	<1
	29-Sep-21	10.90	1
	08-Dec-21	10.44	<1
	17-Mar-22	10.16	1
	28-Jun-22	9.87	<1
	15-Jul-22	10.22	-
	27-Sep-22	9.95	250
	17-Nov-22	9.65	2
	20-Dec-22	9.98	<1
	03-Mar-23	9.48	1
	11-Jul-23	8.98	<1
	11-Sep-23	9.26	240

Sample Location:	Date Sampled:	Standing Water Level (mBTOC)	Total Organic Carbon (mg/L)
	19-Dec-23	10.43	16
	14-Mar-24	10.93	130
	20-Jun-24	10.53	1
	18-Sep-24	10.15	2
	18-Dec-24	9.98	2
MB306	11-Sep-23	9.26	1
	20-Sep-17	6.85	<1
	05-Dec-17	6.86	<1
	06-Mar-18	6.82	1
	26-Jun-18	8.34	1
	04-Dec-18	7.50	6
	27-Mar-19	7.34	1
	25-Jun-19	7.27	<1
	11-Sep-19	7.18	<1
	18-Dec-19	7.09	2
	18-Mar-20	6.76	9
	07-Jul-20	6.92	<1
	30-Sep-20	6.67	<1
	22-Dec-20	6.70	<1
	16/03/2021	7.00	<1
	16-Jun-21	6.05	1
	29-Sep-21	5.53	1
	08-Dec-21	6.40	<1
	17-Mar-22	6.10	2
	28-Jun-22	5.92	1
	20-Dec-22	5.58	<1
	03-Mar-23	5.47	2
	11-Jul-23	5.77	1
	11/09/2023	6.3	1
	19-Dec-23	6.03	16
	14-Mar-24	5.83	170
	20-Jun-24	6.09	3
	18-Sep-24	5.72	3
	18-Dec-24	5.94	8

'nt' =not tested (low water volume available)

APPENDIX F – Leachate Treated at Lucas Heights 1 Treatment Plant

Table 13. Leachate volumes treated at Lucas Heights 1 Treatment Plant.

Date	Total Volume Treated Leachate m ³	
Jan-19	13,446	
Feb-19	10,653	
Mar-19	13,203	
Apr-19	11,599	
May-19	11,210	
Jun-19	11,961	
Jul-19	10,290	
Aug-19	11,519	
Sep-19	10,723	
Oct-19	16,288	
Nov-19	16,526	
Dec-19	16,908	154,326
Jan-20	16,932	
Feb-20	24,461	
Mar-20	24,773	
Apr-20	22,886	
May-20	20,641	
Jun-20	17,927	
Jul-20	18,246	
Aug-20	21,272	
Sep-20	23,908	
Oct-20	23,345	
Nov-20	22,330	
Dec-20	23,175	259,896
Jan-21	20,205	
Feb-21	20,005	
Mar-21	29,175	
Apr-21	25,212	
May-21	22,853	
Jun-21	20,042	
Jul-21	23,101	
Aug-21	17,310	
Sep-21	20,223	
Oct-21	23,330	
Nov-21	24,160	
Dec-21	21,521	267,137
Jan-22	27,054	
Feb-22	24,490	
Mar-22	33,551	
Apr-22	28,822	
May-22	24,232	
Jun-22	27,434	
Jul-22	27,504	

Aug-22	26,093	
Sep-22	24,768	
Oct-22	31,911	
Nov-22	28,557	
Dec-22	26,031	330,447
Jan-23	23,875	
Feb-23	20,491	
Mar-23	23,542	
Apr-23	23,044	
May-23	21,957	
Jun-23	18,554	
Jul-23	17,526	
Aug-23	20,354	
Sep-23	21,619	
Oct-23	21,511	
Nov-23	21,176	
Dec-23	22,749	256,398
Jan-24	24,738	
Feb-24	21,846	
Mar-24	19,184	
Apr-24	20,654	
May-24	27,474	
Jun-24	33,652	
Jul-24	31,892	
Aug-24	24,598	
Sep-24	22,025	
Oct-24	26,462	
Nov-24	24,761	
Dec-24	21,730	299,016

APPENDIX G – Noise Monitoring Locations

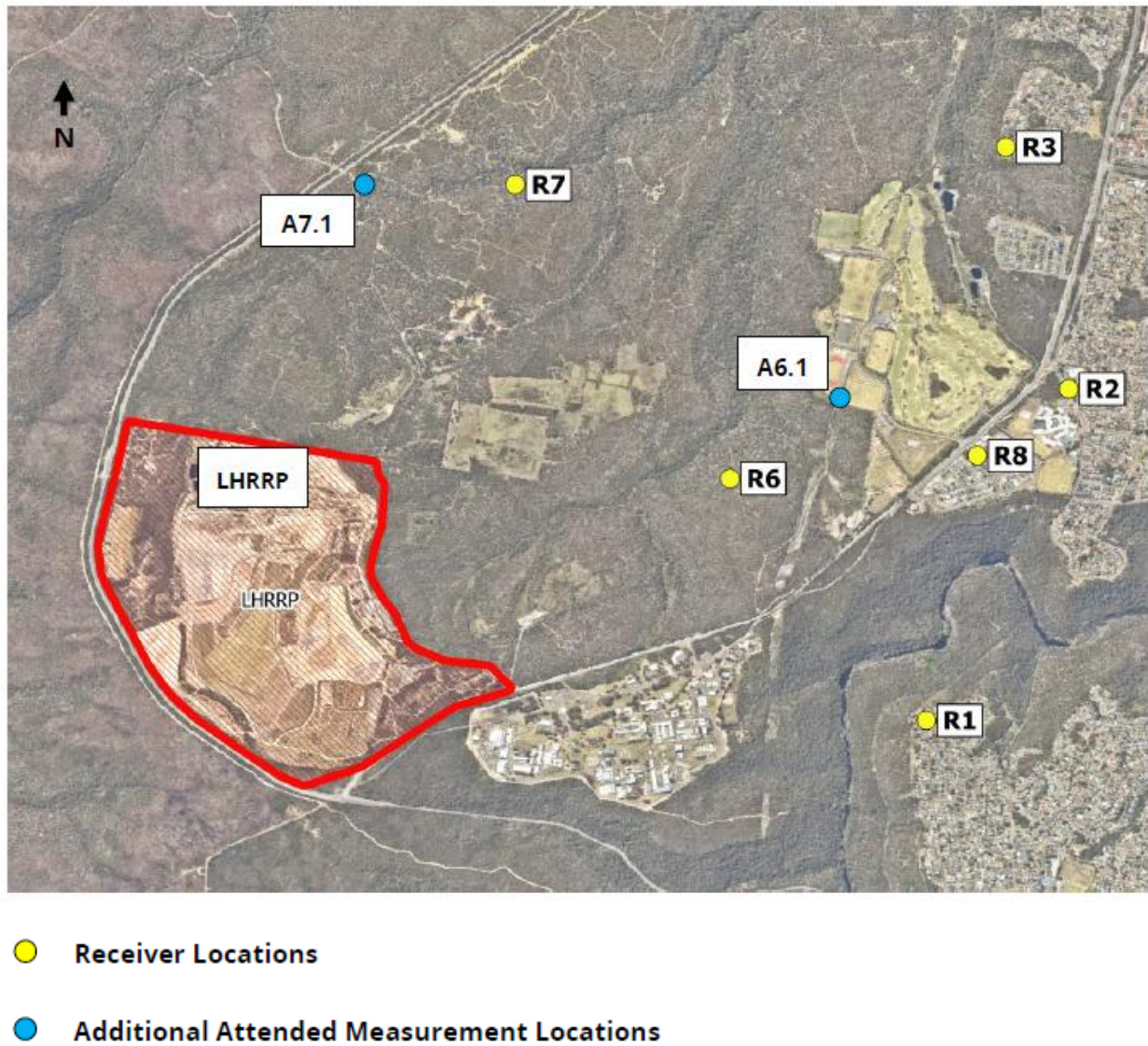


Figure 30. LHRP and Surrounding Area

APPENDIX H – Noise Monitoring Report

LUCAS HEIGHTS RESOURCE RECOVERY PARK

LUCAS HEIGHTS, NSW

ANNUAL NOISE COMPLIANCE MONITORING

RWDI # 2505907

20 October 2025

SUBMITTED TO

**Cleanaway Lucas Heights
Resource Recovery Park**
Little Forest Road
Lucas Heights NSW 2234

SUBMITTED BY

RWDI Australia Pty Ltd (RWDI)
ABN: 86 641 303 871

DOCUMENT CONTROL

Version	Status	Date	Prepared By	Reviewed By
A	Draft	14 October 2025	KN	JL
B	Final	20 October 2025	KN	JL

NOTE

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RWDI

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AAAC

This firm is a member firm of the Association of Australasian Acoustical Consultants and the work here reported has been carried out in accordance with the terms of that membership.



QUALITY ASSURANCE

RWDI Australia Pty Ltd operates a Quality Management System which complies with the requirements of AS/NZS ISO 9001:2015. This management system has been externally certified by SAI Global and Licence No. QEC 13457 has been issued for the following scope: The provision of consultancy services in acoustic engineering, air quality and wind engineering; and the sale, service, support and installation of acoustic monitoring and related systems and technologies.



GLOSSARY OF ACOUSTIC TERMS

Most environments are affected by environmental noise which continuously varies, largely as a result of road traffic. To describe the overall noise environment, a number of noise descriptors have been developed and these involve statistical and other analysis of the varying noise over sampling periods, typically taken as 15 minutes. These descriptors, which are demonstrated in the graph below, are here defined.

Maximum Noise Level (L_{Amax}) – The maximum noise level over a sample period is the maximum level, measured on fast response, during the sample period.

L_{A1} – The L_{A1} level is the noise level which is exceeded for 1% of the sample period. During the sample period, the noise level is below the L_{A1} level for 99% of the time.

L_{A10} – The L_{A10} level is the noise level which is exceeded for 10% of the sample period. During the sample period, the noise level is below the L_{A10} level for 90% of the time. The L_{A10} is a common noise descriptor for environmental noise and road traffic noise.

L_{A90} – The L_{A90} level is the noise level which is exceeded for 90% of the sample period. During the sample period, the noise level is below the L_{A90} level for 10% of the time. This measure is commonly referred to as the background noise level.

L_{Aeq} – The equivalent continuous sound level (L_{Aeq}) is the energy average of the varying noise over the sample period and is equivalent to the level of a constant noise which contains the same energy as the varying noise environment. This measure is also a common measure of environmental noise and road traffic noise.

ABL – The Assessment Background Level is the single figure background level representing each assessment period (daytime, evening and night time) for each day. It is determined by calculating the 10th percentile (lowest 10th percent) background level (L_{A90}) for each period.

RBL – The Rating Background Level for each period is the median value of the ABL values for the period over all of the days measured. There is therefore an RBL value for each period – daytime, evening and night time.

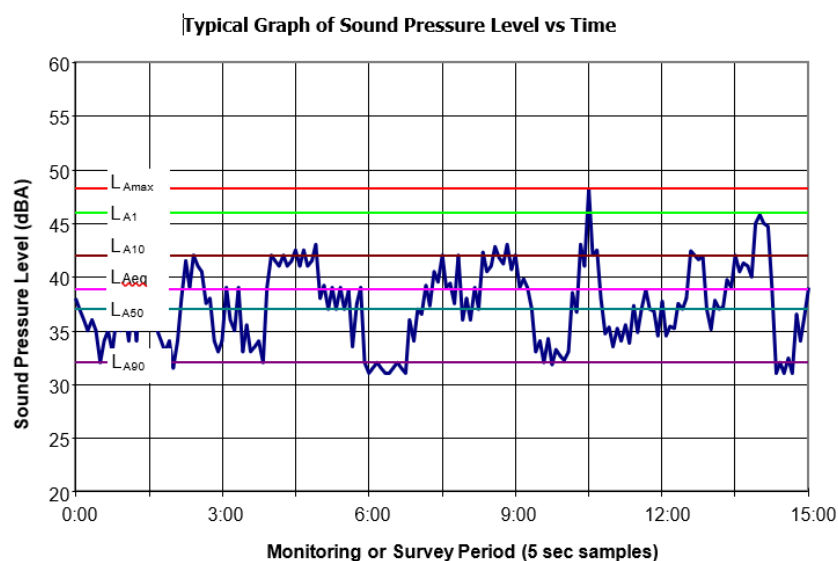




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1 INTRODUCTION

Cleanaway Recycling and Recovery (Cleanaway) operates a solid waste landfill at the Lucas Heights Resource Recovery Park (LHRRP). LHRRP is licensed to accept solid waste from domestic and commercial sources that are suitable for disposal in a general solid (putrescible) waste landfill.

Activities on the site include:

- Landfill;
- A resource recovery centre and waste collection point;
- GO facility for processing garden organics;
- Truck parking area;

Other facilities/operations located at the LHRRP include:

- Renewable energy operations (operated by Energy Developments Ltd);
- Community use areas in the minibike area at the southern extent of the site run by Police Citizens Youth Club (PCYC) and the Sydney Clay Target Association (SICTA) on the leased land on the north western side of the site.

RWDI has been commissioned by Cleanaway to conduct compliance noise monitoring as required by the conditions outlined in Development Consent SSD 6835. The assessment has been conducted in accordance with the NSW EPA Industrial Noise Policy.

The LHRRP is located in Lucas Heights, to the north of New Illawarra Road and East of Heathcote Road. To the north, west and south of the site is primarily bushland. Bushland, and the Australian Nuclear Science and Technology Organisation (ANSTO) are located to the east.

The nearest residential receivers, located to the north and east are described below:

- R1 – Engadine residences, approximately 2 km to the southeast;
- R2 – Barden Ridge residences, approximately 3 km to the east;
- R3 – Menai residences, approximately 3.3 km to the northeast.
- R8 – The Ridgeway residences, approximately 3.2 km to the northeast

Two areas marked as potential future residential developments have also been identified. These areas have been named R6 Gandangara and R7 Gandangara North, and are located approximately 1.5 km and 1.6 km respectively from the LHRRP.

An overview of the area, including receiver locations, is presented in Figure 1.

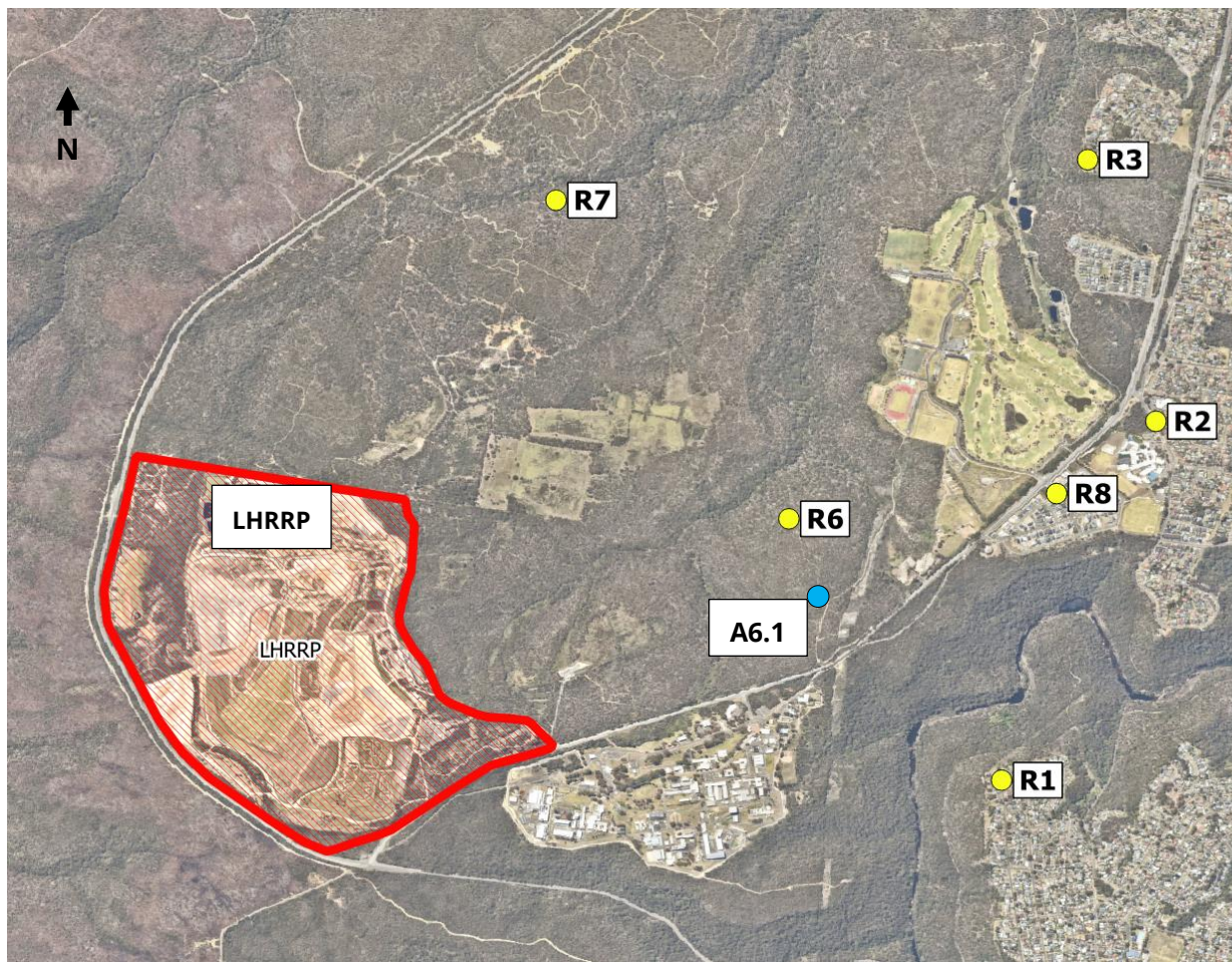


Figure 1: LHRRP and Surrounding Area

- Receiver Locations
- Additional Attended Measurement Locations

2 NOISE COMPLIANCE CONDITIONS

2.1 Lucas Heights Resource Recovery Park

Conditions for compliance have been outlined in Schedule C of Development Consent SSD 6835. Conditions from this consent relevant to noise are presented below:

C53. *The Applicant must comply with the hours detailed in Table 2, unless otherwise agreed in writing by the EPA or the Planning Secretary.*

Table 2: Hours of Work

Facility	Activity	Day	Time
Landfill	Construction	Monday – Friday Saturday – Sunday	7 am – 5 pm 8 am – 5 pm
	Operation	Monday – Friday Saturday Sunday	5 am – 5 pm 6 am – 5 pm 8 am – 5 pm
	Other operations	Monday – Sunday	Anytime
GO Facility	Construction	Monday – Friday Saturday – Sunday	7 am – 5 pm 8 am – 5 pm
	Operation	Monday – Friday Saturday – Sunday	6 am – 5 pm 8 am – 5 pm
	Other operations	Monday – Sunday	Anytime

C54. *The Applicant must ensure noise from the site does not exceed the noise limits in Table 3.*

Table 3: Noise Limits dB(A)

No.	Location	Day L _{eq} (15min)	Evening L _{eq} (15min)	Night L _{eq} (15min)	Night L ₁ (1min)
R1	Engadine	35	35	35	45
R2	Barden Ridge	35	35	35	45
R3	Menai	35	35	35	45
R6	Gandangara	37	37	37	45
R7	Gandangara North	35	35	35	45
R8	The Ridgeway	35	35	35	35



- C56. *The Applicant must monitor noise from the site to demonstrate compliance with the noise limits in Table 3. The monitoring must be:*
- (a) undertaken annually, or to address genuine noise complaints that are related to the site as determined by the EPA or the Planning Secretary;*
 - (b) in accordance with the NSW Industrial Noise Policy; and*
 - (c) reported to the EPA and the Planning Secretary within one month of completing the monitoring, including details of management actions taken and the effectiveness of the actions to address any exceedances of the limits in Table 3.*

3 NOISE MEASUREMENTS

3.1 Lucas Heights Resource Recovery Park

Noise measurements were conducted on Thursday 9 October 2025 at the six receiver locations outlined in the Development Consent and in Figure 1. A 15-minute measurement was taken at each location.

The weather during the measurements was slightly overcast with low to moderate wind speeds.

All measurements were conducted using an NTi XL2 Sound Level Meter. This sound level meter conforms to AS IEC 61672.2-2019 Electroacoustics – Sound level meters Pattern evaluation tests as a Class 1 Precision Sound Level Meter which has an accuracy suitable for field and laboratory use. The A-Weighting filter of the meter was selected, and the time weighting was set to “Fast”. The calibration of the meter was checked before and after the measurements with a B&K 4231 sound level calibrator and no significant drift was noted.

The sound level meter and sound level calibrator have been laboratory calibrated within the previous two years in accordance with our in-house Quality Assurance Procedures.

A summary of the noise measurements is presented in Table 1. A summary of the observed noise environment for each location is presented in the section below the table. Analysis of the noise contribution from LHRRP at these locations is presented in Section 4.

Table 1: Summary of Attended Measurements

Location	Start Time	L _{Aeq}	L _{A90}	L _{Amin}	Noise audible from LHRRP
R1 – Engadine	9:00 am	48	43	40	No
R2 – Barden Ridge	11:49 am	60	48	45	No
R3 – Menai	12:15 pm	44	38	35	No
R6 – Gandangara	10:49 am	51	45	41	No
R7 – Gandangara North	9:56 am	46	39	36	No
R8 – The Ridgeway	11:27 am	59	51	45	No

- R1 The measurement was taken near 42 Sierra Road, Engadine. The background level at this location was dominated by rustling of leaves from wind through nearby trees. The L_{Aeq} level was dominated by intermittent noise from insects and birds. No noise from the LHRRP was audible at this location throughout the measurement period.
- R2 This measurement was taken near 157 Old Illawarra Road, Barden Ridge. The background level at this location was dominated by rustling of leaves from wind through nearby trees. The L_{Aeq} level was dominated by occasional road traffic noise along Old Illawarra Road and intermittent noise from insects and birds. No noise from the LHRRP was audible at this location throughout the measurement period.



