Soil Assessment and Landfill Gas Risk Assessment

GWS Centre of Excellence – Building D
1 Olympic Boulevard, Sydney Olympic Park, NSW

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ARC ENVIRONMENTAL

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GWS Centre of Excellence – Building D
1 Olympic Boulevard, Sydney Olympic Park, NSW

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List of Acronyms

Acronym	Definition
ABC	Ambient Background Concentration
ACL	Added Contaminant Limits
ACM	Asbestos Containing Materials
AHD	Australian Height Datum
AS	Australian Standard
AST	Aboveground Storage Tank
bgl	Below ground level
btoc	Below top of casing
CEC	Cation Exchange Capacity
COC	Chain of Custody
CS	Characteristic Scenario
BTEX	Benzene, toluene, ethylbenzene, xylenes
BTEXN	Benzene, toluene, ethylbenzene, xylenes, naphthalene
DELWP	Department of Environment, Land, Water and Planning
DSE	Department of Sustainability and Environment
DSI	Detailed Site Investigation
DO	Dissolved oxygen
DQO	Data Quality Objectives
EC	Electrical Conductivity
EIL	Ecological Investigation Level
ERS	Environmental Reference Standard
ESA	Environmental Site Assessment
ESL	Ecological Screening Level
EMP	Environment Management Plan
EPA	Environment Protection Authority
GSV	Gas Screening Value
HIL	Human Health Investigation Level
HSL	Human Health Screening Level
IWRG	Industrial Waste Resource Guidelines
km	Kilometre
L	Litre
LOR	Limits of Reporting
LFG	Landfill Gas
m	Metre
MGA	Map Grip of Australia
mm	Millimetre
MoE	Maintenance of Ecosystems
MW	Monitoring well
NATA	National Association of Testing Authorities
NDD	Non-destructive digging
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure

Acronym	Definition
NHMRC	National Health and Medical Research Council
OCP	Organochlorine Pesticides
PAH	Polycyclic Aromatic hydrocarbon
PCB	Polychlorinated Biphenyls
PCR	Primary Contact Recreation
PID	Photo-ionisation Detector
PIR	Property Information Report
PSI	Preliminary Site Investigation
ppm	Parts per million
QAQC	Quality Assurance / Quality Control
RPD	Relative Percentage Difference
SB	Soil Bore
SOPA	Sydney Olympic Park Authority
TCE	Trichloroethylene
TDS	Total Dissolved Solids
TPH	Total Petroleum Hydrocarbons
UPSS	Underground Petroleum Storage Systems
USCS	Unified Soil Classification System
USEPA	United States Environment Protection Authority
UST	Underground Storage Tank
VHC	Volatile Chlorinated Hydrocarbons
VOCs	Volatile Organic Compounds
WHO	World Health Organisation

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Executive Summary

ARC Environmental has completed a Soil and Landfill Gas Risk Assessment at the GWS Centre of Excellence located at 1 Olympic Boulevard, Sydney Olympic Park, NSW ('the Site').

FDC Construction has been engaged to assist in the management of design and development for new facilities for the GWS Giants Centre of Excellence. The development will be the construction of the proposed pool hall which will herein be referred to as the "Building D Assessment Area."

An Environmental Audit is required to be undertaken for a proposed building extension, with Paul Moritz of Douglas Partners engaged as the Auditor. As such the focus of this report is limited to the "Building D Assessment Area" which is the footprint of the proposed building extensions, and does not assess the wider facility including the existing buildings and does not assess the management of the former golf driving range landfill.

This soil and landfill gas risk assessment was undertaken to assess the risk of contamination at the Building D Assessment Area associated with the former landfill and the suitability of the Building D Assessment Area for the planned Building D development, including a swimming pool. In order to achieve project objectives, five (5) soil bores were advanced and four (4) of these bores were converted to landfill gas bores. Landfill gas bores were monitored three (3) times over a period of six weeks, followed by a surface emissions and sub-surface utility survey of the Building D Assessment Area.

Findings of the SLFGRA were as follows:

- *Landfill capping was observed to have greatest thickness in the centre and southeast of the Building D Assessment Area. Capping thickness varied from 1.7 to 4 mbgl;*
- *Waste beneath capping was observed to contain brick, glass, wood fragments and metal pieces;*
- *Concentrations of >C_{16}-C_{34} Fraction (F3), zinc and benzo(a)pyrene were recorded in exceedance of the adopted ecological criteria for recreational open space and commercial land use between drilling depths of 0.5 mbgl and 5 mbgl. Although the adopted NEPM EILs being applied are only relevant to the top 2 m of the soil profile, comparison has been made to all samples to consider potential reuse of excavated material elsewhere on the Site during the redevelopment works;*
- *Concentrations of lead in soil at depths greater than 4 mbgl in the southeast of the Building D Assessment Area exceeded NSW CT1 waste thresholds and CT2 thresholds in the centre;*
- *Soil analytical results did not exceed any of the adopted human health criteria. Therefore, excavated soil from the Building D development area may be reused at the Site, subject to SOPA approval;*
- *Soil vapour results did not exceed any of the adopted assessment criteria for commercial/industrial land use. Identified volatile organic compounds in landfill gas need to be taken into consideration in selection of the landfill gas protection measures (i.e. membrane) to be implemented;*
- *The worst-case scenario for the Building D Assessment Area has a GSV of 4.54 L/hr for methane and 0.89 L/hr for carbon dioxide, indicating that the Characteristic Situation is 4 (CS4). A CS of 4 would lead to the requirement of gas protection measures;*
- *In accordance with NSW EPA 2020 guidance, a Level 3 full quantitative risk assessment as an additional factor is to be considered. It is considered that a Level 3 Risk Assessment is not required;*

- *Landfill gas protection measures must be implemented into the proposed Building D design to meet the required score of 4 in accordance NSW EPA, Guidelines for the Assessment and Management of Sites Impacted by Hazardous Ground Gases, 2020. The proposed gas mitigation measures and the slab, footings and piling types should be documented in a mitigation design specification document.*

1. Introduction

ARC Environmental (ARC) was engaged by FDC Construction to conduct a Soil and Landfill Gas Risk Assessment at the GWS Centre of Excellence located at 1 Olympic Boulevard, Sydney Olympic Park, NSW ('the Site'). The location of the Site is defined in ***Figure 1***.

FDC Construction has been engaged to assist in the management of design and development for new facilities for the GWS Giants Centre of Excellence. The development will be the construction of the proposed pool hall which will herein be referred to as the "Building D Assessment Area."

An Environmental Audit is required to be undertaken for a proposed building extension, with Paul Moritz of Douglas Partners engaged as the Auditor. As such the focus of this report is limited to the "Building D assessment area" which is the footprint of the proposed building extensions, as presented in ***Figure 2***, and does not assess the wider facility including the existing buildings and does not assess the management of the former golf driving range landfill.

1.1 Objectives

The objectives of the assessment was as follows;

- Assess the soil conditions within Building D Assessment Area to determine suitability for reuse on Site; and
- Assess the risks posed by landfill gas and protection measures, if required, for the proposed Building D development.

1.2 Scope of Works

Based on the project objectives, the scope of works completed by ARC included the following:

- A review of previous environmental investigations and environmental setting information relevant to the Site and surrounds;
- Preparation of project-specific health and safety documentation appropriate for the scope of works;
- Clearing of proposed drilling locations by a professional cable locator prior to drilling;
- Advancement of five (5) soil bores, and drilling and installation of four (4) landfill gas bores;
- Collection and laboratory analysis soil samples;
- Landfill gas monitoring of four (4) newly installed landfill gas bores approximately fortnightly for a period of six (6) weeks;
- Soil vapour sampling from four (4) landfill gas monitoring bores;
- Laboratory analysis of soil and soil vapour samples by a laboratory accredited by the National Association of Testing Authorities (NATA) for the methods used; and

- Collation and interpretation of the data, including a quality assurance / quality control (QA/QC) data validation process; and preparation of this report.

2. Site Information

A summary of Site identification details is provided in ***Table 2.1***. The site and surroundings information was collated from the site visit and review of available mapping as part of this investigation. The site location is shown on ***Figure 1***.

Table 2.1 Site Identification Summary

Information	Details
Street Address	1 Olympic Boulevard, Sydney Olympic Park
Lot Details	Lot 10 of DP1217982
Current Site Owner	Sydney Olympic Park Authority (SOPA)
Current Site Use	Recreational – Greater Western Sydney (GWS) Giants Centre of Excellence Training Facility
Building D Assessment Area	Approx 700 m^2
Zoning	B4 Mixed Use
Local Government Authority	City of Parramatta Council

2.1.1 Site Uses

The Site is currently used for recreational purposes as the GWS Giants Centre of Excellence (CoE) Training and Administrative Facility. It is understood that the Site is expected to continue to remain for this use with additional development planned for the current facilities, including a swimming pool hall in the southeast (Building D), as presented in ***Figure 2***. Design drawings for the proposed development of Building D are presented in ***Appendix A***.

2.1.2 Surrounding Land Use

Surrounding land use is summarised in ***Table 2.2***.

Table 2.2 Summary of Surrounding Land Use

Direction	Land Use
North	A multi-level carparking building.
South	Grassed batters to Shirley Strickland Avenue, followed by Sydney Olympic Tennis World.
East	Training oval and former landfill, followed by Australia Avenue and Bicentennial Park.
West	Olympic Boulevard, followed by the Genea Netball Centre.

2.1.3 Nearby Sensitive Land Use

A review of local mapping indicates that no sensitive land uses exist within a 500 m radius of the Site.

2.1.4 Site Features

Site infrastructure is summarised in ***Table 2.3*** below. The layout of the Site is presented in ***Figure 2***.

Site features are presented in ***Figure 2***.

Table 2.3 Summary of Site Features

Feature	Description
Surface	Grass-covered sporting fields are located in the centre and eastern portion of the Site, with a large, grass-capped asbestos stockpile beyond these fields in the northeast corner. An asphalt road runs along the south, eastern and northeastern boundary of the Site. There is also an asphalt car park in the west of the Site. The assessment area is covered in grass with tan-bark garden beds running along the northern boundary.
Buildings/ Equipment storage	The main building at the Site is 'GWS GIANTS- VALO Community Centre', a large building with a corrugated roof which features offices, a café, and training facilities. There is a smaller, recently constructed building with a corrugated roof in the northeast corner of the Site.
Drainage	Suspected stormwater drainage exists in the southwest extent of the Assessment Area

2.2 Site Environmental Setting

The following section describes the Site environmental setting obtained from publicly available information.

2.2.1 Topography

The Site lies approximately 15 m above Australian Height Datum (AHD) and was observed to be generally flat with sloping batters along its southern and western boundaries to the surrounding roads. The northern/north-western third of the site slopes downwards towards the carpark. The rest of the Site is relatively flat at about the same height as the adjacent oval.

2.2.2 Acid Sulphate Soils Potential

The Australian Soil Resource Information System (ASRIS), provided by the CSIRO, defined the probability of Acid Sulfate Soils effecting the Site as low probability of occurrence with low confidence.

A review of Acid Sulphate Soil (ASS) distribution data on the NSW government SEED database (Sharing and Enabling Environmental Data) found that the site was not in an area known to be affected by acid sulphate soils but was in an area marked as disturbed terrain.

2.2.3 Regional Geology

The NSW Department of Mineral Resources, Sydney 1983 1:100,0000 Geological Survey indicates that the Site is underlain by manmade fill (mf), quaternary silty to peaty sands, silts and clays and Triassic Ashfield Shale from the Wianamatta group, comprising grey and dark grey shale with laminate on a regional scale.

2.2.4 *Regional Hydrogeology and Groundwater Quality*

The regional groundwater gradient is inferred to be in an easterly direction towards Bicentennial Park and Powell's Creek with the end receptor being Parramatta River. From this site groundwater/leachate is likely present within the waste mass and is actively managed with a drainage system present with associated sumps and pumps which extract leachate/groundwater. It is considered likely that the active management of groundwater/leachate would affect the flow direction beneath the Site.

2.2.5 *Groundwater Resource Utilisation*

A search of the NSW Department of Industry – Water NSW Groundwater Database online tool on 3 July 2023 for groundwater bores within 1 km of the centre of the Site was undertaken, indicating the 17 groundwater bores are registered in the search area. The search results did not include any information on the use of the identified groundwater bores, groundwater levels or chemistry information.

2.2.6 *Nearby Surface Water*

The nearest surface water is an unnamed creek located to the south at an approximate distance of 65 metres from the Site which drains to Lake Belvedere to the east and Powell's Creek.

2.2.7 *NSW EPA Contaminated Sites and Environmental Licence Registers*

The Site is regulated by the NSW Environment Protection Authority (EPA) by a Maintenance of Remediation Notice. No 28040 (NSW EPA Notice 28040) under Section 28 of the *Contaminated Land Management Act 1997* which was issued to the Sydney Olympic Park Authority (SOPA) in 2009.

The NSW EPA Notice 28040 requires SOPA to manage the Site in accordance with the SOPA Remediated Lands Management Plan January 2009 (SOPA RLMP, 2009). This management plan is relevant for all old landfill sites within the Sydney Olympic Park precinct.

Copies of NSW EPA Notice 28040 and an extract of the SOPA RLMP, 2009 related to the Site provided by SOPA are presented in ***Appendix B***.

2.3 Previous Environmental Assessment Reports

The former landfill present, remediation works undertaken and management of the subject site under the NSW EPA Notice 28040 and the SOPA RLMP, 2009 has resulted in multiple environmental assessment reports, including the following:

- Douglas Partners 2013, Report on Landfill Gas Assessment and Mitigation Design – GWS Giants Administrative Facility Development, Olympic Park Boulevard, Sydney Olympic Park (Douglas Partners, 2013);
- Sinclair Knight Mertz 2014, Site Audit Report 235 by Dr Ian Swane, GWS Giants Training and Administrative Facility, Sydney Olympic Park Part of Lot 200 in DP 1041756 (SKM, 2014);
- Sydney Olympic Park Authority 2009, Remediated Lands Management Plan (extract) (SOPA RLMP, 2009); and

- ARC Environmental 2019, Western Sydney Football Club Limited Environmental and Geotechnical Site Assessment (ESGA), 16 December 2019.

2.3.1 SOPA Golf Driving Range Landfill History

The *SOPA RLMP, 2009* provides the following subject site history for the closed landfill present at the subject site.

The Golf Driving Range landfill (GDR Landfill) is a consolidation of 3 separate landfills from the State Sports Centre Precinct. The precinct was used for the uncontrolled tipping of municipal waste from 1965 to 1982. Waste was stockpiled in three separate landfills over a 42-hectare subject site north of the rail line; the Western, Northern (now the Golf Driving Range) and Southern landfills. The waste comprised a heterogeneous mix of a wide variety of constituents including variable quantities of putrescible fill.

A remediation strategy for the State Sports Centre subject site was developed in 1991. Part of the remediation strategy was to consolidate contamination and implement some forms of environmental protection. This included the placement of a low-permeability clay cap and subsurface drainage system, the installation of a leachate collection system and clay cut-off wall and the redirection and protection of Boundary Creek.

Works were undertaken to consolidate the three landfills into one. Between 1991 and 1993, 130,000 m^3 of waste was shifted from the Western and Southern landfills to overlay the Northern landfill and create a 15-metre-high mound. The Western and Southern landfills were then validated by visual inspection and testing of residual soils to ensure that all traces of contamination were removed prior to backfilling with clean imported fill. Remediation of the GDR was initially complete in March 1994 when the subject site was landscaped.

The original intent was to discharge collected leachate directly to sewer. Changes in Trade Waste requirements however, resulted in sewer discharge being abandoned in 1995 and the construction of a rising main to discharge the leachate to the Kronos Hill system was implemented. The pipe was commissioned in late 1998.

As part of the Olympic Overlay works, the GDR Landfill was recontoured during the late 1999/ early 2000. The earthworks incorporated some waste movement and recontouring, restoration of the clay cap, minor modifications to the leachate system, the installation of a gas drainage layer and the restructure of the sub-surface drainage system. The subject site was approved for use as a “Park, recreational open space, playing field” by an independent site auditor in 2000.

2.3.2 GWS Giants WestConnex Centre (Building B) – Douglas Partners and SKM Previous Environmental Investigations

Subsequent to the rehabilitation of the GDR Landfill for the 2000 Olympic Overlay works, more recent environmental investigations were undertaken at the subject site to support the redevelopment of the former golf driving range into a training field and social sports field and redevelopment and extension of the former golf driving range buildings into the current GWS Giants training facilities and administration buildings. The environmental investigations detailed here are related to Building B, as presented in ***Figure 2***.

Douglas Partners, 2013

Douglas Partners undertook a review of the existing landfill conditions, landfill gas mitigation system for the golf driving range buildings, and a geotechnical and preliminary landfill gas assessment previously undertaken by Aurecon in 2012. Based on the review undertaken and in order to supplement the existing landfill gas information the assessment included the following:

- Installation of paired LFG monitoring wells within and below the existing clay cap at four locations. Locations were based on those general areas where the highest LFG concentrations were detected during the Aurecon geotechnical investigation and to provide a general subject site coverage. Locations were also influenced by the presence of services and subject site accessibility constraints;
- Solid flight augering was undertaken using a Geotrace drill rig to reach the required well installation depth. At each location, one borehole was extended at least 2.4 m into the landfill material. The other borehole at each location was terminated at the top of the red and brown clay capping layer;
- Each borehole was logged by an environmental scientist from the auger returns;
- Monitoring of each well for LFG concentration and gas flow rate was undertaken during steady and falling atmospheric pressure events;
- Gas sampling of DP1 and DP3 using laboratory prepared summa canisters over approximately a one hour period; and
- Monitoring surface locations across the subject site.

Based on the preliminary LFG screening reported in the Aurecon geotechnical report, combined with the results of their LFG monitoring, Douglas Partners considered methane to be the primary gas of concern and undertook an assessment of the risk posed to the proposed development using gas screening values (GSVs) and gas characteristic situations. This subsequently established the level of mitigation required as part of the works.

SKM, 2014

The subject site audit report was prepared by Dr Ian Swane of Sinclair Knight Mertz in 2014 with the purpose of meeting the requirements of the Contaminated Land Management Act 1997 and the SOPA Development Consent.

The extent of the subject site covered by the site audit was defined as the footprint of the proposed building covering an area of 2,200 m^2 and did not include the existing building or other parts of the former golf driving range which were considered to be subject of an earlier site audit prepared by Dr Bill Ryall, with a site audit statement issued in December 2000 and regulated by the NSW EPA under NSW EPA Notice 28040.

Because the subject site was considered to be extensively regulated by the NSW EPA and its remediation was subject to the statutory site audit completed in December 2000, the Site Auditor considered that the scope of the subject site audit should be limited to the following matters that relate directly to the suitability of the proposed building development and for its proposed use:

- The management of landfill gas at the subject site;

- The cap design at the subject site;
- The suitability of excavated material for reuse at the subject site;
- The suitability of imported fill for use at the subject site; and
- The review of an Environmental Management Plan (EMP) for the ongoing management of the subject site (if required).

The Site Auditor considered the proposed facility corresponded to a Recreational C land use as specified in the NEPM (2013) guidelines, which was taken as being equivalent to an open space/parkland use as specified by the NSW EPA (April 2006) "*Guidelines for the NSW Site Auditor Scheme* (2nd edition)".

The auditor undertook a review of subject site conditions up to 2000, between 2002-2007, landfill gas and geotechnical assessment work in 2012 and the follow up landfill gas assessment and modified remediation strategy undertaken by Douglas Partners reported in 2013. The Site Auditor considered the modified remediation strategy documented in the Douglas Partners report (May 2013) when inclusive of the review recommendations met NSW EPA requirements.

The Site Audit included assessment of the adequacy of the remediation and validation works at the subject site by the builder AJ Edwards and Douglas Partners and the compliance with NSW EPA reporting requirements. Each of the following required components were considered to have been adequately addressed:

- Environmental control measures.
- Excavation, shaping and preparation of the cap subgrade.
- Gravel blanket gas drainage layer and pipework construction.
- Compacted clay cap construction.
- Sealed concrete slab construction.
- Gas extraction and venting system.
- LFG monitoring.

Douglas Partners concluded that the as-constructed LFG mitigation measures rendered the subject site suitable for its use as a T&A facility. The Site Auditor considered the available data supported this conclusion provided contamination that remained at the subject site was managed in accordance with an appropriate EMP.

The results of the Douglas Partners, 2013 investigation in conjunction with the outcome of the auditor's review (SKM, 2014) including identified landfill depths, landfill gas conditions, landfill gas mitigation measures and geotechnical requirements are summarised below.

2.3.3 GWS Giants WestConnex Centre Extension (Building C) – ARC Environmental, ESG Environmental and Douglas Partners Environmental Investigations

ARC Environmental undertook environmental assessment of proposed building extensions at the Site, which ultimately led to the development of Building C, as presented in ***Figure 2***.

The assessment indicated that shallow soil above the former landfill waste presented a low and acceptable risk to future users of the proposed building extension and to workers during construction.

Based on reported results, shallow soil was likely classified as General Solid Waste CT1 should off-site disposal be required as part of future construction works.

The assessment indicated that a clay capping layer was generally present above the former landfill at variable thickness and depths as follows:

- Northern portion – thickness between 0.75 and 1m above waste encountered below at approximately 1.25 m.
- Southwest Corner – present from 1.2 to at least 2.0 mbgl.
- Southeast portion – present from around 0.9 with waste encountered at approximately 4.5 m.

Monitoring of landfill gas concentrations from the former GDR landfill indicated that organic decomposition of waste was still occurring with elevated concentrations of typical landfill gases, methane, and carbon dioxide, within and below the inferred capping layer. As a result of the landfill gas risk assessment undertaken using the gas screening value methodology consistent with NSW EPA (2012, the Site was considered to represent a Characteristic Gas Situation 3 (CS3).

Based on results of the assessment, Level 2 landfill gas protection measures were recommended, for CS3 and commercial buildings, which was endorsed by the Auditor (Douglas Partners, 2020).

ESG Environmental prepared a LFG gas management system design report, endorsed by the Auditor, providing a conceptual design for the proposed approach to managing potential risks arising from landfill gas. It provided for passive ventilation of landfill gas above and within the existing landfill capping layer, and beneath an impermeable membrane to be installed on the ground surface beneath the building. Slotted pipework was to be installed in gravel trenches on a linear grid beneath the membrane, with the pipes connected to a vertical steel ventilation stack on the perimeter of the building. The membrane was to be sealed around the piles on which the building is supported, and around other intrusions from the sub-surface.

As required by the Conditions of the lease agreement, the Auditor endorsed an Environmental Management Plan (EMP) and a Construction Environmental Management Plan (CEMP) for the proposed development. An ongoing Long Term Environmental Management Plan (LTEMP) was prepared prior to occupation of Building C to ensure ongoing management of residual environmental and human health risks associated with potential landfill gas ingress into the sub-floor space beneath the proposed building.

3. Data Quality Objectives

ARC will adopt quality assurance procedures to provide a consistent approach to evaluation of whether the Data Quality Objectives (DQOs) required by the project have been achieved. The approach will be consistent with the DQO process outlined in the National Environment Protection (Assessment of Site Contamination) Measure (the "ASC NEPM') Schedule B2 *Guideline on Site Characterisation*. The DQOs will focus on assessment of the useability of the data in terms of accuracy and reliability in forming conclusions on the condition of the element of the environment being investigated. The DQOs established for this investigation are detailed in ***Table 3.1***.

Table 3.1 Summary of Data Quality Objectives

DQO Step	Description
1. State the Problem	The GWS Giants intend to extend their WestConnex Centre building including the installation of a swimming pool area in proposed Building D. To assess the risk posed to future site users and construction workers, an assessment is to be undertaken to identify whether the Building D Assessment Area poses any risk to human health and environment for the proposed land use based on the historic use as a landfill.
2. Identify the Decision	The primary objectives of the investigation are as follows: • What are the risks of contamination at the Building D Assessment Area? • Is the Building D Assessment Area suitable for the proposed development? • What landfill gas mitigation measures and management plans are appropriate to reduce risks associated with previous landfilling activities?
3. Identify the Information Inputs	• Advance five (5) on-site soil bores within the proposed Building D footprint, undertake soil sampling and laboratory analysis. • Convert four (4) soil bores into subsurface landfill gas bores, within and below the existing cap and undertake monitoring of landfill concentration and flow; • Undertake a surface emissions survey of proposed building footprints including of service pits and conduits; • Undertake soil vapour sampling to understand composition of landfill gases and how they might impact potential mitigation systems; • Undertake a landfill gas risk assessment; and • Prepare a report to support the completion of the development.
4. Define the Boundaries of the Study	The SLFGRA will be limited to within the proposed Building D footprint within the GWS Giants WestConnex Centre.
5. Develop a Decision Rule	The decision rule is the comparison of the monitoring analytical results against relevant published guideline criteria most notably the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 for soil and for landfill gas the NSW EPA, 'Guidelines for the Assessment and Management of Sites Impacted by Hazardous Ground Gases', May 2020. Reference will also be made to other relevant international guidance which deals with developing on LFG impacted sites if and as required as listed in *Section 5.* National Association of Testing Authorities (NATA) accredited laboratories will be used for the given analytes and media. Appropriate laboratory limits of reporting (i.e. below relevant health-based screening levels) will be requested from the primary laboratory.

DQO Step	Description
	Data collected from the subject Site and adjacent areas will be reviewed to: • Assess whether the soil data is representative of actual conditions at the Site, via the completion a data quality review, and whether it can be relied upon. • Compare contaminant concentrations against the adopted assessment criteria, to assist in establishing whether it poses a risk to identified protected beneficial uses. • Monitoring landfill gas concentrations and flow, and soil vapour concentrations for comparison with NSW EPA 2020 guidance and risk matrices. If it is determined that additional information is required to further reduce the uncertainties associated with the distribution and characteristics of contaminants within soil, groundwater or landfill gas, then appropriate recommendations for further investigation will be provided which may include remediation and/or management prior to the proposed redevelopment. If remedial works are undertaken to the extent practicable, but elevated contaminant concentrations remain, control measures will be required to mitigate the risk.
6. Specify Performance or Acceptance Criteria	For the purpose of LFG monitoring, a pre-calibrated GA5000 landfill gas analyser will be used to monitor LFG concentrations in the landfill gas bores and an Inspectra Laser for surface monitoring locations. Analysis will be carried out at each sampling location for a period of 5 minutes for monitoring bores and until concentration levels remain constant. A range of QA/QC procedures and results will be used to evaluate whether the DQOs have been achieved. These procedures assess the useability of the data, particularly with regards to data accuracy and reliability for forming conclusions and are undertaken in accordance with guidance provided within Australian Standards and the ASC NEPM (2013). A data validation assessment with specific acceptance criteria and discussion of results will be completed and provided within the investigation report. As a minimum, field (intra-laboratory) and laboratory (inter-laboratory) duplicates will be collected at a frequency of 1 in 20. All field blanks, equipment rinsate blanks, and laboratory method blanks will require an acceptance limit of concentrations below the laboratory limit of reporting. All blank samples will be assessed for the potential cross-contamination of contaminants of interest.
7. Develop the Plan for Obtaining Data	The assessment will be undertaken in accordance with the ASC NEPM (2013) and relevant NSW guidance. To maintain the integrity and reliability of data the following measures will be adopted: • Samples will be collected using dedicated sampling equipment/containers; • Further soil samples will be collected at regular intervals down the soil profile and on-site VOC screening (PID head space) will be completed prior to analysis; • Leak testing will be undertaken prior to and during soil vapour sampling; • Monitoring of landfill gas flow and concentrations from sub-surface bores; • Surface emissions monitoring including service pits for landfill gas; • Strict adherence to QA/QC protocols; and • Use of suitable laboratory limits of reporting. Additional data may be required where: 1. Significant data gaps are identified; and 2. The additional sampling identifies contamination not previously identified at a level that would pose a risk to future site use. The scope and methodology for the assessment are outlined in *Section 4*. The on-site landfill gas assessment will be undertaken in accordance with the NSW Guidelines for the Assessment and Management of Sites Impacted by Hazardous Ground Gas (2020).