- R3 This measurement was taken near 47 Windle Place, Menai. The background level at this location was dominated by rustling of leaves from wind through nearby trees. The L_{Aeq} level was dominated by intermittent noise from insects and birds. No noise from the LHRRP was audible at this location throughout the measurement period.
- R6 A noise measurement was taken at location A6.1 as specified in Figure 1. It was not possible to conduct noise measurements at location R6 in Figure 1 as it is located on private land and could not be accessed. The A6.1 location was the closest location to R6 that could be accessed and is expected to be representative of the noise conditions experienced at location R6.
- The background noise level at location A6.1 was dominated by rustling of leaves from wind through nearby trees, and bird/insect noise. The L_{Aeq} level was controlled by intermittent insect and bird noise. No noise from the LHRRP was audible at this location throughout the measurement period.
- R7 This measurement was taken near the location R7 specified in Figure 1. The background level at this location was dominated by rustling of leaves from wind through nearby trees, and bird/insect noise. The L_{Aeq} level was controlled by intermittent insect and bird noise. No noise from the LHRRP was audible at this location throughout the measurement period.
- R8 This measurement was taken near 3 Gurrumul Street, Barden Ridge. The L_{Aeq} level was dominated by intermittent insect and bird noise, some rustling of leaves from wind through nearby trees, and occasional road traffic noise on New Illawarra Road (A6). No noise from the LHRRP was audible at this location throughout the measurement period.



4 NOISE ASSESSMENT

Considering that no noise from the site was audible at locations R1, R2, R3, R6, R7 or R8, noise level contributions from the LHRRP site at each receiver location have been derived based on the L_{Amin} level measurements recorded on Thursday 9 October 2025. Inaudibility is often defined as being at least 10 dB lower than the minimum noise level recorded, and the site noise contribution in Table 2 has been calculated using this metric.

Table 2: LHRRP Noise Compliance Summary

Location	Minimum Level L_{Amin}	Estimated Site Noise Contribution $L_{Aeq, 15min}$	Noise limit $L_{Aeq, 15min}$	Complies
R1	40	< 30	35	Yes
R2	45	< 35	35	Yes
R3	35	< 25	35	Yes
R6	41	< 31	37	Yes
R7	36	< 26	35	Yes
R8	45	< 35	35	Yes

Given that no noise from the site was audible at any time at locations R1, R2, R3, R6, R7, or R8, the estimated noise from the LHRRP complies with the consent conditions at all locations.

5 CONCLUSION

The Lucas Heights Resource Recovery Park is required to conduct annual compliance noise monitoring as outlined in Development Consent SSD 6835. This report details the annual monitoring that took place on Thursday 9 October 2025.

Noise contributions from the LHRRP at the surrounding residential receivers have been measured and assessed. The assessment indicates that all the relevant noise requirements of the Development Consent have been complied with.



6 STATEMENT OF LIMITATIONS

This report entitled *Lucas Heights Resource Recovery Park – Annual Noise Compliance Monitoring* was prepared by RWDI Australia Pty Ltd (“RWDI”) for Cleanaway (“Client”). The findings and conclusions presented in this report have been prepared for the Client and are specific to the project described herein (“Project”). The conclusions contained in this report are based on the information available to RWDI when this report was prepared.

The conclusions contained in this report have also been made for the specific purpose(s) set out herein. Should the Client or any other third party utilize the report and/or implement the conclusions contained therein for any other purpose or project without the involvement of RWDI, the Client or such third party assumes any and all risk of any and all consequences arising from such use and RWDI accepts no responsibility for any liability, loss, or damage of any kind suffered by Client or any other third party arising therefrom.

Finally, it is imperative that the Client and/or any party relying on the conclusions in this report carefully review the stated assumptions contained herein and to understand the different factors which may impact the conclusions provided.

APPENDIX I – LHRRP Aquatic Ecology Spring 2024 and Autumn 2025 Monitoring Report



LHRRP Mill Creek Aquatic Ecology Spring 2024 and Autumn 2025 Baseline Report

Cleanaway Pty Ltd

14 August 2025

→ **The Power of Commitment**



Project name		LHRRP - Mill Creek aquatic monitoring 2024-2025					
Document title		LHRRP Mill Creek Aquatic Ecology Spring 2024 and Autumn 2025 Baseline Report					
Project number		12655144					
File name		12655144-REP_LHRRP Mill Creek Aquatic Monitoring 2024-2025 Annual Report.docx					
Status Code	Revision	Author	Reviewer		Approved for issue		
			Name	Signature	Name	Signature	Date
S4	0	T. Hopwood	L. Lagerroff		L. Lagerroff		14/08/25
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Executive summary

Cleanaway Pty Ltd (Cleanaway) currently operates the Lucas Heights Resource Recovery Park (LHRRP) in accordance with SSD-6835 and environment protection licences (EPLs) 5065 and 12520. Cleanaway acquired the site from SUEZ Recycling and Recovery Pty Ltd (SUEZ) in late 2021.

The following activities are proposed at the Lucas Height Resource Recovery Park (LHRRP) and were approved on 23 January 2017 under SSD-6835:

- Reprofilling of existing landfill areas to provide up to 8.3 million cubic metres of additional landfill airspace capacity.
- Relocation and expansion of the existing garden organics (GO) facility. The existing GO facility will be relocated to the western side of the site adjacent to Heathcote Road.
- Construction and operation of a fully enclosed advanced resource recovery technology (ARRT) facility.
- Landfilling will cease in 2037 after which time the site will be rehabilitated and converted to community parkland, with capping and landscaping to be completed and the site made available for community use in 2039.

MOD 2 has since been approved (23 November 2023) to modify the SSD-6835 development consent. The ARRT facility would no longer be developed as part of MOD 2.

An Aquatic Habitat Monitoring Plan (AHMP; GHD 2021) was developed as required under SSD-6835 consent condition C33. GHD was engaged by Cleanaway to complete aquatic ecology and surface water quality monitoring in spring 2024 and autumn 2025 at the LHRRP, in accordance with the methods outlined in the AHMP (GHD 2021). This included aquatic ecology (macroinvertebrate) sampling, surface water quality monitoring, and habitat assessment at four sites. The sampling completed for this program in spring 2024 and autumn 2025 is the second year of baseline sampling, as required by the AHMP (GHD 2021), prior to commencement of construction of the GO. Although initial works (clearing and excavation) for the GO facility commenced prior to sampling in spring 2023, there were no reported impacts to Mill Creek during or following these preliminary works. As such, Mill Creek is considered to have been in a baseline condition during sampling in the spring 2023 to autumn 2025 period. The AHMP was updated in 2024 to reflect the removal of the ARRT facility from SSD-6835 (GHD 2024a).

The four aquatic ecology sites sampled are located on Mill Creek, adjacent to LHRRP: Two sites (MCUP2 and MCUP) are located upstream of the MOD 2 project areas while two sites (MC0 and MC1) are located downstream of the proposed impacts. Sites MCUP and MC1 were previously sampled during the aquatic ecosystem investigation in autumn 2015, while sites MCUP2 and MC0 were newly established and sampled for the first time in spring 2023.

Water quality was generally good during the spring 2024 to autumn 2025 monitoring period, with few toxicants observed in concentrations that are known to have adverse impacts to aquatic organisms. Water quality was generally similar between the sites, and between the spring 2024 and autumn 2025 sampling events. Some minor exceedances of the toxicant default guideline values (DGVs) for dissolved metals aluminium, copper and zinc were observed during the monitoring period, although these were isolated occurrences, and concentrations were generally lower than observed in the 2023-2024 monitoring period. As there was no spatial pattern observed, the elevated metals concentrations are likely sourced from the local lithology, rather than being attributable to LHRRP operations.

Elevated nutrients and turbidity are also commonly observed in Mill Creek, with exceedances of the DGVs observed in spring 2024 and autumn 2025. However, results for these analytes were also lower in spring 2024 and autumn 2025 than in autumn 2024, when sampling was conducted soon after a large rainfall event and turbidity and nutrient concentrations were very high. Nutrients and turbidity have been higher at downstream sites MC0 and MC1 compared to upstream sites during the aquatic ecology sampling to date, particularly during or shortly after periods of high-volume rainfall. This suggests that runoff and discharges from LHRRP are a contributing source of the nutrients and suspended solids in Mill Creek. Elevated nutrients and turbidity are potential stressors to aquatic organisms including macroinvertebrates.

Overall, the macroinvertebrate communities of each site were consistent with the quality and diversity of available aquatic habitats observed. Upstream site MCUP contained the greatest diversity of aquatic habitats, including a variety of macrophytes, trailing vegetation and submerged woody habitats, which explains the more diverse aquatic macroinvertebrate community at this site, and the higher AUSRIVAS result (Band A), indicating the site is in a reference condition with most of the expected taxa (i.e. macroinvertebrate groups) collected. This demonstrates an improvement on the results from the 2023-2024 monitoring period, due to the collection of a number of pollution tolerant taxa in the 2024-2025 monitoring period that were missing in 2023-2024 (potentially due to the high-volume rainfall event preceding sampling). However, AUSRIVAS results at MCUP are also influenced by the lower number of taxa expected to be collected by the model, likely due to the completely silt substrate, which contrasts with the bedrock observed at all other sites. In other words, based on the site characteristics at MCUP, the macroinvertebrate community is not expected by the AUSRIVAS model to be very diverse.

The macroinvertebrate samples collected from all other sites (upstream site MCUP2 and downstream sites MC0 and MC1 received) received a Band B AUSRIVAS rating, indicating significant impairment of the macroinvertebrate community, with fewer macroinvertebrate taxa collected than were predicted by the model. These results are consistent with outcomes from the 2023-2024 monitoring period. As discussed, water quality was generally improved during the 2024-2025 monitoring period compared to the 2023-2024 monitoring period. The environmental conditions were also more stable in the lead-up to spring 2024 and autumn 2025 sampling, and, therefore, scouring due to high flow is not expected to have influenced the Mill Creek macroinvertebrate community in the 2024-2025 monitoring period. As such, the aquatic habitats present at each site appear to be the major factor limiting macroinvertebrate community condition in Mill Creek.

Overall, the sampling completed in accordance with the methods outlined in the AHMP during the spring 2023 to autumn 2025 period has identified some existing impacts to water quality due to LHRRP operations, prior to construction of the GO facility, primarily elevated nutrients and turbidity after period of high rainfall. However, differences in aquatic habitats between the sites and sampling events appears to be the primary factor influencing the macroinvertebrate communities of Mill Creek during the baseline monitoring.

This report is subject to, and must be read in conjunction with, the limitations set out in Section 1.5 and the assumptions and qualifications contained throughout the Report.

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Appendix C	Macroinvertebrate identification QA

1. Introduction

1.1 Background

Cleanaway Pty Ltd (Cleanaway) currently operates the Lucas Heights Resource Recovery Park (LHRRP) in accordance with SSD-6835 and environment protection licences (EPLs) 5065 and 12520. Cleanaway acquired the site from SUEZ Recycling and Recovery Pty Ltd (SUEZ) in late 2021.

The following activities are proposed at the Lucas Height Resource Recovery Park (LHRRP) and were approved on 23 January 2017 under SSD-6835:

- Reprofilling of existing landfill areas to provide up to 8.3 million cubic metres of additional landfill airspace capacity.
- Relocation and expansion of the existing garden organics (GO) facility. The existing GO facility will be relocated to the western side of the site adjacent to Heathcote Road.
- Construction and operation of a fully enclosed advanced resource recovery technology (ARRT) facility. The ARRT will be located on the western side of the site adjacent to the GO facility. Establishment of the ARRT facility will be dependent upon SUEZ securing a guaranteed, long-term waste supply to ensure that the substantial upfront investment is able to be recouped.
- Landfilling will cease in 2037 after which time the site will be rehabilitated and converted to community parkland, with capping and landscaping to be completed and the site made available for community use in 2039.

Two modifications have since been approved to modify the SSD-6835 development consent, including:

- MOD 1 - Modification to allow for operation of the landfill between 5:00 am and 5:00 pm Monday to Friday and 6:00 am to 5:00 pm Saturdays (with no change to Sunday operation hours). MOD 1 was approved on 5 June 2018.
- MOD 2 - Modification to further expand the GO facility capacity to 100,000 tonnes per year, improve the GO facility composting technology, separate the areas of the GO facility across the eastern and western sides of the LHRRP, increase the landfill input rate to 970,000 tonnes per year and minor changes to Conditions related to leachate calibration and groundwater monitoring bores. MOD 2 was approved on 23 November 2023. As part of MOD 2, Cleanaway confirmed that the ARRT facility would not be developed.

Mill Creek would be realigned for the development of the GO facility. An Aquatic Habitat Monitoring Plan (AHMP) (GHD 2021) was developed as required under SSD-6835 consent condition C33, outlining a monitoring program for Mill Creek before and after the proposed works. The AHMP was updated in 2024 to reflect the removal of the ARRT facility from SSD-6835 (GHD 2024a). Although initial works (clearing and excavation) for the GO facility commenced prior to sampling in spring 2023, there were no reported impacts to Mill Creek during or following these works. As such, the aquatic ecology monitoring completed for this program between spring 2023 and autumn 2025 is considered to be baseline sampling, as required by the AHMP, prior to commencement of construction of the GO and the realignment of Mill Creek.

1.2 Scope

GHD was engaged by Cleanaway to complete aquatic ecology and surface water quality monitoring in spring 2024 and autumn 2025 at the LHRRP, in accordance with the methods outlined in the AHMP (GHD 2021, 2024a). This includes the following:

- Aquatic ecology (macroinvertebrate), surface water quality monitoring, and habitat assessment at four Mill Creek sites in spring 2024 and autumn 2025.
- A monitoring report outlining the results of the spring 2024 and autumn 2025 sampling events (referred to collectively as the '2024-2025 monitoring period', or 'current monitoring period'), and a brief comparison to the results of the spring 2023 and autumn 2024 monitoring events (referred to as the '2023-2024 monitoring period').

The purpose of this sampling was to establish baseline conditions prior to the construction of the GO facility.

1.3 Purpose of this report

The purpose of this report is to present the results of the aquatic ecology (macroinvertebrates), surface water quality, and aquatic habitat assessments undertaken in spring 2024 and autumn 2025. This is required in fulfilment of the condition of SSD-6835 and the associated AHMP.

1.4 Assumptions

Rainfall records were obtained from the Bureau of Meteorology (BOM) website. It is assumed that the data presented by BOM provide an accurate reflection of environmental conditions at the LHRRP.

1.5 Limitations

This report has been prepared by GHD for Cleanaway Pty Ltd and may only be used and relied on by Cleanaway Pty Ltd for the purpose agreed between GHD and Cleanaway Pty Ltd as set out in Section 1.3 of this report.

GHD otherwise disclaims responsibility to any person other than Cleanaway Pty Ltd arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report (refer Section 1.4 of this report). GHD disclaims liability arising from any of the assumptions being incorrect.

The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

Investigations undertaken in respect of this report are constrained by the particular site conditions, such as the location of buildings, services and vegetation. As a result, not all relevant site features and conditions may have been identified in this report.

2. Methodology

2.1 Survey sites

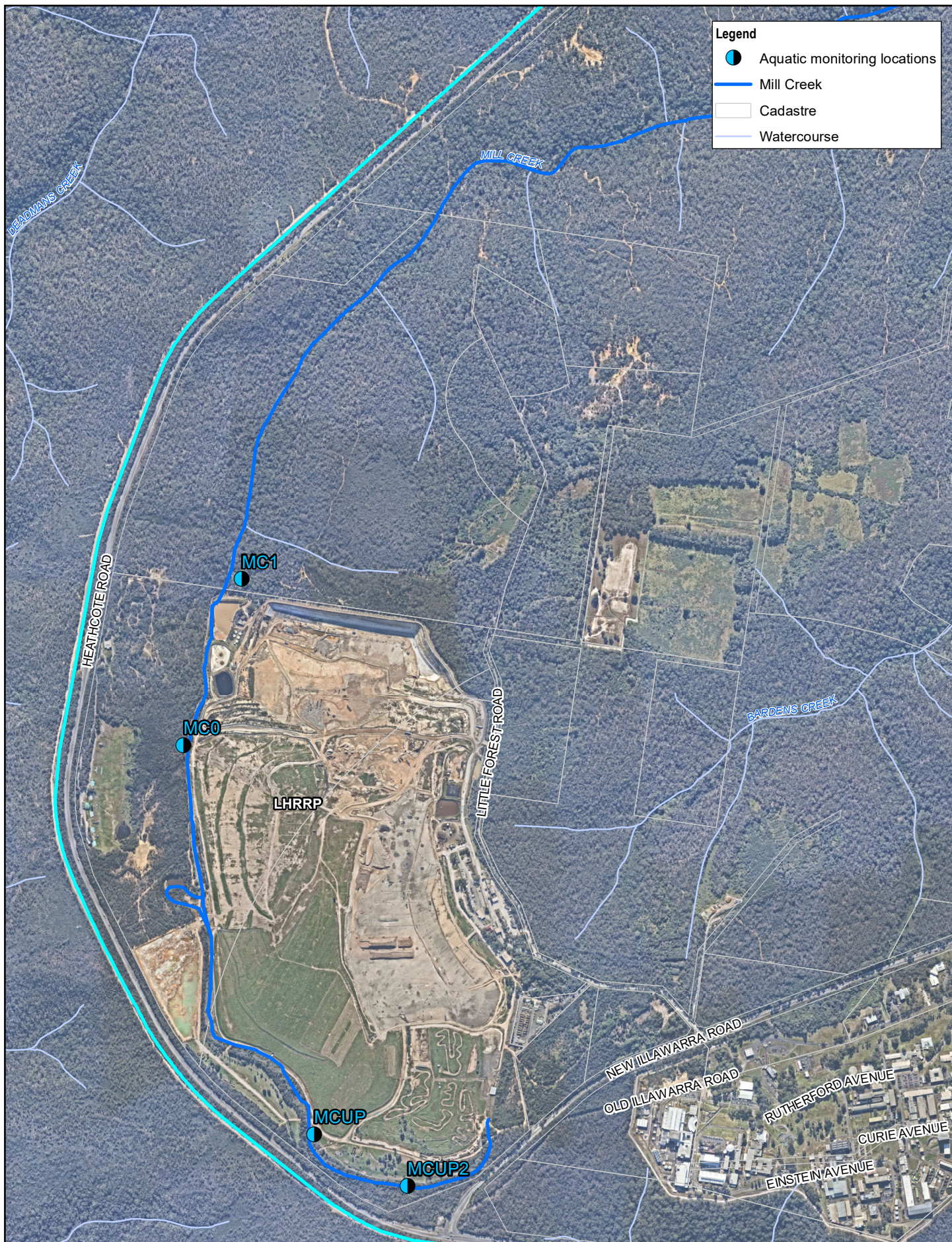
The LHRRP is located to the north of the intersection of New Illawarra Road and Heathcote Road in Lucas Heights, New South Wales. The headwaters of Mill Creek run along the western boundary of the LHRRP, and the creek ultimately discharges into the Georges River.

Four sites on Mill Creek, adjacent to LHRRP, as previously sampled in spring 2023 and autumn 2024, were again sampled in spring 2024 and autumn 2025. The monitoring locations are detailed in Table 2.1 and Figure 2.1.

Sites MCUP and MC1 were previously sampled during the aquatic ecosystem investigation in autumn 2015 (GHD 2015). Sites MCUP2 and MC0 were newly established and sampled for the first time in spring 2023.

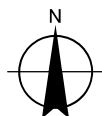
Table 2.1 Aquatic ecology monitoring locations on Mill Creek sampled spring 2024 and autumn 2025

Site Code	Site Name	Site Type	Latitude	Longitude	Justification
MCUP2	Mill Creek further upstream of MCUP	Reference / upstream	-34.05257°	150.97018°	To provide an additional control site. New site established and first sampled in spring 2023.
MCUP	Mill Creek upstream of duck pond	Reference / upstream	-34.05112°	150.96669°	Previous monitoring undertaken in autumn 2015. Reference site required for assessment of impacts.
MC0	Mill Creek downstream of proposed GO facility	Impact / downstream	-34.04052°	150.96313°	Future impact site to determine potential impacts from the proposed GO facility. Currently baseline. New site established and first sampled in spring 2023.
MC1	Mill Creek immediately downstream of LHRRP	Impact / downstream	-34.03606°	150.96474°	Previous monitoring undertaken in autumn 2015. Downstream site for assessment of impacts.



Paper Size ISO A4
 0 0.1 0.2 0.3 0.4
 Kilometers

Map Projection: Transverse Mercator
 Horizontal Datum: GDA2020
 Grid: GDA2020 MGA Zone 56



Cleanaway Pty Ltd
 Lucas Heights Resource Recovery Park
 Aquatic Habitat Monitoring Plan

Project No. 12655144
 Revision No. 0
 Date 7/07/2025

Aquatic monitoring locations

FIGURE 2-1

2.2 Water quality sampling

2.2.1 *In situ* water quality analysis

Physico-chemical water quality parameters were measured *in situ* at each of the sampling sites in Table 2.1 using a YSI Pro Plus multi-parameter water quality meter. This meter was calibrated in accordance with Quality System/Quality Assurance (QS/QA) requirements and the manufacturer's specifications prior to its use in the field. Turbidity was measured *in situ* using a WTW Turb 430 IR portable turbidity meter.

In situ physico-chemical measurements recorded included:

- Temperature (°C)
- pH (pH units)
- Electrical conductivity (EC) (µS/cm)
- Dissolved oxygen (DO) (mg/L and % saturation)
- Turbidity (NTU)

2.2.2 Laboratory water quality analysis

Water quality samples were collected from the monitoring locations in Table 2.1 prior to the collection macroinvertebrate samples. Disposable nitrile gloves were worn to prevent sample contamination and for staff safety.

Samples requiring analysis of dissolved metals were field filtered using a high volume 0.45 micrometre (µm) filter prior to collection in the sample bottle.

Chemical analyses in Table 2.2 were performed by a National Association of Testing Authorities (NATA) accredited laboratory. Laboratory certificates of analysis (COAs) are presented in Appendix A.

Table 2.2 *Analytical testing - water quality*

Category	Analytes
Metals (dissolved and total)	Aluminium, arsenic, barium, beryllium, boron, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, nickel, zinc.
Anions	Chloride, sulfate, alkalinity, fluoride.
Cations	Calcium, magnesium, potassium, sodium.
Nutrients	Total nitrogen, nitrate, nitrite, nitrate + nitrite (NO _x), Total Kjeldahl Nitrogen (TKN), ammonia, total nitrogen (TN), total phosphorus (TP), reactive phosphorous (RP).
Other	Total dissolved solids (TDS), dissolved organic carbon (DOC), total suspended solids (TSS), water hardness, pH, EC.

2.3 Macroinvertebrates

2.3.1 Sample collection

Field sampling followed Rapid Bio assessment (RBA) protocols in accordance with the NSW Australian River Assessment System (AUSRIVAS) Sampling and Processing Manual (Turak *et al.* 2004). The AUSRIVAS program is a nationally recognised, standardised sampling protocol used to assess the health of Australian Rivers and was developed for Australia's National River Health Program.

Sampling was conducted using a standard ISO 7828 (1983) design sweep-net with 250 µm mesh. The net was washed thoroughly between each sample to remove any retained invertebrates to prevent cross-site contamination.

A single macroinvertebrate sample was collected from edge habitat at each site in each sampling event. Edge habitat is defined as areas of little or no flow within 0.5 m of the bank including backwaters (Turak *et al.* 2004). Areas of detritus, overhanging vegetation and roots, snags and macrophytes (aquatic plants) are targeted microhabitats within edge habitat. Sampling of the edge habitat was undertaken by sweeping the net in an upwards direction, perpendicular to the bank. This process was continued, working upstream over approximately 10 m of edge, which was not necessarily continuous.

For each RBA sample, the collected material was placed into a sorting tray and macroinvertebrates picked for a minimum of 40 minutes by experienced aquatic ecologists using forceps and pipettes. If new taxa were found between 30 and 40 minutes, sorting continued for a further 10 minutes. This processing cycle was continued up to a total maximum picking time of 1 hour.

The objective of the RBA sorting protocol is to obtain a sample containing as diverse a community as possible (and hence provide a useful measure of taxa richness). Attempts were made to collect all taxa (meaning macroinvertebrate families or other groups) present in the sample, including rare or cryptic taxa. Samples were preserved in 70 percent methylated spirits and clearly labelled with information including site, habitat, sampling method, date and sampler.

2.3.2 Laboratory processing and identification

Macroinvertebrates were examined in GHD's macroinvertebrate laboratory using Leica MZ 9.5 stereo-dissection microscopes with planachromat objectives and zoom capability between 6.3-60x. Animals were identified using published and working taxonomic keys.

Most macroinvertebrates were identified to family level with some exceptions following standard conventions of the NSW AUSRIVAS sampling and processing manual (Turak *et al.* 2004). Chironomidae (Diptera) were identified to sub-family (e.g. Orthocladiinae, Chironominae, and Tanypodinae). Groups such as Nematoda, Oligochaeta and Acarina were identified to class or order level in accordance with accepted convention. Microcrustacea (Ostracoda, Copepoda and Cladocera) were also identified to the class/order level.

Upon completion of identification, all samples were returned to 100% ethanol for long-term archiving. Archived samples are retained for the life of the project. Reference specimens will remain the property of GHD.

2.4 Habitat assessment

Observations were collected at each site based on visual estimates of characteristics such as:

- Streambed composition (percentage of total composition for each substrate category)
- Aquatic and riparian vegetation cover and shading
- Percentage cover of instream organic material
- Types of instream habitat (e.g. large woody habitat)
- Wetted width and depth

The assessment also included sketches of the longitudinal and cross-sectional profiles of the assessed river reach with the location of macroinvertebrate and *in situ* water quality sampling indicated, along with approximate height of banks and riparian vegetation. Photographs and GPS coordinates were also collected at each site.

Assessment of the condition of the aquatic habitat was also conducted using the Riparian, Channel, and Environment (RCE) inventory (Peterson 1992). RCE provides a standardised approach to assess the adjacent land, condition of the banks, channel and bed using 13 indicators. The RCE Inventory has been modified by Chessman *et al.* (1997) to suit Australian conditions. The scoring system has been simplified to a range of 0 to 4 for each descriptor with 0 indicating the poorest condition. The total score is derived by summing the scores for each descriptor. Scores can be expressed as a percentage of the maximum score of 52. A score of 52 would indicate completely natural / unmodified conditions of the waterway and associated riparian vegetation.

2.5 Data analysis and guideline values

2.5.1 Water quality

Water quality results were compared to the Australian and New Zealand Guidelines for Fresh and Marine Water Quality. The following default guideline values (DGVs) were used to assess water quality:

- DGV ranges for physical and chemical stressors outlined in Table 3.3.2 of the ANZECC (2000a) guidelines
- DGV ranges for conductivity (EC) and turbidity outlined in Table 3.3.3 of the ANZECC (2000a) guidelines
- DGV ranges for TSS outlined in Table 8.2.12 of the ANZECC (2000b) guidelines – Volume 2
- Toxicant DGVs for protection of 95 percent of freshwater species as outlined in ANZG (2018)
- Recently published DGVs for nitrate, for protection of 95 percent of freshwater species, outlined in ANZG (2025)

The ANZECC (2000a) and ANZG (2018) DGVs relevant to the project are presented in Table 2.3 below. It is noted that these DGVs are not intended as performance criteria. Exceedance of these DGVs should trigger further investigation into the likely cause, and assessment of monitoring results based on a weight of evidence approach as recommended by ANZG (2018).

The toxicant DGVs represent the thresholds above which biological effects to aquatic organisms (including aquatic macroinvertebrates) are possible. Dissolved metal and metalloid concentrations are more applicable for comparison to the DGVs than total metals, as they are more representative of the bioavailable fractions of metals and metalloids within the water. Therefore, it is recommended that only metal and metalloid results be compared to the DGVs. Hardness modified guideline values (HMGVs) are applicable to dissolved cadmium, lead, nickel and zinc concentrations in water samples with a water hardness greater than 30 mg/L (as CaCO₃). When the dissolved concentrations of these metals exceeded the DGV, HMGVs were calculated using the algorithms presented in Table 3.4.3 of ANZECC (2000a) and the water hardness values observed during the corresponding sampling event in 2023. Toxicant DGVs are also identified in ANZG (2018) for ammonia, nitrate and fluoride.

The ANZECC (2000a) stressor DGVs for physicochemical parameters, total nitrogen, nitrate + nitrite, reactive phosphorus and total phosphorus indicate potentially adverse conditions that may put stress on aquatic ecosystems. However, the potential for adverse outcomes, such as algal blooms or excessive macrophyte growth, depends on site-specific or catchment factors such as the background lithology and environmental conditions.

Water quality results from downstream sites were also compared to the concentration limits (100th percentile) prescribed by EPL 5065 for overflow quality monitoring – MC1 (EPA point 1), as presented in Table 2.3. These EPL limits are presented in this report to identify where water quality in Mill Creek may be outside of the ANZECC (2000a) stressor DGVs due to current site activities.

Table 2.3 DGVs applicable to Mill Creek sites and EPL 5065 point 1 (MC1) concentration limits

Parameter	Units	ANZECC (2000) / ANZG (2018) DGV	EPL 5065 point 1 (MC1) limit
Physical and chemical stressors			
EC	µS/cm	2200	1500
pH	pH units	6.5-8.5	5.5-8.5
DO	% saturation	85-110	-
DO	mg/L	-	6
TSS	mg/L	50	50
Turbidity	NTU	50	-
Nitrate + nitrite	mg/L	0.04	-
Total nitrogen	mg/L	0.35	-
Total phosphorus	mg/L	0.025	-
Reactive phosphorus	mg/L	0.02	-

Parameter	Units	ANZECC (2000) / ANZG (2018) DGV	EPL 5065 point 1 (MC1) limit
Toxicants			
Aluminium	mg/L	0.055	-
Arsenic	mg/L	0.013	-
Boron	mg/L	0.94	-
Cadmium	mg/L	0.0002	-
Chromium (III+VI)	mg/L	0.001	-
Cobalt *	mg/L	0.0014	-
Copper	mg/L	0.0014	-
Lead	mg/L	0.0034	-
Manganese	mg/L	1.9	-
Mercury	mg/L	0.0006	-
Nickel	mg/L	0.011	-
Selenium	mg/L	0.011	-
Zinc	mg/L	0.008	-
Ammonia as N	mg/L	0.9	2.5
Nitrate	mg/L	2.6 (hardness 30-150 mg/L) 29.0 (hardness > 150 mg/L)	-
Fluoride	mg/L	1.7	-

* DGV is an interim value with unknown level of species protection

2.5.2 Macroinvertebrates

Univariate metrics

The following metrics have been calculated to allow for assessment of macroinvertebrate community health:

- Taxa richness
- EPT richness
- SIGNAL-2

Taxa richness

Taxonomic richness refers to the number of different taxa contained in a sample identified to family level, apart from certain taxa which were identified to order/class only (e.g., Oligochaeta) or to sub-family (i.e., members of the family Chironomidae). Rare and common taxa are considered equally, as richness does not take abundance into account.

EPT richness

The EPT richness is the number of collected families belonging to the Ephemeroptera (mayflies), Plecoptera (stoneflies) and Trichoptera (caddisflies) orders. These groups of macroinvertebrates have been found to be particularly sensitive to changes in their environment (Karr and Chu 1999) and, therefore, can be used to assess impacts due to chemical and physical changes (Plafkin *et al.* 1989).

SIGNAL-2

SIGNAL-2 (Stream Invertebrate Grade Number – Average Level) (Chessman 2003) is a simple scoring system for macroinvertebrates of Australian rivers. SIGNAL-2 is a biotic index based on pollution sensitivity values (grade numbers) assigned to aquatic macroinvertebrates that have been derived from published and unpublished information on their tolerance to pollutants, such as sewage, salinity and nitrification.

Macroinvertebrates are assigned a grade between 1 (most tolerant) and 10 (most sensitive) and grades have been calculated for both the Order and Family taxonomic levels. Families in a sample that have not been assigned a grade are excluded from the analysis and the total number of families that have a SIGNAL-2 grade is the SIGNAL-2 richness. Animals that could not be identified to the target level (e.g. family) due to damage or immaturity are excluded from this analysis to avoid “double counting”. The overall SIGNAL-2 score for each site is calculated by the sum of the SIGNAL-2 grade for each taxon within a sample divided by the SIGNAL-2 richness.

NSW AUSRIVAS Model

NSW AUSRIVAS Models provide a river health assessment based on predictive models of macroinvertebrate distribution. Physical and/or chemical data collected at a site (e.g. altitude, distance from source, or the percentage coverage of bedrock or cobble substrate) is used to determine the predicted (expected) composition of the macroinvertebrate fauna if the site is in an undisturbed or reference condition. The AUSRIVAS assessment compares the macroinvertebrates collected at a site (Observed) to those predicted to occur (Expected) and the ratio derived indicates the band assessment of the sample data and an assessment of the departure of the community from reference conditions. The resulting statistic is known as the O/E50 and expresses the ratio of observed taxa to those expected (i.e. those with a 50% or greater probability of being collected), given the physical / chemical input variables.

The NSW combined-season eastern edge model was used for all sites, which utilises the macroinvertebrate results collected from each site in spring 2023 and autumn 2024 collectively. The upper limits for the AUSRIVAS model are provided in Table 2.4, along with the AUSRIVAS band labels, names and descriptions.

Rainfall data required for the AUSRIVAS environmental variables input file were obtained from the Lucas Heights (ANSTO) BOM station (66078) (BOM 2025), which is the nearest active weather station with long-term data.

Table 2.4 NSW combined-season eastern edge AUSRIVAS bands and descriptions

Band Label	Upper Limit (O/E50)	Band Name	Band Description
Band X	Infinity	More biologically diverse than reference sites	More taxa found than expected. Potential biodiversity hot-spot. Possible mild organic enrichment.
Band A	1.17	Reference condition	Most/all of the expected families found. Water quality and/or habitat condition roughly equivalent to reference sites. Impact on water quality and habitat condition does not result in a loss of macroinvertebrate diversity.
Band B	0.82	Significantly impaired	Fewer families than expected. Potential impact either on water quality or habitat quality or both, resulting in loss of taxa.
Band C	0.48	Severely impaired	Many fewer families than expected. Loss of macroinvertebrate biodiversity due to substantial impacts on water and/or habitat quality.
Band D	0.14	Extremely impaired	Few of the expected families remain. Extremely poor water and/or habitat quality. Highly degraded.

Multivariate metrics

Multivariate analysis was conducted to identify spatial and temporal trends in macroinvertebrates. Multivariate analysis allows comparisons between sites based upon macroinvertebrate community composition. A Classification/Hierarchical agglomerative clustering analysis was performed using PRIMER 7 (Clarke and Gorley 2015) statistical analysis software.

Initially, the data were transformed to presence/absence as the AUSRIVAS sampling protocol is not a quantitative technique. Bray-Curtis was the resemblance measure used to derive the resemblance matrix between samples, which are suitable for biological data (Bray and Curtis 1957).

Classification or cluster analysis is a mathematical method of grouping entities according to the relative similarity of their attributes. In an ecological setting these techniques can be used to group sites according to how similar their macroinvertebrate community is. This technique is used to identify if there are differences in the macroinvertebrate communities between sites or between sampling events. Cluster analysis was used to analyse the spring 2024 and autumn 2025 data.

A non-metric Multi-Dimensional Scaling (nMDS) ordination was also produced to identify temporal and spatial trends in macroinvertebrate community composition in samples collected between spring 2023 and autumn 2025. A nMDS ordination provides a graphical representation of the relative similarity of entities (i.e. samples) based on their attributes (i.e. macroinvertebrate community composition) within a reduced dimensional space. The more similar samples are to each other, the closer they are located within the ordination space. The nMDS ordination was also performed on Bray-Curtis similarity coefficients. The 2-dimensional ordination has been displayed as this is more easily interpreted than the 3-dimensional plot. To determine if the 2-dimensional ordinations accurately represent patterns amongst the samples, the stress levels associated were considered. The stress level is a measure of the distortion produced by compressing multi-dimensional data into a reduced set of dimensions and would increase as the number of axes (i.e. dimensions) is reduced. If the stress is greater than 0.2, the MDS ordination must be interpreted with caution as the true pattern is not well represented in the 2-dimensional plot.

2.6 Quality assurance

In accordance with GHD's Quality Assurance (QA) protocol, one duplicate water sample was collected per monitoring event, at the same time / location as the collection of the primary samples. The collection of duplicate water samples allows for the assessment of the potential level of uncertainty associated with natural variability, sampling method, preservation, or laboratory analysis. The results of the duplicate samples for spring 2024 and autumn 2025 are presented in Appendix B.

One macroinvertebrate sample was reanalysed by a different GHD taxonomist to check the accuracy of identification, the results of which are presented in Appendix C.

3. Results

3.1 Environmental conditions

Daily rainfall as recorded by the Lucas Heights (ANSTO) BOM station (66078) (BOM 2025) is presented in Figure 3.1.

In the 30 days prior to the spring 2024 sampling event (26 November 2024), 48.7 mm of rainfall was recorded, of which 2.8 mm was recorded in the seven days prior to sampling. No rainfall was recorded during sampling.

In the 30 days prior to the autumn 2025 sampling event (15 and 16 May 2025), 61.9 mm of rainfall was recorded, of which 3.6 mm was recorded in the seven days prior to sampling. Between the sampling of the downstream sites on 15 May and the sampling of the upstream sites on 16 May, 13.6 mm of rainfall was recorded.

The largest daily rainfall volume during the monitoring period was recorded on 23 May 2025, during which 94.2 mm was recorded. This rainfall occurred seven days after the completion of sampling in autumn 2025.

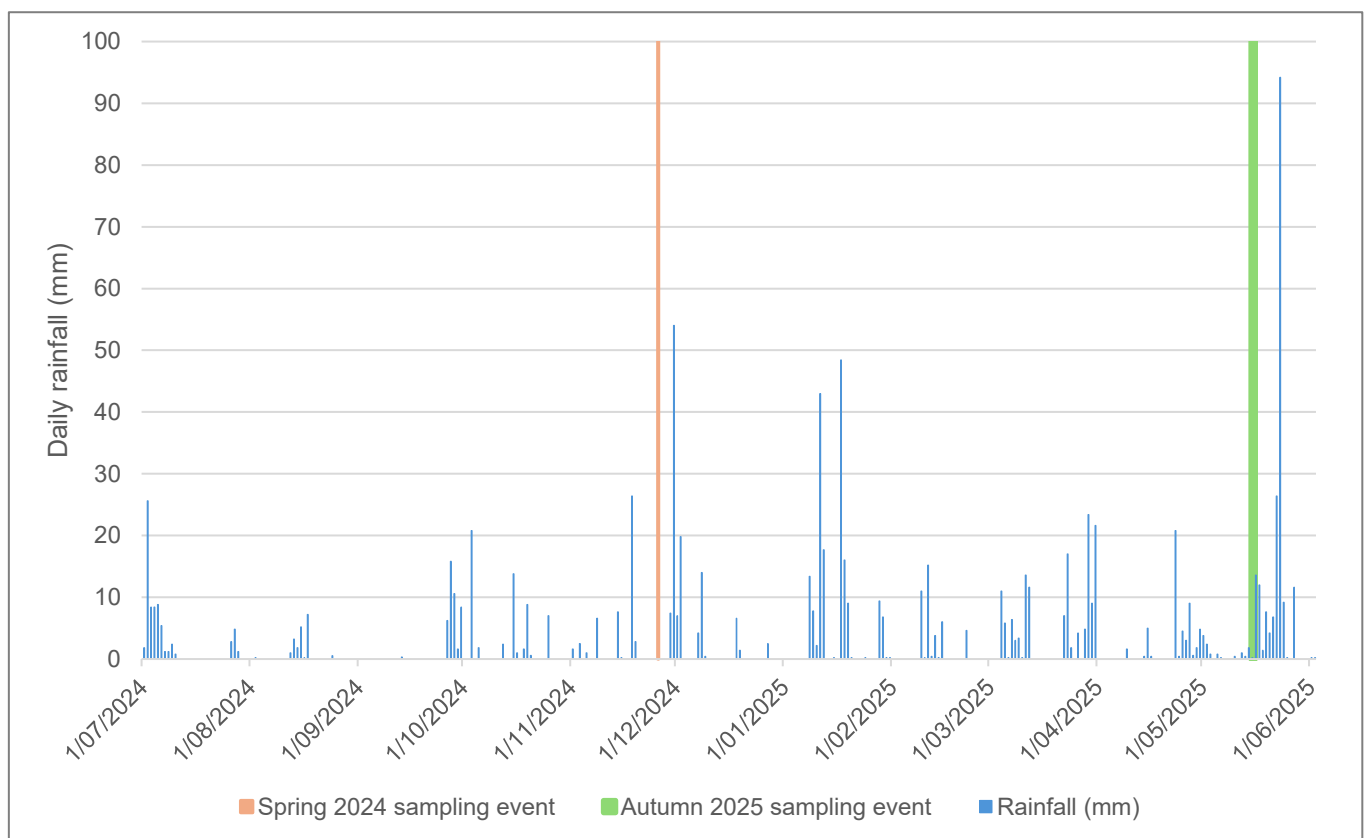


Figure 3.1 Daily rainfall at Lucas Heights, July 2024 to May 2025

3.2 Site condition and habitat assessment

3.2.1 MCUP2 habitat summary

MCUP2 is the farthest upstream site sampled in this program, and was first sampled in spring 2023. MCUP2 is located to the far south of LHRRP, approximately 100 metres from Heathcote Road and 150 metres from New Illawarra Road. The riparian zone at MCUP2 is relatively undisturbed on the left bank, and extends without breaks in vegetation to Heathcote Road. On the right bank, the riparian vegetation is only approximately 10 metres wide, with a cleared grassland beyond this point. The majority of the canopy cover at MCUP2 was shrubby *Banksia ericifolia* (heath banksia), approximately 10 metres tall. Other riparian vegetation included *Melaleuca hypericifolia* (hillock bush), *Casuarina cunninghamiana* (river she-oak), *Kunzea ambigua* (tick bush) and *Gahnia clarkei* (tall saw-sedge). Increasing coverage of weeds were also observed at MCUP2, including *Lantana camara* and *Ageratina adenophora* (crofton weed).

The reach at MCUP2 consists of a narrow channel, which was dry in several places during site reconnaissance in spring 2023, and a wide, marshy section, in which the macroinvertebrate samples have been collected for the past four monitoring events. Within this wide, marshy section there is a narrower, bedrock-confined section along the left bank, which contained the majority of the water present in spring 2024. The wetted width of the reach was between three (spring 2024) and 20 metres (autumn 2025), and water was approximately 0.2 metres deep. Instream habitats sampled in both spring 2024 and autumn 2025 consisted of a variety of macrophytes, including *Juncus* sp. (rushes), *Cyperus* sp. (sedges), *Baumea articulata* (jointed twig rush) and *Persicaria* sp. (knotweed), and emergent terrestrial grasses growing within the channel, along with algae that was present in spring 2024 only. The substrate was primarily silt/mud, except for in the confined bedrock section of the channel.

Spring 2024	Autumn 2025
	
Within the channel at MCUP2, facing upstream, showing emergent grasses and <i>Banksia ericifolia</i> in the riparian zone.	Looking upstream, showing dense <i>Juncus</i> sp. and grasses within the channel.
	
Pool within the bedrock confined section of the channel, facing downstream, showing knotweed and other macrophytes.	Pooled water within the dense macrophytes, within the marshy channel of the reach.

3.2.2 MCUP habitat summary

MCUP is located to the south of and adjacent to the LHRRP, approximately 70 metres from Heathcote Road. Vegetation at MCUP is approximately eight to 10 metres wide on the left bank, and 10 to 14 metres wide on the right bank. Beyond the riparian vegetation on both banks are cleared areas of grass, with the landfill area beyond this on the right bank. The vegetation within the riparian zone at MCUP consists of a wide variety of native trees, shrubs and grasses. The majority of the canopy cover at MCUP was *Casuarina cunninghamiana*, approximately eight metres tall. Other riparian vegetation included *Banksia* spp., *Melaleuca hypericifolia*, *Callistemon* sp. (bottlebrush), *Kunzea ambigua*, *Acacia decurrens* (green wattle) and *Gahnia clarkei*. No weeds were observed within the reach at MCUP.

The reach at MCUP consists of a deep channel, approximately three metres wide and one metre deep, and a shallower backwater section approximately 0.2 metres deep. Instream habitats sampled in both spring 2024 and autumn 2025 consisted primarily of a variety of macrophytes, including *Schoenoplectiella mucronata* (bog bulrush), *Juncus* sp. (rushes), and *Persicaria* sp. (knotweed), most of which were found in the backwater, as well as trailing *Juncus* sp. along the edges of the channel, and some submerged branches and sticks. The substrate consisted of unconsolidated, soft silt.