4. Methodology

4.1 Sampling Locations and Rationale

4.1.1 Soil Assessment

Five (5) soil bore locations were positioned in locations within the proposed development footprint to enable characterisation of the potential for soil contamination to exist at the Building D Assessment Area above the underlying landfill. Soil sampling was conducted to a maximum depth of 2.0 metres below ground level. Locations of soil bores are shown in ***Figure 2***.

Background concentrations of metals for the derivation of site-specific ecological investigation levels were taken from soil samples collected within soils across the Building D Assessment Area considered representative of domains observed on-site.

4.1.2 Landfill Gas Assessment

During the assessment, four (4) of the soil bores were converted to landfill gas monitoring bores to determine the source concentrations and flow of landfill gas from the former landfill both within and below the capping layer present.

Landfill gas monitoring bores were installed at depths varying between 1.5 – 6.0 mbgl to allow assessment of landfill gas both within and below the capping layer. The bore locations were selected based on the proposed building extension footprint. Monitoring was undertaken over three (3) rounds within six (6) weeks to obtain temporal data and, where possible, falling barometric conditions which can increase movement of landfill gas due to increased pressure differential. The landfill gas monitoring bore locations are shown in ***Figure 2***.

BS 8485:2015 states where a site encompasses an old landfill area and adjoining area of natural ground, then boreholes located in the landfill are likely to define the source hazard that directly impacts any development above.

A surface emissions walkover was also undertaken including monitoring of service pits present within and in the vicinity of the “Building D Assessment Area” to assess any current potential landfill gas migration.

4.2 Fieldworks Methodology

Field activities that were undertaken as part of the scope of works are summarised in ***Table 4.1***.

Table 4.1 Summary of Field Activities

Activity	Description
Dates of Field Activity	**17-18 May 2023:** Site walkover, subsurface utility survey, advancement and collection of soil samples from five (5) soil bores (LFG01- LFG04 and SB01), followed by installation of four (4) landfill gas bores. **25 May 2023:** Landfill gas monitoring at LFG01- LFG04. **16 June 2023:** Landfill gas monitoring at LFG01- LFG04. **22-23 June 2023:** Landfill gas monitoring at LFG01- LFG04, surface emissions survey and soil vapour canister sampling of all four (4) landfill gas bores.
Utility Clearance	A 'Dial Before You Dig' underground utility search was performed prior to the commencement of site works under the direct supervision of ARC.
Soil Boring	ARC engaged and supervised JK Geotech Pty Ltd to advance five (5) soil bores, four (4) of which were converted to landfill gas bores. Bores were advanced using a combination of hand auger, followed by solid stem auger to target depth. All observations and readings, including visual and olfactory observations, were recorded in the field on soil bore logs and in line with USCS (Unified Soil Classification System) by a suitably qualified consultant. Soil bore logs are included in ***Appendix C***.
Soil Sampling	Soil samples were generally collected at surface, 0.5 mbgl, 1.0 mbgl and 2.0 mbgl, or where visual impact or change of lithology were observed, directly from the hand auger or augers until the capping layer or waste was encountered. Duplicate soil samples were collected in snap-lock bags for screening with a calibrated PID. The PID calibration certificate is included within ***Appendix D.*** Clean disposable gloves were used for soil sampling collection. Samples were placed in laboratory prepared glass jar sample containers with individual and unique identification including project number, sampling date and sample number, and then placed into a cooled, insulated and sealed container for transport to the laboratory under Chain of Custody (COC) procedures. Copies of the COC documentation are presented in ***Appendix E***.
Bore Reinstatement	Following completion of logging and sampling, soil bore SB01 was reinstated with soil cuttings in the order they were removed followed by and a bentonite plug and completed flush to the surface in accordance with the SOPA RLMP Table 8.1 requirements.
Landfill Gas Monitoring Bore Installation	Following advancement of the soil bores, four (4) landfill gas bores were installed depths between 2 mbgl and 6 mbgl with protective flush gatic covers and vapour caps. Monitoring bores were installed to have a gas tight seal in consideration of NSW EPA Guidelines for the Assessment and Management of Sites Impacted by Hazardous Ground Gases, 2020 and SOPA RLMP Table 8.1. The landfill gas bores were installed with 50 mm, flush jointed, class 18 uPVC, threaded screen and casing as follows: • LFG01: installed to 2.0 mbgl, with screened interval from 1.0 to 2.0 mbgl; • LFG02: installed to 1.5 mbgl, with screened interval from 1.0 to 1.5 mbgl; • LFG03: installed to 4.9 mbgl, with screened interval from 2.0 to 4.9 mbgl; and • LFG04: installed to 6.0 mbgl, with screened interval from 4.0 to 6.0 mbgl. The installation details of the four (4) installed landfill gas bores were selected based on soil/waste logging, and comments in the endorsed work plan by the Auditor. The endorsed work plan required that four (4) bores were to be installed, ensuring that the two (2) shallower bores were screened only within the landfill cap and two (2) deeper bores were screened within waste body.

Activity	Description
	Sand filter packs were generally raised approximately 0.5 m above the top of the screen and a 0.5 m bentonite seal was set above the top of the sand pack. The wells were grout sealed from the bentonite seal to the surface and were finished with a flush mounted gatic and fitted with a lockable well cap. Bore construction details are included on the bore logs as presented in ***Appendix C***.
Landfill Gas Monitoring Bore Purging and Sampling	Landfill Gas Monitoring was undertaken in accordance with the methodologies outlined in NSW EPA Guidelines for the Assessment and Management of Sites Impacted by Hazardous Ground Gases, 2020 and BS8485:2015. Monitoring of the four (4) LFG bores (LFG01 - LFG04) was conducted using a calibrated GA5000 analyser during periods of falling atmospheric pressure. Prior to the gas measurements the initial peak flow rate and differential pressure were noted. Following this the methane; carbon dioxide; oxygen, carbon monoxide and hydrogen sulphide levels were recorded over a period of 5 minutes for each bore, or longer until stabilised. LFG monitoring field sheets are provided in ***Appendix F*** and the equipment calibration certificates are presented in ***Appendix D***. Weather data sourced from the Bureau of Meteorology Bankstown Airport station, the closest weather station to the Site which records barometric pressure, is presented in ***Appendix G***.
Surface and Utility Pit Emissions Landfill Gas Monitoring	A Landfill gas walkover survey was undertaken at the Building D Assessment Area. Utility structures were monitored in general accordance NSW EPA Guidelines for the Assessment and Management of Sites Impacted by Hazardous Ground Gases, 2020. A calibrated Inspectra Laser and GA5000 landfill gas analyser were used during the monitoring and methane readings (ppm), carbon dioxide; oxygen, carbon monoxide and hydrogen sulphide levels were recorded on the field sheets provided in ***Appendix F***. The equipment calibration certificates are presented in ***Appendix D***.
Soil Vapour Sampling	Soil vapour sampling of four (4) soil vapour/landfill gas bores was undertaken by a suitably experienced consultant. A 'shut in" test was completed to ensure the sampling train was not leaking. Tubing was connected to each of the gauges provided, a vacuum of 20" Hg was then applied over a period of a minute using a hand pump to make sure a vacuum was able to be held and there were no leaking connections. Isopropanol was sprayed under a shroud to test for leaks in the pin and the sampling systems. Pre and post PID readings (calibrated to a known concentration of isobutylene gas) was undertaken. The calibration certificate is included within ***Appendix D*** and the PID measurements are included in the soil vapour sampling sheet provided in ***Appendix F***. Teflon tubing from the vapour probe was connected to the 1.4 L evacuated summa cannister provided by ALS, and a dedicated soil gas sampling train with flow restrictor (60 mL/min) was connected to the canister. To calculate the volume of sample drawn into the canister, vacuum pressure was recorded at the start and end of sampling. Upon receipt at the laboratory, the canister vacuum pressure was also measured to determine if any leaks occurred during transit.
Equipment Decontamination	Decontamination of re-useable equipment including the hand auger, drilling rods and interface probe comprised rinsing in a mixture of industrial grade phosphate free detergent (Decon 90) and tap water, followed by a rinse in Decon 90 and de-ionised water and a final rinse in de-ionised water. Any excess soil was removed from the hand auger with a scrubbing brush. In addition, a new pair of Nitrile gloves was used between each sample collection location.
Waste Disposal	Waste soil cuttings were placed in locked metal drums and removed from the Site by JK Geotech Pty Ltd.

4.3 Environmental Laboratory Analysis

The soil, soil vapour and Quality Assurance / Quality Control (QAQC) samples were transported to ALS Laboratories (ALS) in Sydney for chemical analysis. ALS are accredited by the National Association of Testing Authorities (NATA) for the analyses undertaken.

Soil

Two (2) primary soil samples per soil bore were analysed. The analysis included the following:

- Total recoverable hydrocarbons (TRH);
- Benzene, toluene, ethylbenzene, xylenes and naphthalene (BTEXN);
- Polycyclic Aromatic Hydrocarbons (PAHs);
- NEPM metals;
- Sulfate;
- pH;
- 2 x NSW EPA Waste Soil Classification Short Suite;
- 2 x PFAS; and
- 11 x Asbestos identification in soils.

During soil sampling, quality control samples were analysed as follows:

- One (1) intra- and one (1) inter- laboratory duplicate sample (TRH, BTEXN, PAHs, 8 metals);
- One (1) rinsate blank per day of sampling: (TRH, BTEXN); and
- One (1) trip blank per laboratory batch: TRH C_6-C_{10}, BTEXN.

Soil Vapour

Summa canister sampling of soil vapour from four (4) landfill gas bores was undertaken, with one duplicate sample, for analysis of the following:

- TO-15X VOCs (82 analytes); and
- Light hydrocarbons and gases (CO_2; O_2; CO; H_2; He, CH_4; ethane; propane; butane).

5. Regulatory Framework and Assessment Criteria

The environmental assessment was undertaken in accordance with regulatory framework and assessment criteria outlined below.

5.1 Regulatory Framework for Soil

The following regulatory guidance documents have been referenced in conducting the soil assessment for the Building D Assessment Area:

- NSW EPA Contaminated Land Guidelines - Sampling Design Part 1 – Application, 2022.
- NSW EPA Contaminated Land Guidelines - Sampling Design Part 2 – Interpretation, 2022.
- NSW EPA Waste Classification Guidelines 2014 Part 1: Classifying waste (NSW EPA, 2014).
- NSW Government Office of Environment & Heritage, Guidelines for Consultants Reporting on Contaminated Sites, 2011.
- National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013.
- National Environment Protection Council, and including ERRATA update 6 February 2014.

State Environmental Planning Policy 55 Managing Land Contamination 1998 (SEPP 55) sets out the regulatory framework for the management of contaminated land within the State of NSW. The intent of this policy is to provide for a state-wide planning approach to the remediation of contaminated land and to reduce the risk of harm to human health or any other aspect of the environment. The SEPP 55 was introduced in 1998 under the Environmental Planning and Assessment Act 1979.

SEPP 55 specifies when contamination and remediation is to be considered in determining development applications. Consideration of risk must include risks during construction and operation of the development. The former includes work safety issues as well as the potential for works to disturb contamination and cause off-site movement of chemicals.

5.2 Soil Quality Assessment Criteria

Assessment criteria has been selected to provide an appropriate indication of the environmental status of the Building D Assessment Area with consideration given to the current and future proposed commercial land use, and intrusive workers during works. ARC refers to the National Environment Protection Council (NEPC) (2013) - National Environment Protection (Assessment of Site Contamination) Amendment Measure, 1999 (ASC NEPM, 2013) for site assessment criteria as approved by the NSW EPA.

The applicable Health-based Investigation Levels (HILs) and Health Screening Levels (HSL's) for this investigation will include commercial for the building footprint and recreational for soil reuse in other open areas of the Building D Assessment Area, as follows:

- NEPM 2013 Health Investigation Levels and Health Screening Levels (HIL/HSL D – Commercial/Industrial; and C - Recreational);

- CRC Care Soil Health Screening Levels for Vapour Intrusion (HSL D – Commercial/Industrial; and C – Recreational/Open Space);
- CRC Care Soil Health Screening Levels for Direct Contact –Intrusive Maintenance Workers; and
- HEPA PFAS National Environmental Management Plan Version 2.0 – Human Health Investigation Levels (HILs) – Industrial / Commercial.

The applicable Ecological-based Investigation Levels (EILs) and Ecological Screening Levels (ESL's) for this investigation will include the following:

- Maintenance of Ecosystems – Modified and Highly Modified Ecosystems: NEPM 2013 Ecological Investigation Levels and Ecological Screening Levels (commercial/industrial and public open space); and
- HEPA PFAS National Environmental Management Plan Version 2.0 – Ecological Direct & Indirect Exposure.

In the absence of soil characteristic data, the lowest NEPM added contaminant limit (ACL) value it has been adopted as the site-specific EILs.

With respect to asbestos containing materials (ACM), ARC has adopted a criterion of "no visible ACM" in surface soils (upper 10 cm) as well as Western Australia Department of Health (WA DoH) Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia (2009).

The ecological and human health "investigation levels" are not intended to be interpreted as "maximum permissible levels", "clean up levels" or "safe levels", rather, they are levels at which further investigation or assessment should be undertaken to provide assurance that unacceptable contamination does not occur. Subsequent assessment on a site-specific basis often results in higher levels being acceptable. However, since the "investigation levels" are generally set at conservatively low levels, they are often taken to be the acceptable levels.

5.2.1 Soil Waste Classification

Soil waste to be removed from site will be categorised in accordance with NSW EPA's Waste Classification Guidelines Part 1: Classifying Waste 2014 (NSW EPA, 2014). The waste classification guideline presents criteria for classifying waste soil into the following categories:

- General Solid Waste: value < CT1;
- Restricted Solid Waste: value >CT1 but <CT2;
- Hazardous Waste: value > CT2.

The classification of soil at the Site for off-site disposal is beyond the scope of this investigation and further data would need to be collected before any classification could be reached. However, guideline values have been adopted to allow preliminary interpretation of the soil contaminant concentrations and its classification based on the data collected to date for indicative purposes.

5.3 Soil Vapour Assessment Criteria for Protection of Human Health

The National Environment Protection (Assessment of Site Contamination) Measure (NEPM 2013) provides soil vapour Health Screening Levels (HSLs) for vapour intrusion for the protection of site users from vapours emanating from impacted soil. The screening levels provide a trigger for additional assessment or remediation. The NEPM also provides soil vapour investigation levels for human health.

Further, the CRC CARE Technical Report No. 10 (2011) provides HSLs for vapour intrusion to intrusive maintenance workers in shallow trenches.

The HSLs have been developed to assess risk based on different geological settings, which directly influence vapour migration and the potential risks posed. Soil logging identified fill material of varying composition underlying the Building D Assessment Area. As such, the HSLs derived for sand-based geology have been adopted, with soil vapour between 0 and 8 mbgl for commercial/industrial land use and intrusive maintenance workers (shallow trench) at 0 to <2 mbgl.

5.4 Regulatory Framework for Landfill Gas

The following regulatory guidance documents have been referenced in conducting the landfill gas assessment for the Building D Assessment Area:

- NSW EPA Guidelines for the Assessment and Management of Sites Impacted by Hazardous Ground Gases, 2020 (NSW EPA, 2020).
- NSW EPA, Environmental Guidelines, Solid Waste Landfills, Second Edition, 2016;
- British Standard, 2007, 'BS8485:2007 Code of Practice for the Characterization and Remediation from Ground Gas in Affected Developments';
- British Standards Institution, 2015, 'BS 8485:2015 Code of Practice For The Design of Protective Measures for Methane and Carbon Dioxide Ground Gases for New Buildings'.
- Construction Industry Research and Information Association (CIRIA) Publication C665, 2007, 'Assessing Risks Posed by Hazardous Ground Gases to Buildings'; and
- Construction Industry Research and Information Association (CIRIA), 1995, 'Risk assessment for methane and other gases from the ground, Report 152'.

5.5 Landfill Gas Risk Assessment

The NSW EPA, 2020 publication provides guidance for the assessment and management of sites impacted by hazardous ground gases with both assessment criteria and a risk assessment framework.

The landfill gas assessment criteria are sourced from the NSW EPA Environmental Guidelines: Solid Waste Landfills which was updated in 2016. The assessment criteria provided for sub-surface landfill gas concentrations is for perimeter monitoring bores and not those installed within the waste material and as such is not relevant to this assessment. However, the criteria provided for the assessment of surface emissions of 0.05% v/v methane has been adopted.

5.5.1 Characteristic Gas Situation

In order to determine the risk posed by landfill gas in the subsurface, reference is typically made to Gas Screening Values (GSV) which incorporates both flow and concentrations (NSW EPA, 2020 and CIRIA, 2007). This was adopted for the quantitate risk assessment via screening of calculated GSVs.

The screening process uses the GSV to determine the characteristic gas situation of a site, which in turn is used to influence the approach to be taken to property developments and the mitigation / protection measures that may need to apply.

ARC has applied the NSW EPA, 2020 classification system and determined a risk rating based on GSV for each soil gas bore based on current results. These have been used to complete a quantitative risk assessment, as discussed in detail in *Section 8.1*.

6. Field and Laboratory Results

6.1 Soil Results

6.1.1 Site Geology

Based on a review of borelogs from the site investigation of the Building D Assessment Area, it is considered that the waste material has been capped with imported fill material at varying depths. Imported fill material was noted to contain a combination of sandy silts, gravels, clay and fine-medium grained sands.

Waste below the imported landfill capping material varies considerably in depth and composition across the Building D Assessment Area. Waste composition is summarised in ***Table 6.1***. Borelogs are presented in ***Appendix C***.

Table 6.1 Summary of Site Geology

Location	Maximum Depth of Capping Material	Geological Description of Waste Below Capping Material
LFG01	>2.0 mbgl	Waste not encountered. Termination of borehole at 2.0 mbgl.
LFG02	1.7 mbgl	FILL: Silty Clay, fragments of wood, glass and metal, black, soft, medium-high plasticity.
LFG03	4.0 mbgl	FILL: Silty Clay, fragments of wood, glass and metal, black, soft, medium-high plasticity.
LFG04	3.0 mbgl	FILL: Clay, brick, glass and wood fragments, dark grey with red/brown mottling, soft, medium-high plasticity.
SB01	>1.3 mbgl	Waste not encountered. Termination of borehole due to refusal at 1.3 mbgl.

Based on the above summary, landfill capping is of greatest thickness in the southeast extent of the assessment area. Waste material in this area was also noted to consist of more anthropogenic inclusions than other areas, such as brick fragments. However, due to termination of LFG01 and SB01 at 2.0 and 1.3 mbgl, respectively, maximum depth of capping is unknown in the western extent of the assessment area.

6.1.2 Soil Investigation Field Observations

Odours and / or staining during sampling was noted as follows:

- No staining was observed during soil sampling at any locations;
- A decomposition odour was noted during drilling as follows;
  - LFG02 – minor decomposition odour at a depth of 1.7mbgl;
  - LFG03 – minor decomposition odour at a depth of 3.4mbgl increasing to strong decomposition odour at a depth of 4mbgl; and

- LFG04 – some decomposition odour at a depth of 2mbgl and strong decomposition odour at a depth of 5mbgl.

- Anthropogenic inclusions within fill material were glass fragments, crushed brick, wood pieces, waste fragments, gravels and metal pieces.

Field screening results, including visual and olfactory observations of the soil matrix and the PID head space field measurements, are included in the bore logs presented in ***Appendix C***.

6.1.3 Soil Analytical Results

Soil analytical results and adopted assessment criteria are presented in ***Attached Table 1***. The NATA certified laboratory reports and accompanying Chain of Custody (CoC) documentation are included with the laboratory reports included within ***Appendix E***. The analytical results exceeding adopted assessment criteria are summarised in **Table 6.2**.

Table 6.2 Exceedances of Adopted Soil Assessment Criteria

Analyte	Results		Criteria Exceeded	
	Soil ID	Concentration (mg/kg)	Criteria (mg/kg)	Source
>C16-C34 Fraction (F3)	LFG03_4.0 LFG04_5.0	730 1,380	300	NEPM 2013 Table 1B(6) ESLs for Public Open Space
Lead	LFG03_4.0 LFG04_5.0	473 108	100 400	NSW 2014 General Solid Waste CT1 (No Leaching) NSW 2014 Restricted Solid Waste CT2 (No Leaching)
Zinc	LFG03_4.0 LFG04_0.5 LFG04 _2.0** LFG04_5.0	337 101 87** 226	70 110	NEPM Site-specific EILs - Public Open Space NEPM Site-specific EILs - Commercial and Industrial
Benzo(a) pyrene	LFG03_1.5	1.5	0.7	NEPM 2013 Table 1B(6) ESLs for Public Open Space

Note: ** represents where a duplicate result has been adopted due to exceeding criteria, where the primary sample did not exceed.

Laboratory results also indicated that:

- Exceedances of the adopted assessment criteria were limited to soil bores LFG03 and LFG04.
- All samples collected within the top 1.0 m had reported results below the adopted assessment criteria, with the exception of one exceedance of ecological criteria for zinc.
- All reported results remained below the adopted health assessment criteria for both recreational and commercial/industrial land use.
- Reported concentrations of BTEXN were below laboratory limits of reporting (LORs) in all samples, with the exception of elevated naphthalene in LFG3_4.0, which remained below criteria.
- Concentrations of phenols, chlorinated hydrocarbons, pesticides MAHs and halogenated benzenes were reported below laboratory LORs across all samples.
- Asbestos was not detected in 11 soil samples.

- PFAS was detected in sample LFG4_5.0, with all results below adopted health and ecological criteria.

6.2 Soil Vapour Results

Soil Vapour analytical results and adopted assessment criteria are presented in ***Attached Table 2***. The NATA certified laboratory reports and accompanying CoC documentation are included with the laboratory reports included within ***Appendix E***.

No reported concentrations within soil vapour samples exceeded the adopted human health criteria.

6.3 Soil and Soil Vapour Quality Assurance/Quality Control

To ensure that representative soil and soil vapour samples are collected, and the analytical results are representative of the actual field conditions, rigorous field and laboratory Quality Assurance and Quality Control (QA/QC) procedures were adopted during sampling and laboratory analysis.

A summary of field quality assessment/quality control (QA/QC) samples collected during the course of this GME is presented in ***Table 6.3.***

Table 6.3 Data Quality Objectives

Parameter	Data Quality Objective	Data Quality Assessment
Field QAQC		
COC Documentation	Documentation completed	Samples were provided to the laboratories with completed chain of custody documentation (attached in ***Appendix E***).
Inter and Intra-Laboratory Samples (1 in 20 samples)	Relative Percentage Difference (RPD) < 30%	***Soil*** Intra-laboratory samples were collected at a rate of at least 1 in 20 samples (2 samples for 16 primary soil samples. All RPDs between the primary sample and inter-laboratory duplicate samples were within the acceptable range according to AS4482.1 – 2005 (refer to ***Attached Table 3***), with the exception of: • LFG03_4.0 and QC01: C_{15}-C_{28} Fraction (130%), C_{29}-C_{36} Fraction (100%) C_{10}-C_{36} Fraction (Sum) (153%), >C_{16}-C_{34} Fraction (136%), >C_{10}-C_{40} Fraction (Sum) (149%), lead (68%), nickel (84%) and zinc (82%); and • LFG04_2.0 and QC02: PAHs (Sum of total) (82%). These elevated RPDs are not considered to impact the quality of the data because both the primary and duplicate samples either exceeded or did not exceed the adopted assessment criteria. The only exceptions to this are for >C16-C34 Fraction (only primary exceeds) and zinc (only duplicate exceeds). As such, the zinc value for the primary sample has been adopted. ***Soil Vapour*** Intra-laboratory samples were collected at a rate of at least 1 in 20 samples (1 sample for 4 primary soil vapour samples). All RPDs between the primary sample and inter-laboratory duplicate samples were within the acceptable range according to AS4482.1 – 2005 (refer to ***Attached Table 4***). Note that RPDs > 50% due to differences where concentrations were reported less than 10 times the detection limits, are not considered to impact the quality of the data. Inter-laboratory samples were not collected for this assessment

Parameter	Data Quality Objective	Data Quality Assessment
Blank Samples (Rinsate, Trip Blank, Trip Spike)	Concentrations at or near the Limit of Reporting (LOR)	Analytical results for the blank samples analysed are in ***Attached Table 5a*** and ***5b***. Concentrations reported for the trip blank sample TRB1 were all less than the LOR, therefore no cross contamination during transit to the laboratory has occurred. Concentrations reported for the rinsate sample RB1 were all less than the LOR, therefore correct rinsing techniques have been employed.
Handling and Preservation	Samples received intact and cold (near 4˚C)	The soil samples were received by the laboratory cooled to a measured ambient temperature of 8.2ºC, with ice present in the eskies.
Laboratory QAQC		
Holding Time	Samples analysed within specified holding times	Samples were analysed within recommended holding times for the analysis requested, with the exception of: • pH for soil samples (1 day overdue); and • TPH/TRH/BTEXN for the trip blank sample (1 day overdue).
Method Blank Samples (1 in 20 samples)	Concentrations at or below the LOR	The laboratory analysis of method blank samples showed all blank results below the laboratory reporting limits.
Laboratory Duplicate Samples (1 in 20 samples)	RPD < 50% or as per laboratory requirement	The laboratory analysis of duplicate samples showed all samples within acceptable limits and with adequate frequency.
Laboratory Control Samples (1 in 20 samples)	Recovery 75–125% or as per laboratory requirement	Laboratory control spike recoveries showed all results within the acceptable range, with the exception of: • Phenolic compounds; and • Polynuclear Aromatic Hydrocarbons. Laboratory control spike recoveries showed all results with adequate frequency
Matrix Spikes (1 in 20 Samples)	Recovery 75–125% or as per laboratory requirement	Matrix spike recoveries were all within the laboratory requirements and with adequate frequency.
Surrogate (Every Sample)	Recovery with statistically derived QC limits or 70–130%	The laboratory analysis of surrogate recovery samples showed all results within the range 70 – 130% for all regular sample matrices.
Laboratory LORs	LORs lower than adopted guidelines	Limits of reporting for groundwater samples were deemed to be sufficiently low to enable comparison of contaminant concentrations with adopted assessment criteria.

Overall, the data quality information provides confidence that the soil and groundwater data is of sufficient quality (in terms of completeness, comparability, representativeness, precision and accuracy) and that the analytical data is suitable for the purposes of this assessment.

6.4 Landfill Gas Monitoring Results

In order to prevent underestimating potential LFG emissions due to barometric pressure differentials, the surface emissions walkover and landfill gas bore monitoring was carried out during falling barometric conditions measured across all three days of the surveying as shown in the pressure differentials between 9am and 3pm presented in ***Appendix G*** for the dates that landfill gas monitoring works were undertaken (BoM, 2023).

6.4.1 Surface Emissions Monitoring Survey

A Landfill Gas surface emissions walkover survey was conducted on 22 June 2023 across the former Landfill area and within all on-site and adjacent utility pits in accordance NSW EPA, 2020.

The highest concentration of methane measured within any utility pits in the footprint of the proposed building extension was 6.3 ppm, which is below the NSW EPA 2020 threshold level of 500 ppm for corrective action. No odours were noted during the surface emissions walkover.

The monitoring locations of the surface emissions walkover survey are presented in ***Figure 3***.

6.4.2 Landfill Gas Risk Assessment

Based on the results of this assessment and a review of historically reported landfill gas results, methane is considered the primary gas of concern given due to its presence in high concentrations and its explosive properties. Detected concentrations of carbon dioxide also pose a potential asphyxiation risk and health risk to future site occupants and intrusive maintenance workers.