The water was visibly turbid in autumn 2025.

Spring 2024	Autumn 2025
 Looking downstream in the channel, showing trailing <i>Juncus</i> sp. and submerged woody habitat within the channel, and flowering <i>Callistemon</i> sp.	 Looking downstream in the channel, showing trailing <i>Juncus</i> sp. and submerged woody habitat within the channel, and turbid water.
 Looking upstream through the backwater, showing emergent macrophytes (primarily <i>Schoenoplectiella mucronata</i>).	 Looking upstream through the backwater, showing emergent macrophytes and grasses.

3.2.3 MC0 habitat summary

MC0 is a newly established site first sampled in spring 2023. MC0 is located on the western side of and directly adjacent to the LHRRP. The riparian zone has been highly modified, resulting in little remaining riparian vegetation and minimal shading of the channel. There is vegetation at MC0 approximately 120 to 150 metres wide beyond the left bank, and consists of *Casuarina cunninghamiana*, *Banksia* spp. and *Eucalyptus* spp, although the vegetation does not reach to the channel due to fencing. Vegetation on the right bank is sparse and mostly cleared, and consists mostly of weeds and grasses, primarily *Senecio* (fireweed), with some sparse native shrubs.

The reach at MC0 consists of a shallow channel, approximately two to three metres wide, with water only approximately 0.1 metre deep. Much of the channel is reinforced with concrete, although concreted sections were not sampled for macroinvertebrates. There is also a secondary drainage channel that runs along the right bank of the site, parallel to the main channel. Instream habitats at MC0 were limited, consisted primarily of algae in both sampling events. The substrate at MC0 site was bedrock, with some sand deposits, although some cobbles and pebbles were present in the upstream section of the reach, although water levels in these areas were too shallow for sampling.

Spring 2024	Autumn 2025
 The majority of the pooled water at MC0, with some algae and trailing vegetation on the edges, looking downstream.	 Looking upstream in the channel, showing complete coverage of green filamentous algae.
 Looking downstream in the concreted section of the reach, showing very shallow water (and red-bellied black snake).	 Looking downstream at MC0 showing some open water with accumulated algae along the margins and substrate.

3.2.4 MC1 habitat summary

MC1 is located on the northwestern corner of the LHRRP within an area of native vegetation, downstream of all other sites. MC1 is located downstream of sediment dams and drainage channels that collect runoff from the LHRRP. There was no flow observed from these channels or dams into the creek observed during the spring 2024 or autumn 2025 monitoring events.

The riparian zone at MC1 is mostly undisturbed, with the exception of a small amount of clearing that has been conducted historically where groundwater monitoring bores have been installed. The majority of the canopy cover at MCUP was *Eucalyptus* spp. up to 30 metres tall. Other riparian vegetation included a wide variety of native tree, shrub and grass species, including a variety of *Eucalypt* species, *Banksia ericifolia*, *Banksia serrata*, *Callistemon* sp., *Hakea gibbosa* (rock needlebush), *Leptospermum* spp. (tea trees), *Lambertia formosa* (mountain-devil), *Acacia longifolia* (Sydney golden wattle), *Xanthorrhoea* sp. (grass tree), *Telopea speciosissima* (waratah) and *Gahnia clarkei*. Weeds observed include *Gomphocarpus fruticosus* (milkweed) and *Ageratina adenophora*.

The reach at MC1 consists of a deep channel, approximately seven metres wide and over one metre deep at its deepest point. Downstream of this channel is a shallow area of bedrock with a series of cascades. Water levels at MC1 in spring 2024 and autumn 2025 were low, with very little flow connecting the sampled pool to the downstream environment past the bedrock outcrop. Instream habitat sampled in both spring 2024 and autumn 2025 consisted primarily of trailing *Juncus* sp., *Gahnia* and other grasses, macrophyte *Schoenoplectiella mucronata* and submerged woody habitat (sticks and branches). In autumn 2025, lower water levels meant that much of this trailing vegetation was above the water line. In spring 2024, there was algae growth on the instream habitats as well as in the shallow bedrock sections of the reach. The substrate was mostly bedrock, although there was an accumulation of unconsolidated silt in the sampled pool.

Spring 2024	Autumn 2025
 Looking upstream in the channel at MC1, showing trailing <i>Juncus</i> sp. and grasses, and submerged woody habitat	 Looking upstream from the shallow bedrock section, showing trailing <i>Gahnia</i> sp. and grasses, submerged woody habitat, and lower water levels.
 Looking downstream over the bedrock outcrop in spring 2024, with minimal flow connectivity and algae growth	 Looking downstream over the bedrock outcrop in autumn 2025, with minimal flow connectivity

3.2.5 RCE inventory

Average RCE scores for each site from spring 2024 and autumn 2025 are presented in Table 3.1.

RCE scores were highest at downstream site MC1, primarily due to its location within an area of undisturbed native vegetation, and generally reduced growth of algae or dense macrophytes. Scores at MC1, however, were reduced from the maximum due to the accumulation of deep, soft, silty sediment which had blanketed the substrate at MC1. RCE scores were lowest at MC0 (though only slightly lower than MCUP), largely due to its proximity to the landfill area, disturbance to the riparian zone, and lack of any detritus or retention devices (logs and other woody debris) in the channel.

Moderate RCE scores were recorded at the two upstream sites (MCUP2 and MCUP). These sites were characterised by riparian vegetation being in a generally good condition, although narrower than that observed at MC1. At MCUP2, the score was reduced due to the wide, shallow nature of the channel, and by an overgrowth of dense macrophytes, although the highly vegetated channel meant the substrate was stable. In contrast, scores at MCUP were reduced due to the accumulation of soft silt on the substrate, but increased by the very deep channel form.

RCE scores were generally similar at all sites in the spring 2024 to autumn 2025 period, when compared to the spring 2023 to autumn 2024 period. Scores at the upstream sites (MCUP2 and MCUP) were slightly lower in the 2024-2025 period (compared to the 2023-2024 monitoring period) primarily due to reduced presence of retention devices (logs) within the channel, and at MCUP2, the accumulation of additional loose sediments.

Table 3.1 *Average RCE scores from spring 2023 and autumn 2024 surveys*

Site	MCUP2	MCUP	MC0	MC1
Category				
1. Land use pattern beyond immediate riparian zone	2	2	1	3
2. Width of riparian strip of woody vegetation	3	3	2	4
3. Completeness of riparian strip of woody vegetation	3	2	1.5	3
4. Vegetation of riparian zone within 10 m of channel	3	4	3	4
5. Stream bank structure	3	3	4	3
6. Bank undercutting	4	3	4	3
7. Channel form	2	4	1.5	4
8. Riffle/pool sequence	2	2	1	2.5
9. Retention devices in stream	1	1.5	0	1.5
10. Channel sediment accumulations	1	0	3.5	1
11. Stream bottom	2	0	3	2.5
12. Stream detritus	2	2	1.5	2.5
13. Aquatic vegetation	1.5	2	2	3.5
RCE score	29.5	28.5	28	37.5
RCE percentage (%)	57%	55%	54%	72%

3.3 Water quality

The results of *in situ* and laboratory water quality analyses for samples collected in spring 2024 and autumn 2025 are presented in Table 3.2. Results have been compared to the ANZECC (2000) and ANZG (2018) DGVs (refer Section 2.5.1). Parameters measured at concentrations below the laboratory limit of reporting (LOR) at all sites have not been presented in Table 3.2. Laboratory COAs showing data for all measured parameters are provided in Appendix A.

Water temperature was warmer at all sites in spring 2024 than autumn 2025. Water was warmest at MC0 in both sampling events, although the spring 2024 result was much warmer than all other results. Water was coldest at upstream sites MCUP2 and MCUP in both sampling events, although, in autumn 2025, the water temperature was only slightly warmer at MC1 than MCUP2.

EC results were below the DGV at all sites in both spring 2024 and autumn 2025. EC in spring 2024 was highest at MC0, and in autumn 2025 was equally high at MC0 and MC1. EC results were lowest at upstream site MCUP2 in both spring 2024 and autumn 2025. EC results were similar between the sampling events at all sites except MC0, where the spring 2024 result was notably higher.

pH results were within the DGV range at all sites except for MC0 in both sampling events, where the pH was above the upper DGV. In both spring 2024 and autumn 2025, pH results were lowest at upstream site MCUP2. pH results at all sites were similar between the sampling events.

DO saturations were within the DGV range at MC0 only in both sampling events, and were below the lower DGV at all other sites. DO saturations were lowest in both sampling events at upstream site MCUP2, at which the DO saturation was at a hypoxic level (below 30 percent saturation). The DO saturation was also at a hypoxic saturation at MCUP in spring 2024. DO results at all sites were higher in autumn 2025 than in spring 2024.

The turbidity result at MCUP in autumn 2025 exceeded the DGV. All other turbidity results were below the DGVs, with the autumn 2025 turbidity results at all sites except MCUP particularly low. TSS results were also low in most samples, although the MCUP autumn 2025 result was equal to the DGV.

Water hardness was highest in both sampling events at MC0, and was higher in spring 2024 than autumn 2025 at all sites except MC1. Concentrations of all major ions were highest at either MC0 or MC1 in both spring 2024 and autumn 2025, except for bicarbonate alkalinity. Bicarbonate alkalinity was highest at MCUP in spring 2024 and similarly high at MC1 and MCUP in autumn 2025. All major ions were lowest at MCUP2 in both sampling events, except for potassium in autumn 2025, which was lowest at MC0.

The piper plot in Figure 3.2 displays the relative cation and anion composition of water samples. The ionic composition of water was consistent between most sites, with all results indicating a mixed calcium/sodium cation composition. Results at MCUP2, MCUP and MC1 had a mixed bicarbonate/chloride anion composition, while at MC0, sulfate was the dominant anion. Ionic composition was mostly consistent between the sampling events, although there was more dominance of the chloride ion at MCUP2 and MC0 in autumn 2025 compared to spring 2024.

Concentrations of most dissolved metals were low at all Mill Creek sites during the monitoring period, with most results below the DGVs, and many metals not observed in concentrations above the LORs at any site (refer Appendix A for metals observed below the LOR at all sites). Exceedances of the DGVs for dissolved metals were isolated instances only during the spring 2024 to autumn 2025 monitoring period.

The dissolved aluminium concentration exceeded the DGV at upstream site MCUP2 in spring 2024 only, and this value was more than double that recorded at other sites. The aluminium concentration in autumn 2025 was also highest at MCUP2, although the result was below the DGV. The concentration of dissolved copper exceeded the DGV at MC1 in spring 2024 only. All other dissolved copper concentrations were equal to or below the LOR. The dissolved zinc concentration at MCUP2 exceeded the DGV in autumn 2025 only. However, the exceedance was below the calculated HMGV (refer Table 3.3), indicating that the hardness of the water at MCUP2 ameliorated the potential toxicity of the elevated zinc concentration.

Concentrations of all other dissolved metals were below the respective DGVs at all sites in both sampling events. Dissolved iron concentrations in both sampling events were highest at upstream site MCUP2, and were lowest (and below the LOR) at downstream sites MC0 and MC1. Dissolved manganese concentrations were highest at upstream site MCUP, and were again lowest in both sampling events at MC0 and MC1. Concentrations of all other metals were similar between the sites, or indicated no clear spatial or temporal patterns.

Nutrient concentrations were generally elevated in Mill Creek during the monitoring period, with several exceedances of the DGVs observed. Concentrations of NO_x exceeded the DGV at downstream site MC1 in both sampling events, and at MCUP in autumn 2025 only, with the MC1 spring 2024 result the highest of all NO_x concentrations observed during the monitoring period. NO_x was composed primarily of nitrate in all samples, except at MC1 in spring 2024, where nitrite was observed in a concentration higher than the LOR. All nitrate concentrations were below the relevant DGV.

TN concentrations exceeded the DGV at all sites in both sampling events, except for at MC0 in autumn 2025. TN concentrations were lowest at MC0 in both sampling events, and were highest in spring 2024 at MC1, and in autumn 2025 at MCUP2. Similarly, TP concentrations exceeded the DGV at all sites in both sampling events, except for at MC0 in spring 2024. TP concentrations were highest in both sampling events at MCUP2.

There was no exceedance of the toxicant DGV for ammonia at any Mill Creek site in either spring 2024 or autumn 2025. Ammonia concentrations showed no clear pattern, with the highest results in spring 2024 observed at upstream site MCUP, and the highest concentration in autumn 2025 at downstream site MC1.

DOC concentrations in both sampling events were highest at MCUP2 and lowest at MC1. Fluoride concentrations in Mill Creek were low, with results from all samples below the DGV.

Table 3.2 Mill Creek water quality results, spring 2024 and autumn 2025

Analyte	Unit	LOR	Spring 2024				Autumn 2025				DGV
			Upstream		Downstream		Upstream		Downstream		
			MCUP2	MCUP	MC0	MC1	MCUP2	MCUP	MC0	MC1	
Date			26/11/24	26/11/24	26/11/24	26/11/24	16/05/25	16/05/25	15/05/25	15/05/25	
Time			07:15	08:40	10:10	11:40	07:30	09:15	14:00	14:50	
Physicochemical parameters											
Temperature^	°C	0.1	19.1	21.0	28.6	22.6	14.8	15.6	18.0	15.9	NA
EC^	µS/cm	1	196	523	771	499	192	462	548	548	2,200
pH^	pH unit	0.1	6.7	7.5	9.0	8.3	6.6	7.4	9.4	8.0	6.5-8.5
DO^	% sat.	0.1	9.0	16.4	100.3	48.9	17.2	38.6	108.5	58.7	85-110
DO^	mg/L	0.01	0.83	1.46	8.25	4.23	1.72	3.87	10.27	5.79	NA
Turbidity^	NTU	0.1	15.4	10.8	2.5	7.0	4.4	113.0	1.2	2.6	50
TDS	mg/L	1	163	260	409	251	128	310	336	308	NA
TSS	mg/L	1	18	<5	<5	5	15	50	<5	<5	50
Total hardness as CaCO ₃	mg/L	1	59	166	280	140	45	135	180	157	NA
Major ions											
Bicarbonate alkalinity as CaCO ₃	mg/L	1	60	133	110	107	39	110	56	112	NA
Total alkalinity as CaCO ₃	mg/L	1	60	133	110	107	39	110	56	112	NA
Sulfate as SO ₄	mg/L	1	8	32	213	48	4	22	116	55	NA
Chloride	mg/L	1	18	63	57	54	31	65	60	69	NA
Calcium	mg/L	1	17	50	79	38	13	41	49	43	NA
Magnesium	mg/L	1	4	10	20	11	3	8	14	12	NA
Potassium	mg/L	1	4	6	5	9	7	7	3	8	NA
Sodium	mg/L	1	12	38	50	40	17	40	43	48	NA

Analyte	Unit	LOR	Spring 2024				Autumn 2025				DGV
			Upstream		Downstream		Upstream		Downstream		
			MCUP2	MCUP	MC0	MC1	MCUP2	MCUP	MC0	MC1	
Dissolved metals											
Aluminium	mg/L	0.01	0.07	<0.01	0.02	0.03	0.04	0.02	<0.01	0.02	0.055
Barium	mg/L	0.001	0.027	0.098	0.048	0.067	0.020	0.075	0.036	0.089	NA
Boron	mg/L	0.05	0.06	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.94
Cobalt	mg/L	0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.0014*
Copper	mg/L	0.001	<0.001	<0.001	<0.001	0.002	<0.001	0.001	<0.001	0.001	0.0014
Iron	mg/L	0.05	1.97	0.07	<0.05	<0.05	0.48	0.13	<0.05	<0.05	NA
Manganese	mg/L	0.001	0.192	0.246	0.018	0.034	0.047	0.072	<0.001	0.010	1.9
Nickel	mg/L	0.001	0.001	0.002	0.002	0.002	<0.001	0.001	<0.001	0.002	0.011
Zinc	mg/L	0.005	0.007	<0.005	<0.005	0.008	0.009	0.007	<0.005	<0.005	0.008
Nutrients											
Ammonia	mg/L	0.001	0.03	0.36	0.06	0.21	0.02	0.03	<0.01	0.55	0.9
Nitrite	mg/L	0.001	<0.01	<0.01	<0.01	0.10	<0.01	<0.01	<0.01	0.01	NA
Nitrate	mg/L	0.001	<0.01	0.03	<0.01	0.96	<0.01	0.14	0.04	0.56	2.6 / 29.0#
NO _x	mg/L	0.001	<0.01	0.03	<0.01	1.06	<0.01	0.14	0.04	0.57	0.04
TKN	mg/L	0.1	1.5	1.0	0.6	1.4	1.8	0.7	0.3	1.1	NA
TN	mg/L	0.1	1.5	1.0	0.6	2.5	1.8	0.8	0.3	1.7	0.35
TP	mg/L	0.001	0.07	0.04	<0.01	0.03	0.16	0.05	0.12	0.04	0.025
Other parameters											
DOC	mg/L	1	26	9	9	7	16	10	10	7	NA
Fluoride	mg/L	0.1	<0.1	0.2	0.1	0.3	<0.1	0.1	<0.1	0.1	1.7

Results highlighted in **yellow** are outside the DGVs.

NA = No guideline value applies.

* DGV is an interim value only

Results highlighted in **blue** exceed the DGV but are below the relevant HMGV.

[^] = result measured *in situ*.

[#] DGVs presented are for moderate hardness (30-150 mg/L) and hard (>150 mg/L) waters, respectively.

Table 3.3 HMGV for zinc at MCUP2 in autumn 2025 (all values in mg/L)

Site	Hardness	Observed concentration	HMGV	Result
MCUP2 (autumn 2025)	45	0.009	0.0113	No exceedance of HMGV

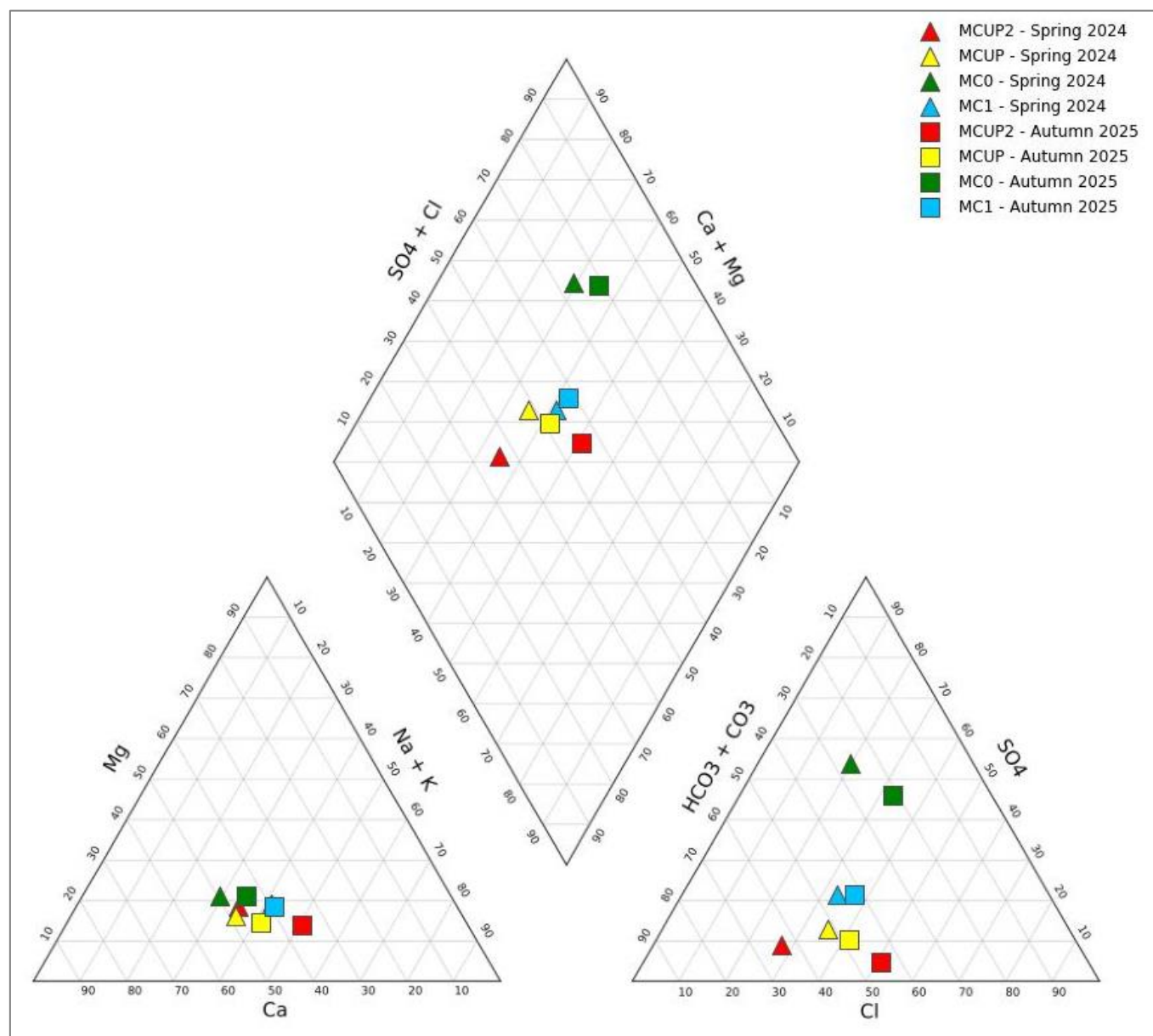


Figure 3.2 Piper plot demonstrating ionic composition of water in Mill Creek, spring 2024 and autumn 2025

3.4 Macroinvertebrates

3.4.1 Univariate analysis

Macroinvertebrate metrics results from samples collected in spring 2024 and autumn 2025 are presented in Figure 3.3 to Figure 3.5.

Taxa richness was highest in spring 2024 at downstream site MC1 (23 taxa) followed by upstream site MCUP (22 taxa), while in autumn 2025, taxa richness was highest at upstream site MCUP (23 taxa) followed by MCUP2 (19 taxa) (Figure 3.3). Taxa richness was lowest in both sampling events at downstream site MC0 (16 taxa). At upstream sites MCUP2 and MCUP, taxa richness was slightly higher in autumn 2025 than spring 2024 (one to two taxa higher), while at downstream site MC1, there were five fewer taxa collected in autumn 2025 compared to spring 2024. Taxa richness was equal between the sampling events at MC0.