For landfill gases, NSW EPA 2020 outlines the approach to Level 2 risk assessment, based on site-specific ground gas measurements, as summarized in ***Table 6.4***.

Table 6.4 GSV Values and Characteristic Situation

Site Gas Characterisation	Risk Classification	GSV Threshold (L / hr)	Additional Factors	Typical Sources
CS1	Very Low	<0.07	Typically, <1% methane concentration and <5% carbon dioxide concentration (otherwise consider an increase to CS2)	Natural soils with low organic content Typical fill
CS2	Low	0.07 to <0.7	Borehole flow rate not to exceed 70 L/hr; otherwise consider increase to CS 3	Natural soil with high organic content Fill
CS3	Moderate	0.7 to <3.5	-	Old inert waste landfill Flooded mine workings
CS4	Moderate to High	3.5 to <15	Consider need for Level 3 Risk Assessment	Mine workings susceptible to flooding Closed putrescible waste landfill
CS5	High	15 to <70	Level 3 Risk Assessment Required	Shallow, un-flooded abandoned mine workings

Site Gas Characterisation	Risk Classification	GSV Threshold (L / hr)	Additional Factors	Typical Sources
CS6	Very High	>70		Recent putrescible waste landfill.

Source (NSW EPA, 2020 – Table 7)

If maximum measured methane concentration exceeds 20%, increase to CS3 (NSW, EPA 2020).

The screening process uses the Gas Screening Value (GSV) to determine the characteristic gas situation of a Building D Assessment Area, which in turn is used to influence the approach to be taken to property developments and the mitigation / protection measures that may need to apply.

The GSV is an overall site value, not an individual borehole value or an event value. A worst-case GSV has been calculated from the highest flow rate and highest concentration, from any monitoring event.

For the purpose of developing the LFG design and assessing the appropriate levels of protection required for the building extension, approximate gas screening values (GSV = maximum gas concentration multiplied by maximum gas flow rate) has been calculated in general accordance with the NSW EPA 2020.

6.4.3 Sub-surface Landfill Gas Monitoring

Three (3) rounds of monitoring for the four (4) LFG monitoring bores were conducted by ARC Environmental.

A summary of landfill gas monitoring results collected during monitoring including methane, carbon dioxide, oxygen, balance and flow rate are presented in ***Table 6.5***.

Table 6.5 Summary of Sub-surface Landfill Gas Monitoring Readings

Landfill Gas Bore	Date	Peak Flow Rate (L/hr)	Peak CH_4 (%v/v)	Peak CO_2 (%v/v)	GSV CH_4 (L/hr)	GSV CO_2 (L/hr)	Characteristic Situation
LFG01	25/05/2023	5.1	6.2	7.7	0.3162	0.3927	-
	16/06/2023	-8.5	1.7	5.7	-0.1445	-0.4845	-
	22/06/23	0.1	2.5	9.0	0.0025	0.009	-
LFG02	25/05/2023	-0.2	0.1	6.6	-0.0002	-0.0132	-
	16/06/2023	0.0	0.0	5.5	0	0	-
	22/06/23	0.0	5.1	17.5	0	0	-
LFG03	25/05/2023	0.0	63.1	8.9	0	0	-
	16/06/2023	0.2	65.5	13.2	0.131	0.00264	-
	22/06/23	0.0	75.0	12.9	0	0	-
LFG04	25/05/2023	-0.1	89.1	5.6	-0.0891	-0.0056	-
	16/06/2023	0.1	67.7	10.7	0.0677	0.0107	-
	22/06/23	0.1	47.9	10.7	0.0479	0.0107	-
Maximum Values		**5.1**	**89.1**	**17.5**	**4.54**	**0.89**	**CS4**

The worst-case scenario for the Building D Assessment Area has a GSV of 4.54 L/hr for methane and 0.89 L/hr for carbon dioxide, indicating that the Characteristic Situation is 4 (CS4). A CS of 4 would lead to the requirement of gas protection measures as detailed in *Section 6.5*.

In accordance with NSW EPA 2020 guidance, a Level 3 full quantitative risk assessment as an additional factor is to be considered. It is considered that a Level 3 Risk Assessment is not required, based on the following:

- quantitative risk analysis is only required to resolve bulk ground gas problems where the CS is 5 or 6;
- while it may be worthwhile in other cases (i.e. CS is 4) if there is a prospect of significantly reducing the cost of protective measures, it is considered that the additional time and costs would outweigh the further assessment on this project. Quantitative risk analysis is both expensive and time-consuming; and
- the environmental investigation undertaken over a number of years for several expansions to the GWS Giants buildings has provided for a comprehensive data set to allow confidence that the worst-case scenario has been allowed for in consideration of gas protection measures.

6.5 Gas Protection Measures

It is recommended that the level of protection required for a site be determined using the following approach, which has been adapted for conditions in NSW from the procedures outlined in British Standard 8485:2007.

In accordance with NSW EPA, 2020, an appropriate guidance value is designated based on building type and gas characteristic situation, presented in ***Table 6.6*** and based on the Building D Assessment Area results:

- Standard commercial building; and
- Characteristic situation is 4 (CS4).

Table 6.6 Guidance Values for Gas Protection

Gas Characteristic Situation (CS)	Required gas protection guidance values				
	Low density residential	Medium-high density residential (strata title)	Public buildings, schools, hospitals, shopping centres	Standard, commercial buildings (offices, etc)	Large commercial (warehousing) and industrial buildings
1	0	0	0	0	0
2	3	3	3	2	1 [(a)]
3	4	3	3	2	2
4	6 [(b)]	5 [(b)]	5	4	3
5	- [(b)]	6 [(b)]	6 [(c)]	5	4
6	- [(d)]	- [(d)]	6 [(c)]	6	6

(a) If maximum measured methane concentration exceeds 20%, increase to CS3.

(b) Residential development not recommended at CS4 and above without pathway intervention and high level of management.

(c) Consideration of evacuation issues and social risk required.

(d) Level 3 Risk Assessment is required.

Results give a guidance value of 4. When a guidance value has been obtained, proposed gas protection measures and combinations of measures may be evaluated using the scores listed in ***Table 6.6.*** A combination of protection measures appropriate for site conditions should be selected such that the combined score equals or exceeds the required guidance value.

Table 6.7 Sources of Protection Measures

Measure of System Element	Score	Comments
Venting and dilution measures		
Passive sub-floor ventilation with very good performance (steady state concentration of methane over 100% of ventilation layer remains below 1% v/v at a wind speed of 0.3 m/s)	2.5	
Passive sub-floor ventilation with good performance (steady state concentration of methane over 100% of ventilation layer remains below 1% v/v at a wind speed of 1 m/s and below 2.5% v/v at a wind speed of 0.3 m/s).	1.5	If passive ventilation cannot meet this requirement an active system will be required.
Subfloor ventilation with active abstraction or pressurization.	2.5	Robust management systems must be in place to ensure long-term operation and maintenance.
Ventilated car park (basement or undercroft).	4.0	Assumes that car park is vented to deal with exhaust fumes in accordance with BCA(a) requirements.
Floor Slabs		
Reinforced concrete ground bearing floor slab	0.5	It is good practice to install ventilation in all foundation systems to effect pressure relief as a minimum. Breaches in floor slabs, such as joints, have to be effectively sealed against gas ingress to maintain these performances.
Reinforced concrete ground bearing foundation raft with limited service penetrations cast into slab	1.0	
Reinforced concrete cast in situ or post tensioned suspended slab with minimal service penetrations and water bars around all penetrations and at joints	1.5	
Fully tanked basement	2.0	
Membranes		
Proprietary gas-resistant membrane with a gas transmission rate for the gases of concern on the site that is certified and appropriate to the overall design of the gas protection system. It should be installed by a specialist to an appropriate level of workmanship with documented internal CQC, including integrity testing (e.g. tracer gas or smoke testing), under independent CQA carried out by a certified specialist(e) or appropriately qualified and experienced professional with independent verification of the entire process	2.0	Membrane performance depends on the membrane material and thickness specified, design and quality of the installation, protection from and resistance to damage after installation, and the integrity of joints in membranes that require joints. Materials that offer some degree of self-sealing and repair are preferred. Long-term performance depends on the durability of the material, including its resistance to chemical degradation in the environment in which it is installed
Monitoring and Detection Alarms		
Intermittent monitoring using hand-held equipment	0.5	Monitoring and alarm systems are only valid as part of a combined gas protection system. Where fitted, permanent systems should be installed in the underfloor venting system but can also be provided in the occupied space as a back-up
Permanent monitoring system installed in the occupied space of the building	1	
Permanent monitoring system installed in the underfloor venting / dilution system	2	
Pathway Intervention		
Vertical barriers	-	Required for residential and public buildings at

Measure of System Element	Score	Comments
Vertical venting systems	-	CS4 and above.

Source: NSW EPA, 2020.

7. Conclusions

7.1 Conclusions

This soil and landfill gas risk assessment was undertaken to assess the risk of contamination at the Building D Assessment Area associated with the former landfill and the suitability of the Building D Assessment Area for the planned Building D development, including a swimming pool. In order to achieve project objectives, five (5) soil bores were advanced and four (4) of these bores were converted to landfill gas bores. Landfill gas bores were monitored three (3) times over a period of six weeks, followed by a surface emissions and sub-surface utility survey of the Assessment Area.

Findings of the SLFGRA were as follows:

- Landfill capping was observed to have greatest thickness in the centre and southeast of the Building D Assessment Area. Capping thickness varied from 1.7 to 4 mbgl;
- Waste beneath capping was observed to contain brick, glass, wood fragments and metal pieces;
- Concentrations of >C_{16}-C_{34} Fraction (F3), zinc and benzo(a)pyrene were recorded in exceedance of the adopted ecological criteria for recreational open space and commercial land use between drilling depths of 0.5 mbgl and 5 mbgl. Although the adopted NEPM EILs being applied are only relevant to the top 2 m of the soil profile, comparison has been made to all samples to consider potential reuse of excavated material elsewhere on the Site during the redevelopment works;
- Concentrations of lead in soil at depths greater than 4 mbgl in the southeast of the Assessment Area exceeded NSW CT1 waste thresholds and CT2 thresholds in the centre;
- Soil analytical results did not exceed any of the adopted human health criteria. Therefore, excavated soil from the Building D development area may be reused at the Site, subject to SOPA approval;
- Soil vapour results did not exceed any of the adopted assessment criteria for commercial/industrial land use. Identified volatile organic compounds in landfill gas need to be taken into consideration in selection of the landfill gas protection measures (i.e. membrane) to be implemented;
- The worst-case scenario for the Building D Assessment Area has a GSV of 4.54 L/hr for methane and 0.89 L/hr for carbon dioxide, indicating that the Characteristic Situation is 4 (CS4). A CS of 4 would lead to the requirement of gas protection measures;
- In accordance with NSW EPA 2020 guidance, a Level 3 full quantitative risk assessment as an additional factor is to be considered. It is considered that a Level 3 Risk Assessment is not required;
- Landfill gas protection measures must be implemented into the proposed Building D design to meet the required score of 4 in accordance NSW EPA, *Guidelines for the Assessment and Management of Sites Impacted by Hazardous Ground Gases*, 2020. The proposed gas mitigation measures and the slab, footings and piling types should be documented in a mitigation design specification document.

8. Limitations

This report was prepared in accordance with the scope of work outlined and/or referenced within this report and subject to the applicable cost, time and other constraints. ARC Environmental performed the services in a manner consistent with the normal level of care and expertise exercised by members of the environmental profession. No warranties, expressed or implied, are made.

ARC Environmental makes no warranty concerning the suitability of the site for any purpose or the permissibility of any use, development or re-development of the site. Use of the site for any purpose may require planning and other approvals and, in some cases, EPA and accredited site auditor approvals. ARC Environmental offers no opinion as to the likelihood of obtaining any such approvals, or the conditions and obligations which such approvals may impose, which may include the requirement for additional environment works.

Except as otherwise stated, ARC Environmental's assessment is limited strictly to identifying specified environmental conditions associated with the subject site and does not evaluate structural or geotechnical conditions of any part of the site (including any buildings, equipment or infrastructure).

This assessment is based on site conditions observed by ARC Environmental personnel in the course of performing their work, sampling and analyses described in the report, and information provided by FDC Construction ("the Client"). Conclusions and recommendations made in the report are the professional opinions of the ARC Environmental personnel involved with the project and, while normal checking of the accuracy of data has been conducted, ARC Environmental assumes no responsibility or liability for errors in data obtained from such sources, regulatory agencies and/or any other external sources, nor from occurrences outside the scope of this project.

The information relating to the soil and groundwater conditions in this document is considered to be accurate at the date of site issue. Subsurface conditions can vary across a particular site, which cannot be wholly defined by investigation. As a result, it is unlikely that the results and estimations presented in this report will represent the extremes of conditions within the site. Subsurface conditions including impact concentrations can change in a limited period of time.

Only the chemicals specifically referred to in this report have been considered. ARC Environmental makes no statement or representation as to the existence (or otherwise) of any chemicals other than those specifically referred to herein. Except as otherwise specifically stated in this report, ARC Environmental makes no warranty or representation as to the presence or otherwise of asbestos and/or asbestos containing materials (“ACM”) on the site.

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9. References

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Figures

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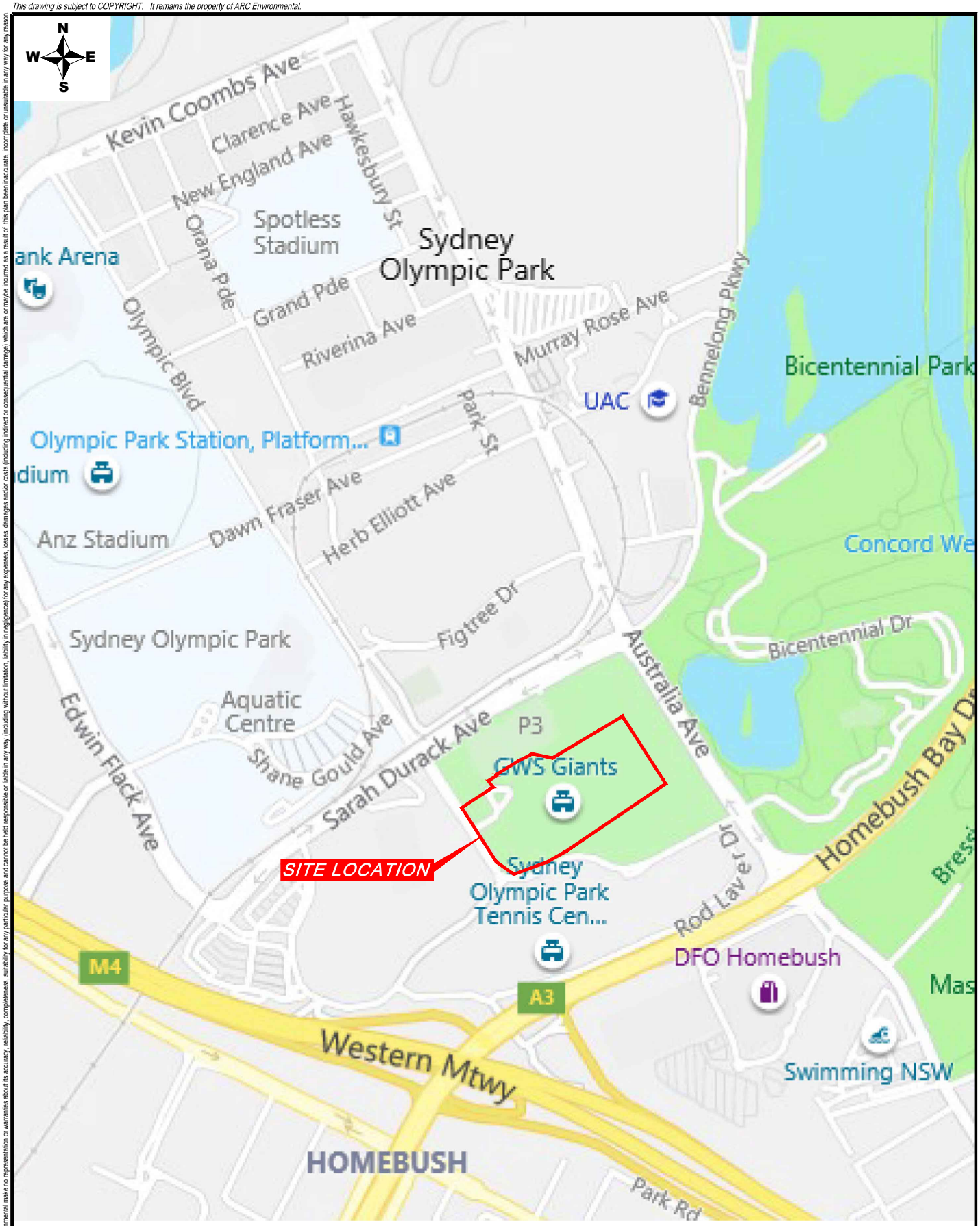

LEGEND

SITE BOUNDARY (APPROX)

0 250 500m

SCALE 1:10000

SOURCE: Image from bingmaps.com

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Client	Project	Title
FDC CONSTRUCTION	GWS COE SOIL AND LFG ASSESSMENT, 1 OLYMPIC BOULEVARD, SYDNEY, OLYMPIC PARK, NSW	SITE LOCATION

Drawn: BBL	Designed: DT	Date: 11/07/2023	File No.: 2207292-Figure 001	Job No.: 2207292	Figure: 001	Rev. A

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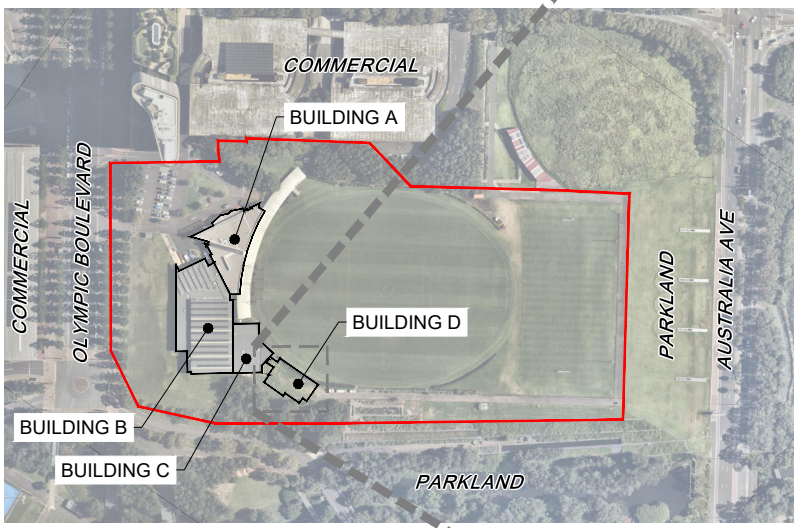

SITE LAYOUT
SCALE 1:5000

0 7.5 15m
SCALE 1:300

0 125 250m
SCALE 1:5000

LEGEND
- SITE BOUNDARY (APPROX)
- SB-x SOIL BORE LOCATION
- LFG-x LANDFILL GAS SUBSURFACE BORE LOCATION
- PROPOSED BUILDING

SOURCE: Image from nearmap.

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Client: FDC CONSTRUCTION

Project: GWS COE
SOIL AND LFG ASSESSMENT,
1 OLYMPIC BOULEVARD, SYDNEY,
OLYMPIC PARK, NSW

Title: SITE LAYOUT

Drawn: BBL	Designed: DT	Date: 07/07/2023	File No.: 2207292-Figure 002	Job No.: 2207292	Figure: 002	Rev. A

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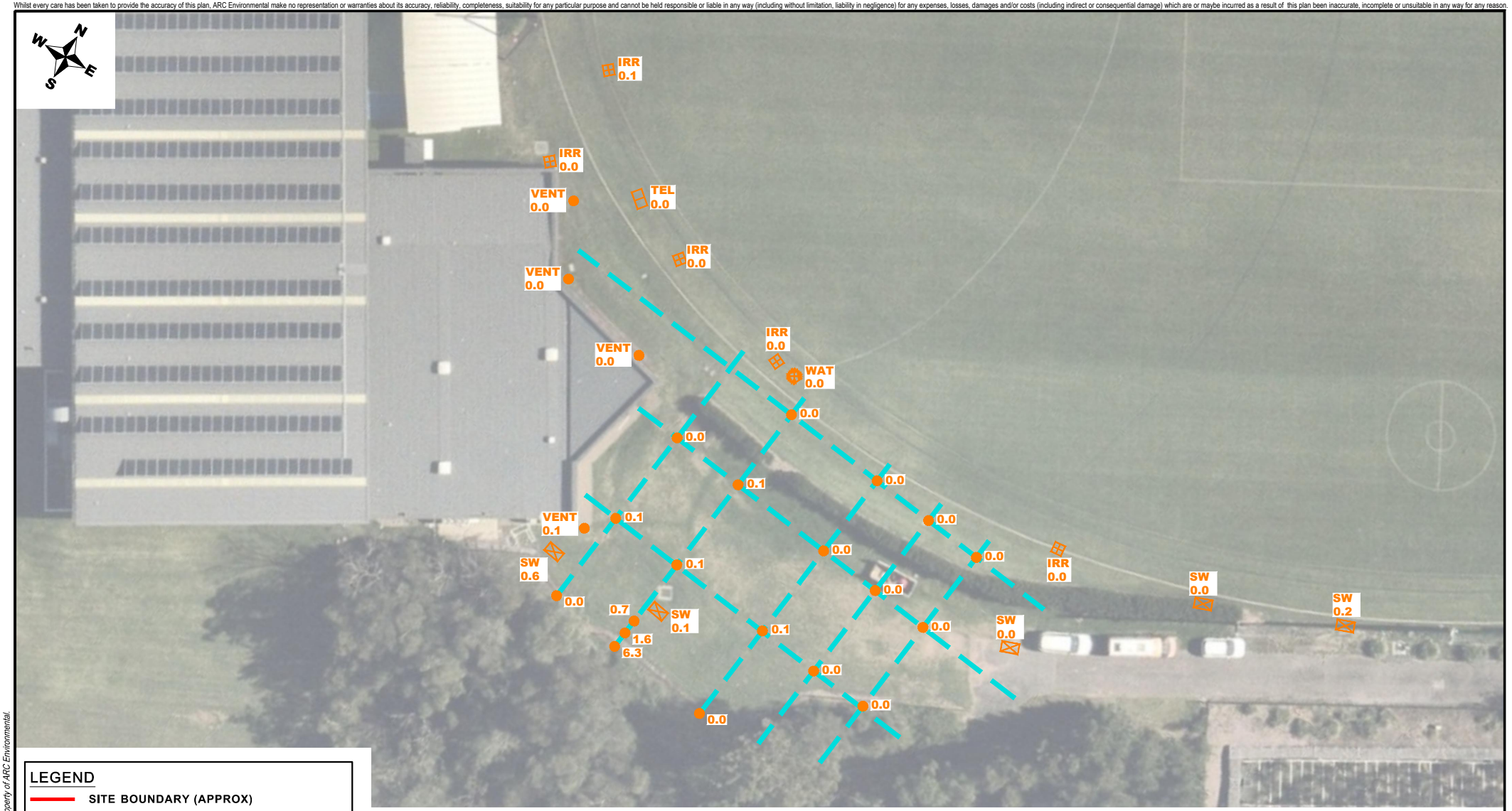

LEGEND

- SITE BOUNDARY (APPROX)
- PATH TAKEN WITH INSPECTRA LASER
- IRR x.x — IRRIGATION PIT LOCATION AND ppm MONITORING FOR METHANE / CH4
- SW x.x — STORMWATER SERVICE PIT LOCATION AND ppm MONITORING FOR METHANE / CH4
- TEL x.x — TELSTRA SERVICE PIT LOCATION AND ppm MONITORING FOR METHANE / CH4
- WAT x.x — WATER SERVICE PIT LOCATION AND ppm MONITORING FOR METHANE / CH4
- x.x — MONITORING LOCATION AND ppm MONITORING FOR METHANE / CH4

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Client: FDC CONSTRUCTION

Project: GWS CoE
SOIL AND LFG ASSESSMENT,
1 OLYMPIC BOULEVARD, SYDNEY,
OLYMPIC PARK, NSW

Title: SURFACE EMISSIONS AND SUB-SURFACE UTILITY SURVEY

Drawn: BBL	Designed: DT	Date: 11/07/2023	File No.: 2207292-Figure 003	Job No.: 2207292	Figure: 003	Rev. A

Tables

Table 1
Soil Analytical Results
GWS Giants CoE
1 Olympic Boulevard, Olympic Park NSW
2207292

	TPH									TRH							TRH - (Silica Gel Cleanup)			
	C10-C14 Fraction (SG)	C10-C36 Fraction (Sum)(SG)	C15-C28 Fraction (SG)	C29-C36 Fraction (SG)	C6-C9 Fraction	C10-C14 Fraction	C15-C28 Fraction	C29-C36 Fraction	C10-C36 Fraction (Sum)	C6-C10 Fraction	C6-C10 minus BTEX (F1)	>C10-C16 Fraction	>C10-C16 Fraction minus Naphthalene (F2)	>C16-C34 Fraction (F3)	>C34-C40 Fraction (F4)	>C10-C40 Fraction (Sum)	>C10-C16 Fraction (SG)	>C16-C34 Fraction (SG)	>C34-C40 Fraction (SG)	>C10-C40 Fraction (SG)
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL	50	50	100	100	10	20	50	50	50	10	10	50	50	100	100	50	50	100	100	50
NEPM 2013 Table 1A(1) HILs Rec C Soil																				
NEPM 2013 Table 1A(1) HILs Comm/Ind D Soil																				
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand (0-1m)											260		NL							
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand (1-2m)											370		NL							
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand (2-4m)											630		NL							
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand (>=4m)											NL		NL							
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand (0 - 1m)											NL		NL							
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand (1-2m)											NL		NL							
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand (2-4m)											NL		NL							
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand (>=4m)											NL		NL							
NEPM 2013 Table 1B(5) Generic EIL - Comm/Ind																				
NEPM Site-specific EILs - Commercial and Industrial																				
NEPM 2013 Table 1B(5) Generic EIL - Urban Res & Public Open Space																				
NEPM Site-specific EILs - Urban Res & Public Open Space																				
NEPM 2013 Table 1B(6) ESLs for Comm/Ind, Coarse Soil											215	170	170	1,700	3,300			1,700	3,300	
NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil											180	120	120	300	2,800			300	2,800	
CRC Care HSL - Direct Contact: Intrusive Maintenance Workers										82,000		62,000		85,000	120,000					
CRC Care HSL-C Recreational / Open Space										5,100		3,800		5,300	7,400					
CRC Care HSL-D Commercial / Industrial										26,000		20,000		27,000	38,000					
PFAS NEMP 2020 Ecological direct exposure																				
PFAS NEMP 2020 Ecological indirect exposure																				
PFAS NEMP 2020 Commercial/Industrial (HIL D)																				
NSW 2014 General Solid Waste CT1 (No Leaching)					650				10,000											
NSW 2014 Restricted Solid Waste CT2 (No Leaching)					2,600				40,000											
Field ID	**Date**	**Depth**	**Sample Type**																	
LFG1 0.5	**18 May 2023**	**0.5**	**Normal**	-	-	-	-	<10	<50	<100	<100	<50	<10	<10	<50	<50	<100	<100	<50	-	-	-	-
LFG1 1.0	**18 May 2023**	**1**	**Normal**	<50	<50	<100	<100	<10	-	-	-	-	<10	-	-	-	-	-	-	<50	<100	<100	<50
LFG1 1.5	**18 May 2023**	**1.5**	**Normal**	-	-	-	-	<10	<50	<100	<100	<50	<10	<10	<50	<50	<100	<100	<50	-	-	-	-
LFG2 0.5	**18 May 2023**	**0.5**	**Normal**	-	-	-	-	<10	<50	<100	<100	<50	<10	<10	<50	<50	<100	<100	<50	-	-	-	-
LFG2 1.0	**18 May 2023**	**1**	**Normal**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LFG2 1.5	**18 May 2023**	**1.5**	**Normal**	-	-	-	-	<10	<50	<100	<100	<50	<10	<10	<50	<50	<100	<100	<50	-	-	-	-
LFG2 2.0	**18 May 2023**	**2**	**Normal**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LFG3 0.5	**18 May 2023**	**0.5**	**Normal**	-	-	-	-	<10	<50	<100	<100	<50	<10	<10	<50	<50	110	<100	110	-	-	-	-
LFG3 1.5	**18 May 2023**	**1.5**	**Normal**	-	-	-	-	<10	<50	110	120	230	<10	<10	<50	<50	190	100	290	-	-	-	-
LFG3 3.4	**18 May 2023**	**3.4**	**Normal**	<50	<50	<100	<100	<10	-	-	-	-	<10	-	-	-	-	-	-	<50	<100	<100	<50
LFG3 4.0	**18 May 2023**	**4**	**Normal**	-	-	-	-	<10	<50	520	300	820	14	14	50	<50	730	170	950	-	-	-	-
QC1	**18 May 2023**	**4**	**QA/QC**	-	-	-	-	<10	<50	110	<100	110	<10	<10	<50	<50	140	<100	140	-	-	-	-