EPT richness results were very consistent between the sampling events, with identical results observed between the sampling events at all sites (Figure 3.4). EPT richness was lowest at upstream site MCUP2 (one EPT taxon), moderate at MCUP and MC0 (two EPT taxa) and highest at downstream site MC1 (three EPT taxa).

In spring 2024, SIGNAL-2 scores were highest at MCUP2 (3.21), followed by MC1 (3.14), while in autumn 2025, SIGNAL-2 scores were highest at MC1 (3.31) followed by MCUP2 (3.25) (Figure 3.5). SIGNAL-2 scores were lower and similar at MCUP (2.95 and 2.80) and MC0 (3.00 and 2.92) in both sampling events. SIGNAL-2 scores at all sites were fairly consistent between the sampling events, although results at MCUP and MC0 were slightly higher in spring 2024, and results at MCUP2 and MC1 were slightly higher in autumn 2025. The SIGNAL-2 scores were below 3.5 at all sites in both sampling events, indicating a macroinvertebrate community comprising mostly pollution tolerant taxa.

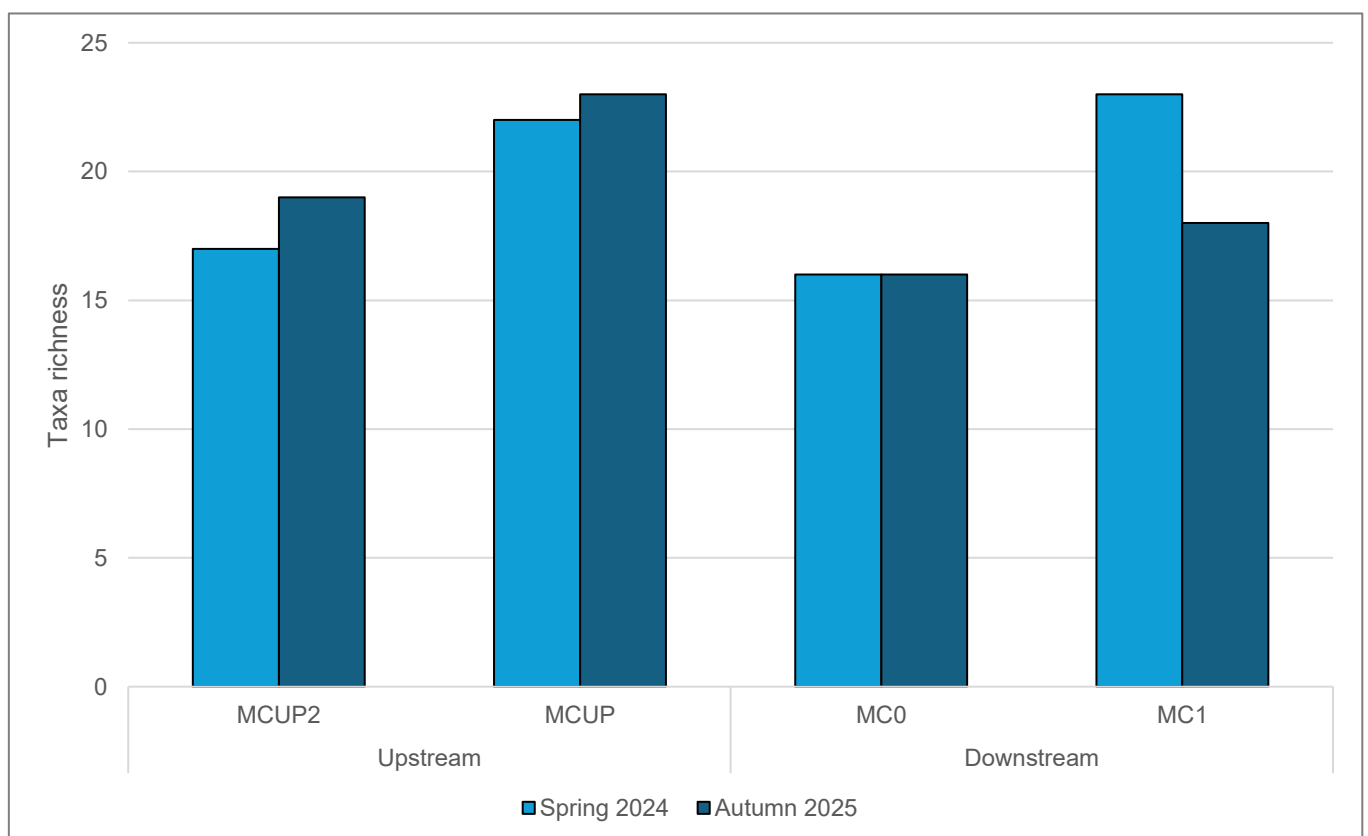


Figure 3.3 Taxa richness in Mill Creek, spring 2024 and autumn 2025

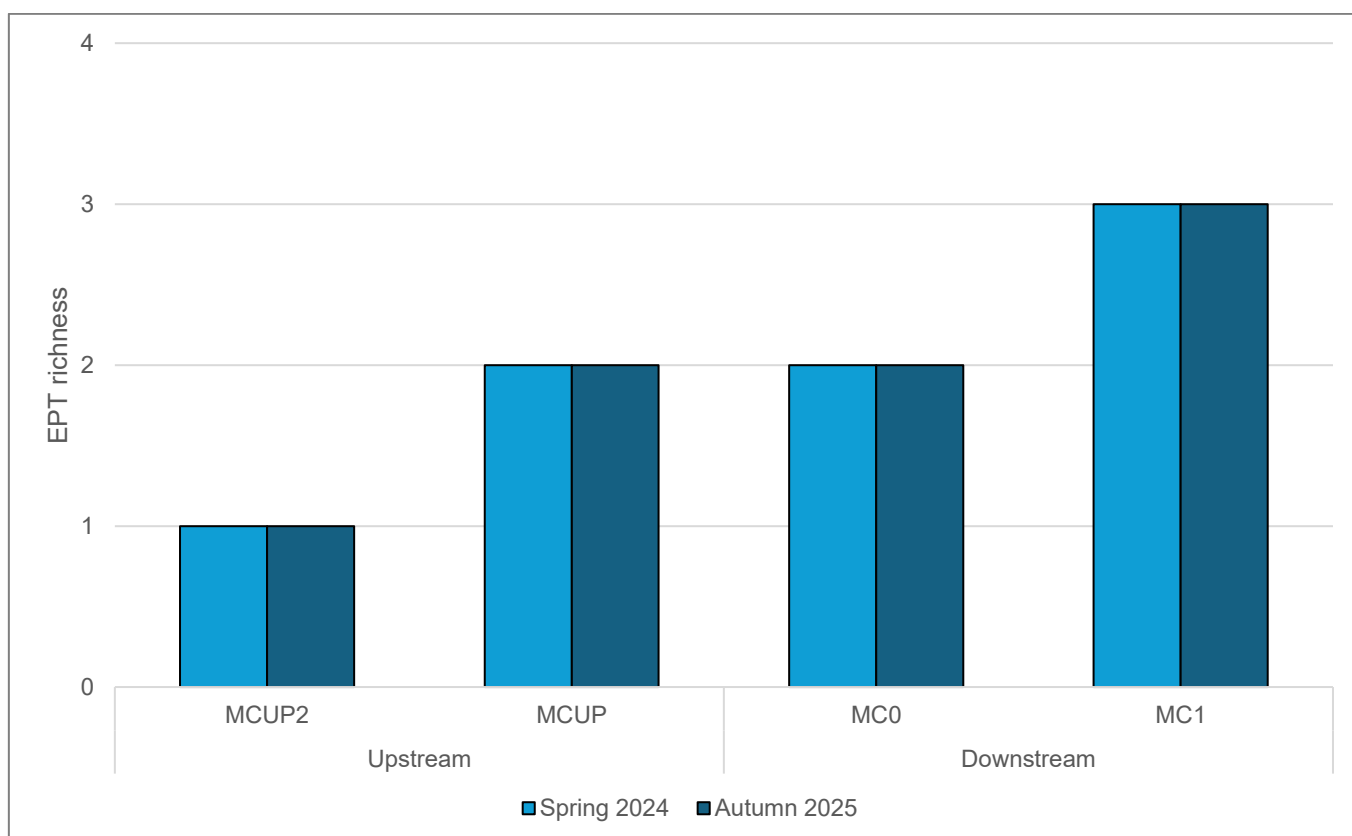


Figure 3.4 EPT richness in Mill Creek, spring 2024 and autumn 2025

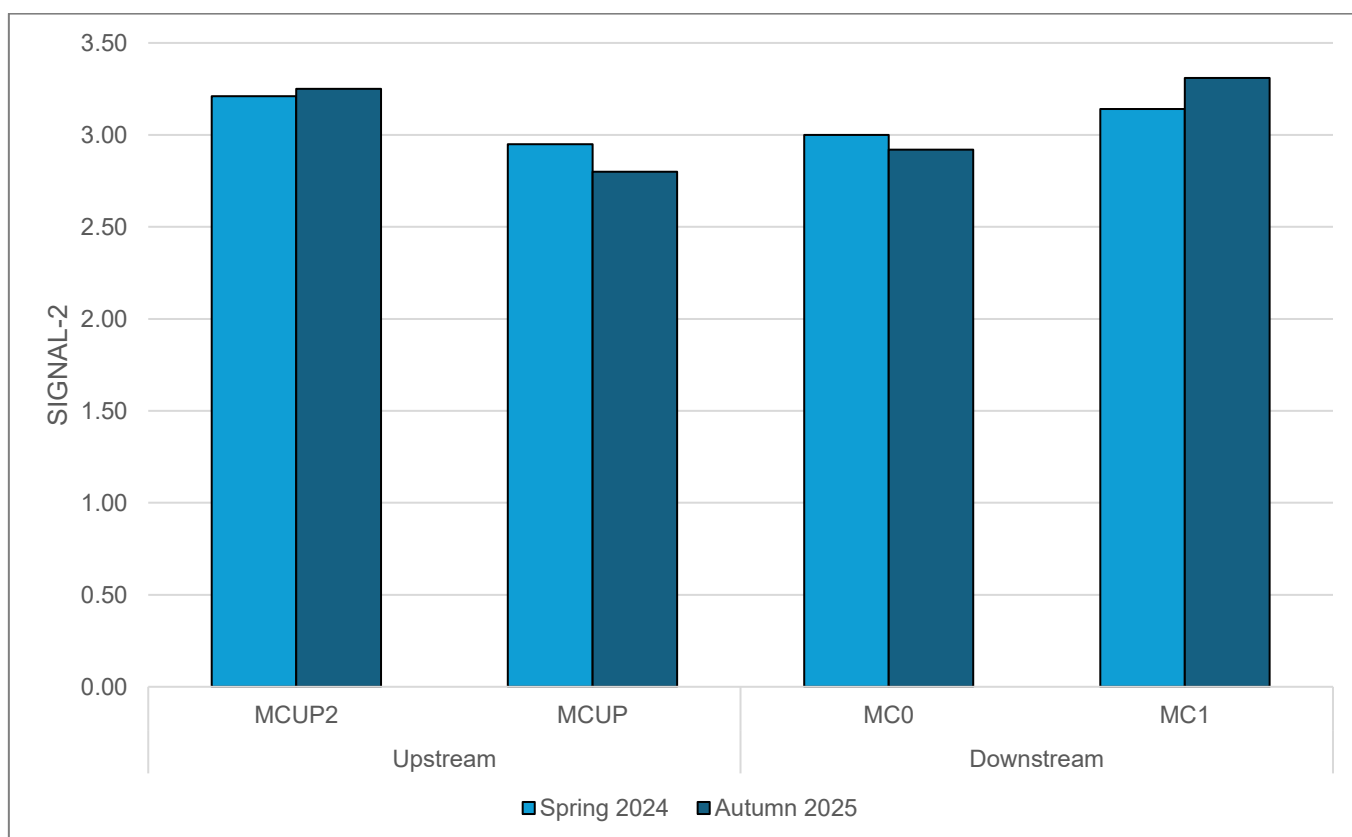


Figure 3.5 SIGNAL-2 in Mill Creek, spring 2024 and autumn 2025

3.4.2 AUSRIVAS

The results of AUSRIVAS modelling are presented in Figure 3.6. The NSW combined-season eastern edge model was used for all sites, using combined results for the spring 2024 and autumn 2025 sampling events. Results from upstream site MCUP received a Band A result, indicating that the macroinvertebrate community was in a reference condition, with most of the expected taxa collected. Results from all other sites show Band B results, indicating the macroinvertebrate communities in the remainder of Mill Creek were significantly impaired (refer Table 2.4), with fewer macroinvertebrate families collected than were expected by the model. Results were similarly low at upstream site MCUP2 and downstream site MC0, and were slightly higher (and were therefore missing fewer of the expected taxa) at MC1.

Table 3.4 displays the inventory of taxa that were predicted by the AUSRIVAS model to be found at these sites at a probability of 50 percent or greater, but were not collected in either spring 2024 or autumn 2025. MCUP was missing the fewest taxa (five missing taxa), and MCUP2 was missing the most expected taxa (11 missing taxa). MCUP2 had the lowest average SIGNAL-2 score of the missing taxa (4.27), indicating that most of the missing taxa were pollution tolerant, while the average SIGNAL-2 of missing taxa from all other sites were higher and within a similar range (5.00 to 5.20).

Several expected taxa were missing from all Mill Creek sites, including Atyidae (shrimp), Leptophlebiidae (mayfly), and Gerridae (true bug). Synlestidae and Argiolestidae (damselflies) and Hydroptilidae (caddisfly) were also missing from all sites, but were not expected by the model to be found at MCUP. Similarly, Gripopterygidae (stonefly) was not found at any site, but was only expected by the model to be collected from the downstream sites (MC0 and MC1). There were no other clear patterns in the missing taxa between the sites.

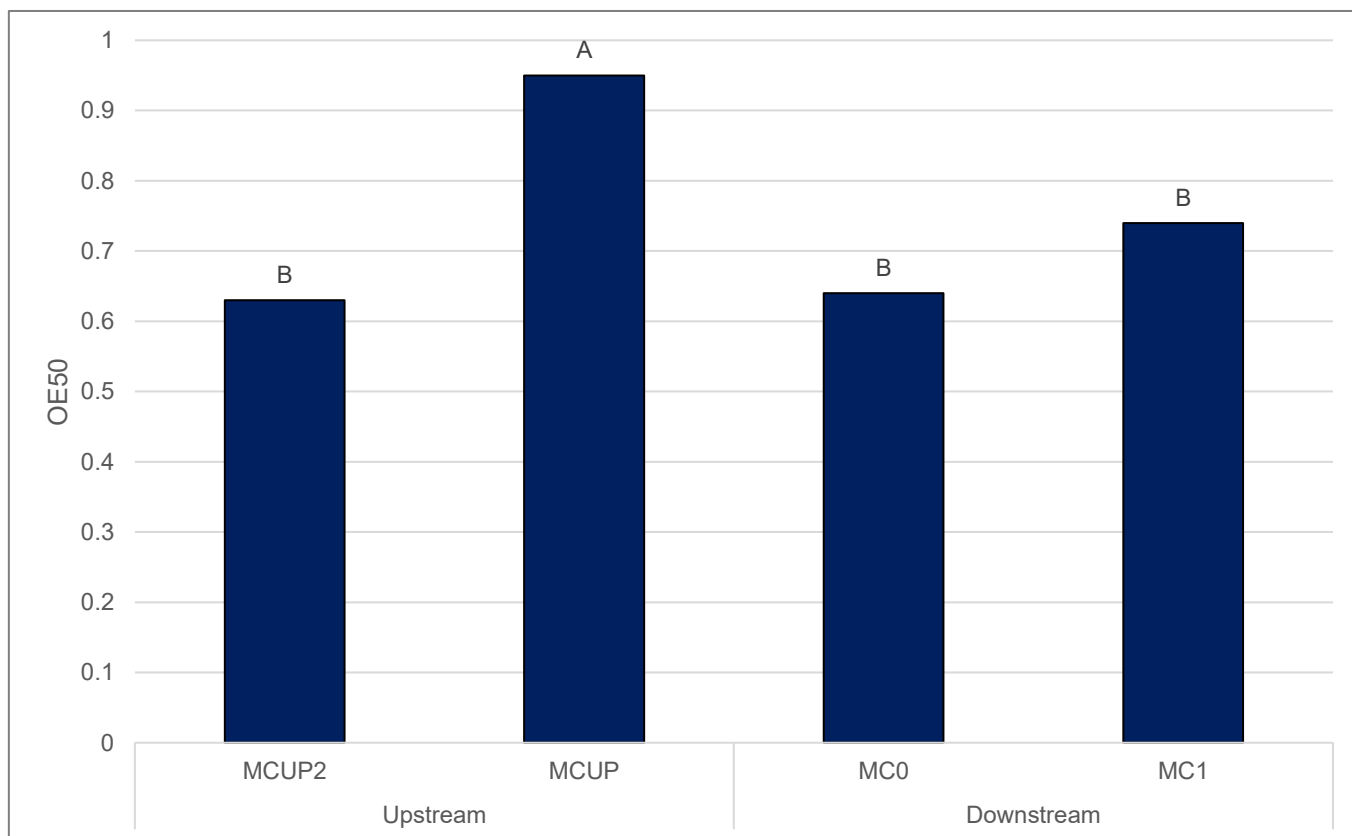


Figure 3.6 AUSRIVAS OE50 scores at Mill Creek sites, spring 2024 to autumn 2025

Table 3.4 *Inventory of macroinvertebrate taxa predicted at ≥50% by AUSRIVAS modelling but not collected in spring 2024 or autumn 2025*

Taxon Name	SIGNAL-2	MCUP2	MCUP	MC0	MC1
Atyidae	3	X	X	X	X
Gyrinidae	4	X		X	
Hydrophilidae	2				X
Scirtidae	6		X		X
Tanypodinae	1	X			
Orthoclaadiinae	4		X		
Baetidae	4	X		X	
Leptophlebiidae	8	X	X	X	X
Gerridae	3	X	X	X	X
Corixidae	3	X			
Notonectidae	4	X			
Argiolestidae	5	X		X	X
Synlestidae	7	X		X	X
Aeshnidae	4			X	
Gripopterygidae	5			X	X
Hydroptilidae	8	X		X	X
Total missing taxa		11	5	10	9
Average SIGNAL-2 of missing taxa		4.27	5.00	5.20	5.10

3.4.3 Multivariate analysis

The cluster plot demonstrates the relative similarity in macroinvertebrate community composition of samples collected in spring 2024 and autumn 2025 (Figure 3.7). All macroinvertebrate samples collected in spring 2024 and autumn 2025 have been grouped displaying at least 50 percent similarity in community composition.

The pair of samples collected from upstream site MCUP2 were the most similar of all samples, indicating more than 70 percent similarity in community composition. Samples from all other sites indicated more similarity to a sample from another site, than to the same site between the sampling events. Samples collected from MCUP and MC1 in spring 2024 were also more than 70 percent similar. The macroinvertebrate community composition at downstream sites indicated more variability between the sampling events, with the pairs of samples from these two sites indicating only approximately 50 percent similarity between the sampling events.

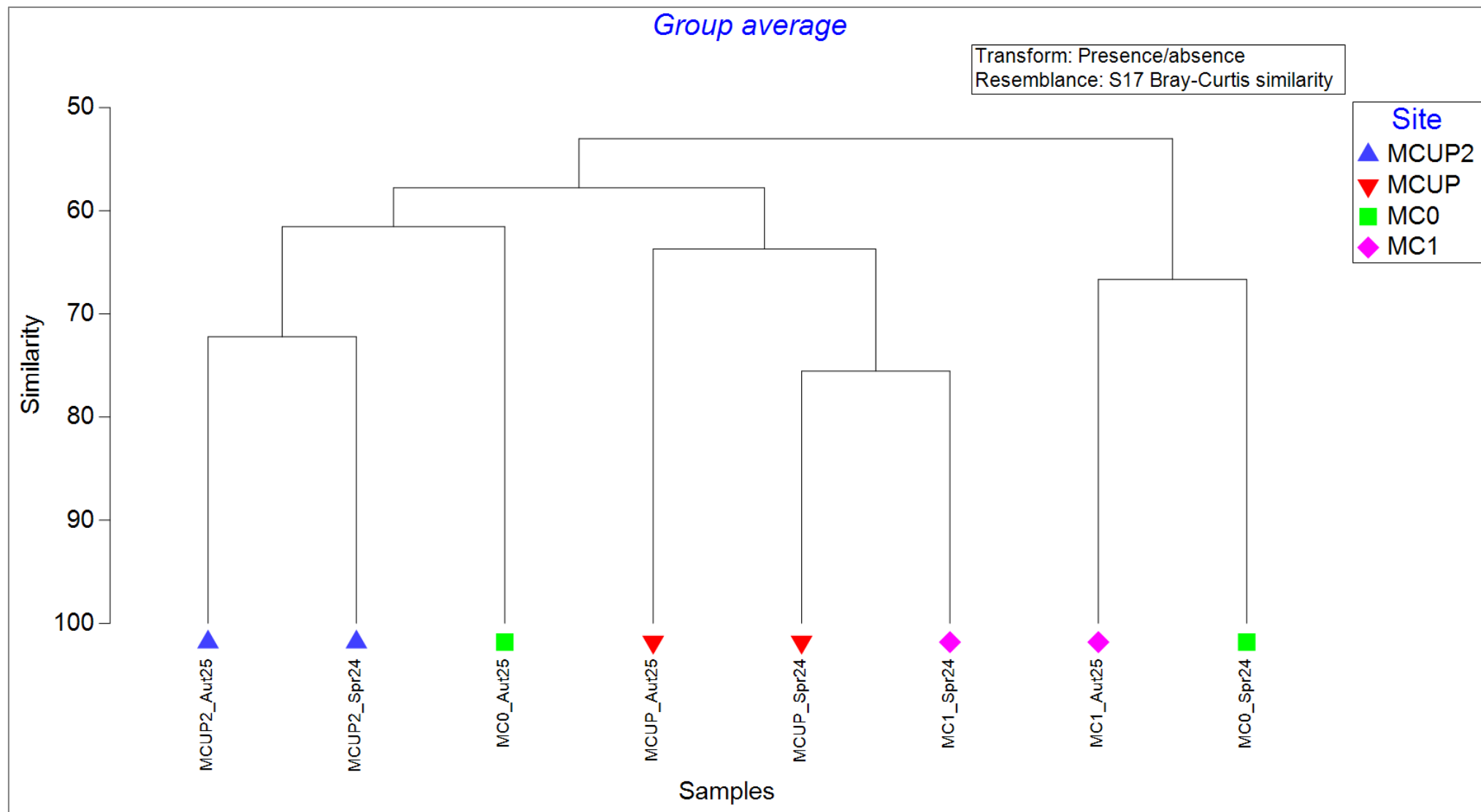


Figure 3.7 Cluster plot demonstrating relative similarity in community composition between samples spring 2024 and autumn 2025

3.4.4 Historical review

The nMDS plot demonstrates the relative similarity in macroinvertebrate community composition of samples collected in all sampling events between spring 2023 and autumn 2025 (Figure 3.8). All macroinvertebrate samples have been grouped displaying at least 40 percent similarity in community composition. The most distinct community composition was observed in the sample collected from MC0 in autumn 2024, with all other samples grouping indicating at least 50 percent similarity.