Table 1
Soil Analytical Results
GWS Giants CoE
1 Olympic Boulevard, Olympic Park NSW
2207292

	TPH									TRH							TRH - (Silica Gel Cleanup)			
	C10-C14 Fraction (SG)	C10-C36 Fraction (Sum)(SG)	C15-C28 Fraction (SG)	C29-C36 Fraction (SG)	C6-C9 Fraction	C10-C14 Fraction	C15-C28 Fraction	C29-C36 Fraction	C10-C36 Fraction (Sum)	C6-C10 Fraction	C6-C10 minus BTEX (F1)	>C10-C16 Fraction	>C10-C16 Fraction minus Naphthalene (F2)	>C16-C34 Fraction (F3)	>C34-C40 Fraction (F4)	>C10-C40 Fraction (Sum)	>C10-C16 Fraction (SG)	>C16-C34 Fraction (SG)	>C34-C40 Fraction (SG)	>C10-C40 Fraction (SG)
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL	50	50	100	100	10	20	50	50	50	10	10	50	50	100	100	50	50	100	100	50
NEPM 2013 Table 1A(1) HILs Rec C Soil																				
NEPM 2013 Table 1A(1) HILs Comm/Ind D Soil																				
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand (0-1m)											260		NL							
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand (1-2m)											370		NL							
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand (2-4m)											630		NL							
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand (>=4m)											NL		NL							
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand (0 - 1m)											NL		NL							
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand (1-2m)											NL		NL							
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand (2-4m)											NL		NL							
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand (>=4m)											NL		NL							
NEPM 2013 Table 1B(5) Generic EIL - Comm/Ind																				
NEPM Site-specific EILs - Commercial and Industrial																				
NEPM 2013 Table 1B(5) Generic EIL - Urban Res & Public Open Space																				
NEPM Site-specific EILs - Urban Res & Public Open Space																				
NEPM 2013 Table 1B(6) ESLs for Comm/Ind, Coarse Soil											215	170	170	1,700	3,300			1,700	3,300	
NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil											180	120	120	300	2,800			300	2,800	
CRC Care HSL - Direct Contact: Intrusive Maintenance Workers										82,000		62,000		85,000	120,000					
CRC Care HSL-C Recreational / Open Space										5,100		3,800		5,300	7,400					
CRC Care HSL-D Commercial / Industrial										26,000		20,000		27,000	38,000					
PFAS NEMP 2020 Ecological direct exposure																				
PFAS NEMP 2020 Ecological indirect exposure																				
PFAS NEMP 2020 Commercial/Industrial (HIL D)																				
NSW 2014 General Solid Waste CT1 (No Leaching)					650				10,000											
NSW 2014 Restricted Solid Waste CT2 (No Leaching)					2,600				40,000											
Field ID	**Date**	**Depth**	**Sample Type**																	
LFG4 0.5	**18 May 2023**	**0.5**	**Normal**	-	-	-	-	<10	<50	<100	<100	<50	<10	<10	<50	<50	<100	<100	<50	-	-	-	-
LFG4 2.0	**18 May 2023**	**2**	**Normal**	-	-	-	-	<10	<50	<100	<100	<50	<10	<10	<50	<50	<100	<100	<50	-	-	-	-
QC2	**18 May 2023**	**2**	**QA/QC**	-	-	-	-	<20	<20	<50	53	53	<20	<20	<50	<50	<100	<100	<100	-	-	-	-
LFG4 5.0	**18 May 2023**	**5**	**Normal**	-	-	-	-	<10	<50	950	600	1,550	12	12	60	60	1,380	330	1,770	-	-	-	-
SB1 0.5	**18 May 2023**	**0.5**	**Normal**	-	-	-	-	<10	<50	<100	<100	<50	<10	<10	<50	<50	<100	<100	<50	-	-	-	-
SB1 1.0	**18 May 2023**	**1**	**Normal**	-	-	-	-	<10	<50	<100	<100	<50	<10	<10	<50	<50	<100	<100	<50	-	-	-	-
Statistics																				
Number of Results				**2**	**2**	**2**	**2**	**16**	**14**	**14**	**14**	**14**	**16**	**14**	**14**	**14**	**14**	**14**	**14**	**2**	**2**	**2**	**2**
Number of Detects				**0**	**0**	**0**	**0**	**0**	**0**	**4**	**4**	**5**	**2**	**2**	**2**	**1**	**5**	**3**	**5**	**0**	**0**	**0**	**0**
Minimum Concentration				**<50**	**<50**	**<100**	**<100**	**<10**	**<20**	**<50**	**53**	**<50**	**<10**	**<10**	**50**	**<50**	**<100**	**100**	**<50**	**<50**	**<100**	**<100**	**<50**
Minimum Detect				**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**110**	**53**	**53**	**12**	**12**	**50**	**60**	**110**	**100**	**110**	**ND**	**ND**	**ND**	**ND**
Maximum Concentration				**<50**	**<50**	**<100**	**<100**	**<20**	**<50**	**950**	**600**	**1,550**	**<20**	**<20**	**60**	**60**	**1,380**	**330**	**1,770**	**<50**	**<100**	**<100**	**<50**
Maximum Detect				**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**950**	**600**	**1,550**	**14**	**14**	**60**	**60**	**1,380**	**330**	**1,770**	**ND**	**ND**	**ND**	**ND**
Average Concentration *				**25**	**25**	**50**	**50**	**5.3**	**24**	**155**	**112**	**213**	**6.3**	**6.5**	**29**	**28**	**214**	**82**	**251**	**25**	**50**	**50**	**25**
Median Concentration *				**25**	**25**	**50**	**50**	**5**	**25**	**50**	**50**	**25**	**5**	**5**	**25**	**25**	**50**	**50**	**25**	**25**	**50**	**50**	**25**
Standard Deviation *				**0**	**0**	**0**	**0**	**1.2**	**4**	**261**	**156**	**439**	**2.9**	**3.1**	**11**	**9.4**	**381**	**79**	**502**	**0**	**0**	**0**	**0**
95% UCL (Student's-t) *				**25**	**25**	**50**	**50**	**5.86**	**25.83**	**278.2**	**186.1**	**421.4**	**7.59**	**7.959**	**34.52**	**31.93**	**394.5**	**119.5**	**488.4**	**25**	**50**	**50**	**25**
% of Detects				**0**	**0**	**0**	**0**	**0**	**0**	**29**	**29**	**36**	**12**	**14**	**14**	**7**	**36**	**21**	**36**	**0**	**0**	**0**	**0**
% of Non-Detects				**100**	**100**	**100**	**100**	**100**	**100**	**71**	**71**	**64**	**88**	**86**	**86**	**93**	**64**	**79**	**64**	**100**	**100**	**100**	**100**

* A Non Detect Multiplier of 0.5 has been applied.

Notes:

* Where NEPM characterisation results were not available, ARC used Added Contaminant Limits (ACLs) to adopt the lowest EIL level in NEPM, assuming Ambient Background Concentration's (ABCs) were zero.

[A]According to EPA NSW Waste Classification Guidelines (2014) Al, Ba, B, Cr (III + VI), Co, Cu, Fe, Mn, V, and Zn have not been listed with values in this table and need not be tested for.

Table 1
Soil Analytical Results
GWS Giants CoE
1 Olympic Boulevard, Olympic Park NSW
2207292

	BTEXN								Metals													
	Benzene	Toluene	Ethylbenzene	Xylene (m & p)	Xylene (o)	Xylene Total	Total BTEX	Naphthalene (VOC)	Arsenic	Beryllium	Cadmium	Chromium (hexavalent)	Chromium (III+VI)	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Zinc
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL	0.1	0.1	0.1	0.2	0.1	0.3	0.2	0.5	2	1	0.4	0.5	2	5	5	0.1	2	2	5	2	5
NEPM 2013 Table 1A(1) HILs Rec C Soil									300	90	90	300		17,000	600	80		1,200	700		30,000
NEPM 2013 Table 1A(1) HILs Comm/Ind D Soil									3,000	500	900	3,600		240,000	1,500	730		6,000	10,000		400,000
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand (0-1m)	3	NL	NL			230		NL													
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand (1-2m)	3	NL	NL			NL		NL													
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand (2-4m)	3	NL	NL			NL		NL													
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand (>=4m)	3	NL	NL			NL		NL													
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand (0 - 1m)	NL	NL	NL			NL		NL													
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand (1-2m)	NL	NL	NL			NL		NL													
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand (2-4m)	NL	NL	NL			NL		NL													
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand (>=4m)	NL	NL	NL			NL		NL													
NEPM 2013 Table 1B(5) Generic EIL - Comm/Ind								370	160												
NEPM Site-specific EILs - Commercial and Industrial													310*	85*	1,800*			55*			110*
NEPM 2013 Table 1B(5) Generic EIL - Urban Res & Public Open Space								170	100												
NEPM Site-specific EILs - Urban Res & Public Open Space													190*	60*	1,100*			30*			70*
NEPM 2013 Table 1B(6) ESLs for Comm/Ind, Coarse Soil	75	135	165			180															
NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil	50	85	70			105															
CRC Care HSL - Direct Contact: Intrusive Maintenance Workers	1,100	120,000	85,000			130,000		29,000													
CRC Care HSL-C Recreational / Open Space	120	18,000	5,300			15,000		1,900													
CRC Care HSL-D Commercial / Industrial	430	99,000	27,000			81,000		11,000													
PFAS NEMP 2020 Ecological direct exposure																					
PFAS NEMP 2020 Ecological indirect exposure																					
PFAS NEMP 2020 Commercial/Industrial (HIL D)																					
NSW 2014 General Solid Waste CT1 (No Leaching)	10	288	600			1,000			100	20	20	100	A	A	100	4	100	40	20	100	A
NSW 2014 Restricted Solid Waste CT2 (No Leaching)	40	1,152	2,400			4,000			400	80	80	400	A	A	400	16	400	160	80	400	A
Field ID	**Date**	**Depth**	**Sample Type**																		
LFG1 0.5	**18 May 2023**	**0.5**	**Normal**	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<1	<5	-	<1	-	8	16	33	<0.1	-	7	-	-	66
LFG1 1.0	**18 May 2023**	**1**	**Normal**	<0.2	<0.5	<0.5	<0.5	<0.5	-	-	-	<5	<1	<1	<0.5	-	-	26	<0.1	<2	5	<5	<2	-
LFG1 1.5	**18 May 2023**	**1.5**	**Normal**	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<1	<5	-	<1	-	11	16	31	0.1	-	7	-	-	47
LFG2 0.5	**18 May 2023**	**0.5**	**Normal**	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<1	<5	-	<1	-	10	17	27	0.1	-	8	-	-	50
LFG2 1.0	**18 May 2023**	**1**	**Normal**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LFG2 1.5	**18 May 2023**	**1.5**	**Normal**	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<1	8	-	<1	-	14	28	42	0.3	-	6	-	-	45
LFG2 2.0	**18 May 2023**	**2**	**Normal**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LFG3 0.5	**18 May 2023**	**0.5**	**Normal**	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<1	<5	-	<1	-	14	19	27	<0.1	-	11	-	-	50
LFG3 1.5	**18 May 2023**	**1.5**	**Normal**	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<1	<5	-	<1	-	20	24	45	<0.1	-	12	-	-	55
LFG3 3.4	**18 May 2023**	**3.4**	**Normal**	<0.2	<0.5	<0.5	<0.5	<0.5	-	-	-	<5	<1	<1	<0.5	-	-	26	<0.1	<2	6	<5	<2	-
LFG3 4.0	**18 May 2023**	**4**	**Normal**	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	2	10	-	<1	-	28	40	473	0.1	-	22	-	-	337
QC1	**18 May 2023**	**4**	**QA/QC**	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	2	8	-	<1	-	18	41	232	0.1	-	9	-	-	141

Table 1
Soil Analytical Results
GWS Giants CoE
1 Olympic Boulevard, Olympic Park NSW
2207292

	BTEXN								Metals														
	Benzene	Toluene	Ethylbenzene	Xylene (m & p)	Xylene (o)	Xylene Total	Total BTEX	Naphthalene (VOC)	Arsenic	Beryllium	Cadmium	Chromium (hexavalent)	Chromium (III+VI)	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Zinc
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL	0.1	0.1	0.1	0.2	0.1	0.3	0.2	0.5	2	1	0.4	0.5	2	5	5	0.1	2	2	5	2	5
NEPM 2013 Table 1A(1) HILs Rec C Soil									300	90	90	300		17,000	600	80		1,200	700		30,000
NEPM 2013 Table 1A(1) HILs Comm/Ind D Soil									3,000	500	900	3,600		240,000	1,500	730		6,000	10,000		400,000
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand (0-1m)	3	NL	NL			230		NL													
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand (1-2m)	3	NL	NL			NL		NL													
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand (2-4m)	3	NL	NL			NL		NL													
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand (>=4m)	3	NL	NL			NL		NL													
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand (0 - 1m)	NL	NL	NL			NL		NL													
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand (1-2m)	NL	NL	NL			NL		NL													
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand (2-4m)	NL	NL	NL			NL		NL													
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand (>=4m)	NL	NL	NL			NL		NL													
NEPM 2013 Table 1B(5) Generic EIL - Comm/Ind								370	160												
NEPM Site-specific EILs - Commercial and Industrial													310*	85*	1,800*			55*			110*
NEPM 2013 Table 1B(5) Generic EIL - Urban Res & Public Open Space								170	100												
NEPM Site-specific EILs - Urban Res & Public Open Space													190*	60*	1,100*			30*			70*
NEPM 2013 Table 1B(6) ESLs for Comm/Ind, Coarse Soil	75	135	165			180															
NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil	50	85	70			105															
CRC Care HSL - Direct Contact: Intrusive Maintenance Workers	1,100	120,000	85,000			130,000		29,000													
CRC Care HSL-C Recreational / Open Space	120	18,000	5,300			15,000		1,900													
CRC Care HSL-D Commercial / Industrial	430	99,000	27,000			81,000		11,000													
PFAS NEMP 2020 Ecological direct exposure																					
PFAS NEMP 2020 Ecological indirect exposure																					
PFAS NEMP 2020 Commercial/Industrial (HIL D)																					
NSW 2014 General Solid Waste CT1 (No Leaching)	10	288	600			1,000			100	20	20	100	A	A	100	4	100	40	20	100	A
NSW 2014 Restricted Solid Waste CT2 (No Leaching)	40	1,152	2,400			4,000			400	80	80	400	A	A	400	16	400	160	80	400	A
Field ID	**Date**	**Depth**	**Sample Type**																		
LFG4 0.5	**18 May 2023**	**0.5**	**Normal**	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<1	6	-	<1	-	15	26	40	0.2	-	12	-	-	101
LFG4 2.0	**18 May 2023**	**2**	**Normal**	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<1	6	-	<1	-	13	14	26	<0.1	-	7	-	-	60
QC2	**18 May 2023**	**2**	**QA/QC**	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	-	<0.5	7.1	-	<0.4	-	16	29	41	0.2	-	14	-	-	87
LFG4 5.0	**18 May 2023**	**5**	**Normal**	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<1	14	-	1	-	54	42	108	0.2	-	12	-	-	226
SB1 0.5	**18 May 2023**	**0.5**	**Normal**	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<1	<5	-	<1	-	10	22	34	<0.1	-	13	-	-	55
SB1 1.0	**18 May 2023**	**1**	**Normal**	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<1	<5	-	<1	-	8	9	18	<0.1	-	7	-	-	37
Statistics																							
Number of Results				**16**	**16**	**16**	**16**	**16**	**14**	**13**	**14**	**16**	**2**	**16**	**2**	**14**	**14**	**16**	**16**	**2**	**16**	**2**	**2**	**14**
Number of Detects				**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**7**	**0**	**1**	**0**	**14**	**14**	**16**	**8**	**0**	**16**	**0**	**0**	**14**
Minimum Concentration				**<0.1**	**<0.1**	**<0.1**	**<0.2**	**<0.1**	**<0.3**	**<0.2**	**<0.5**	**<5**	**<1**	**<0.4**	**<0.5**	**8**	**9**	**18**	**0.1**	**<2**	**5**	**<5**	**<2**	**37**
Minimum Detect				**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**2**	**6**	**ND**	**1**	**ND**	**8**	**9**	**18**	**0.1**	**ND**	**5**	**ND**	**ND**	**37**
Maximum Concentration				**<0.2**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.2**	**2**	**14**	**<1**	**1**	**<0.5**	**54**	**42**	**473**	**0.3**	**<2**	**22**	**<5**	**<2**	**337**
Maximum Detect				**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**2**	**14**	**ND**	**1**	**ND**	**54**	**42**	**473**	**0.3**	**ND**	**22**	**ND**	**ND**	**337**
Average Concentration *				**0.097**	**0.24**	**0.24**	**0.24**	**0.24**	**0.24**	**0.1**	**0.7**	**5.1**	**0.5**	**0.51**	**0.25**	**17**	**24**	**77**	**0.11**	**1**	**9.9**	**2.5**	**1**	**97**
Median Concentration *				**0.1**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.1**	**0.5**	**2.5**	**0.5**	**0.5**	**0.25**	**14**	**23**	**33.5**	**0.075**	**1**	**8.5**	**2.5**	**1**	**57.5**
Standard Deviation *				**0.012**	**0.05**	**0.05**	**0.038**	**0.05**	**0.027**	**0**	**0.56**	**3.5**	**0**	**0.15**	**0**	**12**	**11**	**118**	**0.077**	**0**	**4.3**	**0**	**0**	**86**
95% UCL (Student's-t) *				**0.102**	**0.259**	**0.259**	**0.257**	**0.259**	**0.256**	**0.1**	**0.96**	**6.645**	**0.5**	**0.578**	**0.25**	**22.69**	**29.48**	**128.5**	**0.14**	**1**	**11.77**	**2.5**	**1**	**137.5**
% of Detects				**0**	**0**	**0**	**0**	**0**	**0**	**0**	**14**	**44**	**0**	**6**	**0**	**100**	**100**	**100**	**50**	**0**	**100**	**0**	**0**	**100**
% of Non-Detects				**100**	**100**	**100**	**100**	**100**	**100**	**100**	**86**	**56**	**100**	**94**	**100**	**0**	**0**	**0**	**50**	**100**	**0**	**100**	**100**	**0**

* A Non Detect Multiplier of 0.5 has been applied.

Table 1
Soil Analytical Results
GWS Giants CoE
1 Olympic Boulevard, Olympic Park NSW
2207292

	Inorganics						Phenols							Chlorinated Hydrocarbons										
	Moisture Content	Cyanide Total	Fluoride	Moisture Content (dried @ 103°C)	pH (Lab)	Sulphate (filtered)	3&4-Methylphenol (m&p-cresol)	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2-Methylphenol	4-chloro-3-methylphenol	Pentachlorophenol	Phenol	1,1,1,2-tetrachloroethane	1,1,1-trichloroethane	1,1,2,2-tetrachloroethane	1,1,2-trichloroethane	1,1-dichloroethene	1,2-dichloroethane	Carbon tetrachloride	Chloroform	Dichloromethane	Tetrachloroethene	Trichloroethene	Vinyl chloride
	%	mg/kg	mg/kg	%	-	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL	1	1	40	1	0.1	10	1	0.5	0.5	0.5	0.5	2	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	4
NEPM 2013 Table 1A(1) HILs Rec C Soil												120	40,000										0.2	0.01	
NEPM 2013 Table 1A(1) HILs Comm/Ind D Soil												660	240,000										0.5	0.01	
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand (0-1m)																									
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand (1-2m)																									
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand (2-4m)																									
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand (>=4m)																									
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand (0 - 1m)																									
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand (1-2m)																									
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand (2-4m)																									
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand (>=4m)																									
NEPM 2013 Table 1B(5) Generic EIL - Comm/Ind																									
NEPM Site-specific EILs - Commercial and Industrial																									
NEPM 2013 Table 1B(5) Generic EIL - Urban Res & Public Open Space																									
NEPM Site-specific EILs - Urban Res & Public Open Space																									
NEPM 2013 Table 1B(6) ESLs for Comm/Ind, Coarse Soil																								0.05	
NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil																								0.05	
CRC Care HSL - Direct Contact: Intrusive Maintenance Workers																								28	
CRC Care HSL-C Recreational / Open Space																									
CRC Care HSL-D Commercial / Industrial																									
PFAS NEMP 2020 Ecological direct exposure																									
PFAS NEMP 2020 Ecological indirect exposure																									
PFAS NEMP 2020 Commercial/Industrial (HIL D)																									
NSW 2014 General Solid Waste CT1 (No Leaching)		320	3,000					8,000	40	4,000				200	600	26	24	14	10	10	120	172	14	10	4
NSW 2014 Restricted Solid Waste CT2 (No Leaching)		1,280	12,000					32,000	160	16,000				800	2,400	104	96	56	40	40	480	688	56	40	16
Field ID	**Date**	**Depth**	**Sample Type**																							
LFG1 0.5	**18 May 2023**	**0.5**	**Normal**	19.0	-	-	-	8.2	140	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LFG1 1.0	**18 May 2023**	**1**	**Normal**	15.1	<1	90	-	-	-	<1	<0.5	<0.5	<0.5	<0.5	<2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<4
LFG1 1.5	**18 May 2023**	**1.5**	**Normal**	15.8	-	-	-	7.9	60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LFG2 0.5	**18 May 2023**	**0.5**	**Normal**	6.5	-	-	-	8.8	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LFG2 1.0	**18 May 2023**	**1**	**Normal**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LFG2 1.5	**18 May 2023**	**1.5**	**Normal**	13.8	-	-	-	8.3	80	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LFG2 2.0	**18 May 2023**	**2**	**Normal**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LFG3 0.5	**18 May 2023**	**0.5**	**Normal**	8.9	-	-	-	9.2	130	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LFG3 1.5	**18 May 2023**	**1.5**	**Normal**	15.0	-	-	-	9.8	420	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LFG3 3.4	**18 May 2023**	**3.4**	**Normal**	15.4	<1	180	-	-	-	<1	<0.5	<0.5	<0.5	<0.5	<2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<4
LFG3 4.0	**18 May 2023**	**4**	**Normal**	18.9	-	-	-	8.4	260	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
QC1	**18 May 2023**	**4**	**QA/QC**	18.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 1
Soil Analytical Results
GWS Giants CoE
1 Olympic Boulevard, Olympic Park NSW
2207292

	Inorganics						Phenols							Chlorinated Hydrocarbons										
	Moisture Content	Cyanide Total	Fluoride	Moisture Content (dried @ 103°C)	pH (Lab)	Sulphate (filtered)	3&4-Methylphenol (m&p-cresol)	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2-Methylphenol	4-chloro-3-methylphenol	Pentachlorophenol	Phenol	1,1,1,2-tetrachloroethane	1,1,1-trichloroethane	1,1,2,2-tetrachloroethane	1,1,2-trichloroethane	1,1-dichloroethene	1,2-dichloroethane	Carbon tetrachloride	Chloroform	Dichloromethane	Tetrachloroethene	Trichloroethene	Vinyl chloride
	%	mg/kg	mg/kg	%	-	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL	1	1	40	1	0.1	10	1	0.5	0.5	0.5	0.5	2	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	4
NEPM 2013 Table 1A(1) HILs Rec C Soil												120	40,000										0.2	0.01	
NEPM 2013 Table 1A(1) HILs Comm/Ind D Soil												660	240,000										0.5	0.01	
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand (0-1m)																									
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand (1-2m)																									
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand (2-4m)																									
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand (>=4m)																									
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand (0 - 1m)																									
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand (1-2m)																									
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand (2-4m)																									
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand (>=4m)																									
NEPM 2013 Table 1B(5) Generic EIL - Comm/Ind																									
NEPM Site-specific EILs - Commercial and Industrial																									
NEPM 2013 Table 1B(5) Generic EIL - Urban Res & Public Open Space																									
NEPM Site-specific EILs - Urban Res & Public Open Space																									
NEPM 2013 Table 1B(6) ESLs for Comm/Ind, Coarse Soil																								0.05	
NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil																								0.05	
CRC Care HSL - Direct Contact: Intrusive Maintenance Workers																								28	
CRC Care HSL-C Recreational / Open Space																									
CRC Care HSL-D Commercial / Industrial																									
PFAS NEMP 2020 Ecological direct exposure																									
PFAS NEMP 2020 Ecological indirect exposure																									
PFAS NEMP 2020 Commercial/Industrial (HIL D)																									
NSW 2014 General Solid Waste CT1 (No Leaching)		320	3,000					8,000	40	4,000				200	600	26	24	14	10	10	120	172	14	10	4
NSW 2014 Restricted Solid Waste CT2 (No Leaching)		1,280	12,000					32,000	160	16,000				800	2,400	104	96	56	40	40	480	688	56	40	16
Field ID	**Date**	**Depth**	**Sample Type**																						
LFG4 0.5	**18 May 2023**	**0.5**	**Normal**	11.6	-	-	-	8.7	130	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LFG4 2.0	**18 May 2023**	**2**	**Normal**	14.4	-	-	-	8.0	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
QC2	**18 May 2023**	**2**	**QA/QC**	-	-	-	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LFG4 5.0	**18 May 2023**	**5**	**Normal**	17.9	-	-	-	8.3	220	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB1 0.5	**18 May 2023**	**0.5**	**Normal**	9.0	-	-	-	8.6	170	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB1 1.0	**18 May 2023**	**1**	**Normal**	10.8	-	-	-	8.7	150	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Statistics																									
Number of Results				**15**	**2**	**2**	**1**	**12**	**12**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**
Number of Detects				**15**	**0**	**2**	**1**	**12**	**12**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Minimum Concentration				**6.5**	**<1**	**90**	**15**	**7.9**	**20**	**<1**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<2**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<4**
Minimum Detect				**6.5**	**ND**	**90**	**15**	**7.9**	**20**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**
Maximum Concentration				**19**	**<1**	**180**	**15**	**9.8**	**420**	**<1**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<2**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<4**
Maximum Detect				**19**	**ND**	**180**	**15**	**9.8**	**420**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**
Average Concentration *				**14**	**0.5**	**135**		**8.6**	**152**	**0.5**	**0.25**	**0.25**	**0.25**	**0.25**	**1**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**2**
Median Concentration *				**15**	**0.5**	**135**	**15**	**8.5**	**135**	**0.5**	**0.25**	**0.25**	**0.25**	**0.25**	**1**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**2**
Standard Deviation *				**3.9**	**0**	**64**		**0.53**	**109**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
95% UCL (Student's-t) *				**15.83**	**0.5**	**419.1**		**8.849**	**209.1**	**0.5**	**0.25**	**0.25**	**0.25**	**0.25**	**1**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**2**
% of Detects				**100**	**0**	**100**	**100**	**100**	**100**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
% of Non-Detects				**0**	**100**	**0**	**0**	**0**	**0**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

* A Non Detect Multiplier of 0.5 has been applied.

Table 1
Soil Analytical Results
GWS Giants CoE
1 Olympic Boulevard, Olympic Park NSW
2207292

	PAH																				Cyanides
	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a) pyrene	Benzo(b+j)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene	Benzo(a)pyrene TEQ calc (Half)	Benzo(a)pyrene TEQ (LOR)	Benzo(a)pyrene TEQ calc (Zero)	PAHs (Sum of total)	Cyanide (WAD)
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1
NEPM 2013 Table 1A(1) HILs Rec C Soil																	3	3	3	300	
NEPM 2013 Table 1A(1) HILs Comm/Ind D Soil																	40	40	40	4,000	
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand (0-1m)														NL							
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand (1-2m)														NL							
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand (2-4m)														NL							
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand (>=4m)														NL							
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand (0 - 1m)														NL							
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand (1-2m)														NL							
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand (2-4m)														NL							
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand (>=4m)														NL							
NEPM 2013 Table 1B(5) Generic EIL - Comm/Ind														370							
NEPM Site-specific EILs - Commercial and Industrial																					
NEPM 2013 Table 1B(5) Generic EIL - Urban Res & Public Open Space														170							
NEPM Site-specific EILs - Urban Res & Public Open Space																					
NEPM 2013 Table 1B(6) ESLs for Comm/Ind, Coarse Soil					1.4																
NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil					0.7																
CRC Care HSL - Direct Contact: Intrusive Maintenance Workers														29,000							
CRC Care HSL-C Recreational / Open Space														1,900							
CRC Care HSL-D Commercial / Industrial														11,000							
PFAS NEMP 2020 Ecological direct exposure																					
PFAS NEMP 2020 Ecological indirect exposure																					
PFAS NEMP 2020 Commercial/Industrial (HIL D)																					
NSW 2014 General Solid Waste CT1 (No Leaching)					0.8															200	
NSW 2014 Restricted Solid Waste CT2 (No Leaching)					3.2															800	

Field ID	Date	Depth	Sample Type																				
LFG1 0.5	**18 May 2023**	**0.5**	**Normal**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5	-
LFG1 1.0	**18 May 2023**	**1**	**Normal**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5	<1
LFG1 1.5	**18 May 2023**	**1.5**	**Normal**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	0.5	-
LFG2 0.5	**18 May 2023**	**0.5**	**Normal**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5	-
LFG2 1.0	**18 May 2023**	**1**	**Normal**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LFG2 1.5	**18 May 2023**	**1.5**	**Normal**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	0.7	0.6	1.2	<0.5	1.3	-
LFG2 2.0	**18 May 2023**	**2**	**Normal**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LFG3 0.5	**18 May 2023**	**0.5**	**Normal**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.0	<0.5	<0.5	<0.5	<0.5	0.8	0.6	1.2	<0.5	1.8	-
LFG3 1.5	**18 May 2023**	**1.5**	**Normal**	<0.5	<0.5	<0.5	1.5	1.5	1.7	0.9	0.8	1.4	<0.5	3.4	<0.5	0.7	<0.5	1.3	3.3	2.2	2.5	2.0	16.5	-
LFG3 3.4	**18 May 2023**	**3.4**	**Normal**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5	<1
LFG3 4.0	**18 May 2023**	**4**	**Normal**	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	<0.5	<0.5	<0.5	<0.5	1.2	<0.5	<0.5	1.8	0.6	1.1	0.6	1.2	<0.5	5.2	-
QC1	**18 May 2023**	**4**	**QA/QC**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.8	<0.5	<0.5	3.3	<0.5	0.7	0.6	1.2	<0.5	4.8	-

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1 Olympic Boulevard, Olympic Park NSW
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	PAH																				Cyanides
	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a) pyrene	Benzo(b+j)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene	Benzo(a)pyrene TEQ calc (Half)	Benzo(a)pyrene TEQ (LOR)	Benzo(a)pyrene TEQ calc (Zero)	PAHs (Sum of total)	Cyanide (WAD)
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1
NEPM 2013 Table 1A(1) HILs Rec C Soil																	3	3	3	300	
NEPM 2013 Table 1A(1) HILs Comm/Ind D Soil																	40	40	40	4,000	
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand (0-1m)														NL							
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand (1-2m)														NL							
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand (2-4m)														NL							
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand (>=4m)														NL							
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand (0 - 1m)														NL							
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand (1-2m)														NL							
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand (2-4m)														NL							
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand (>=4m)														NL							
NEPM 2013 Table 1B(5) Generic EIL - Comm/Ind														370							
NEPM Site-specific EILs - Commercial and Industrial																					
NEPM 2013 Table 1B(5) Generic EIL - Urban Res & Public Open Space														170							
NEPM Site-specific EILs - Urban Res & Public Open Space																					
NEPM 2013 Table 1B(6) ESLs for Comm/Ind, Coarse Soil					1.4																
NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil					0.7																
CRC Care HSL - Direct Contact: Intrusive Maintenance Workers														29,000							
CRC Care HSL-C Recreational / Open Space														1,900							
CRC Care HSL-D Commercial / Industrial														11,000							
PFAS NEMP 2020 Ecological direct exposure																					
PFAS NEMP 2020 Ecological indirect exposure																					
PFAS NEMP 2020 Commercial/Industrial (HIL D)																					
NSW 2014 General Solid Waste CT1 (No Leaching)					0.8															200	
NSW 2014 Restricted Solid Waste CT2 (No Leaching)					3.2															800	

Field ID	Date	Depth	Sample Type																			
LFG4 0.5	18 May 2023	0.5	Normal	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.8	<0.5	<0.5	<0.5	<0.5	0.7	0.6	1.2	<0.5	1.5	-
LFG4 2.0	18 May 2023	2	Normal	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	0.6	0.6	1.2	<0.5	1.2	-
QC2	18 May 2023	2	QA/QC	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5	-
LFG4 5.0	18 May 2023	5	Normal	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.9	<0.5	<0.5	1.1	0.6	0.9	0.6	1.2	<0.5	3.5	-
SB1 0.5	18 May 2023	0.5	Normal	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5	-
SB1 1.0	18 May 2023	1	Normal	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5	-

Statistics

Number of Results	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	2
Number of Detects	0	0	0	1	1	2	1	1	1	0	9	0	1	3	3	8	16	16	1	9	0
Minimum Concentration	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	<0.5	<0.5	<0.5	<0.5	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	0.5	<1
Minimum Detect	ND	ND	ND	1.5	1.5	0.5	0.9	0.8	1.4	ND	0.5	ND	0.7	1.1	0.6	0.6	0.6	1.2	2	0.5	ND
Maximum Concentration	<0.5	<0.5	<0.5	1.5	1.5	1.7	0.9	0.8	1.4	<0.5	3.4	<0.5	0.7	3.3	1.3	3.3	2.2	2.5	2	16.5	<1
Maximum Detect	ND	ND	ND	1.5	1.5	1.7	0.9	0.8	1.4	ND	3.4	ND	0.7	3.3	1.3	3.3	2.2	2.5	2	16.5	ND
Average Concentration *	0.25	0.25	0.25	0.33	0.33	0.36	0.29	0.28	0.32	0.25	0.72	0.25	0.28	0.59	0.36	0.68	0.7	1.3	0.36	2.4	0.5
Median Concentration *	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.55	0.25	0.25	0.25	0.25	0.425	0.6	1.2	0.25	0.85	0.5
Standard Deviation *	0	0	0	0.31	0.31	0.36	0.16	0.14	0.29	0	0.78	0	0.11	0.84	0.28	0.76	0.4	0.32	0.44	4.1	0
95% UCL (Student's-t) *	0.25	0.25	0.25	0.465	0.465	0.516	0.362	0.345	0.448	0.25	1.064	0.25	0.327	0.959	0.481	1.007	0.875	1.424	0.551	4.179	0.5
% of Detects	0	0	0	6	6	12	6	6	6	0	56	0	6	19	19	50	100	100	6	56	0
% of Non-Detects	100	100	100	94	94	88	94	94	94	100	44	100	94	81	81	50	0	0	94	44	100

* A Non Detect Multiplier of 0.5 has been applied.

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GWS Giants CoE
1 Olympic Boulevard, Olympic Park NSW
2207292

	Organochlorine Pesticides																			MAH	Organo-phosphorous Pesticides	Halogenated Benzenes	
	4,4-DDE	a-BHC	Aldrin	b-BHC	Chlordane	Chlordane (cis)	Chlordane (trans)	d-BHC	DDD	DDT	Dieldrin	Endosulfan I	Endosulfan II	Endosulfan sulphate	Endrin	Endrin aldehyde	g-BHC (Lindane)	Heptachlor	Heptachlor epoxide	Styrene	Chlorpyrifos	Chlorobenzene	Hexachlorobenzene
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.2	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.5	0.05	0.5	0.05
NEPM 2013 Table 1A(1) HILs Rec C Soil					70										20			10			250		10
NEPM 2013 Table 1A(1) HILs Comm/Ind D Soil					530										100			50			2,000		80
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand (0-1m)																							
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand (1-2m)																							
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand (2-4m)																							
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand (>=4m)																							
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand (0 - 1m)																							
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand (1-2m)																							
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand (2-4m)																							
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand (>=4m)																							
NEPM 2013 Table 1B(5) Generic EIL - Comm/Ind										640													
NEPM Site-specific EILs - Commercial and Industrial																							
NEPM 2013 Table 1B(5) Generic EIL - Urban Res & Public Open Space										180													
NEPM Site-specific EILs - Urban Res & Public Open Space																							
NEPM 2013 Table 1B(6) ESLs for Comm/Ind, Coarse Soil																							
NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil																							
CRC Care HSL - Direct Contact: Intrusive Maintenance Workers																							
CRC Care HSL-C Recreational / Open Space																							
CRC Care HSL-D Commercial / Industrial																							
PFAS NEMP 2020 Ecological direct exposure																							
PFAS NEMP 2020 Ecological indirect exposure																							
PFAS NEMP 2020 Commercial/Industrial (HIL D)																							
NSW 2014 General Solid Waste CT1 (No Leaching)																				60	4	2,000	
NSW 2014 Restricted Solid Waste CT2 (No Leaching)																				240	16	8,000	
Field ID	**Date**	**Depth**	**Sample Type**																							
LFG1 0.5	**18 May 2023**	**0.5**	**Normal**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LFG1 1.0	**18 May 2023**	**1**	**Normal**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.5	<0.05
LFG1 1.5	**18 May 2023**	**1.5**	**Normal**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LFG2 0.5	**18 May 2023**	**0.5**	**Normal**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LFG2 1.0	**18 May 2023**	**1**	**Normal**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LFG2 1.5	**18 May 2023**	**1.5**	**Normal**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LFG2 2.0	**18 May 2023**	**2**	**Normal**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LFG3 0.5	**18 May 2023**	**0.5**	**Normal**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LFG3 1.5	**18 May 2023**	**1.5**	**Normal**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LFG3 3.4	**18 May 2023**	**3.4**	**Normal**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.5	<0.05
LFG3 4.0	**18 May 2023**	**4**	**Normal**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
QC1	**18 May 2023**	**4**	**QA/QC**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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GWS Giants CoE
1 Olympic Boulevard, Olympic Park NSW
2207292

	Organochlorine Pesticides																			MAH	Organo-phosphorous Pesticides	Halogenated Benzenes	
	4,4-DDE	a-BHC	Aldrin	b-BHC	Chlordane	Chlordane (cis)	Chlordane (trans)	d-BHC	DDD	DDT	Dieldrin	Endosulfan I	Endosulfan II	Endosulfan sulphate	Endrin	Endrin aldehyde	g-BHC (Lindane)	Heptachlor	Heptachlor epoxide	Styrene	Chlorpyrifos	Chlorobenzene	Hexachlorobenzene
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.2	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.5	0.05	0.5	0.05
NEPM 2013 Table 1A(1) HILs Rec C Soil					70										20			10			250		10
NEPM 2013 Table 1A(1) HILs Comm/Ind D Soil					530										100			50			2,000		80
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand (0-1m)																							
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand (1-2m)																							
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand (2-4m)																							
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand (>=4m)																							
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand (0 - 1m)																							
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand (1-2m)																							
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand (2-4m)																							
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand (>=4m)																							
NEPM 2013 Table 1B(5) Generic EIL - Comm/Ind										640													
NEPM Site-specific EILs - Commercial and Industrial																							
NEPM 2013 Table 1B(5) Generic EIL - Urban Res & Public Open Space										180													
NEPM Site-specific EILs - Urban Res & Public Open Space																							
NEPM 2013 Table 1B(6) ESLs for Comm/Ind, Coarse Soil																							
NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil																							
CRC Care HSL - Direct Contact: Intrusive Maintenance Workers																							
CRC Care HSL-C Recreational / Open Space																							
CRC Care HSL-D Commercial / Industrial																							
PFAS NEMP 2020 Ecological direct exposure																							
PFAS NEMP 2020 Ecological indirect exposure																							
PFAS NEMP 2020 Commercial/Industrial (HIL D)																							
NSW 2014 General Solid Waste CT1 (No Leaching)																				60	4	2,000	
NSW 2014 Restricted Solid Waste CT2 (No Leaching)																				240	16	8,000	
Field ID	**Date**	**Depth**	**Sample Type**																							
LFG4 0.5	**18 May 2023**	**0.5**	**Normal**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LFG4 2.0	**18 May 2023**	**2**	**Normal**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
QC2	**18 May 2023**	**2**	**QA/QC**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LFG4 5.0	**18 May 2023**	**5**	**Normal**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB1 0.5	**18 May 2023**	**0.5**	**Normal**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB1 1.0	**18 May 2023**	**1**	**Normal**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Statistics

Number of Results	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**
Number of Detects	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Minimum Concentration	**<0.05**	**<0.05**	**<0.05**	**<0.05**	**<0.05**	**<0.05**	**<0.05**	**<0.05**	**<0.05**	**<0.2**	**<0.05**	**<0.05**	**<0.05**	**<0.05**	**<0.05**	**<0.05**	**<0.05**	**<0.05**	**<0.05**	**<0.5**	**<0.05**	**<0.5**	**<0.05**
Minimum Detect	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**
Maximum Concentration	**<0.05**	**<0.05**	**<0.05**	**<0.05**	**<0.05**	**<0.05**	**<0.05**	**<0.05**	**<0.05**	**<0.2**	**<0.05**	**<0.05**	**<0.05**	**<0.05**	**<0.05**	**<0.05**	**<0.05**	**<0.05**	**<0.05**	**<0.5**	**<0.05**	**<0.5**	**<0.05**
Maximum Detect	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**
Average Concentration *	**0.025**	**0.025**	**0.025**	**0.025**	**0.025**	**0.025**	**0.025**	**0.025**	**0.025**	**0.1**	**0.025**	**0.025**	**0.025**	**0.025**	**0.025**	**0.025**	**0.025**	**0.025**	**0.025**	**0.25**	**0.025**	**0.25**	**0.025**
Median Concentration *	**0.025**	**0.025**	**0.025**	**0.025**	**0.025**	**0.025**	**0.025**	**0.025**	**0.025**	**0.1**	**0.025**	**0.025**	**0.025**	**0.025**	**0.025**	**0.025**	**0.025**	**0.025**	**0.025**	**0.25**	**0.025**	**0.25**	**0.025**
Standard Deviation *	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
95% UCL (Student's-t) *	**0.025**	**0.025**	**0.025**	**0.025**	**0.025**	**0.025**	**0.025**	**0.025**	**0.025**	**0.1**	**0.025**	**0.025**	**0.025**	**0.025**	**0.025**	**0.025**	**0.025**	**0.025**	**0.025**	**0.25**	**0.025**	**0.25**	**0.025**
% of Detects	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
% of Non-Detects	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

* A Non Detect Multiplier of 0.5 has been applied.

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	Perfluoroalkane Carboxylic Acids											(n:2) Fluorotelomer Sulfonic Acids				Perfluoroalkane Sulfonic Acids					
	Perfluorobutanoic acid (PFBA)	Perfluorohexanoic acid (PFHxA)	Perfluoropentanoic acid (PFPeA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorodecanoic acid (PFDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorononanoic acid (PFNA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluoroundecanoic acid (PFUnDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL	0.001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0005	0.0002	0.0002	0.0005	0.0005	0.0005	0.0005	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
NEPM 2013 Table 1A(1) HILs Rec C Soil																					
NEPM 2013 Table 1A(1) HILs Comm/Ind D Soil																					
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand (0-1m)																					
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand (1-2m)																					
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand (2-4m)																					
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand (>=4m)																					
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand (0 - 1m)																					
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand (1-2m)																					
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand (2-4m)																					
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand (>=4m)																					
NEPM 2013 Table 1B(5) Generic EIL - Comm/Ind																					
NEPM Site-specific EILs - Commercial and Industrial																					
NEPM 2013 Table 1B(5) Generic EIL - Urban Res & Public Open Space																					
NEPM Site-specific EILs - Urban Res & Public Open Space																					
NEPM 2013 Table 1B(6) ESLs for Comm/Ind, Coarse Soil																					
NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil																					
CRC Care HSL - Direct Contact: Intrusive Maintenance Workers																					
CRC Care HSL-C Recreational / Open Space																					
CRC Care HSL-D Commercial / Industrial																					
PFAS NEMP 2020 Ecological direct exposure					10															1	
PFAS NEMP 2020 Ecological indirect exposure																				0.01	
PFAS NEMP 2020 Commercial/Industrial (HIL D)					50														20	20	
NSW 2014 General Solid Waste CT1 (No Leaching)																					
NSW 2014 Restricted Solid Waste CT2 (No Leaching)																					
Field ID	**Date**	**Depth**	**Sample Type**																			
LFG1 0.5	**18 May 2023**	**0.5**	**Normal**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LFG1 1.0	**18 May 2023**	**1**	**Normal**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LFG1 1.5	**18 May 2023**	**1.5**	**Normal**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LFG2 0.5	**18 May 2023**	**0.5**	**Normal**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LFG2 1.0	**18 May 2023**	**1**	**Normal**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LFG2 1.5	**18 May 2023**	**1.5**	**Normal**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LFG2 2.0	**18 May 2023**	**2**	**Normal**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LFG3 0.5	**18 May 2023**	**0.5**	**Normal**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LFG3 1.5	**18 May 2023**	**1.5**	**Normal**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LFG3 3.4	**18 May 2023**	**3.4**	**Normal**	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
LFG3 4.0	**18 May 2023**	**4**	**Normal**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
QC1	**18 May 2023**	**4**	**QA/QC**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 1
Soil Analytical Results
GWS Giants CoE
1 Olympic Boulevard, Olympic Park NSW
2207292

	Perfluoroalkane Carboxylic Acids											(n:2) Fluorotelomer Sulfonic Acids				Perfluoroalkane Sulfonic Acids					
	Perfluorobutanoic acid (PFBA)	Perfluorohexanoic acid (PFHxA)	Perfluoropentanoic acid (PFPeA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorodecanoic acid (PFDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorononanoic acid (PFNA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluoroundecanoic acid (PFUnDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL	0.001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0005	0.0002	0.0002	0.0005	0.0005	0.0005	0.0005	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
NEPM 2013 Table 1A(1) HILs Rec C Soil																					
NEPM 2013 Table 1A(1) HILs Comm/Ind D Soil																					
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand (0-1m)																					
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand (1-2m)																					
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand (2-4m)																					
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand (>=4m)																					
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand (0 - 1m)																					
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand (1-2m)																					
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand (2-4m)																					
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand (>=4m)																					
NEPM 2013 Table 1B(5) Generic EIL - Comm/Ind																					
NEPM Site-specific EILs - Commercial and Industrial																					
NEPM 2013 Table 1B(5) Generic EIL - Urban Res & Public Open Space																					
NEPM Site-specific EILs - Urban Res & Public Open Space																					
NEPM 2013 Table 1B(6) ESLs for Comm/Ind, Coarse Soil																					
NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil																					
CRC Care HSL - Direct Contact: Intrusive Maintenance Workers																					
CRC Care HSL-C Recreational / Open Space																					
CRC Care HSL-D Commercial / Industrial																					
PFAS NEMP 2020 Ecological direct exposure					10															1	
PFAS NEMP 2020 Ecological indirect exposure																				0.01	
PFAS NEMP 2020 Commercial/Industrial (HIL D)					50														20	20	
NSW 2014 General Solid Waste CT1 (No Leaching)																					
NSW 2014 Restricted Solid Waste CT2 (No Leaching)																					
Field ID	**Date**	**Depth**	**Sample Type**																		
LFG4 0.5	**18 May 2023**	**0.5**	**Normal**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LFG4 2.0	**18 May 2023**	**2**	**Normal**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
QC2	**18 May 2023**	**2**	**QA/QC**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LFG4 5.0	**18 May 2023**	**5**	**Normal**	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	0.0008	<0.0002
SB1 0.5	**18 May 2023**	**0.5**	**Normal**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB1 1.0	**18 May 2023**	**1**	**Normal**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Statistics																								
Number of Results				**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**
Number of Detects				**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**
Minimum Concentration				**<0.001**	**<0.0002**	**<0.0002**	**<0.0002**	**<0.0002**	**<0.0002**	**<0.0002**	**<0.0002**	**<0.0005**	**<0.0002**	**<0.0002**	**<0.0005**	**<0.0005**	**<0.0005**	**<0.0002**	**<0.0002**	**<0.0002**	**<0.0002**	**<0.0002**	**<0.0002**	**<0.0002**
Minimum Detect				**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**0.0008**	**ND**
Maximum Concentration				**<0.001**	**<0.0002**	**<0.0002**	**<0.0002**	**<0.0002**	**<0.0002**	**<0.0002**	**<0.0002**	**<0.0005**	**<0.0002**	**<0.0002**	**<0.0005**	**<0.0005**	**<0.0005**	**<0.0002**	**<0.0002**	**<0.0002**	**<0.0002**	**<0.0002**	**0.0008**	**<0.0002**
Maximum Detect				**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**0.0008**	**ND**
Average Concentration *				**0.0005**	**0.0001**	**0.0001**	**0.0001**	**0.0001**	**0.0001**	**0.0001**	**0.0001**	**0.00025**	**0.0001**	**0.0001**	**0.00025**	**0.00025**	**0.00025**	**0.00025**	**0.0001**	**0.0001**	**0.0001**	**0.0001**	**0.00045**	**0.0001**
Median Concentration *				**0.0005**	**0.0001**	**0.0001**	**0.0001**	**0.0001**	**0.0001**	**0.0001**	**0.0001**	**0.00025**	**0.0001**	**0.0001**	**0.00025**	**0.00025**	**0.00025**	**0.00025**	**0.0001**	**0.0001**	**0.0001**	**0.0001**	**0.00045**	**0.0001**
Standard Deviation *				**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0.00049**	**0**
95% UCL (Student's-t) *				**0.0005**	**0.0001**	**0.0001**	**0.0001**	**0.0001**	**0.0001**	**0.0001**	**0.0001**	**0.00025**	**0.0001**	**0.0001**	**0.00025**	**0.00025**	**0.00025**	**0.00025**	**0.0001**	**0.0001**	**0.0001**	**0.0001**	**0.00266**	**0.0001**
% of Detects				**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**50**	**0**
% of Non-Detects				**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**50**	**100**

* A Non Detect Multiplier of 0.5 has been applied.

Table 1
Soil Analytical Results
GWS Giants CoE
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2207292

	Perfluoroalkyl Sulfonamides							PFAS			PCBs	Biota	Mass	Solvents
	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFHxS and PFOS	Sum of PFAS	Sum of PFAS (WA DER List)	PCBs (Sum of total)	Biota Description	weight of sample	Methyl Ethyl Ketone
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	-	g	mg/kg
EQL	0.0002	0.0005	0.0002	0.0005	0.0005	0.0002	0.0005	0.0002	0.0002	0.0002	0.1		0.01	5
NEPM 2013 Table 1A(1) HILs Rec C Soil											1			
NEPM 2013 Table 1A(1) HILs Comm/Ind D Soil											7			
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand (0-1m)														
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand (1-2m)														
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand (2-4m)														
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand (>=4m)														
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand (0 - 1m)														
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand (1-2m)														
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand (2-4m)														
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand (>=4m)														
NEPM 2013 Table 1B(5) Generic EIL - Comm/Ind														
NEPM Site-specific EILs - Commercial and Industrial														
NEPM 2013 Table 1B(5) Generic EIL - Urban Res & Public Open Space														
NEPM Site-specific EILs - Urban Res & Public Open Space														
NEPM 2013 Table 1B(6) ESLs for Comm/Ind, Coarse Soil														
NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil														
CRC Care HSL - Direct Contact: Intrusive Maintenance Workers														
CRC Care HSL-C Recreational / Open Space														
CRC Care HSL-D Commercial / Industrial														
PFAS NEMP 2020 Ecological direct exposure														
PFAS NEMP 2020 Ecological indirect exposure														
PFAS NEMP 2020 Commercial/Industrial (HIL D)								20						
NSW 2014 General Solid Waste CT1 (No Leaching)											50			4,000
NSW 2014 Restricted Solid Waste CT2 (No Leaching)											50			16,000
Field ID	**Date**	**Depth**	**Sample Type**											
LFG1 0.5	**18 May 2023**	**0.5**	**Normal**	-	-	-	-	-	-	-	-	-	-	-	1	43.9	-
LFG1 1.0	**18 May 2023**	**1**	**Normal**	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	<5
LFG1 1.5	**18 May 2023**	**1.5**	**Normal**	-	-	-	-	-	-	-	-	-	-	-	1	54.1	-
LFG2 0.5	**18 May 2023**	**0.5**	**Normal**	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LFG2 1.0	**18 May 2023**	**1**	**Normal**	-	-	-	-	-	-	-	-	-	-	-	1	50.9	-
LFG2 1.5	**18 May 2023**	**1.5**	**Normal**	-	-	-	-	-	-	-	-	-	-	-	1	55.2	-
LFG2 2.0	**18 May 2023**	**2**	**Normal**	-	-	-	-	-	-	-	-	-	-	-	1	42.0	-
LFG3 0.5	**18 May 2023**	**0.5**	**Normal**	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LFG3 1.5	**18 May 2023**	**1.5**	**Normal**	-	-	-	-	-	-	-	-	-	-	-	1	55.3	-
LFG3 3.4	**18 May 2023**	**3.4**	**Normal**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.1	1	45.9	<5
LFG3 4.0	**18 May 2023**	**4**	**Normal**	-	-	-	-	-	-	-	-	-	-	-	-	-	-
QC1	**18 May 2023**	**4**	**QA/QC**	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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	Perfluoroalkyl Sulfonamides							PFAS			PCBs	Biota	Mass	Solvents
	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFHxS and PFOS	Sum of PFAS	Sum of PFAS (WA DER List)	PCBs (Sum of total)	Biota Description	weight of sample	Methyl Ethyl Ketone
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	-	g	mg/kg
EQL	0.0002	0.0005	0.0002	0.0005	0.0005	0.0002	0.0005	0.0002	0.0002	0.0002	0.1		0.01	5
NEPM 2013 Table 1A(1) HILs Rec C Soil											1			
NEPM 2013 Table 1A(1) HILs Comm/Ind D Soil											7			
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand (0-1m)														
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand (1-2m)														
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand (2-4m)														
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand (>=4m)														
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand (0 - 1m)														
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand (1-2m)														
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand (2-4m)														
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand (>=4m)														
NEPM 2013 Table 1B(5) Generic EIL - Comm/Ind														
NEPM Site-specific EILs - Commercial and Industrial														
NEPM 2013 Table 1B(5) Generic EIL - Urban Res & Public Open Space														
NEPM Site-specific EILs - Urban Res & Public Open Space														
NEPM 2013 Table 1B(6) ESLs for Comm/Ind, Coarse Soil														
NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil														
CRC Care HSL - Direct Contact: Intrusive Maintenance Workers														
CRC Care HSL-C Recreational / Open Space														
CRC Care HSL-D Commercial / Industrial														
PFAS NEMP 2020 Ecological direct exposure														
PFAS NEMP 2020 Ecological indirect exposure														
PFAS NEMP 2020 Commercial/Industrial (HIL D)								20						
NSW 2014 General Solid Waste CT1 (No Leaching)											50			4,000
NSW 2014 Restricted Solid Waste CT2 (No Leaching)											50			16,000
Field ID	**Date**	**Depth**	**Sample Type**											
LFG4 0.5	**18 May 2023**	**0.5**	**Normal**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LFG4 2.0	**18 May 2023**	**2**	**Normal**	-	-	-	-	-	-	-	-	-	-	-	1	378	-
QC2	**18 May 2023**	**2**	**QA/QC**	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LFG4 5.0	**18 May 2023**	**5**	**Normal**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	0.0042	<0.0005	0.0008	0.0050	0.0008	-	1	223	-
SB1 0.5	**18 May 2023**	**0.5**	**Normal**	-	-	-	-	-	-	-	-	-	-	-	1	61.2	-
SB1 1.0	**18 May 2023**	**1**	**Normal**	-	-	-	-	-	-	-	-	-	-	-	1	45.1	-
Statistics														
Number of Results				**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**11**	**11**	**2**
Number of Detects				**0**	**0**	**0**	**0**	**0**	**1**	**0**	**1**	**1**	**1**	**0**	**11**	**11**	**0**
Minimum Concentration				**<0.0002**	**<0.0005**	**<0.0002**	**<0.0005**	**<0.0005**	**<0.0002**	**<0.0005**	**<0.0002**	**<0.0002**	**<0.0002**	**<0.1**	**1**	**42**	**<5**
Minimum Detect				**ND**	**ND**	**ND**	**ND**	**ND**	**0.0042**	**ND**	**0.0008**	**0.005**	**0.0008**	**ND**	**1**	**42**	**ND**
Maximum Concentration				**<0.0002**	**<0.0005**	**<0.0002**	**<0.0005**	**<0.0005**	**0.0042**	**<0.0005**	**0.0008**	**0.005**	**0.0008**	**<0.1**	**1**	**378**	**<5**
Maximum Detect				**ND**	**ND**	**ND**	**ND**	**ND**	**0.0042**	**ND**	**0.0008**	**0.005**	**0.0008**	**ND**	**1**	**378**	**ND**
Average Concentration *				**0.0001**	**0.00025**	**0.0001**	**0.00025**	**0.00025**	**0.0022**	**0.00025**	**0.00045**	**0.0026**	**0.00045**	**0.05**	**1**	**96**	**2.5**
Median Concentration *				**0.0001**	**0.00025**	**0.0001**	**0.00025**	**0.00025**	**0.00215**	**0.00025**	**0.00045**	**0.00255**	**0.00045**	**0.05**	**1**	**54.1**	**2.5**
Standard Deviation *				**0**	**0**	**0**	**0**	**0**	**0.0029**	**0**	**0.00049**	**0.0035**	**0.00049**	**0**	**0**	**107**	**0**
95% UCL (Student's-t) *				**0.0001**	**0.00025**	**0.0001**	**0.00025**	**0.00025**	**0.0151**	**0.00025**	**0.00266**	**0.018**	**0.00266**	**0.05**	**1**	**154.4**	**2.5**
% of Detects				**0**	**0**	**0**	**0**	**0**	**50**	**0**	**50**	**50**	**50**	**0**	**100**	**100**	**0**
% of Non-Detects				**100**	**100**	**100**	**100**	**100**	**50**	**100**	**50**	**50**	**50**	**100**	**0**	**0**	**100**

* A Non Detect Multiplier of 0.5 has been applied.