There are some minor clusters of samples showing similarity in composition between sites and/or sampling events. Samples from upstream site MCUP2 are positioned showing 60 percent similarity, except for the autumn 2025 sample, which was positioned indicating more similarity based on sampling event, clustered to show at least 60 percent similarity to samples from MCUP and MC0 also collected in autumn 2025. Samples collected from MC0 and MC1 in spring 2023 were clustered with the MCUP samples from spring 2023 to spring 2024. This indicates greater similarity in community composition of the samples from upstream site MCUP and the two downstream sites in spring 2023. The macroinvertebrate community at MC0 was highly variable between sampling events.

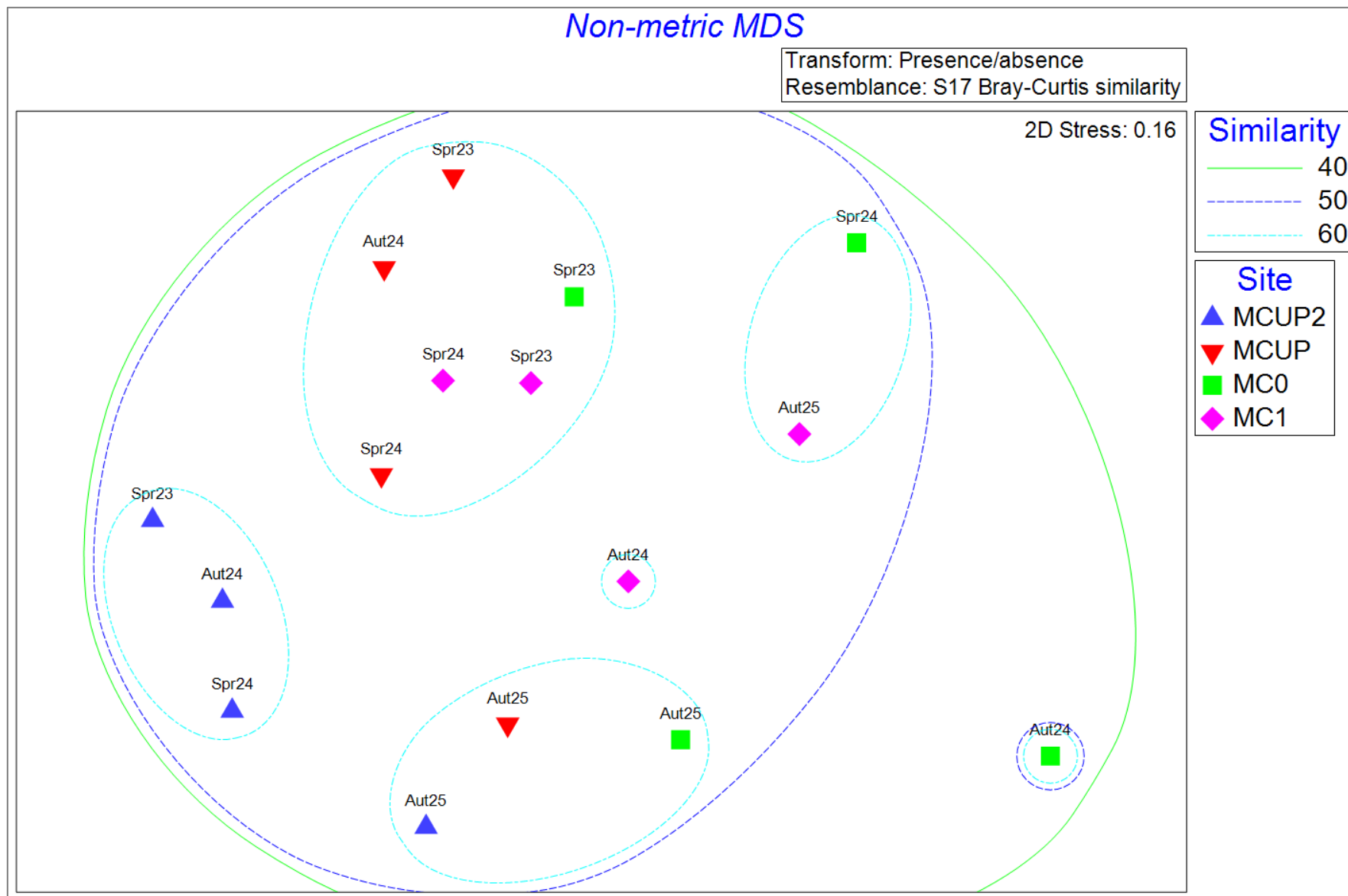


Figure 3.8 nMDS demonstrating relative similarity in community composition between samples collected between spring 2023 and autumn 2025

4. Discussion

4.1 Water quality

Water quality was generally good during the spring 2024 to autumn 2025 monitoring period, with few toxicants observed in concentrations that are known to have adverse impacts to aquatic organisms. Exceedances of the toxicant DGVs in this monitoring period include one exceedance of the DGV for aluminium at MCUP2, and one exceedance of the DGV for copper at MC1 (both in spring 2024 only). The DGV represents the threshold at which biological effects to aquatic organisms (including aquatic macroinvertebrates) are possible. However, as these exceedances were low level (only just above the DGV) and were not sustained (results in autumn 2025 were below the DGVs), toxic impacts to aquatic organisms due to these metals concentrations are expected to be minimal. There was also a single exceedance of the DGV for dissolved zinc observed at MCUP2 in autumn 2025. Although this concentration exceeded the DGV, the toxicity was expected to be ameliorated by the elevated water hardness observed at the site (ANZECC 2000a), and therefore, was unlikely to be toxic to the aquatic organisms at this site.

Concentrations of dissolved metals aluminium and copper were generally lower in spring 2024 and autumn 2025 compared to the 2023-2024 period (GHD 2024b). Dissolved aluminium concentrations exceeded the DGV at both upstream sites (MCUP2 and MCUP) in both spring 2023 and autumn 2024, while as stated above, there was only one exceedance (at MCUP2 in spring 2024) observed in the 2024-2025 monitoring period. Similarly, dissolved copper concentrations exceeded the DGV at all sites in at least one sampling event during the 2023-2024 period, while in the 2024-2025 period, only the result from MC1 in spring 2024 exceeded the DGV. During the 2023-2024 monitoring period, the highest dissolved copper concentrations were observed in both sampling events at MC0, suggesting the risk of toxicity from copper was greater at MC0 than at any other site. Although analyses for metals in sediments of Mill Creek were not conducted, aluminium is abundant in the lithosphere (ANZECC 2000b). Consequently, dissolved aluminium concentrations are commonly naturally elevated in many waterways. As such the elevated dissolved aluminium concentrations observed at the upstream sites are likely to be naturally occurring and are not considered to be due to influence from LHRRP operations. The lower concentrations observed in the 2024-2025 monitoring period are likely due to lower rainfall and reduced runoff prior to these events. Similarly, it is likely that the zinc is also naturally occurring and sourced from the local lithology (NHMRC 2008). As, such, the isolated observances of dissolved metals exceeding the DGV are not likely to be the result of LHRRP operations.

There were exceedances of the DGVs for nutrients across all sites during the monitoring period, including NO_x, TN and TP. The DGVs for nutrients indicate concentrations at which the nutrient might be a stressor to aquatic ecosystems. Concentrations of nutrients above these stressor levels have the potential to impact aquatic species that are sensitive to nutrients, or influence aquatic communities if the elevated nutrients result in nuisance growth of plants (i.e. choking of the waterway by macrophyte) or algae (i.e. blanketing of the substrate or altered DO) (ANZECC 2000b), and associated changes to food sources and habitats. There was at least one exceedance of the DGVs for nutrients at all sites in both spring 2024 and autumn 2025, and concentrations were generally similar to those observed in spring 2023. This represents a notable decrease compared to the very high concentrations observed at most sites in autumn 2024 (GHD 2024b). The most notable change in concentrations of nutrients between the 2023-2024 monitoring period and the current monitoring period (2024-2025) was observed at MC0. NO_x concentrations were notably lower, with no exceedances of the DGV observed in spring 2024 or autumn 2025, compared to the exceedances observed in spring 2023 and autumn 2024, with the autumn 2024 concentration over 160 times higher than the DGV. Similarly, TN was very high at MC0 in autumn 2024, at over 40 times the DGV. However, TN at MC0 in spring 2024 and autumn 2025 was the lowest of all sites, at only just over the DGV in spring 2024, and below the DGV in autumn 2025.

Nitrate concentrations were notably reduced in the 2024-2025 monitoring period, compared to the concentrations observed in autumn 2024. New DGVs for nitrate have been established by ANZG (2025), with differing toxicity values based on the hardness of the water. For the hard water (hardness > 150 mg/L) observed at MCUP and MC0 in autumn 2024, when nitrate concentrations were highest, a DGV for nitrate of 29.0 mg/L would apply. This indicates that the nitrate values observed in autumn 2024 at MCUP (2.70 mg/L) and MC0 (6.38 mg/L) were unlikely to have had toxic effects on aquatic species including macroinvertebrates.

The elevated nutrient concentrations observed in Mill Creek, particularly during the spring 2023 and autumn 2024 sampling events, were increased by the high rainfall volumes recorded prior to sampling during this period, which contributed to higher runoff from LHRRP. Elevated nutrient concentrations are commonly associated with landfill operations (NSW EPA 2016), and given the limited upstream catchment area and activities in Mill Creek, the elevated nutrients observed in Mill Creek, particularly in the 2023-2024 monitoring period, are likely to have originated from LHRRP. The lower rainfall volumes prior to sampling in spring 2024 and autumn 2025 likely contributed to the lower nutrient concentrations observed.

Low DO saturations (below the lower DGV) were observed during the monitoring period, at all sites except MC0. DO was particularly low at the two upstream sites (MCUP2 and MCUP) during both sampling events. Low DO is also considered a physical stressor to aquatic organisms (ANZECC 2000a). Flow was notably lower at these upstream sites compared to the two downstream sites, which likely contributed to the lower DO due to reduced aeration of the water. It is likely that DO was higher at MC0 than at the remaining sites, due to the large amounts of green filamentous algae growing in the channel. The timing of sampling at MC0 (late morning in spring 2024 and early afternoon in autumn 2025) likely also contributed to the elevated DO levels, as photosynthetic activity by algae peaks during daylight hours, increasing oxygen concentrations in the water column (NSW DPI 2023).

One further difference in water quality observed at MC0 between the two monitoring periods was an increased expression of sulfate in both spring 2024 and autumn 2025, compared to results from the 2023-2024 period. This included both higher concentrations compared to all other sites and the results from the 2023-2024 monitoring period, as well as higher concentrations relative to other ions at MC0 (as seen in the Piper diagram (Figure 3.2)). At all other sites, the ionic compositions were unchanged between the monitoring periods. The mechanism for this increased sulfate at MC0 in spring 2024 and autumn 2025 is unclear, although given the proximity of MC0 to the landfill, and the lower concentrations at the upstream sites, the landfill is the most likely source. Known toxicity values for sulfate in freshwaters are currently not available, although toxicity studies have determined that in hard waters such as were observed at MC0, a conservative value of 650 mg/L of sulfate should cause no chronic impacts to aquatic species (Elphick *et al.* 2011). Therefore, the highest sulfate value observed at MC0 (213 mg/L in spring 2024) is unlikely to have had notable adverse impacts on aquatic organisms at MC0.

Turbidity results were much lower during the 2024-2025 monitoring period than were observed during the 2023-2024 monitoring period, with only one DGV exceedance observed (at MCUP in autumn 2025). Turbidity was elevated above the DGV at all sites in autumn 2024, and was particularly high at MC0, where the recorded turbidity was over 12 times higher than the ANZECC (2000a) stressor DGV. Elevated turbidity is also a stressor to aquatic species, as suspended particles can clog feeding apparatus of filter feeding taxa, block light, and smother detritus and other food sources (ANZECC 2000a), indicating the potential for impacts to aquatic macroinvertebrates based on the observed turbidity results in autumn 2024, and at MCUP in autumn 2025. Turbidity was likely elevated in autumn 2024 due to the large volumes of rain that were recorded prior to sampling, including both in the 24-hour period before sampling, and during sampling. Similarly, 13.6 mm of rainfall was recorded in the approximately 18-hour period prior to sampling at MCUP in autumn 2025. This rainfall was recorded after the sampling of downstream sites MC0 and MC1 in autumn 2025, which likely contributed to the difference in turbidity results between MCUP and the downstream sites in autumn 2025.

4.2 Macroinvertebrates

During the 2024-2025 monitoring period, taxa richness results (the total number of different macroinvertebrate families collected) were highest at upstream site MCUP (both seasons) and downstream site MC1 (spring 2024) and were lowest at downstream site MC0 (both seasons). As the patterns in water quality in the 2024-2025 monitoring period don't align with the patterns in taxa richness, it is likely that the variety and diversity of aquatic habitats at each site has had the most prominent influence on the macroinvertebrate communities of Mill Creek during spring 2024 and autumn 2025. Aquatic habitats at MCUP and MC1 were similar, with a deep channel with silty substrate, and a variety of aquatic habitats including some macrophytes (mostly bog bulrush), trailing grasses, and some large woody debris. Both sites were also well shaded, with fairly continuous riparian vegetation, exhibiting a variety of native vegetation species and few weeds. This similarity in habitats between MCUP and MC1 is likely to have contributed to the similarity observed in the macroinvertebrate community composition between MCUP and MC1, which were grouped in the cluster plot and historical nMDS indicating similarity in the macroinvertebrate community composition between samples from these sites.

There was a notable decrease in taxa richness at MC1 between spring 2024 and autumn 2025 (five fewer taxa collected). As there were no water quality toxicants observed at MC1 in concentrations above the DGVs in autumn 2025, and dissolved copper concentrations reduced from above the DGV in spring 2024 to below the DGV in 2025, the decrease in richness between sampling events at MC1 is likely due to a decline in the quality of aquatic habitats present. The water levels at MC1 were low in autumn 2025, which meant that much of the overhanging vegetation (mostly trailing *Gahnia* and *Juncus* sp.) was out of the water, therefore no longer able to provide habitat for aquatic organisms, including macroinvertebrates. This may have contributed to the fewer taxa collected from MC1 in autumn 2025 compared to spring 2024.

The sample collected from MC1 in autumn 2025 also showed some differences in macroinvertebrate community composition (i.e. the types of macroinvertebrates collected) to the spring 2023/spring 2024 samples and the autumn 2024 sample, separating in the nMDS plot. There was also a notable decrease observed in the macroinvertebrate SIGNAL-2 scores between the spring 2023 and autumn 2024 sampling events, with some of the more sensitive taxa including Acarina (mite – SIGNAL-2 = 6), Corduliidae (dragonfly – SIGNAL-2 = 5) and Argiolestidae (damselfly – SIGNAL-2 = 5) collected from MC1 in spring 2023 but not in autumn 2024. As there was no difference in aquatic habitats observed at MC1 between these events, it is likely that the combined influence of elevated turbidity and nutrients in autumn 2024, as discussed in Section 4.1, compared to spring 2023, contributed to the decrease in the number of more pollution sensitive macroinvertebrate taxa observed at MC1 in this event. The high rainfall prior to the autumn 2024 monitoring may have also contributed to the poorer macroinvertebrate community condition by washing away some macroinvertebrates. The SIGNAL-2 scores observed at MC1 in spring 2024 and autumn 2025 had increased, and were similar to the spring 2023 result. This coincided with a decrease in turbidity and nutrients, and a decrease in flow, which supports the hypothesis that these factors influenced the reduced presence of sensitive taxa at MC1 in autumn 2024.

Upstream site MCUP2 contained very different aquatic habitat to all other sites, with a wide, shallow marshy section with abundant macrophytes, which contrasts with the channelised waterways observed at all other sites. This difference in aquatic habitats at MCUP2 likely contributed to the difference in the macroinvertebrate community composition observed at this site compared to all other sites. The samples collected from MCUP2 both in spring 2024 and autumn 2025, as well as samples from the 2023-2024 monitoring period, as shown in the cluster plots and nMDS, showed no more than 60 percent similarity to any sample from any other site.

The aquatic habitat at MC0 was the most different from all other sites, with this site containing a bedrock substrate (and concrete in some areas that weren't sampled), as well as very limited instream habitat. The primary aquatic habitat in all sampling events except autumn 2024 was algae, while in autumn 2024, algae were not present, and the only aquatic habitat was some trailing terrestrial grasses. In autumn 2024, there was also substantial flow through the channel, due to the higher rainfall in the period prior to sampling. This rapid flow likely disturbed some instream habitats such as detritus, and did not provide ideal habitat for edge communities that prefer still or slow-flowing waters. It also may have caused the physical removal of some macroinvertebrates through scouring, particularly as there was little instream habitat such as logs to provide refuge. These factors, along with the impacts due to water quality discussed above, are likely to have influenced the macroinvertebrate community at MC0 in autumn 2024, contributing to the lower taxa richness and EPT richness results observed compared to all other sampling events. In addition to this, the low diversity in aquatic habitats also likely contributed to the lower taxa richness observed at MC0 compared to all other sites in all sampling events. The macroinvertebrate community composition was highly variable at MC0 in all four sampling events, with the MC0 samples in each sampling event being more similar to samples from other sites in the nMDS plot. In autumn 2025, the macroinvertebrate community composition at MC0 was most similar to the autumn 2025 samples from the upstream sites.

Results for the AUSRIVAS combined-season model in the 2024-2025 monitoring period indicated that the macroinvertebrate community at upstream site MCUP was in a reference condition, with most of the macroinvertebrate families expected by the model collected. This demonstrates a notable improvement due to the collection of several additional (mostly pollution tolerant) taxa in 2024-2025 monitoring period that were missing during the 2023-2024 monitoring, including beetles Gyrinidae (SIGNAL-2 = 4) and Hydrophilidae (SIGNAL-2 = 2), true fly Culicidae (SIGNAL-2 = 1) and true bug Hydrometridae (SIGNAL-2 = 3). The high OE50 score received by MCUP is likely to have been influenced by the diversity of aquatic habitats observed at this site, which is likely to support more sensitive macroinvertebrate families, coupled with the model expecting fewer sensitive taxa to be collected at this site. For example, the sensitive stonefly family Gripopterygidae (SIGNAL-2 = 8) was not collected from any site during the monitoring period, but was expected by the AUSRIVAS model to be collected (with greater than 50 percent probability) only at downstream site MC0 and MC1. Similarly, the damselfly families Synlestidae (SIGNAL-2 = 6), and Argiolestidae (SIGNAL-2 = 5) and the caddisfly family Hydroptilidae (SIGNAL-2 = 4) were missing from all sites, but were expected by the model to appear at all sites except MCUP. The AUSRIVAS model not expecting these macroinvertebrate families to be collected from MCUP only, is likely due to the substrate of the site being entirely soft silt, with no bedrock that is present at all other sites.

AUSRIVAS results at all other sites in the 2024-2025 monitoring period indicated that macroinvertebrate communities within all sampled areas of Mill Creek were significantly impaired (refer Table 2.4), with fewer macroinvertebrate families collected than were expected by the model. This was also true for all sites in the 2023-2024 monitoring period, including MCUP, although the number of missing taxa at the remaining sites were all very similar between the 2023-2024 and 2024-2025 monitoring periods (a maximum of one taxa different between the monitoring periods). As discussed in Section 4.1, water quality was generally improved during the current monitoring period compared to the 2023-2024 monitoring period, with fewer exceedances of the toxicity DGVs (dissolved metals), as well as reduced nutrients and turbidity which may be stressors to aquatic organisms. As such, the aquatic habitats present at each site appear to be the major factor influencing the macroinvertebrate communities of Mill Creek.

5. Conclusion

Water quality was generally good during the spring 2024 to autumn 2025 monitoring period, with few toxicants observed in concentrations that are known to have adverse impacts to aquatic organisms, and was generally similar between the sites, and between the spring 2024 and autumn 2025 sampling events. Some minor exceedances of the toxicant DGVs (dissolved metals aluminium, copper and zinc) were observed during the 2024-2025 monitoring period, although these were isolated occurrences, and were observed in lower concentrations and with fewer exceedances than were observed in the 2023-2024 monitoring period. These metals are not attributed to LHRRP operations, and are instead likely naturally occurring, sourced from the local lithology.

Elevated nutrients and turbidity are also commonly observed in Mill Creek, with exceedances of the DGVs observed in spring 2024 and autumn 2025. However, results for these analytes were also lower in spring 2024 and autumn 2025 than observed in autumn 2024 following a large rainfall event. Elevated nutrients and turbidity are attributed to runoff and discharges from LHRRP, and downstream sites MC0 and MC1 have experienced higher concentrations than upstream sites during the sampling to date, particularly during or shortly after periods of high-volume rainfall. Elevated nutrients and turbidity are potential stressors to aquatic organisms including macroinvertebrates.

Overall, the macroinvertebrate communities of each site were consistent with the quality and diversity of available aquatic habitats observed. Upstream site MCUP contained the greatest diversity of aquatic habitats, including a variety of macrophytes, trailing vegetation and submerged woody habitats, which explains the more diverse aquatic macroinvertebrate community at this site, and the higher AUSRIVAS result (Band A), indicating the site is in a reference condition with most of the expected taxa collected. This demonstrates an improvement on the results from the 2023-2024 monitoring period, due to the collection of a number of pollution tolerant taxa in the 2024-2025 monitoring period that were missing in 2023-2024. However, the expectations of community diversity are lower in the AUSRIVAS model for MCUP than for other sites, likely due to the silt substrate at MCUP, which contrasts with the bedrock observed at all other sites.

All other sites received a Band B AUSRIVAS result, indicating significant impairment of the macroinvertebrate community, with fewer macroinvertebrate taxa collected than were predicted by the model, and results unchanged from the 2023-2024 monitoring period. As discussed, water quality was generally improved during the 2024-2025 monitoring period compared to the 2023-2024 monitoring period. As such, the aquatic habitats present at each site appear to be the major factor influencing the macroinvertebrate communities of Mill Creek.

Overall, the baseline sampling completed in accordance with the methods outlined in the AHMP during the spring 2023 to autumn 2025 period has identified some existing impacts to water quality due to LHRRP operations, prior to construction of the GO facility, primarily elevated nutrients and turbidity after period of high rainfall. However, differences in aquatic habitats between the sites and sampling events appears to be the primary factor influencing the macroinvertebrate communities of Mill Creek during the baseline monitoring.

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Appendices

Appendix A

Laboratory COAs – water quality



CERTIFICATE OF ANALYSIS

Work Order : ES2438499
Client : GHD PTY LTD
Contact : [REDACTED]
Address : Level 3, GHD Tower, 24 Honeysuckle Drive
Newcastle 2300
Telephone : 02 4910 7760
Project : 12655144
Order number : Spring 2024
C-O-C number : ----
Sampler : [REDACTED]
Site :
Quote number : EN/000
No. of samples received : 5
No. of samples analysed : 5

Page : 1 of 6
Laboratory : Environmental Division Sydney
Contact : [REDACTED]
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : +61-2-8784 8555
Date Samples Received : 26-Nov-2024 13:26
Date Analysis Commenced : 26-Nov-2024
Issue Date : 03-Dec-2024 16:52



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
Gregory Towers	Laboratory Technician	Newcastle - Inorganics, Mayfield West, NSW



General Comments

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

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

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

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

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

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

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO₂ and Fluoride to the Anions.
- EG020: It is recognised that total concentration is less than dissolved for some metal analytes. However, the difference is within experimental variation of the methods
- TDS by method EA-015 sample 1 may bias high due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- EA016: Calculated TDS is determined from Electrical conductivity using a conversion factor of 0.65.
- 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

				MCUP2	MCUP	MC0	MC1	MCX
Sampling date / time				26-Nov-2024 07:15	26-Nov-2024 08:40	26-Nov-2024 10:10	26-Nov-2024 11:40	26-Nov-2024 10:45
Compound	CAS Number	LOR	Unit	ES2438499-001	ES2438499-002	ES2438499-003	ES2438499-004	ES2438499-005
				Result	Result	Result	Result	Result
EA005: pH								
pH Value	----	0.01	pH Unit	6.70	7.48	8.78	7.78	8.78
EA006: Sodium Adsorption Ratio (SAR)								
^ Sodium Adsorption Ratio	----	0.01	-	0.68	1.28	1.30	1.47	1.29
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	180	496	728	470	724
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	1	mg/L	163	260	409	251	441
EA016: Calculated TDS (from Electrical Conductivity)								
Total Dissolved Solids (Calc.)	----	1	mg/L	117	322	473	306	471
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	18	<5	<5	5	<5
EA045: Turbidity								
Turbidity	----	0.1	NTU	10.7	8.4	2.8	5.3	2.0
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	59	166	280	140	282
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	60	133	110	107	111
Total Alkalinity as CaCO3	----	1	mg/L	60	133	110	107	111
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	8	32	213	48	214
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	18	63	57	54	58
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	17	50	79	38	80
Magnesium	7439-95-4	1	mg/L	4	10	20	11	20
Sodium	7440-23-5	1	mg/L	12	38	50	40	50



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	MCUP2	MCUP	MC0	MC1	MCX
Sampling date / time					26-Nov-2024 07:15	26-Nov-2024 08:40	26-Nov-2024 10:10	26-Nov-2024 11:40	26-Nov-2024 10:45
Compound	CAS Number	LOR	Unit		ES2438499-001	ES2438499-002	ES2438499-003	ES2438499-004	ES2438499-005
					Result	Result	Result	Result	Result
ED093F: Dissolved Major Cations - Continued									
Potassium	7440-09-7	1	mg/L		4	6	5	9	5
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		0.07	<0.01	0.02	0.03	0.02
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Boron	7440-42-8	0.05	mg/L		0.06	<0.05	<0.05	<0.05	<0.05
Barium	7440-39-3	0.001	mg/L		0.027	0.098	0.048	0.067	0.048
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L		0.001	<0.001	<0.001	<0.001	<0.001
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	0.002	<0.001
Manganese	7439-96-5	0.001	mg/L		0.192	0.246	0.018	0.034	0.018
Nickel	7440-02-0	0.001	mg/L		0.001	0.002	0.002	0.002	0.002
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L		0.007	<0.005	<0.005	0.008	<0.005
Iron	7439-89-6	0.05	mg/L		1.97	0.07	<0.05	<0.05	<0.05
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		0.14	0.07	0.05	0.09	0.05
Arsenic	7440-38-2	0.001	mg/L		0.001	<0.001	<0.001	<0.001	<0.001
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	<0.05	<0.05	<0.05
Barium	7440-39-3	0.001	mg/L		0.033	0.100	0.050	0.071	0.055
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L		0.001	<0.001	<0.001	<0.001	<0.001
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Sample ID

				MCUP2	MCUP	MC0	MC1	MCX
Sampling date / time				26-Nov-2024 07:15	26-Nov-2024 08:40	26-Nov-2024 10:10	26-Nov-2024 11:40	26-Nov-2024 10:45
Compound	CAS Number	LOR	Unit	ES2438499-001	ES2438499-002	ES2438499-003	ES2438499-004	ES2438499-005
				Result	Result	Result	Result	Result
EG020T: Total Metals by ICP-MS - Continued								
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	0.003	0.002
Manganese	7439-96-5	0.001	mg/L	0.210	0.260	0.020	0.070	0.020
Nickel	7440-02-0	0.001	mg/L	<0.001	0.002	0.002	0.003	0.002
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.002	<0.001	0.002
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L	0.009	0.008	<0.005	0.020	0.008
Iron	7439-89-6	0.05	mg/L	5.00	0.82	0.10	0.09	0.11
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	<0.1	0.2	0.1	0.3	0.1
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	0.03	0.36	0.06	0.21	0.06
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	0.10	<0.01
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	<0.01	0.03	<0.01	0.96	<0.01
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.03	<0.01	1.06	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	1.5	1.0	0.6	1.4	0.6
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	1.5	1.0	0.6	2.5	0.6
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	0.07	0.04	<0.01	0.03	<0.01



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	MCUP2	MCUP	MC0	MC1	MCX
Sampling date / time					26-Nov-2024 07:15	26-Nov-2024 08:40	26-Nov-2024 10:10	26-Nov-2024 11:40	26-Nov-2024 10:45
Compound	CAS Number	LOR	Unit		ES2438499-001	ES2438499-002	ES2438499-003	ES2438499-004	ES2438499-005
					Result	Result	Result	Result	Result
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L		1.87	5.10	8.24	4.66	8.31
∅ Total Cations	----	0.01	meq/L		1.80	5.12	7.89	4.77	7.94
∅ Ionic Balance	----	0.01	%		----	0.23	2.17	1.18	2.27
EP002: Dissolved Organic Carbon (DOC)									
Dissolved Organic Carbon	----	1	mg/L		26	9	9	7	6

Inter-Laboratory Testing

Analysis conducted by ALS Newcastle, NATA accreditation no. 825, site no. 1656 (Chemistry / Biology).
(WATER) EA005: pH



CERTIFICATE OF ANALYSIS

Work Order : ES2514364
Client : GHD PTY LTD
Contact : [REDACTED]
Address : Level 3, GHD Tower, 24 Honeysuckle Drive
Newcastle 2300
Telephone : 02 4910 7760
Project : 12655144
Order number : Autumn 2025
C-O-C number : ----
Sampler : [REDACTED]
Site :
Quote number : EN/000
No. of samples received : 5
No. of samples analysed : 5

Page : 1 of 6
Laboratory : Environmental Division Sydney
Contact : [REDACTED]
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : +61-2-8784 8555
Date Samples Received : 16-May-2025 13:52
Date Analysis Commenced : 16-May-2025
Issue Date : 23-May-2025 17:16



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
Allan Brown	Laboratory Technician	Newcastle - Inorganics, Mayfield West, NSW
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Christopher Cameron	Laboratory Technician	Newcastle - Inorganics, Mayfield West, NSW



General Comments

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

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

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

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

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

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

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H⁺ to the Cations and Nitrate, SiO₂ and Fluoride to the Anions.
- EG020: It is recognised that total concentration is less than dissolved for some metal analytes. However, the difference is within experimental variation of the methods.
- EA016: Calculated TDS is determined from Electrical conductivity using a conversion factor of 0.65.
- 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

				MCUP2	MCUP	MC0	MC1	MCX
Sampling date / time				16-May-2025 07:30	16-May-2025 09:00	15-May-2025 14:00	15-May-2025 14:45	16-May-2025 09:30
Compound	CAS Number	LOR	Unit	ES2514364-001	ES2514364-002	ES2514364-003	ES2514364-004	ES2514364-005
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	6.75	7.20	9.08	7.95	7.33
EA006: Sodium Adsorption Ratio (SAR)								
^ Sodium Adsorption Ratio	----	0.01	-	1.10	1.50	1.39	1.67	1.50
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	188	455	540	536	454
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	1	mg/L	128	310	336	308	291
EA016: Calculated TDS (from Electrical Conductivity)								
Total Dissolved Solids (Calc.)	----	1	mg/L	122	296	351	348	295
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	15	50	<5	<5	51
EA045: Turbidity								
Turbidity	----	0.1	NTU	4.5	82.6	0.7	2.2	88.3
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	45	135	180	157	135
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	39	110	56	112	110
Total Alkalinity as CaCO3	----	1	mg/L	39	110	56	112	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	4	22	116	55	20
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	31	65	60	69	67
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	13	41	49	43	41
Magnesium	7439-95-4	1	mg/L	3	8	14	12	8
Sodium	7440-23-5	1	mg/L	17	40	43	48	40



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Sample ID

				MCUP2	MCUP	MC0	MC1	MCX
Sampling date / time				16-May-2025 07:30	16-May-2025 09:00	15-May-2025 14:00	15-May-2025 14:45	16-May-2025 09:30
Compound	CAS Number	LOR	Unit	ES2514364-001	ES2514364-002	ES2514364-003	ES2514364-004	ES2514364-005
				Result	Result	Result	Result	Result
ED093F: Dissolved Major Cations - Continued								
Potassium	7440-09-7	1	mg/L	7	7	3	8	7
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	0.04	0.02	<0.01	0.02	0.02
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Barium	7440-39-3	0.001	mg/L	0.020	0.075	0.036	0.089	0.074
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	<0.001	0.001	<0.001	0.001	0.001
Manganese	7439-96-5	0.001	mg/L	0.047	0.072	<0.001	0.010	0.070
Nickel	7440-02-0	0.001	mg/L	<0.001	0.001	<0.001	0.002	<0.001
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L	0.009	0.007	<0.005	<0.005	0.005
Iron	7439-89-6	0.05	mg/L	0.48	0.13	<0.05	<0.05	0.14
EG020T: Total Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	0.11	1.07	<0.01	0.06	1.19
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Boron	7440-42-8	0.05	mg/L	0.08	<0.05	<0.05	<0.05	<0.05
Barium	7440-39-3	0.001	mg/L	0.027	0.085	0.036	0.090	0.087
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L	<0.001	0.001	<0.001	<0.001	0.001
Chromium	7440-47-3	0.001	mg/L	<0.001	0.002	<0.001	<0.001	0.002



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Sample ID

				MCUP2	MCUP	MC0	MC1	MCX
Sampling date / time				16-May-2025 07:30	16-May-2025 09:00	15-May-2025 14:00	15-May-2025 14:45	16-May-2025 09:30
Compound	CAS Number	LOR	Unit	ES2514364-001	ES2514364-002	ES2514364-003	ES2514364-004	ES2514364-005
				Result	Result	Result	Result	Result
EG020T: Total Metals by ICP-MS - Continued								
Copper	7440-50-8	0.001	mg/L	0.001	0.004	<0.001	0.001	0.003
Manganese	7439-96-5	0.001	mg/L	0.272	0.085	<0.001	0.039	0.089
Nickel	7440-02-0	0.001	mg/L	<0.001	0.002	<0.001	0.001	0.002
Lead	7439-92-1	0.001	mg/L	<0.001	0.003	<0.001	0.002	0.003
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L	0.022	0.024	0.005	<0.005	0.025
Iron	7439-89-6	0.05	mg/L	1.75	2.06	<0.05	0.15	2.11
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	<0.1	0.1	<0.1	0.1	0.1
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	0.02	0.03	<0.01	0.55	0.08
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	<0.01	0.14	0.04	0.56	0.15
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.14	0.04	0.57	0.15
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	1.8	0.7	0.3	1.1	0.8
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	1.8	0.8	0.3	1.7	1.0
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	0.16	0.05	0.12	0.04	0.05



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	MCUP2	MCUP	MC0	MC1	MCX
Sampling date / time					16-May-2025 07:30	16-May-2025 09:00	15-May-2025 14:00	15-May-2025 14:45	16-May-2025 09:30
Compound	CAS Number	LOR	Unit		ES2514364-001	ES2514364-002	ES2514364-003	ES2514364-004	ES2514364-005
					Result	Result	Result	Result	Result
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L		1.74	4.49	5.23	5.33	4.50
∅ Total Cations	----	0.01	meq/L		1.81	4.62	5.54	5.42	4.62
∅ Ionic Balance	----	0.01	%		----	1.47	2.95	0.90	1.30
EP002: Dissolved Organic Carbon (DOC)									
Dissolved Organic Carbon	----	1	mg/L		16	10	10	7	10

Inter-Laboratory Testing

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

(WATER) EA005P: pH by PC Titrator

Appendix B

Water quality QA

Analyte	Unit	Spring 2024		Autumn 2025	
		MC0	Duplicate	MCUP	Duplicate
Date		26/11/2024	26/11/2024	16/05/2025	16/05/2025
Physicochemical parameters					
pH Value	pH Unit	8.78	8.78	7.20	7.33
Electrical Conductivity @ 25°C	µS/cm	728	724	455	454
TDS	mg/L	409	441	310	291
TSS	mg/L	<5	<5	50	51
Turbidity	NTU	2.8	2	82.6	88.3
Total Hardness as CaCO ₃	mg/L	280	282	135	135
Major ions					
Bicarbonate Alkalinity as CaCO ₃	mg/L	110	111	110	110
Carbonate Alkalinity as CaCO ₃	mg/L	<1	<1	<1	<1
Hydroxide Alkalinity as CaCO ₃	mg/L	<1	<1	<1	<1
Total Alkalinity as CaCO ₃	mg/L	110	111	110	110
Sulfate as SO ₄ - Turbidimetric	mg/L	213	214	22	20
Chloride	mg/L	57	58	65	67
Calcium	mg/L	79	80	41	41
Magnesium	mg/L	20	20	8	8
Potassium	mg/L	5	5	7	7
Sodium	mg/L	50	50	40	40
Dissolved metals					
Aluminium	mg/L	0.02	0.02	0.02	0.02
Arsenic	mg/L	<0.001	<0.001	<0.001	<0.001
Barium	mg/L	0.048	0.048	0.075	0.074
Beryllium	mg/L	<0.001	<0.001	<0.001	<0.001
Boron	mg/L	<0.05	<0.05	<0.05	<0.05
Cadmium	mg/L	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	mg/L	<0.001	<0.001	<0.001	<0.001
Cobalt	mg/L	<0.001	<0.001	<0.001	<0.001
Copper	mg/L	<0.001	<0.001	0.001	0.001
Iron	mg/L	<0.05	<0.05	0.13	0.14
Lead	mg/L	<0.001	<0.001	<0.001	<0.001
Manganese	mg/L	0.018	0.018	0.072	0.07
Mercury	mg/L	<0.0001	<0.0001	<0.0001	<0.0001
Nickel	mg/L	0.002	0.002	0.001	<0.001
Selenium	mg/L	<0.01	<0.01	<0.01	<0.01
Vanadium	mg/L	<0.01	<0.01	<0.01	<0.01
Zinc	mg/L	<0.005	<0.005	0.007	0.005
Nutrients					
Ammonia	mg/L	0.06	0.06	0.03	0.08
Nitrite	mg/L	<0.01	<0.01	<0.01	<0.01

Analyte	Unit	Spring 2024		Autumn 2025	
		MC0	Duplicate	MCUP	Duplicate
Nitrate	mg/L	<0.01	<0.01	0.14	0.15
NO _x	mg/L	<0.01	<0.01	0.14	0.15
TKN	mg/L	0.6	0.6	0.7	0.8
TN	mg/L	0.6	0.6	0.8	1
TP	mg/L	<0.01	<0.01	0.05	0.05
RP	mg/L	<0.01	<0.01	<0.01	<0.01
Other parameters					
DOC	mg/L	9	6	10	10
Fluoride	mg/L	0.1	0.1	0.1	0.1

Appendix C

Macroinvertebrate identification QA

Macroinvertebrate Identification QA/QC Data Sheet

Identifier: 10W Processing Date: 30.5.25
 Project #: 12655144 LIMS/Sample #: 120578 Sample Code: 127MCUPP
 Site Name: _____ Site Code: MCUP
 Collection Date: 16.5.25 Method/Habitat: Edge Collected By: AC + TH
 Taxonomic Id Level: Family Pass/Fail Rate: 95% QA/QC By: ZB

Incorrect Identification	Correct Identification	Error Code
<u>Nemertea</u>	<u>Territorial</u>	<u>2</u>

Number of Taxa (species/families): 23
 Number Identified Incorrectly: 1
 Percentage Correct: 96%
 Pass or Fail: Pass

Training Received For Incorrect Taxa? ☒ (Yes) ☐ (No) QA Date: 3.6.25
 Senior Taxonomist Identifier: [Signature]

Note: 90% pass rate for species level and 95% for family level

Error Codes:

1. ID adult/larvae not identified
2. Complete misidentification
3. Could *reasonably* be identified to a finer taxonomic resolution*
4. Identification has been taken too far based on specimen condition (small or damaged)
5. Miscount*
6. Taxon not recorded on the data sheet
7. Inappropriate identification based on larval exuviae, shells or if the specimen was obviously dead when collected

* These are NOT included in error rate calculations

Macroinvertebrate Identification QA/QC Data Sheet

Identifier: ZB Processing Date: 3.6.25
 Project #: 12655144 LIMS/Sample #: 120255 Sample Code: 126MLOP
 Site Name: _____ Site Code: MCO
 Collection Date: 26-11-24 Method/Habitat: sweep/Edge Collected By: AC + TH
 Taxonomic Id Level: Family Pass/Fail Rate: 95% QA/QC By: TL

Incorrect Identification	Correct Identification	Error Code

Number of Taxa (species/families): 17
 Number Identified Incorrectly: 0
 Percentage Correct: 100
 Pass or Fail: Pass

Training Received For Incorrect Taxa? (Yes/No) QA Date: 3.6.25
 Senior Taxonomist Identifier: TL
ZB

Note: 90% pass rate for species level and 95% for family level

Error Codes:

1. ID adult/larvae not identified
2. Complete misidentification
3. Could *reasonably* be identified to a finer taxonomic resolution*
4. Identification has been taken too far based on specimen condition (small or damaged)
5. Miscount*
6. Taxon not recorded on the data sheet
7. Inappropriate Identification based on larval exuviae, shells or if the specimen was obviously dead when collected

* These are NOT included in error rate calculations



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APPENDIX J – Mann-Kendall Analysis

Results Summary Mann-Kendall Trend Analysis - Lucas Heights RRP					MB008				MB023			
Parameters	Coefficient of Variation	Mann-Kendall Statistic (S)	Confidence Factor	Concentration Trend	Coefficient of Variation	Mann-Kendall Statistic (S)	Confidence Factor	Concentration Trend	Coefficient of Variation	Mann-Kendall Statistic (S)	Confidence Factor	Concentration Trend
Electrical Conductivity (field)	0.61	106	94.80%	Prob. Increasing	0.31	183	99.70%	Increasing	0.31	183	99.70%	Increasing
pH (field)	0.12	76	87.60%	No Trend	0.06	-168	99.40%	Decreasing	0.06	-168	99.40%	Decreasing
Sodium (Na)	0.33	-88	91%	Prob. Decreasing	0.15	-103	94.30%	Prob. Decreasing	0.15	-103	94.30%	Prob. Decreasing
Chloride	0.35	38	71.50%	No Trend	0.23	99	93.50%	Prob. Increasing	0.23	99	93.50%	Prob. Increasing
Nitrate as N	2.79	163	99.70%	Increasing	1.95	2	50.70%	No Trend	1.95	2	50.70%	No Trend
Nitrite as N	0.11	22	63.90%	No Trend	0	0	49.40%	Stable	0	0	49.40%	Stable
Ammonia as N	2.02	96	92.90%	Prob. Increasing	0.76	98	93.30%	Prob. Increasing	0.76	98	93.30%	Prob. Increasing
Total PAH's	0	0	NA	NA	0	0	NA	NA	0	0	NA	NA
Aluminium	1.12	1	50%	No Trend	0.67	11	93.20%	Prob. Increasing	0.67	11	93.20%	Prob. Increasing
Arsenic	0	0	37.9	Stable	0	0	37.90%	Stable	0	0	37.90%	Stable
Barium	0.09	-2	55.70%	Stable	0.37	-12	94.90%	Prob. Decreasing	0.37	-12	94.90%	Prob. Decreasing
Chromium	0	0	37.90%	Stable	0	0	37.90%	Stable	0	0	37.90%	Stable
Cobalt	0.68	-2	55.70%	Stable	1	8	84.50%	No Trend	1	8	84.50%	No Trend
Copper	0.96	2	55.70%	No Trend	0.59	2	55.70%	No Trend	0.59	2	55.70%	No Trend
Lead	0.4	3	72.90%	No Trend	0	0	37.50%	Stable	0	0	37.50%	Stable
Manganese	0.97	0	37.90%	Stable	0.97	7	80.90%	No Trend	0.97	7	80.90%	No Trend
Nickel	1.08	0	37.9	No Trend	0.97	8	84.50%	No Trend	0.97	8	84.50%	No Trend
Zinc	1.14	2	55.70%	No Trend	0.96	2	55.70%	No Trend	0.96	2	55.70%	No Trend
Total Alkalinity	0.77	77	88%	No Trend	0.24	-149	99%	Decreasing	0.24	-149	99%	Decreasing
Total Dissolved Solids	0.38	48	76.50%	No Trend	0.28	87	90.80%	Prob. Increasing	0.28	87	90.80%	Prob. Increasing
Total Organic Carbon	2.08	85	90.30%	Prob. Increasing	1.05	-58	81%	No Trend	1.05	-58	81%	No Trend