Table 2
Soil Vapour Analytical Results
GWS Giants CoE
1 Olympic Boulevard, Olympic Park NSW
2207292

				BTEX						Organic			Chlorinated Hydrocarbons									
				Benzene	Toluene	Ethylbenzene	Xylene (m & p)	Xylene (o)	Xylene Total	Ethane	Ethene	Methane	1,1,1,2-tetrachloroethane	1,1,1-trichloroethane	1,1,2,2-tetrachloroethane	1,1,2-trichloroethane	1,1-dichloroethane	1,1-dichloroethene	1,2-dichloroethane	1,2-dichloropropane	Benzyl chloride	Bromodichloromethane	Bromoform
				µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3
EQL				100	190	220	430	220	650	60,000	55,000	33,000	340	270	340	270	200	200	200	230	260	340	520
NEPM 2013 Table 1A(2) Comm/Ind D Soil Vap VOCC HILs														230,000									
CRC Care 2011 Table B1 Intrusive Workers (Shallow Trench) 0 to <2m - SAND				760,000	NL	NL		NL															
NEPM 2013 Table 1A(5) Comm/Ind D Soil Vapour HSL for Vapour Intrusion, Sand >=0m, <1m				4,000	4,800,000	1,300,000			840,000														
NEPM 2013 Table 1A(5) Comm/Ind D Soil Vapour HSL for Vapour Intrusion, Sand >=1m, <2m				10,000	16,000,000	4,600,000			3,200,000														
NEPM 2013 Table 1A(5) Comm/Ind D Soil Vapour HSL for Vapour Intrusion, Sand >=2m, <4m				30,000	39,000,000	11,000,000			8,000,000														
NEPM 2013 Table 1A(5) Comm/Ind D Soil Vapour HSL for Vapour Intrusion, Sand >=4m, <8m				65,000	84,000,000	25,000,000			18,000,000														
Location Code	**Field ID**	**Date**	**Sample Type**																				
LFG01	**LFG01_220623**	**22 Jun 2023**	**Normal**	<100	<190	<220	<430	<220	<650	<120,000	<110,000	3,820,000	<340	<270	<340	<270	<200	<200	<200	<230	<260	<340	<520
LFG02	**LFG02_220623**	**22 Jun 2023**	**Normal**	<100	<190	<220	<430	<220	<650	<120,000	<110,000	2,330,000	<340	<270	<340	<270	<200	<200	<200	<230	<260	<340	<520
LFG03	**LFG03_220623**	**22 Jun 2023**	**Normal**	1,180	<190	282	<430	<220	<650	<120,000	<110,000	426,000,000	<340	<270	<340	<270	<200	<200	<200	<230	<260	<340	<520
LFG03	**QC01_220623**	**22 Jun 2023**	**Field_D**	1,190	<190	281	<430	<220	<650	<120,000	<110,000	428,000,000	<340	<270	<340	<270	<200	<200	<200	<230	<260	<340	<520
LFG04	**LFG04_220623**	**22 Jun 2023**	**Normal**	418	<190	<220	<430	<220	<650	<120,000	<110,000	305,000,000	<340	<270	<340	<270	<200	<200	<200	<230	<260	<340	<520

Statistics

Number of Results	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**
Number of Detects	**3**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**5**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Minimum Concentration	**<100**	**<190**	**<220**	**<430**	**<220**	**<650**	**<120,000**	**<110,000**	**2,330,000**	**<340**	**<270**	**<340**	**<270**	**<200**	**<200**	**<200**	**<230**	**<260**	**<340**	**<520**	
Minimum Detect	**418**	**ND**	**281**	**ND**	**ND**	**ND**	**ND**	**ND**	**2,330,000**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**
Maximum Concentration	**1,190**	**<190**	**282**	**<430**	**<220**	**<650**	**<120,000**	**<110,000**	**428,000,000**	**<340**	**<270**	**<340**	**<270**	**<200**	**<200**	**<200**	**<230**	**<260**	**<340**	**<520**	
Maximum Detect	**1,190**	**ND**	**282**	**ND**	**ND**	**ND**	**ND**	**ND**	**428,000,000**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**
Average Concentration *	**578**	**95**	**179**	**215**	**110**	**325**	**60,000**	**55,000**	**233,030,000**	**170**	**135**	**170**	**135**	**100**	**100**	**100**	**115**	**130**	**170**	**260**	
Median Concentration *	**418**	**95**	**110**	**215**	**110**	**325**	**60,000**	**55,000**	**305,000,000**	**170**	**135**	**170**	**135**	**100**	**100**	**100**	**115**	**130**	**170**	**260**	
Standard Deviation *	**574**	**0**	**94**	**0**	**0**	**0**	**0**	**0**	**215,748,764**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
95% UCL (Student's-t) *	**1,125**	**95**	**268.2**	**215**	**110**	**325**	**60,000**	**55,000**	**438,700,000**	**170**	**135**	**170**	**135**	**100**	**100**	**100**	**115**	**130**	**170**	**260**	
% of Detects	**60**	**0**	**40**	**0**	**0**	**0**	**0**	**0**	**100**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
% of Non-Detects	**40**	**100**	**60**	**100**	**100**	**100**	**100**	**100**	**0**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	

* A Non Detect Multiplier of 0.5 has been applied.

Table 2
Soil Vapour Analytical Results
GWS Giants CoE
1 Olympic Boulevard, Olympic Park NSW
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				Chlorinated Hydrocarbons															Acrylates
				Carbon tetrachloride	Chlorodibromomethane	Chloroethane	Chloroform	Chloromethane	cis-1,2-dichloroethene	cis-1,3-dichloropropene	Dichloromethane	Hexachlorobutadiene	Tetrachloroethene	trans-1,2-dichloroethene	Trichloroethene	trans-1,3-dichloropropene	Vinyl chloride	Methyl Methacrylate
				µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3
EQL				310	430	130	240	100	20	230	170	530	340	200	5.4	230	5.1	210
NEPM 2013 Table 1A(2) Comm/Ind D Soil Vap VOCC HILs									300				8,000		80		100	
CRC Care 2011 Table B1 Intrusive Workers (Shallow Trench) 0 to <2m - SAND																		
NEPM 2013 Table 1A(5) Comm/Ind D Soil Vapour HSL for Vapour Intrusion, Sand >=0m, <1m																		
NEPM 2013 Table 1A(5) Comm/Ind D Soil Vapour HSL for Vapour Intrusion, Sand >=1m, <2m																		
NEPM 2013 Table 1A(5) Comm/Ind D Soil Vapour HSL for Vapour Intrusion, Sand >=2m, <4m																		
NEPM 2013 Table 1A(5) Comm/Ind D Soil Vapour HSL for Vapour Intrusion, Sand >=4m, <8m																		
Location Code	**Field ID**	**Date**	**Sample Type**															
LFG01	**LFG01_220623**	**22 Jun 2023**	**Normal**	<310	<430	<130	<240	<100	<20.0	<230	<170	<530	<340	<200	<5.4	<230	<5.1	<210
LFG02	**LFG02_220623**	**22 Jun 2023**	**Normal**	<310	<430	<130	<240	<100	<20.0	<230	<170	<530	<340	<200	<5.4	<230	<5.1	<210
LFG03	**LFG03_220623**	**22 Jun 2023**	**Normal**	<310	<430	<130	<240	<100	<100	<230	<170	<530	<340	<200	<135	<230	<63.8	<210
LFG03	**QC01_220623**	**22 Jun 2023**	**Field_D**	<310	<430	<130	<240	<100	<100	<230	<170	<530	<340	<200	<135	<230	<63.8	<210
LFG04	**LFG04_220623**	**22 Jun 2023**	**Normal**	<310	<430	<130	<240	<100	<20.0	<230	<170	<530	<340	<200	<27.0	<230	23.8	<210

Statistics

Number of Results	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**
Number of Detects	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**
Minimum Concentration	**<310**	**<430**	**<130**	**<240**	**<100**	**<20**	**<230**	**<170**	**<530**	**<340**	**<200**	**<5.4**	**<230**	**<5.1**	**<210**
Minimum Detect	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**23.8**	**ND**
Maximum Concentration	**<310**	**<430**	**<130**	**<240**	**<100**	**<100**	**<230**	**<170**	**<530**	**<340**	**<200**	**<135**	**<230**	**<63.8**	**<210**
Maximum Detect	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**23.8**	**ND**
Average Concentration *	**155**	**215**	**65**	**120**	**50**	**26**	**115**	**85**	**265**	**170**	**100**	**31**	**115**	**19**	**105**
Median Concentration *	**155**	**215**	**65**	**120**	**50**	**10**	**115**	**85**	**265**	**170**	**100**	**13.5**	**115**	**23.8**	**105**
Standard Deviation *	**0**	**0**	**0**	**0**	**0**	**22**	**0**	**0**	**0**	**0**	**0**	**34**	**0**	**15**	**0**
95% UCL (Student's-t) *	**155**	**215**	**65**	**120**	**50**	**46.89**	**115**	**85**	**265**	**170**	**100**	**63.01**	**115**	**32.81**	**105**
% of Detects	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**20**	**0**
% of Non-Detects	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**80**	**100**

* A Non Detect Multiplier of 0.5 has been applied.

Table 2
Soil Vapour Analytical Results
GWS Giants CoE
1 Olympic Boulevard, Olympic Park NSW
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				NA							Sample Preparation		MAH							
				2,2,4-Trimethylpentane	Ethyl tert-Butyl Ether (ETBE)	Freon 114	tert-Butyl alcohol	Butane	Propane	Propene	Inert Gases (N2. Ar) by difference	Inert Gases (N2. Ar) by difference	1,2,4-trimethylbenzene	1,3,5-trimethylbenzene	1-methyl-4 ethyl benzene	Isopropylbenzene	n-butylbenzene	n-propylbenzene	sec-butylbenzene	Styrene	tert-butylbenzene
				µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	Mol %	mg/m³	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3
EQL				230	210	350	150	120,000	90,000	90	0.1		240	240	240	250	270	250	270	210	270
NEPM 2013 Table 1A(2) Comm/Ind D Soil Vap VOCC HILs																				
CRC Care 2011 Table B1 Intrusive Workers (Shallow Trench) 0 to <2m - SAND																				
NEPM 2013 Table 1A(5) Comm/Ind D Soil Vapour HSL for Vapour Intrusion, Sand >=0m, <1m																				
NEPM 2013 Table 1A(5) Comm/Ind D Soil Vapour HSL for Vapour Intrusion, Sand >=1m, <2m																				
NEPM 2013 Table 1A(5) Comm/Ind D Soil Vapour HSL for Vapour Intrusion, Sand >=2m, <4m																				
NEPM 2013 Table 1A(5) Comm/Ind D Soil Vapour HSL for Vapour Intrusion, Sand >=4m, <8m																				
Location Code	**Field ID**	**Date**	**Sample Type**																	
LFG01	LFG01_220623	22 Jun 2023	Normal	<230	<210	<350	<150	<240,000	<180,000	<90.0	77.4	885,000	<240	<240	<240	<250	<270	<250	<270	<210	<270
LFG02	LFG02_220623	22 Jun 2023	Normal	<230	<210	<350	<150	<240,000	<180,000	<90.0	78.1	894,000	<240	<240	<240	<250	<270	<250	<270	<210	<270
LFG03	LFG03_220623	22 Jun 2023	Normal	13,400	<210	908	<150	<240,000	<180,000	<90.0	21.0	241,000	<240	<240	<240	1,270	<270	485	<270	<210	<270
LFG03	QC01_220623	22 Jun 2023	Field_D	13,500	<210	936	<150	<240,000	<180,000	<90.0	20.9	239,000	<240	<240	<240	1,260	<270	468	<270	<210	<270
LFG04	LFG04_220623	22 Jun 2023	Normal	2,640	<210	618	<150	<240,000	<180,000	<90.0	42.2	483,000	<240	<240	<240	953	<270	629	460	<210	<270
Statistics																				
Number of Results				5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Number of Detects				3	0	3	0	0	0	0	5	5	0	0	0	3	0	3	1	0	0
Minimum Concentration				<230	<210	<350	<150	<240,000	<180,000	<90	20.9	239,000	<240	<240	<240	<250	<270	<250	<270	<210	<270
Minimum Detect				2,640	ND	618	ND	ND	ND	ND	20.9	239,000	ND	ND	ND	953	ND	468	460	ND	ND
Maximum Concentration				13,500	<210	936	<150	<240,000	<180,000	<90	78.1	894,000	<240	<240	<240	1,270	<270	629	460	<210	<270
Maximum Detect				13,500	ND	936	ND	ND	ND	ND	78.1	894,000	ND	ND	ND	1,270	ND	629	460	ND	ND
Average Concentration *				5,954	105	562	75	120,000	90,000	45	48	548,400	120	120	120	747	135	366	200	105	135
Median Concentration *				2,640	105	618	75	120,000	90,000	45	42.2	483,000	120	120	120	953	135	468	135	105	135
Standard Deviation *				6,920	0	375	0	0	0	0	29	326,818	0	0	0	582	0	229	145	0	0
95% UCL (Student's-t) *				12,552	105	919.8	75	120,000	90,000	45	75.17	859,985	120	120	120	1,301	135	584.8	338.6	105	135
% of Detects				60	0	60	0	0	0	0	100	100	0	0	0	60	0	60	20	0	0
% of Non-Detects				40	100	40	100	100	100	100	0	0	100	100	100	40	100	40	80	100	100

* A Non Detect Multiplier of 0.5 has been applied.

Table 2
Soil Vapour Analytical Results
GWS Giants CoE
1 Olympic Boulevard, Olympic Park NSW
2207292

				Halogenated Benzenes						Halogenated Hydrocarbons					VOCs					
				1,2,4-trichlorobenzene	1,2-dichlorobenzene	1,3-dichlorobenzene	1,4-dichlorobenzene	2-chlorotoluene	Chlorobenzene	1,2-dibromoethane	Bromomethane	Dichlorodifluoromethane	Trichlorofluoromethane	Trichlorofluoromethane	2-isopropyltoluene	2-Chloro-1,3-butadiene	Acrolein	Diisopropyl ether	Vinyl bromide (bromoethene)	Freon 113
				µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	ppmv	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3
EQL				370	300	300	300	260	230	380	190	250		280	270	180	110	210	220	380
NEPM 2013 Table 1A(2) Comm/Ind D Soil Vap VOCC HILs																				
CRC Care 2011 Table B1 Intrusive Workers (Shallow Trench) 0 to <2m - SAND																				
NEPM 2013 Table 1A(5) Comm/Ind D Soil Vapour HSL for Vapour Intrusion, Sand >=0m, <1m																				
NEPM 2013 Table 1A(5) Comm/Ind D Soil Vapour HSL for Vapour Intrusion, Sand >=1m, <2m																				
NEPM 2013 Table 1A(5) Comm/Ind D Soil Vapour HSL for Vapour Intrusion, Sand >=2m, <4m																				
NEPM 2013 Table 1A(5) Comm/Ind D Soil Vapour HSL for Vapour Intrusion, Sand >=4m, <8m																				
Location Code	**Field ID**	**Date**	**Sample Type**																	
LFG01	**LFG01_220623**	**22 Jun 2023**	**Normal**	<370	<300	<300	<300	<260	<230	<380	<190	<250	<0.0500	<280	<270	<180	<110	<210	<220	<380
LFG02	**LFG02_220623**	**22 Jun 2023**	**Normal**	<370	<300	<300	<300	<260	<230	<380	<190	<250	<0.0500	<280	<270	<180	<110	<210	<220	<380
LFG03	**LFG03_220623**	**22 Jun 2023**	**Normal**	<370	<300	<300	<300	<260	<230	<380	<190	<250	<0.0500	<280	<270	<180	<110	<210	<220	<380
LFG03	**QC01_220623**	**22 Jun 2023**	**Field_D**	<370	<300	<300	<300	<260	<230	<380	<190	<250	<0.0500	<280	<270	<180	<110	<210	<220	<380
LFG04	**LFG04_220623**	**22 Jun 2023**	**Normal**	<370	<300	<300	<300	<260	<230	<380	<190	<250	<0.0500	<280	<270	<180	<110	<210	<220	<380

Statistics

Number of Results	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**
Number of Detects	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Minimum Concentration	**<370**	**<300**	**<300**	**<300**	**<260**	**<230**	**<380**	**<190**	**<250**	**<0.05**	**<280**	**<270**	**<180**	**<110**	**<210**	**<220**	**<380**	
Minimum Detect	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	
Maximum Concentration	**<370**	**<300**	**<300**	**<300**	**<260**	**<230**	**<380**	**<190**	**<250**	**<0.05**	**<280**	**<270**	**<180**	**<110**	**<210**	**<220**	**<380**	
Maximum Detect	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	
Average Concentration *	**185**	**150**	**150**	**150**	**130**	**115**	**190**	**95**	**125**	**0.025**	**140**	**135**	**90**	**55**	**105**	**110**	**190**	
Median Concentration *	**185**	**150**	**150**	**150**	**130**	**115**	**190**	**95**	**125**	**0.025**	**140**	**135**	**90**	**55**	**105**	**110**	**190**	
Standard Deviation *	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
95% UCL (Student's-t) *	**185**	**150**	**150**	**150**	**130**	**115**	**190**	**95**	**125**	**0.025**	**140**	**135**	**90**	**55**	**105**	**110**	**190**	
% of Detects	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
% of Non-Detects	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	

* A Non Detect Multiplier of 0.5 has been applied.

Table 2
Soil Vapour Analytical Results
GWS Giants CoE
1 Olympic Boulevard, Olympic Park NSW
2207292

				PAH	Other									Solvents								
				Naphthalene	Helium		Carbon Dioxide		Carbon Monoxide		Hydrogen		Oxygen	Oxygen	tert-Amyl Methyl Ether (TAME)	1,3-Butadiene	1,4-Dioxane	Methyl Ethyl Ketone	2-hexanone (MBK)	4-Methyl-2-pentanone	Acetone	Acetonitrile	Acrylonitrile
				µg/m3	Mol %	mg/m³	Mol %	mg/m³	Mol %	mg/m³	Mol %	mg/m³	Mol %	mg/m³	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3
EQL				100											210	110	180	150	200	200	120	80	110
NEPM 2013 Table 1A(2) Comm/Ind D Soil Vap VOCC HILs																							
CRC Care 2011 Table B1 Intrusive Workers (Shallow Trench) 0 to <2m - SAND				880,000																			
NEPM 2013 Table 1A(5) Comm/Ind D Soil Vapour HSL for Vapour Intrusion, Sand >=0m, <1m				3,000																			
NEPM 2013 Table 1A(5) Comm/Ind D Soil Vapour HSL for Vapour Intrusion, Sand >=1m, <2m				15,000																			
NEPM 2013 Table 1A(5) Comm/Ind D Soil Vapour HSL for Vapour Intrusion, Sand >=2m, <4m				35,000																			
NEPM 2013 Table 1A(5) Comm/Ind D Soil Vapour HSL for Vapour Intrusion, Sand >=4m, <8m				75,000																			
Location Code	**Field ID**	**Date**	**Sample Type**																				
LFG01	**LFG01_220623**	**22 Jun 2023**	**Normal**	<100	<0.010	<16	4.25	76,500	<0.010	<120	<0.010	<8	17.8	234,000	<210	<110	<180	<150	<200	<200	<120	<80.0	<110
LFG02	**LFG02_220623**	**22 Jun 2023**	**Normal**	<100	<0.010	<16	3.33	59,900	<0.010	<120	<0.010	<8	18.2	238,000	<210	<110	<180	<150	<200	<200	<120	<80.0	<110
LFG03	**LFG03_220623**	**22 Jun 2023**	**Normal**	<100	<0.010	<16	12.2	219,000	<0.010	<120	<0.010	<8	1.55	20,300	<210	<110	<180	<150	<200	<200	<120	<80.0	<110
LFG03	**QC01_220623**	**22 Jun 2023**	**Field_D**	<100	<0.010	<16	12.2	220,000	<0.010	<120	<0.010	<8	1.50	19,600	<210	<110	<180	<150	<200	<200	<120	<80.0	<110
LFG04	**LFG04_220623**	**22 Jun 2023**	**Normal**	<100	<0.010	<16	10.1	182,000	<0.010	<120	<0.010	<8	1.11	14,600	<210	<110	<180	<150	<200	<200	<120	<80.0	<110
Statistics																							
Number of Results				**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**
Number of Detects				**0**	**0**	**0**	**5**	**5**	**0**	**0**	**0**	**0**	**5**	**5**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Minimum Concentration				**<100**	**<0.01**	**<16**	**3.33**	**59,900**	**<0.01**	**<120**	**<0.01**	**<8**	**1.11**	**14,600**	**<210**	**<110**	**<180**	**<150**	**<200**	**<200**	**<120**	**<80**	**<110**
Minimum Detect				**ND**	**ND**	**ND**	**3.33**	**59,900**	**ND**	**ND**	**ND**	**ND**	**1.11**	**14,600**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**
Maximum Concentration				**<100**	**<0.01**	**<16**	**12.2**	**220,000**	**<0.01**	**<120**	**<0.01**	**<8**	**18.2**	**238,000**	**<210**	**<110**	**<180**	**<150**	**<200**	**<200**	**<120**	**<80**	**<110**
Maximum Detect				**ND**	**ND**	**ND**	**12.2**	**220,000**	**ND**	**ND**	**ND**	**ND**	**18.2**	**238,000**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**
Average Concentration *				**50**	**0.005**	**8**	**8.4**	**151,480**	**0.005**	**60**	**0.005**	**4**	**8**	**105,300**	**105**	**55**	**90**	**75**	**100**	**100**	**60**	**40**	**55**
Median Concentration *				**50**	**0.005**	**8**	**10.1**	**182,000**	**0.005**	**60**	**0.005**	**4**	**1.55**	**20,300**	**105**	**55**	**90**	**75**	**100**	**100**	**60**	**40**	**55**
Standard Deviation *				**0**	**0**	**0**	**4.3**	**77,773**	**0**	**0**	**0**	**0**	**9.1**	**119,341**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
95% UCL (Student's-t) *				**50**	**0.005**	**8**	**12.54**	**225,628**	**0.005**	**60**	**0.005**	**4**	**16.71**	**219,078**	**105**	**55**	**90**	**75**	**100**	**100**	**60**	**40**	**55**
% of Detects				**0**	**0**	**0**	**100**	**100**	**0**	**0**	**0**	**0**	**100**	**100**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
% of Non-Detects				**100**	**100**	**100**	**0**	**0**	**100**	**100**	**100**	**100**	**0**	**0**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

* A Non Detect Multiplier of 0.5 has been applied.