Results Summary Mann-Kendall Trend Analysis - Lucas Heights RRP					MB032				MB033			
Parameters	Coefficient of Variation	Mann-Kendall Statistic (S)	Confidence Factor	Concentration Trend	Coefficient of Variation	Mann-Kendall Statistic (S)	Confidence Factor	Concentration Trend	Coefficient of Variation	Mann-Kendall Statistic (S)	Confidence Factor	Concentration Trend
Electrical Conductivity (field)	0.5	-11	55.80%	Stable	0.38	48	76.50%	No Trend				
pH (field)	0.08	-41	72.20%	Stable	0.08	-40	72.60%	Stable				
Sodium (Na)	0.14	-146	98.80%	Decreasing	0.13	-181	99.80%	Decreasing				
Chloride	0.09	-73	86.70%	Stable	0.1	-56	80.10%	Stable				
Nitrate as N	2.02	87	92.80%	Prob. Increasing	2.49	56	82.40%	No Trend				
Nitrite as N	0.04	22	63.90%	No Trend	0.08	19	61.90%	No Trend				
Ammonia as N	2.52	-47	75.10%	No Trend	4.92	16	59.10%	No Trend				
Total PAH's	0	0	NA	NA	0	0	NA	NA				
Aluminium	0	0	37.90%	Stable	0.62	8	84.50%	No Trend				
Arsenic	0	0	37.90%	Stable	0	0	37.90%	Stable				
Barium	0.13	8	84.50%	No Trend	0.07	8	84.50%	No Trend				
Chromium	0	0	37.90%	Stable	0	0	37.90%	Stable				
Cobalt	0.33	4	66.70%	No Trend	0.33	2	55.70%	No Trend				
Copper	0	0	37.90%	Stable	0.55	7	80.90%	No Trend				
Lead	0	0	37.50%	Stable	0	0	37.50%	Stable				
Manganese	0.93	6	76.40%	No Trend	0.93	4	66.70%	No Trend				
Nickel	1.42	6	76.40%	No Trend	1.1	4	66.70%	No Trend				
Zinc	1.94	6	76.40%	No Trend	2.06	8	84.50%	No Trend				
Total Alkalinity	0.29	-157	99.30%	Decreasing	0.29	-144	98.70%	Decreasing				
Total Dissolved Solids	0.13	18	60.30%	No Trend	0.13	50	77.50%	No Trend				
Total Organic Carbon	2.21	7	53.50%	No Trend	1.22	75	87.30%	No Trend				

Results Summary Mann-Kendall Trend Analysis - Lucas Heights RRP	MB034				MB035			
Parameters	Coefficient of Variation	Mann-Kendall Statistic (S)	Confidence Factor	Concentration Trend	Coefficient of Variation	Mann-Kendall Statistic (S)	Confidence Factor	Concentration Trend
Electrical Conductivity (field)	0.37	105	93.80%	Prob. Increasing	0.8	-80	88.90%	Stable
pH (field)	0.09	8	54.10%	No Trend	0.09	-129	97.70%	Decreasing
Sodium (Na)	0.13	-204	99.90%	Decreasing	0.46	-250	>99.9%	Decreasing
Chloride	0.09	-20	61.50%	Stable	0.27	-147	98.90%	Decreasing
Nitrate as N	1.38	93	94.10%	Prob. Increasing	2.64	-45	77.10%	No Trend
Nitrite as N	0.17	22	63.90%	No Trend	0.72	-28	67.60%	Stable
Ammonia as N	3.58	116	95.60%	Increasing	2.83	-57	80.60%	No Trend
Total PAH's	0	0	NA	NA	0	0	NA	NA
Aluminium	1.63	-1	50%	No Trend	0.88	-14	97.50%	Decreasing
Arsenic	0	0	37.90%	Stable	0.33	-4	66.70%	Stable
Barium	0.09	5	71.90%	No Trend	0.36	-1	50%	Stable
Chromium	0	0	37.90%	Stable	0	0	37.90%	Stable
Cobalt	0.65	5	71.90%	No Trend	1.55	3	61.40%	No Trend
Copper	0.33	4	66.70%	No Trend	0.82	7	80.90%	No Trend
Lead	0	0	37.50%	Stable	1.6	-1	50%	No Trend
Manganese	0.92	6	76.40%	No Trend	1.69	3	61.40%	No Trend
Nickel	0.84	4	66.70%	No Trend	1.57	5	71.90%	No Trend
Zinc	1.09	8	84.50%	No Trend	1.76	4	66.70%	No Trend
Total Alkalinity	0.39	-132	97.90%	Decreasing	0.39	-23	63.30%	Stable
Total Dissolved Solids	0.13	89	91.30%	Prob. Increasing	0.59	-136	98.20%	Decreasing
Total Organic Carbon	2.04	69	85.30%	No Trend	1.51	-61	82.20%	No Trend

Results Summary Mann-Kendall Trend Analysis - Lucas Heights RRP	MB038				MB039			
Parameters	Coefficient of Variation	Mann-Kendall Statistic (S)	Confidence Factor	Concentration Trend	Coefficient of Variation	Mann-Kendall Statistic (S)	Confidence Factor	Concentration Trend
Electrical Conductivity (field)	0.29	39	72.10%	No Trend				
pH (field)	0.21	-84	90%	Prob. Decreasing				
Sodium (Na)	0.19	318	>99.9%	Increasing				
Chloride	0.16	210	100%	Increasing				
Nitrate as N	3.56	159	99.40%	Increasing				
Nitrite as N	0	0	49.40%	Stable				
Ammonia as N	1	-169	99.60%	Decreasing				
Total PAH's	0	0	NA	NA				
Aluminium	0.44	-4	66.70%	Stable				
Arsenic	0	0	37.90%	Stable				
Barium	0.05	6	76.40%	No Trend				
Chromium	0	0	37.90%	Stable				
Cobalt	0.85	6	76.40%	No Trend				
Copper	1.02	10	90.70%	Prob Increasing				
Lead	0.55	-1	50%	Stable				
Manganese	0.92	8	84.50%	No Trend				
Nickel	1.19	6	76.40%	No Trend				
Zinc	0.93	10	90.70%	Prob. Increasing				
Total Alkalinity	0.35	53	78.90%	No Trend				
Total Dissolved Solids	0.13	203	99.90%	Increasing				
Total Organic Carbon	4.26	289	>99.9%	Increasing				

Results Summary Mann-Kendall Trend Analysis - Lucas Heights RRP					MB040				MB041			
Parameters	Coefficient of Variation	Mann-Kendall Statistic (S)	Confidence Factor	Concentration Trend	Coefficient of Variation	Mann-Kendall Statistic (S)	Confidence Factor	Concentration Trend				
Electrical Conductivity (field)	0.27	133	98%	Increasing	0.37	13	85.40%	No Trend				
pH (field)	0.13	-116	96.30%	Decreasing	0.11	-9	75.80%	Stable				
Sodium (Na)	0.14	-116	96.30%	Decreasing	0.21	15	89.20%	No Trend				
Chloride	0.11	6	53.10%	No Trend	0.2	16	90.70%	Prob. Increasing				
Nitrate as N	1.76	-18	61.30%	No Trend	0.71	8	72.90%	No Trend				
Nitrite as N	0.11	22	63.90%	No Trend	0	0	45.60%	Stable				
Ammonia as N	2.1	73	86.70%	No Trend	0.73	-10	78.40%	Stable				
Total PAH's	0	0	NA	NA	NA	NA	NA	NA				
Aluminium	0.42	-3	61.40%	Stable	NA	NA	NA	NA				
Arsenic	0	0	37.90%	Stable	NA	NA	NA	NA				
Barium	0.08	-3	61.40%	Stable	NA	NA	NA	NA				
Chromium	0	0	37.90%	Stable	NA	NA	NA	NA				
Cobalt	0.67	7	80.90%	No Trend	NA	NA	NA	NA				
Copper	1.53	3	61.40%	No Trend	NA	NA	NA	NA				
Lead	0.4	3	72.90%	No Trend	NA	NA	NA	NA				
Manganese	0.92	3	61.40%	No Trend	NA	NA	NA	NA				
Nickel	0.9	7	80.90%	No Trend	NA	NA	NA	NA				
Zinc	1.55	8	84.50%	No Trend	NA	NA	NA	NA				
Total Alkalinity	0.64	-234	>99.9%	Decreasing	0	0	46%	Stable				
Total Dissolved Solids	0.13	11	56.10%	No Trend	0.24	7	70%	No Trend				
Total Organic Carbon	2.98	47	76.10%	No Trend	2.56	-1	50%	No Trend				

Results Summary Mann-Kendall Trend Analysis - Lucas Heights RRP					MB044				MB045			
Parameters	Coefficient of Variation	Mann-Kendall Statistic (S)	Confidence Factor	Concentration Trend	Coefficient of Variation	Mann-Kendall Statistic (S)	Confidence Factor	Concentration Trend	Coefficient of Variation	Mann-Kendall Statistic (S)	Confidence Factor	Concentration Trend
Electrical Conductivity (field)	0.2	62	82.60%	No Trend	0.26	85	90.30%	Prob. Increasing				
pH (field)	0.09	2	50.60%	No Trend	0.09	140	98.50%	Increasing				
Sodium (Na)	0.11	-164	99.50%	Decreasing	0.13	-176	99.70%	Decreasing				
Chloride	0.1	39	72.10%	No Trend	0.09	39	72.10%	No Trend				
Nitrate as N	1.17	89	93.20%	Prob. Increasing	1.79	89	93.20%	Prob. Increasing				
Nitrite as N	0.31	22	63.90%	No Trend	0.04	22	63.90%	No Trend				
Ammonia as N	2.02	127	97.50%	Increasing	2.38	72	86.30%	No Trend				
Total PAH's	0	0	NA	NA	0	0	NA	NA				
Aluminium	1.72	-2	55.70%	No Trend	1.49	-3	61.40%	No Trend				
Arsenic	0	0	37.90%	Stable	0	0	37.90%	Stable				
Barium	0.79	-1	50%	Stable	0.07	11	93.20%	Prob. Increasing				
Chromium	0	0	37.90%	Stable	0	0	37.90%	Stable				
Cobalt	0.58	2	55.70%	No Trend	0.5	2	55.70%	No Trend				
Copper	1.67	2	55.70%	No Trend	0.38	6	76.40%	No Trend				
Lead	0	0	37.50%	Stable	0	0	37.50%	Stable				
Manganese	0.92	2	55.70%	No Trend	1.11	4	66.70%	No Trend				
Nickel	1.01	2	55.70%	No Trend	1.22	0	37.90%	No Trend				
Zinc	1.04	8	84.50%	No Trend	0.94	0	37.90%	Stable				
Total Alkalinity	0.25	-224	>99.9%	Decreasing	0.18	-115	96.20%	Decreasing				
Total Dissolved Solids	0.16	100	93.70%	Prob. Increasing	0.16	31	67.80%	No Trend				
Total Organic Carbon	1.26	123	97.10%	Increasing	1.07	99	93.50%	Prob. Increasing				

Results Summary Mann-Kendall Trend Analysis - Lucas Heights RRP					MB046				MB047			
Parameters	Coefficient of Variation	Mann-Kendall Statistic (S)	Confidence Factor	Concentration Trend	Coefficient of Variation	Mann-Kendall Statistic (S)	Confidence Factor	Concentration Trend	Coefficient of Variation	Mann-Kendall Statistic (S)	Confidence Factor	Concentration Trend
Electrical Conductivity (field)	0.23	46	75.60%	No Trend	0.4	-18	59.90%	Stable	0.11	-113	95.10%	Decreasing
pH (field)	0.1	-80	88.90%	Stable	0.11	-113	95.10%	Decreasing	0.34	-96	92.90%	Prob. Decreasing
Sodium (Na)	0.12	-82	89.40%	Stable	0.26	-35	70%	Stable	1.83	-89	93.20%	Prob. Decreasing
Chloride	0.1	-50	77.50%	Stable	1.25	-26	66.30%	No Trend	2.53	30	66.60%	No Trend
Nitrate as N	1.27	-76	89.80%	No Trend	0	0	NA	NA	0	0	NA	NA
Nitrite as N	0	0	49.40%	Stable	0.88	-16	99%	Decreasing	0	0	37.90%	Stable
Ammonia as N	1.81	-82	89.40%	No Trend	0.29	4	66.70%	No Trend	0	0	37.90%	Stable
Total PAH's	0	0	NA	NA	0	0	NA	NA	0	0	37.90%	Stable
Aluminium	0.71	6	76.40%	No Trend	0.7	7	80.90%	No Trend	0.73	-2	55.70%	Stable
Arsenic	0	0	37.90%	Stable	0	0	37.50%	Stable	1.07	8	84.50%	No Trend
Barium	0.18	-13	96.50%	Decreasing	1.63	4	66.70%	No Trend	0.76	6	76.40%	No Trend
Chromium	0	0	37.90%	Stable	1.25	4	66.70%	No Trend	0.27	-62	82.60%	Stable
Cobalt	1.19	4	66.70%	No Trend	1.07	8	84.50%	No Trend	0.23	19	60.90%	No Trend
Copper	1.64	5	71.90%	No Trend	0.73	-2	55.70%	Stable	2.6	41	73.10%	No Trend
Lead	0	0	37.50%	Stable	0	0	37.50%	Stable	1.63	4	66.70%	No Trend
Manganese	1.1	5	71.90%	No Trend	1.07	8	84.50%	No Trend	0.27	-62	82.60%	Stable
Nickel	0.9	6	76.40%	No Trend	0.76	6	76.40%	No Trend	0.23	19	60.90%	No Trend
Zinc	1.25	4	66.70%	No Trend	1.63	4	66.70%	No Trend	0.27	-62	82.60%	Stable
Total Alkalinity	1.65	-99	93.50%	Prob. Decreasing	0.27	-62	82.60%	Stable	0.23	19	60.90%	No Trend
Total Dissolved Solids	0.11	131	97.80%	Increasing	2.6	41	73.10%	No Trend	0.23	19	60.90%	No Trend
Total Organic Carbon	3.31	-34	69.40%	No Trend	2.6	41	73.10%	No Trend	0.23	19	60.90%	No Trend

Results Summary Mann-Kendall Trend Analysis - Lucas Heights RRP	MB048				MB049			
Parameters	Coefficient of Variation	Mann-Kendall Statistic (S)	Confidence Factor	Concentration Trend	Coefficient of Variation	Mann-Kendall Statistic (S)	Confidence Factor	Concentration Trend
Electrical Conductivity (field)	0.34	19	61.90%	No Trend	0.5	53	81%	No Trend
pH (field)	0.23	-165	99.80%	Decreasing	0.22	-210	>99.9%	Decreasing
Sodium (Na)	0.16	27	66.90%	No Trend	0.28	105	96.20%	Increasing
Chloride	0.22	-16	60%	Stable	0.2	233	>99.9%	Increasing
Nitrate as N	2.22	78	90.4	Prob. Increasing	1.64	131	97.80%	Increasing
Nitrite as N	0.11	24	65.10%	No Trend	0.08	-27	66.90%	Stable
Ammonia as N	1.64	15	59.30%	No Trend	2	46	76.60%	No Trend
Total PAH's	0	0	NA	NA	0	0	NA	NA
Aluminium	1.41	-14	97.50%	Decreasing	2	-11	93.20%	Prob. Decreasing
Arsenic	0	0	37.90%	Stable	0	0	37.90%	Stable
Barium	0.57	6	76.40%	No Trend	0.47	-11	93.20%	Prob. Decreasing
Chromium	0.87	-7	80.90%	Stable	0.96	-6	76.40%	Stable
Cobalt	0.87	7	80.90%	No Trend	1.09	8	84.50%	No Trend
Copper	0.85	-5	71.90%	Stable	1.38	-3	61.40%	No Trend
Lead	0	0	37.50%	Stable	0	0	37.50%	Stable
Manganese	1.59	6	76.40%	No Trend	1.11	10	90.7	Prob. Increasing
Nickel	0.78	9	88.10%	No Trend	1.04	8	84.50%	No Trend
Zinc	1.2	6	76.40%	No Trend	1.76	4	66.70%	No Trend
Total Alkalinity	0.55	91	93.70%	Prob. Increasing	0.3	40	74.50%	No Trend
Total Dissolved Solids	0.22	48	78.60%	No Trend	0.73	76	89.80%	No Trend
Total Organic Carbon	0.89	-17	60.60%	Stable	1.6	-52	79.40%	No Trend

Results Summary Mann-Kendall Trend Analysis - Lucas Heights RRP					MB056				MB057			
Parameters	Coefficient of Variation	Mann-Kendall Statistic (S)	Confidence Factor	Concentration Trend	Coefficient of Variation	Mann-Kendall Statistic (S)	Confidence Factor	Concentration Trend	Coefficient of Variation	Mann-Kendall Statistic (S)	Confidence Factor	Concentration Trend
Electrical Conductivity (field)	0.24	21	94%	Prob. Increasing	0.31	25	97%	Increasing	0.13	-17	89.10%	Stable
pH (field)	0.13	-17	89.10%	Stable	0.09	-22	94.90%	Prob. Decreasing	0.1	-5	61.90%	Stable
Sodium (Na)	0.1	-5	61.90%	Stable	0.09	33	99.50%	Increasing	0.12	-3	56%	Stable
Chloride	0.12	-3	56%	Stable	0.13	6	64.80%	No Trend	1.24	-53	>99.9%	Decreasing
Nitrate as N	1.24	-53	>99.9%	Decreasing	2.02	15	79.90%	No Trend	0.12	4	59%	No Trend
Nitrite as N	0.12	4	59%	No Trend	0	0	45.10%	Stable	0.85	-9	72.90%	Stable
Ammonia as N	0.85	-9	72.90%	Stable	0.6	52	>99.9%	Increasing	0.44	1	NA	NA
Total PAH's	0.44	1	NA	NA	0.44	-1	NA	NA	0.46	1	NA	NA
Aluminium	0.46	1	NA	NA	0.15	-1	NA	NA	0	0	NA	NA
Arsenic	0	0	NA	NA	0	0	NA	NA	0.05	1	NA	NA
Barium	0.05	1	NA	NA	0.04	-1	NA	NA	0	0	NA	NA
Chromium	0	0	NA	NA	0.47	-1	NA	NA	0	0	NA	NA
Cobalt	0	0	NA	NA	0.08	1	NA	NA	0.28	1	NA	NA
Copper	0.28	1	NA	NA	0.55	-1	NA	NA	0.71	1	NA	NA
Lead	0.71	1	NA	NA	1.03	-1	NA	NA	0.05	-1	NA	NA
Manganese	0.05	-1	NA	NA	0.18	1	NA	NA	0.11	-1	NA	NA
Nickel	0.11	-1	NA	NA	0.28	-1	NA	NA	0.01	-1	NA	NA
Zinc	0.01	-1	NA	NA	0.39	-1	NA	NA	0.13	3	56.90%	No Trend
Total Alkalinity	0.13	3	56.90%	No Trend	0	0	45.10%	Stable	0.17	3	56.90%	No Trend
Total Dissolved Solids	0.17	3	56.90%	No Trend	0.21	35	99.70%	Increasing	0.44	12	79.90%	No Trend
Total Organic Carbon	0.44	12	79.90%	No Trend	0.41	35	99.70%	Increasing				

Results Summary Mann-Kendall Trend Analysis - Lucas Heights RRP	MB305				MB306			
Parameters	Coefficient of Variation	Mann-Kendall Statistic (S)	Confidence Factor	Concentration Trend	Coefficient of Variation	Mann-Kendall Statistic (S)	Confidence Factor	Concentration Trend
Electrical Conductivity (field)	1.36	67	82.40%	No Trend	0.32	93	93.20%	Prob. Increasing
pH (field)	0.24	-15	57.80%	Stable	0.12	-43	75.10%	Stable
Sodium (Na)	0.13	-151	99.10%	Decreasing	0.15	-182	99.90%	Decreasing
Chloride	0.1	-39	72.10%	Stable	0.1	-81	90.20%	Prob. Decreasing
Nitrate as N	1.56	152	99.10%	Increasing	0.35	114	96.70%	Increasing
Nitrite as N	1.05	24	65.10%	No Trend	0.04	9	55.60%	No Trend
Ammonia as N	3.16	111	94.10%	Prob. Increasing	1.5	47	77.10%	No Trend
Total PAH's	0	0	NA	NA	0	0	NA	NA
Aluminium	0.48	2	55.70%	No Trend	0.2	-6	76.40%	Stable
Arsenic	0	0	37.90%	Stable	0	0	37.90%	Stable
Barium	0.13	-8	84.50%	Stable	1.32	-1	50%	No Trend
Chromium	0	0	37.90%	Stable	0	0	37.90%	Stable
Cobalt	0.75	1	50%	No Trend	0.34	6	76.40%	No Trend
Copper	0.55	7	80.90%	No Trend	1.49	6	76.40%	No Trend
Lead	0	0	37.50%	Stable	0.86	2	55.70%	No Trend
Manganese	0.93	1	50%	No Trend	0.87	1	50%	No Trend
Nickel	0.93	0	37.90%	Stable	0.82	2	55.70%	No Trend
Zinc	1	6	76.40%	No Trend	0.97	6	76.40%	No Trend
Total Alkalinity	0.34	-110	95.40%	Decreasing	0.21	-27	66.20%	Stable
Total Dissolved Solids	0.14	26	65.60%	No Trend	0.13	87	91.80%	Prob. Increasing
Total Organic Carbon	2.97	75	87.30%	No Trend	3.86	113	96.60%	Increasing

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