Table 2
Soil Vapour Analytical Results
GWS Giants CoE
1 Olympic Boulevard, Olympic Park NSW
2207292

				Solvents										
				Allyl chloride	Carbon disulfide	Cyclohexane	Ethanol	Ethyl acetate	Heptane	Hexane	MTBE	2-Propanol	Tetrahydrofuran	Vinyl acetate
				µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3
EQL				160	160	170	90	180	200	180	180	120	150	180
NEPM 2013 Table 1A(2) Comm/Ind D Soil Vap VOCC HILs														
CRC Care 2011 Table B1 Intrusive Workers (Shallow Trench) 0 to <2m - SAND														
NEPM 2013 Table 1A(5) Comm/Ind D Soil Vapour HSL for Vapour Intrusion, Sand >=0m, <1m														
NEPM 2013 Table 1A(5) Comm/Ind D Soil Vapour HSL for Vapour Intrusion, Sand >=1m, <2m														
NEPM 2013 Table 1A(5) Comm/Ind D Soil Vapour HSL for Vapour Intrusion, Sand >=2m, <4m														
NEPM 2013 Table 1A(5) Comm/Ind D Soil Vapour HSL for Vapour Intrusion, Sand >=4m, <8m														
Location Code	**Field ID**	**Date**	**Sample Type**											
LFG01	**LFG01_220623**	**22 Jun 2023**	**Normal**	<160	<160	<170	<90.0	<180	<200	<180	<180	715	<150	<180
LFG02	**LFG02_220623**	**22 Jun 2023**	**Normal**	<160	<160	<170	<90.0	<180	<200	<180	<180	147	<150	<180
LFG03	**LFG03_220623**	**22 Jun 2023**	**Normal**	<160	<160	4,540	<90.0	<180	1,280	43,000	<180	432	<150	<180
LFG03	**QC01_220623**	**22 Jun 2023**	**Field_D**	<160	<160	4,610	<90.0	<180	1,290	43,300	<180	280	<150	<180
LFG04	**LFG04_220623**	**22 Jun 2023**	**Normal**	<160	<160	791	<90.0	<180	257	1,120	<180	260	<150	<180
Statistics														
Number of Results				**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**
Number of Detects				**0**	**0**	**3**	**0**	**0**	**3**	**3**	**0**	**5**	**0**	**0**
Minimum Concentration				**<160**	**<160**	**<170**	**<90**	**<180**	**<200**	**<180**	**<180**	**147**	**<150**	**<180**
Minimum Detect				**ND**	**ND**	**791**	**ND**	**ND**	**257**	**1,120**	**ND**	**147**	**ND**	**ND**
Maximum Concentration				**<160**	**<160**	**4,610**	**<90**	**<180**	**1,290**	**43,300**	**<180**	**715**	**<150**	**<180**
Maximum Detect				**ND**	**ND**	**4,610**	**ND**	**ND**	**1,290**	**43,300**	**ND**	**715**	**ND**	**ND**
Average Concentration *				**80**	**80**	**2,022**	**45**	**90**	**605**	**17,520**	**90**	**367**	**75**	**90**
Median Concentration *				**80**	**80**	**791**	**45**	**90**	**257**	**1,120**	**90**	**280**	**75**	**90**
Standard Deviation *				**0**	**0**	**2,348**	**0**	**0**	**624**	**23,401**	**0**	**220**	**0**	**0**
95% UCL (Student's-t) *				**80**	**80**	**4,261**	**45**	**90**	**1,200**	**39,830**	**90**	**576.1**	**75**	**90**
% of Detects				**0**	**0**	**60**	**0**	**0**	**60**	**60**	**0**	**100**	**0**	**0**
% of Non-Detects				**100**	**100**	**40**	**100**	**100**	**40**	**40**	**100**	**0**	**100**	**100**

* A Non Detect Multiplier of 0.5 has been applied.

Table 3
QAQC Results - Soil RPDs
GWS Giants CoE
1 Olympic Boulevard, Olympic Park NSW
2207292

	Field ID	LFG3 4.0	QC1			LFG4 2.0	QC2		
	Date	18 May 2023	18 May 2023			18 May 2023	18 May 2023		
	Matrix Type	Soil	Soil			Soil	Soil		
	Lab Report Number	ES2316686	ES2316686	RPD		ES2316686	992509	RPD	
	Unit	EQL							
TPH									
C6-C9 Fraction	mg/kg	10	<10	<10	0		<10	<20	0
C10-C14 Fraction	mg/kg	20	<50	<50	0		<50	<20	0
C15-C28 Fraction	mg/kg	50	520	110	130		<100	<50	0
C29-C36 Fraction	mg/kg	50	300	<100	100		<100	53	0
C10-C36 Fraction (Sum)	mg/kg	50	820	110	153		<50	53	6
TRH									
C6-C10 Fraction	mg/kg	10	14	<10	33		<10	<20	0
C6-C10 minus BTEX (F1)	mg/kg	10	14	<10	33		<10	<20	0
>C10-C16 Fraction	mg/kg	50	50	<50	0		<50	<50	0
>C10-C16 Fraction minus Naphthalene (F2)	mg/kg	50	<50	<50	0		<50	<50	0
>C16-C34 Fraction (F3)	mg/kg	100	730	140	136		<100	<100	0
>C34-C40 Fraction (F4)	mg/kg	100	170	<100	52		<100	<100	0
>C10-C40 Fraction (Sum)	mg/kg	50	950	140	149		<50	<100	0
BTEX									
Benzene	mg/kg	0.1	<0.2	<0.2	0		<0.2	<0.1	0
Toluene	mg/kg	0.1	<0.5	<0.5	0		<0.5	<0.1	0
Ethylbenzene	mg/kg	0.1	<0.5	<0.5	0		<0.5	<0.1	0
Xylene (m & p)	mg/kg	0.2	<0.5	<0.5	0		<0.5	<0.2	0
Xylene (o)	mg/kg	0.1	<0.5	<0.5	0		<0.5	<0.1	0
Xylene Total	mg/kg	0.3	<0.5	<0.5	0		<0.5	<0.3	0
Total BTEX	mg/kg	0.2	<0.2	<0.2	0		<0.2	-	-
Naphthalene (VOC)	mg/kg	0.5	2	2	0		<1	<0.5	0
Metals									
Arsenic	mg/kg	2	10	8	22		6	7.1	17
Cadmium	mg/kg	0.4	<1	<1	0		<1	<0.4	0
Chromium (III+VI)	mg/kg	2	28	18	43		13	16	21
Copper	mg/kg	5	40	41	2		14	29	70
Lead	mg/kg	5	473	232	68		26	41	45
Mercury	mg/kg	0.1	0.1	0.1	0		<0.1	0.2	67
Nickel	mg/kg	2	22	9	84		7	14	67
Zinc	mg/kg	5	337	141	82		60	87	37
Inorganics									
Moisture Content	%	1	18.9	18.6	2		14.4	-	-
PAH									
Acenaphthene	mg/kg	0.5	<0.5	<0.5	0		<0.5	<0.5	0
Acenaphthylene	mg/kg	0.5	<0.5	<0.5	0		<0.5	<0.5	0
Anthracene	mg/kg	0.5	<0.5	<0.5	0		<0.5	<0.5	0
Benz(a)anthracene	mg/kg	0.5	<0.5	<0.5	0		<0.5	<0.5	0
Benzo(a) pyrene	mg/kg	0.5	<0.5	<0.5	0		<0.5	<0.5	0
Benzo(b+j)fluoranthene	mg/kg	0.5	0.5	<0.5	0		<0.5	<0.5	0
Benzo(g,h,i)perylene	mg/kg	0.5	<0.5	<0.5	0		<0.5	<0.5	0
Benzo(k)fluoranthene	mg/kg	0.5	<0.5	<0.5	0		<0.5	<0.5	0
Chrysene	mg/kg	0.5	<0.5	<0.5	0		<0.5	<0.5	0
Dibenz(a,h)anthracene	mg/kg	0.5	<0.5	<0.5	0		<0.5	<0.5	0
Fluoranthene	mg/kg	0.5	1.2	0.8	40		0.6	<0.5	18
Fluorene	mg/kg	0.5	<0.5	<0.5	0		<0.5	<0.5	0
Indeno(1,2,3-c,d)pyrene	mg/kg	0.5	<0.5	<0.5	0		<0.5	<0.5	0
Naphthalene	mg/kg	0.5	1.8	3.3	59		<0.5	<0.5	0
Phenanthrene	mg/kg	0.5	0.6	<0.5	18		<0.5	<0.5	0
Pyrene	mg/kg	0.5	1.1	0.7	44		0.6	<0.5	18
Benzo(a)pyrene TEQ calc (Half)	mg/kg	0.5	0.6	0.6	0		0.6	0.6	0
Benzo(a)pyrene TEQ (LOR)	mg/kg	0.5	1.2	1.2	0		1.2	1.2	0
Benzo(a)pyrene TEQ calc (Zero)	mg/kg	0.5	<0.5	<0.5	0		<0.5	<0.5	0
PAHs (Sum of total)	mg/kg	0.5	5.2	4.8	8		1.2	<0.5	82

***RPDs have only been considered where a concentration is greater than 1 times the EQL.**
****Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPDs for each EQL multiplier range are: 81 (1 - 10 x EQL); 50 (10 - 30 x EQL); 30 (> 30 x EQL))**
*****Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory**

Table 4
QA/QC Results - Soil Vapour RPDs
GWS Giants CoE
1 Olympic Boulevard, Olympic Park NSW
2207292

			Field ID	LFG03_220623	QC01_220623	
			Date	22 Jun 2023	22 Jun 2023	
			Matrix Type	Air	Air	
			Lab Report Number	EN2306447	EN2306447	RPD
	Unit	EQL				
BTEX						
Benzene	µg/m3	100		1,180	1,190	1
Toluene	µg/m3	190		<190	<190	0
Ethylbenzene	µg/m3	220		282	281	0
Xylene (m & p)	µg/m3	430		<430	<430	0
Xylene (o)	µg/m3	220		<220	<220	0
Xylene Total	µg/m3	650		<650	<650	0
Organic						
Ethane	µg/m3	60,000		<120,000	<120,000	0
Ethene	µg/m3	55,000		<110,000	<110,000	0
Methane	µg/m3	33,000		426,000,000	428,000,000	0
Chlorinated Hydrocarbons						
1,1,1,2-tetrachloroethane	µg/m3	340		<340	<340	0
1,1,1-trichloroethane	µg/m3	270		<270	<270	0
1,1,2,2-tetrachloroethane	µg/m3	340		<340	<340	0
1,1,2-trichloroethane	µg/m3	270		<270	<270	0
1,1-dichloroethane	µg/m3	200		<200	<200	0
1,1-dichloroethene	µg/m3	200		<200	<200	0
1,2-dichloroethane	µg/m3	200		<200	<200	0
1,2-dichloropropane	µg/m3	230		<230	<230	0
Benzyl chloride	µg/m3	260		<260	<260	0
Bromodichloromethane	µg/m3	340		<340	<340	0
Bromoform	µg/m3	520		<520	<520	0
Carbon tetrachloride	µg/m3	310		<310	<310	0
Chlorodibromomethane	µg/m3	430		<430	<430	0
Chloroethane	µg/m3	130		<130	<130	0
Chloroform	µg/m3	240		<240	<240	0
Chloromethane	µg/m3	100		<100	<100	0
cis-1,2-dichloroethene	µg/m3	20		<100	<100	0
cis-1,3-dichloropropene	µg/m3	230		<230	<230	0
Dichloromethane	µg/m3	170		<170	<170	0
Hexachlorobutadiene	µg/m3	530		<530	<530	0
Tetrachloroethene	µg/m3	340		<340	<340	0
trans-1,2-dichloroethene	µg/m3	200		<200	<200	0
Trichloroethene	µg/m3	5.4		<135	<135	0
trans-1,3-dichloropropene	µg/m3	230		<230	<230	0
Vinyl chloride	µg/m3	5.1		<63.8	<63.8	0
Acrylates						
Methyl Methacrylate	µg/m3	210		<210	<210	0
NA						
2,2,4-Trimethylpentane	µg/m3	230		13,400	13,500	1
Ethyl tert-Butyl Ether (ETBE)	µg/m3	210		<210	<210	0
Freon 114	µg/m3	350		908	936	3
tert-Butyl alcohol	µg/m3	150		<150	<150	0
Butane	µg/m3	120,000		<240,000	<240,000	0
Propane	µg/m3	90,000		<180,000	<180,000	0
Propene	µg/m3	90		<90.0	<90.0	0
Sample Preparation						
Inert Gases (N2. Ar) by difference	Mol %	0.1		21.0	20.9	0
Inert Gases (N2. Ar) by difference	mg/m³			241,000	239,000	1
MAH						
1,2,4-trimethylbenzene	µg/m3	240		<240	<240	0
1,3,5-trimethylbenzene	µg/m3	240		<240	<240	0
1-methyl-4 ethyl benzene	µg/m3	240		<240	<240	0
Isopropylbenzene	µg/m3	250		1,270	1,260	1
n-butylbenzene	µg/m3	270		<270	<270	0
n-propylbenzene	µg/m3	250		485	468	4
sec-butylbenzene	µg/m3	270		<270	<270	0
Styrene	µg/m3	210		<210	<210	0
tert-butylbenzene	µg/m3	270		<270	<270	0
Halogenated Benzenes						
1,2,4-trichlorobenzene	µg/m3	370		<370	<370	0
1,2-dichlorobenzene	µg/m3	300		<300	<300	0
1,3-dichlorobenzene	µg/m3	300		<300	<300	0
1,4-dichlorobenzene	µg/m3	300		<300	<300	0
2-chlorotoluene	µg/m3	260		<260	<260	0
Chlorobenzene	µg/m3	230		<230	<230	0
Halogenated Hydrocarbons						
1,2-dibromoethane	µg/m3	380		<380	<380	0
Bromomethane	µg/m3	190		<190	<190	0
Dichlorodifluoromethane	µg/m3	250		<250	<250	0
Trichlorofluoromethane	µg/m3	280		<280	<280	0
VOCs						
2-isopropyltoluene	µg/m3	270		<270	<270	0
2-Chloro-1,3-butadiene	µg/m3	180		<180	<180	0
Acrolein	µg/m3	110		<110	<110	0
Diisopropyl ether	µg/m3	210		<210	<210	0
Vinyl bromide (bromoethene)	µg/m3	220		<220	<220	0
Freon 113	µg/m3	380		<380	<380	0
PAH						
Naphthalene	µg/m3	100		<100	<100	0
Other						
Solvents						
tert-Amyl Methyl Ether (TAME)	µg/m3	210		<210	<210	0
1,3-Butadiene	µg/m3	110		<110	<110	0
1,4-Dioxane	µg/m3	180		<180	<180	0
Methyl Ethyl Ketone	µg/m3	150		<150	<150	0
2-hexanone (MBK)	µg/m3	200		<200	<200	0
4-Methyl-2-pentanone	µg/m3	200		<200	<200	0
Acetone	µg/m3	120		<120	<120	0
Acetonitrile	µg/m3	80		<80.0	<80.0	0
Acrylonitrile	µg/m3	110		<110	<110	0
Allyl chloride	µg/m3	160		<160	<160	0
Carbon disulfide	µg/m3	160		<160	<160	0
Cyclohexane	µg/m3	170		4,540	4,610	2
Ethanol	µg/m3	90		<90.0	<90.0	0
Ethyl acetate	µg/m3	180		<180	<180	0
Heptane	µg/m3	200		1,280	1,290	1
Hexane	µg/m3	180		43,000	43,300	1
MTBE	µg/m3	180		<180	<180	0
2-Propanol	µg/m3	120		432	280	43
Tetrahydrofuran	µg/m3	150		<150	<150	0
Vinyl acetate	µg/m3	180		<180	<180	0

*RPDs have only been considered where a concentration is greater than 1 times the EQL.

**Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPDs for each EQL multiplier range are: 81 (1 - 10 x EQL); 50 (10 - 30 x EQL); 30 (> 30 x EQL))

***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

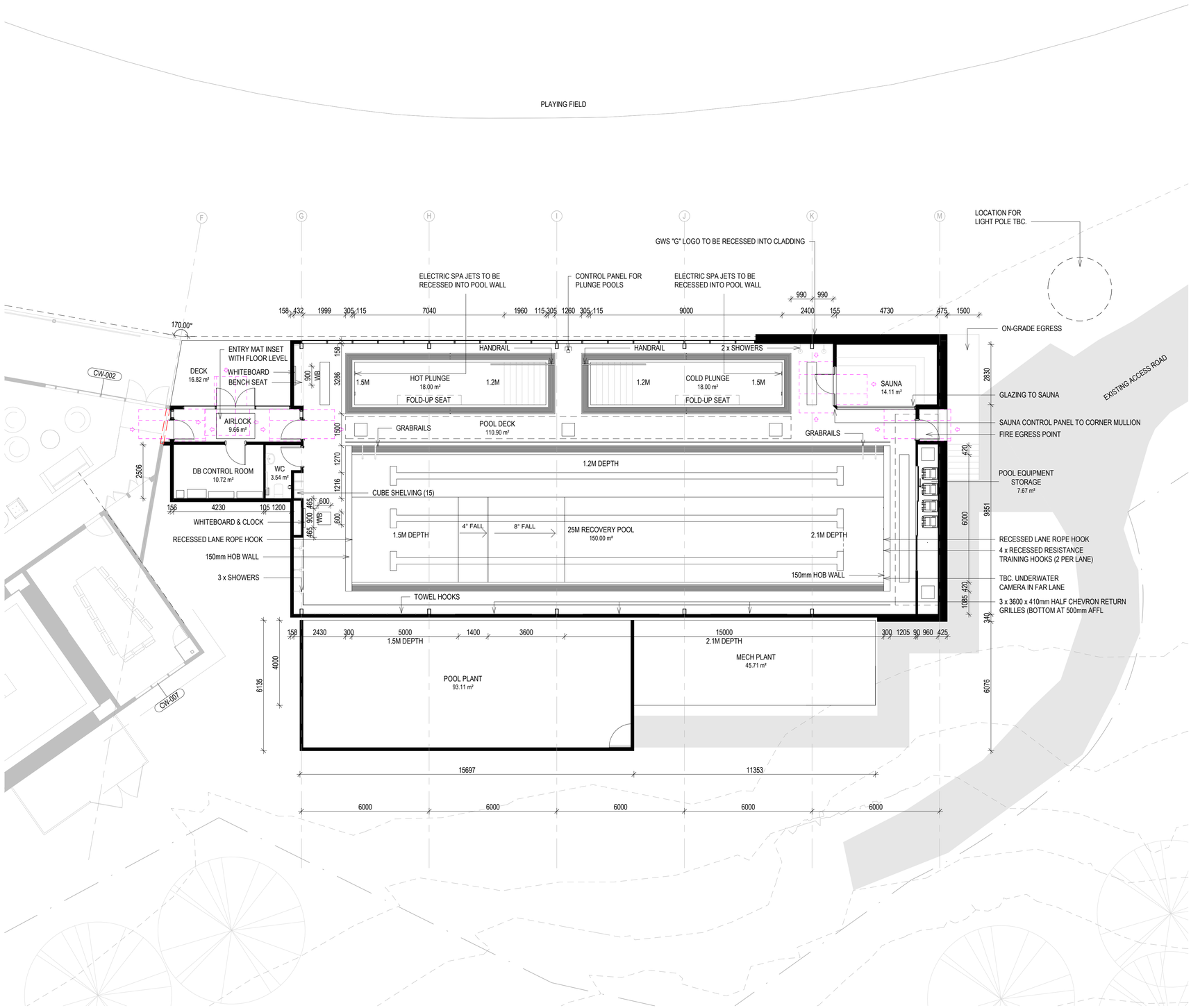
Table 5a
QAQC Results - Soil Field Blanks
GWS Giants CoE
1 Olympic Boulevard, Olympic Park NSW
2207292

		Field ID	**TRB1**
		Date	**08 May 2023**
		Matrix Type	**Soil**
		Lab Report Number	**ES2316686**
	Unit	EQL	
TPH			
C6-C9 Fraction	**mg/kg**	10	<10
TRH			
C6-C10 Fraction	**mg/kg**	10	<10
C6-C10 minus BTEX (F1)	**mg/kg**	10	<10
BTEX			
Benzene	**mg/kg**	0.2	<0.2
Toluene	**mg/kg**	0.5	<0.5
Ethylbenzene	**mg/kg**	0.5	<0.5
Xylene (m & p)	**mg/kg**	0.5	<0.5
Xylene (o)	**mg/kg**	0.5	<0.5
Xylene Total	**mg/kg**	0.5	<0.5
Total BTEX	**mg/kg**	0.2	<0.2
Naphthalene (VOC)	**mg/kg**	1	<1

Table 5b
QAQC Results - Water Field Blanks
GWS Giants CoE
1 Olympic Boulevard, Olympic Park NSW
2207292

		Field ID	RB1
		Date	18 May 2023
		Matrix Type	Water
		Lab Report Number	ES2316686
	Unit	EQL	
TPH			
C6-C9 Fraction	µg/L	20	<20
C10-C14 Fraction	µg/L	50	<50
C15-C28 Fraction	µg/L	100	<100
C29-C36 Fraction	µg/L	50	<50
C10-C36 Fraction (Sum)	µg/L	50	<50
TRH			
C6-C10 Fraction	µg/L	20	<20
C6-C10 minus BTEX (F1)	µg/L	20	<20
>C10-C16 Fraction	µg/L	100	<100
>C10-C16 Fraction minus Naphthalene (F2)	µg/L	100	<100
>C16-C34 Fraction (F3)	µg/L	100	<100
>C34-C40 Fraction (F4)	µg/L	100	<100
>C10-C40 Fraction (Sum)	µg/L	100	<100
BTEX			
Benzene	µg/L	1	<1
Toluene	µg/L	2	<2
Ethylbenzene	µg/L	2	<2
Xylene (m & p)	µg/L	2	<2
Xylene (o)	µg/L	2	<2
Xylene Total	µg/L	2	<2
Total BTEX	µg/L	1	<1
Naphthalene (VOC)	mg/L	0.005	<0.005

Appendix A: Proposed Development Drawings and Planning Report



FOR INFORMATION

REFERENCE MAP

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1:100

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GIANTS

STRUCTURAL, CIVIL AND SERVICES ENGINEER

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PROJECT MANAGER

FDC

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3	FOR INFORMATION & REVIEW	21.07.2022
4	FOR INFORMATION & REVIEW	26.07.2022
5	FOR INFORMATION & REVIEW	11.08.2022
6	FOR INFORMATION & REVIEW	18.08.2022
7	FOR INFORMATION & REVIEW	22.08.2022
8	FOR INFORMATION & REVIEW	30.08.2022
9	FOR INFORMATION & REVIEW	12.09.2022

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PROJECT

GWSTF

1 Olympic Blvd, Sydney Olympic Park NSW 2127

SHEET TITLE

GROUND LEVEL GA PLAN

PROJECT NUMBER	REVIEWED
7767	AB
COORDINATED	APPROVED
KD	AB
SCALE 100% @ A1	NORTH POINT
1 : 100	N 19.18° W
PHASE	DRAWING NUMBER	REVISION
CD	AR-20-0000	9

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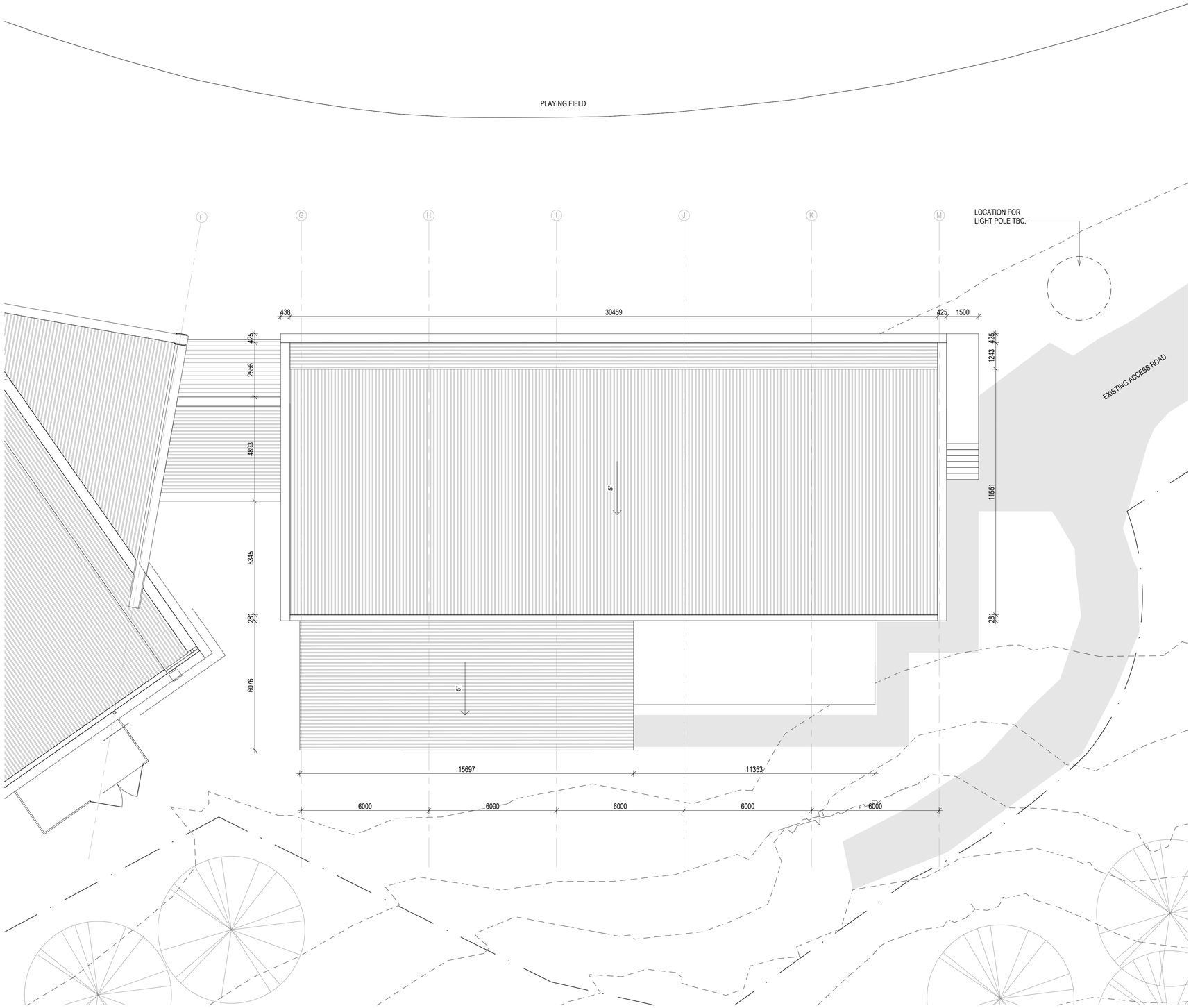

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ROOF PLAN

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COORDINATED	APPROVED
KD	AB
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PHASE	DRAWING NUMBER	REVISION
CD	AR-20-0002	4

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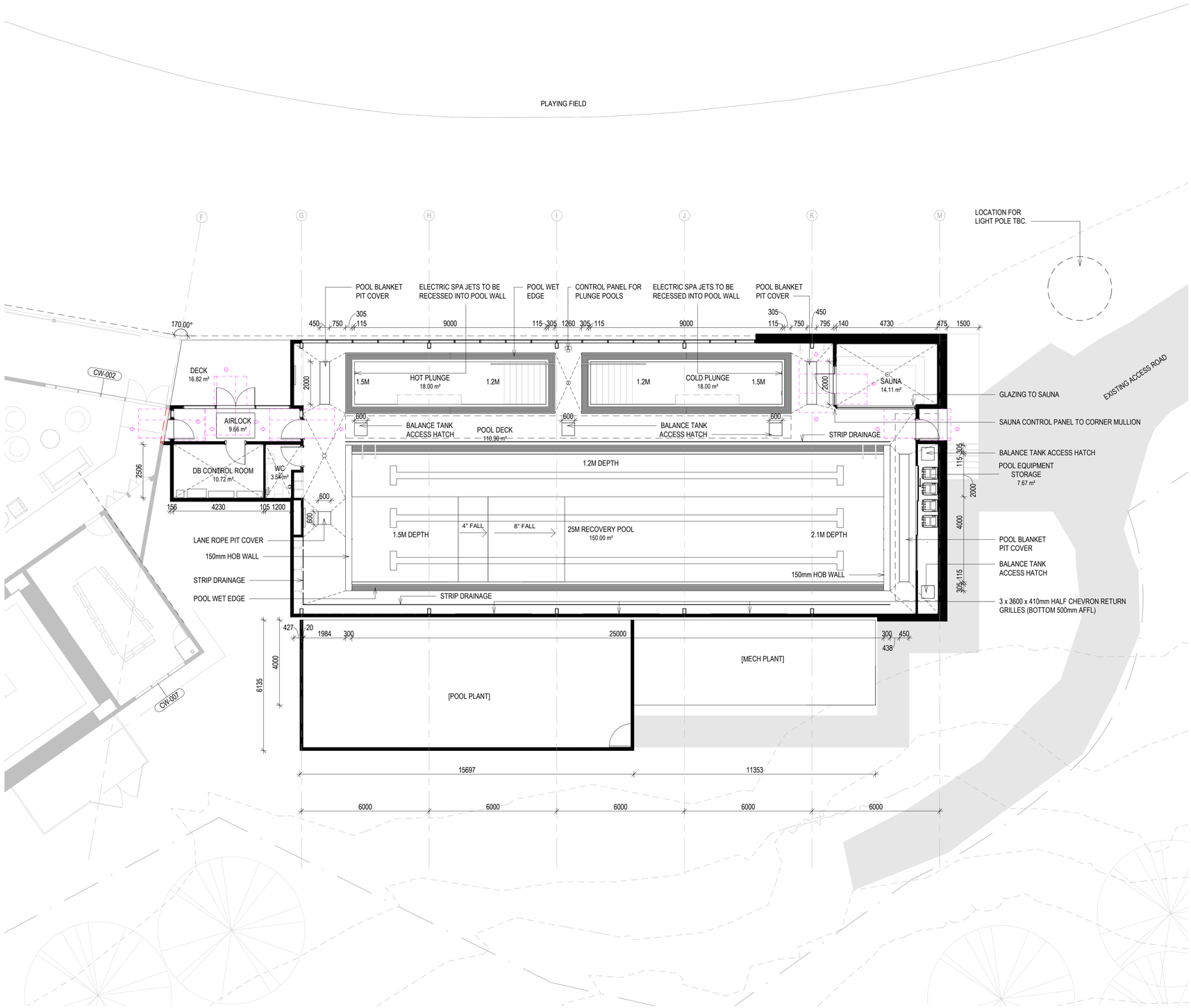

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PROJECT

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1 Olympic Blvd, Sydney Olympic Park NSW 2127

SHEET TITLE

DRAINAGE & MECHANICAL SERVICES
OVERALL PLAN

PROJECT NUMBER	REVIEWED
7767	AB
COORDINATED	APPROVED
KD	AB
SCALE 100% @ A1	NORTH POINT
1 : 100	N 19.18° W

PHASE	DRAWING NUMBER	REVISION
CD	AR-20-0003	5

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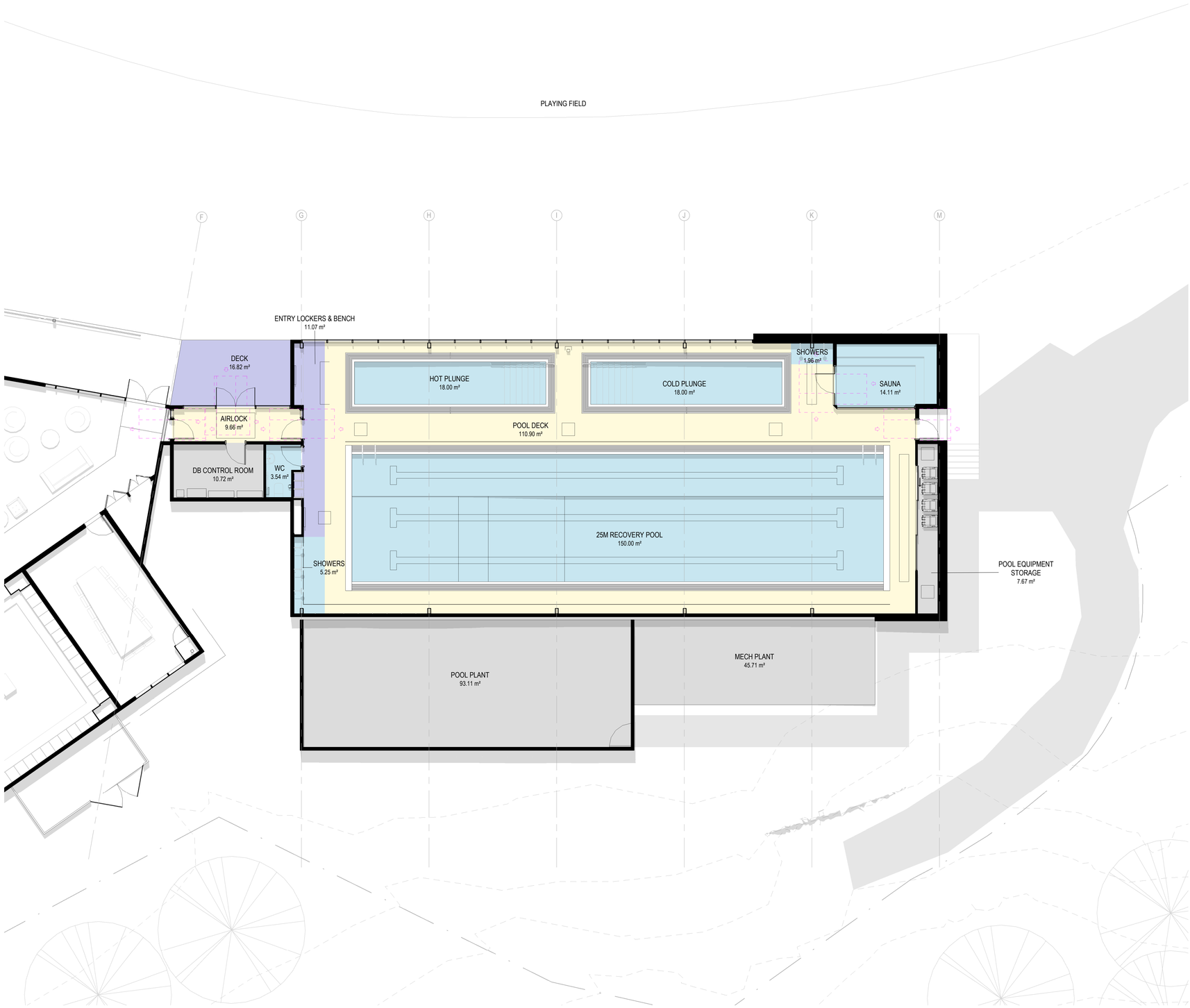

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SHEET TITLE

OCCUPANCY PLAN

PROJECT NUMBER	REVIEWED
7767	Checker
COORDINATED	APPROVED
	Approver
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1 : 100	N 19.18° W

PHASE	DRAWING NUMBER	REVISION
CD	AR-20-0004	4

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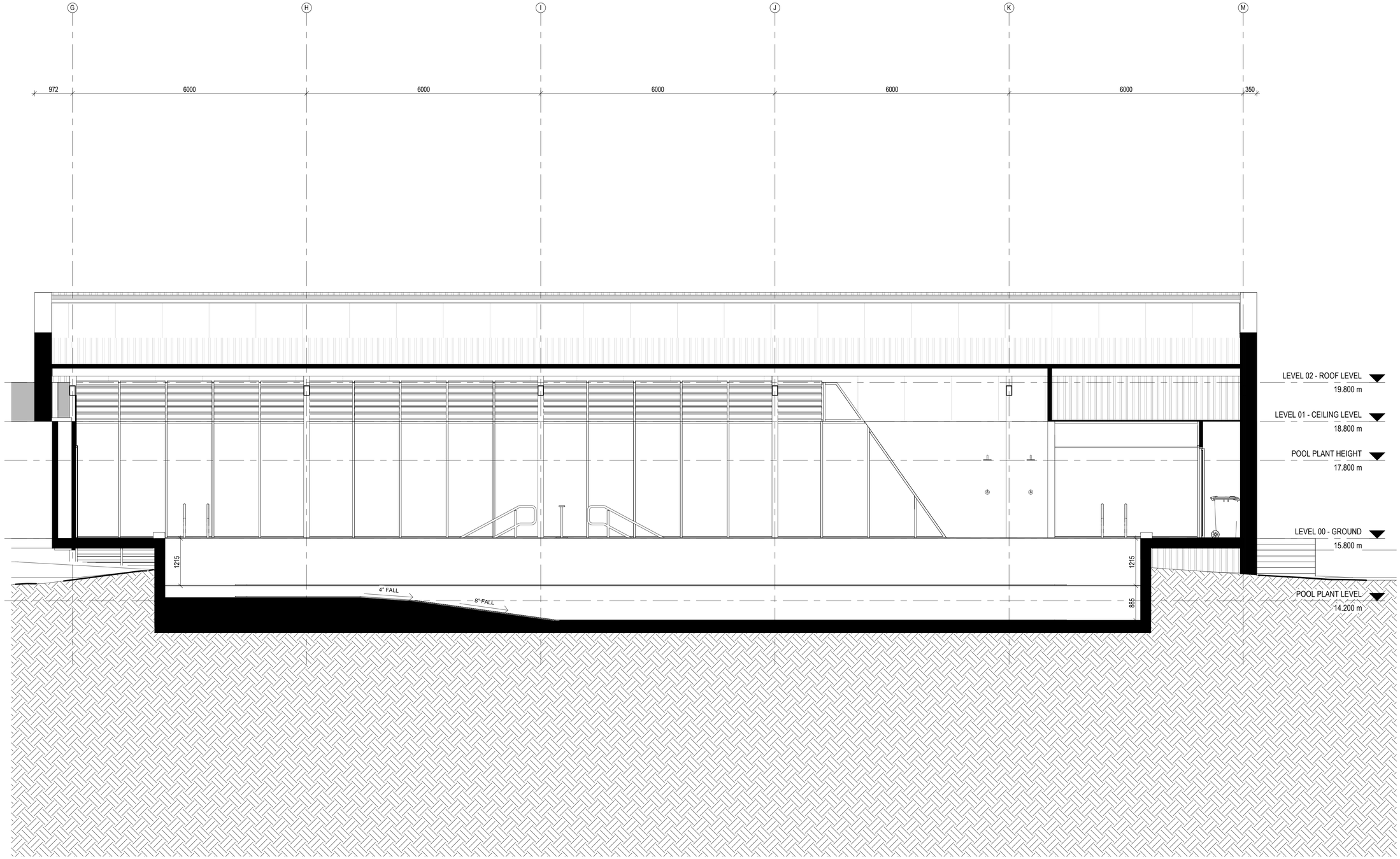

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PROJECT

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1 Olympic Blvd, Sydney Olympic Park NSW 2127

SHEET TITLE

OVERALL POOL HALL SECTION
LONG SECTION

PROJECT NUMBER	REVIEWED
7767	AB
COORDINATED	APPROVED
KD	AB
SCALE 100% @ A1	NORTH POINT
1 : 50	N 19.18° W

PHASE	DRAWING NUMBER	REVISION
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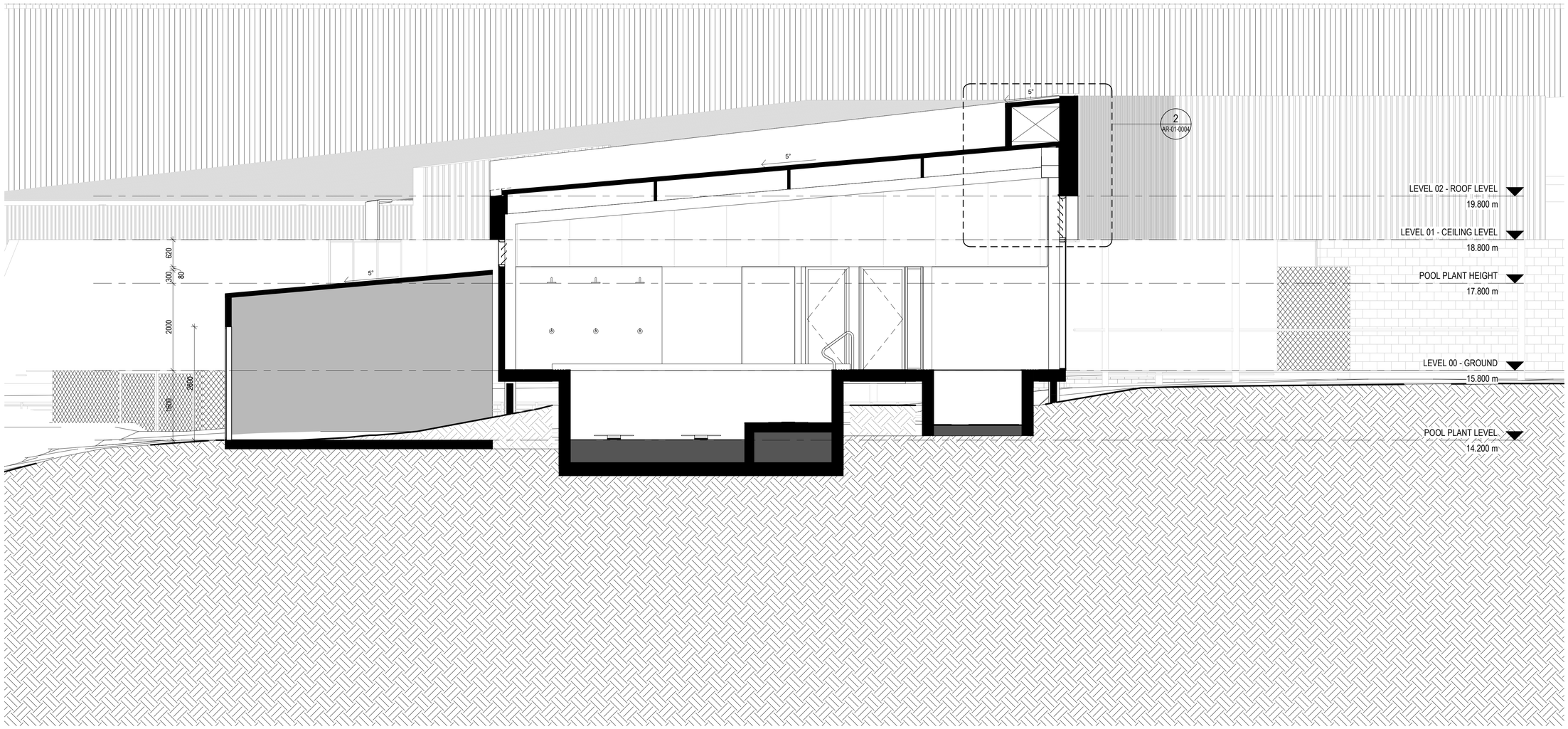

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SHEET TITLE

OVERALL POOL HALL SECTION
SHORT SECTION

PROJECT NUMBER	REVIEWED
7767	AB
COORDINATED	APPROVED
KD	AB
SCALE 100% @ A1	NORTH POINT
1 : 50	N 19.18° W

PHASE	DRAWING NUMBER	REVISION
CD	AR-40-0002	1

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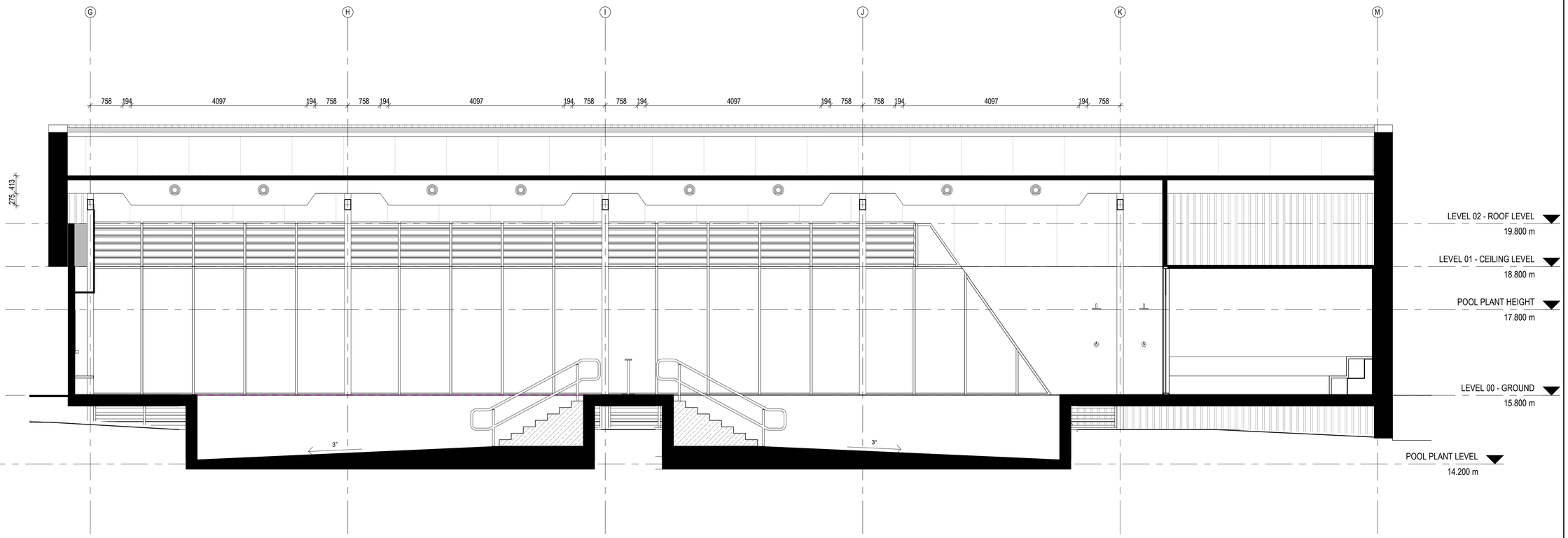
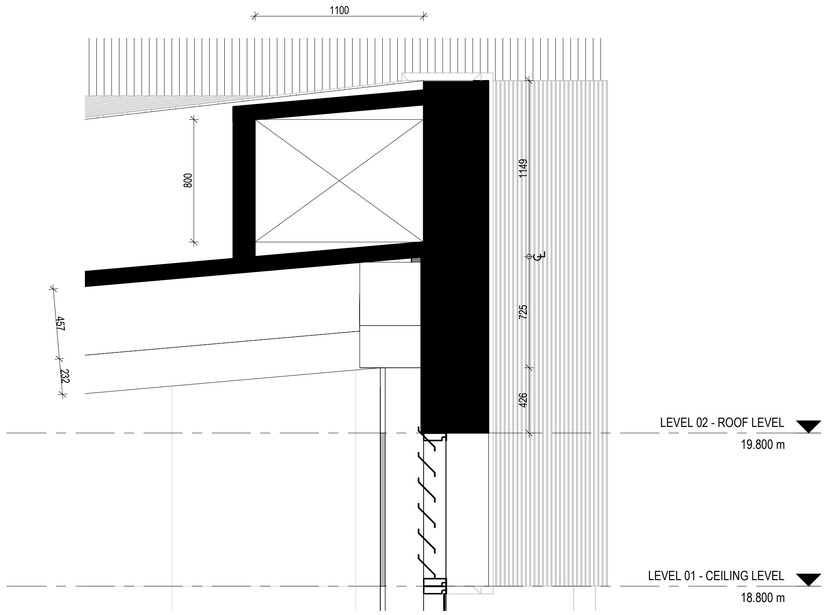


1 MECHANICAL DUCT LONG SECTION

1 : 50



2 MECHANICAL DUCT DETAIL SECTION - Callout 1

1 : 20

FOR INFORMATION

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PROJECT

GWSTF

1 Olympic Blvd, Sydney Olympic Park NSW 2127

SHEET TITLE

MECHANICAL DUCT OPTION

PROJECT NUMBER	REVIEWED
7767	AB
COORDINATED	APPROVED
KD	AB
SCALE 100% @ A1	NORTH POINT
As indicated	N 19.18° W
PHASE	DRAWING NUMBER	REVISION
CD	AR-01-0004	3

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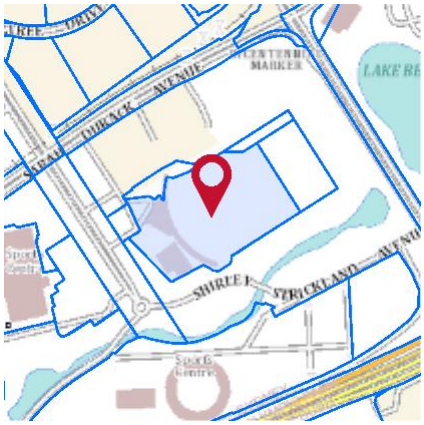
Property Report

1 OLYMPIC BOULEVARD SYDNEY OLYMPIC PARK 2127



Property Details

Address:	1 OLYMPIC BOULEVARD SYDNEY OLYMPIC PARK 2127
Lot/Section /Plan No:	10/-/DP1217982
Council:	CITY OF PARRAMATTA COUNCIL

Summary of planning controls

Planning controls held within the Planning Database are summarised below. The property may be affected by additional planning controls not outlined in this report. Please contact your council for more information.

Land Zoning	B4 - Mixed Use: (pub. 24-3-2016)
Height Of Building	122 m
Floor Space Ratio	6:1
Minimum Lot Size	NA
Heritage	NA
Land Reservation Acquisition	NA
Foreshore Building Line	NA
Acid Sulfate Soils	Disturbed terrain

Detailed planning information

State Environmental Planning Policies which apply to this property

State Environmental Planning Policies can specify planning controls for certain areas and/or types of development. They can also identify the development assessment system that applies and the type of environmental assessment that is required.

- State Environmental Planning Policy (Affordable Rental Housing) 2009: Land Application (pub. 31-7-2009)
- State Environmental Planning Policy (Building Sustainability Index: BASIX) 2004: Land Application (pub. 25-6-2004)
- State Environmental Planning Policy (Concurrences) 2018: Land Application (pub. 21-12-2018)
- State Environmental Planning Policy (Educational Establishments and Child Care Facilities) 2017: Land Application (pub. 1-9-2017)

This report provides general information only and does not replace a Section 10.7 Certificate (formerly Section 149)

- State Environmental Planning Policy (Exempt and Complying Development Codes) 2008: Land Application (pub. 12-12-2008)
- State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004: Land Application (pub. 31-3-2004)
- State Environmental Planning Policy (Infrastructure) 2007: Land Application (pub. 21-12-2007)
- State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007: Land Application (pub. 16-2-2007)
- State Environmental Planning Policy (Miscellaneous Consent Provisions) 2007: Land Application (pub. 28-9-2007)
- State Environmental Planning Policy (Primary Production and Rural Development) 2019: Land Application (pub. 28-2-2019)
- State Environmental Planning Policy (State and Regional Development) 2011: Subject Land (pub. 28-9-2011)
- State Environmental Planning Policy (State Significant Precincts) 2005: Subject Land (pub. 23-3-2012)
- State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017: Subject Land (pub. 25-8-2017)
- State Environmental Planning Policy No 19—Bushland in Urban Areas: Land Application (pub. 24-10-1986)
- State Environmental Planning Policy No 1—Development Standards: Land Application (pub. 17-10-1980)
- State Environmental Planning Policy No 21—Caravan Parks: Land Application (pub. 24-4-1992)
- State Environmental Planning Policy No 33—Hazardous and Offensive Development: Land Application (pub. 13-3-1992)
- State Environmental Planning Policy No 36—Manufactured Home Estates: Land Application (pub. 16-7-1993)
- State Environmental Planning Policy No 50—Canal Estate Development: Land Application (pub. 10-11-1997)
- State Environmental Planning Policy No 55—Remediation of Land: Land Application (pub. 28-8-1998)
- State Environmental Planning Policy No 64—Advertising and Signage: Land Application (pub. 16-3-2001)
- State Environmental Planning Policy No 65—Design Quality of Residential Apartment Development: Land Application (pub. 26-7-2002)
- State Environmental Planning Policy No 70—Affordable Housing (Revised Schemes): Land Application (pub. 1-5-2002)
- Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005: Land Application (pub. 28-6-2016)

Other matters affecting the property

Information held in the Planning Database about other matters affecting the property appears below. The property may also be affected by additional planning controls not outlined in this report. Please speak to your council for more information

Land near High Pressure Pipelines	This property may be located near High Pressure Pipelines and could be subject to requirements listed under ISEPP Clause 66C. Please contact the relevant consent authority for more information.
Local Aboriginal Land Council	METROPOLITAN

Appendix B: NSW EPA and SOPA Notices

Environment Protection Authority

Maintenance of remediation notice

Sections 28 of the Contaminated Land Management Act 1997

REGISTERED MAIL

Sydney Olympic Park Authority
7 Figtree Drive
SYDNEY OLYMPIC PARK NSW 2127

Attention: Mr David Young, General Manager Operations & Sustainability

Notice Number: 28040

This notice is issued under section 28 of the Contaminated Land Management Act 1997 ("the Act").

Sydney Olympic Park Authority (SOPA), "the recipient", must maintain remediation action in accordance with the requirements set out in this notice.

1. Land to which this notice applies ("the land")

This notice applies to the following waste containment areas within the Sydney Olympic Park:

> Aquatic Centre Carpark Landfill; Bicentennial Park Landfill; Blaxland Common Landfill; Golf Driving Range Landfill; Kronos Hill Landfill; Woo-La-Ra Landfill and Wilson Park Bioremediation.

Their locations and boundaries are defined in the attached map. This map is referenced as 001-G-G-0112 Rev. B and is contained in a SOPA document entitled "*Remediated Lands Management Plan January 2009* ".

2. Background

The Sydney Olympic Park ("the SOP") was the venue of the Sydney 2000 Olympic Games. It is located at Homebush Bay – a large piece of land that had been used for uncontrolled landfilling for many years before it was redeveloped as the major Games venue. This resulted in wide spread contamination of the area. Assessment of the contamination in the areas began in the late 1980's and site remediation began in the early 1990's.

With the exception of the remediation of Wilson Park, the remediation strategy was to consolidate and re-contain the waste into several areas within the SOP. In the process, the majority of the SOP area had the buried waste removed and was subsequently redeveloped for the Games. The excavated waste was transferred to the designated waste containment areas. These areas, which include but are not limited to the land of which this notice applies, were capped, landscaped and turned into parkland. Leachate collection and transfer systems were also built to prevent leachate from escaping.

Wilson Park was a former Gasworks site. The nature of the contamination is waste liquid tar rather than uncontrolled landfilling. However, the remediation strategy adopted is also "cap-and-contain" similar to the remediation of the landfilling areas within the SOP.

The remediation of the waste containment areas of which this notice applies occurred at different timelines. Therefore, these waste containment areas were regulated by the Environment Protection Authority ("EPA") on an individual basis. The regulatory instruments include notices issued under section 35 of the Environmentally Hazardous Chemicals Act, voluntary remediation agreement under section 23 of the Act and notices under section 28 of the Act depending on the stage of the remediation at the time the regulatory instruments were issued. The EPA however has envisioned that these regulatory instruments will eventually be converted into a single maintenance of remediation notice under section 28 of the Act.

In March 2007, SOPA provided the EPA with a draft document entitled *Remediated Landfill Systems – Operational Management Plan*. This represents SOPA's attempt to deal with the post-remediation management of the waste containment areas in a holistic way.

This document was subsequently revised and renamed to "*Remediated Lands Management Plan* ". The revised document is supplemented with environmental monitoring data collected between years 2002 – 2007. The EPA is generally satisfied with the monitoring results, which suggest that the waste containment areas pose no unacceptable impact on their surrounding environment. The EPA however considers that additional environmental groundwater monitoring points will be required for some of the waste containment areas.

3. Commencement of this notice

This notice takes effect from the date of this notice and continues in force as varied from time to time, until it is revoked.

4. Maintenance and reporting requirements

Implementing the Remediated Lands Management Plan

A. The recipient must manage the post-remediation of the land in accordance with the SOPA document entitled "*Remediated Lands Management Plan January 2009"* or its subsequent revisions that have been accepted by the EPA ("the RLMP"). In particular, the recipient must carry out the environmental monitoring program in accordance with Section 11 of the RLMP under the heading "*Environmental Monitoring, Performance Assessment and Report"*.

Additional environmental groundwater monitoring points that may be required

B. Within 12 months of the date of this notice, the recipient must provide the EPA with a report justifying the groundwater monitoring strategy at Blaxland Common landfill and Kronos Hill landfill, including any additional groundwater monitoring points that have been or will be installed.

Reporting to the EPA

C. The recipient must prepare a report once every two years. The report must include but is not necessarily limited to:

1) The reporting of the operational performance of the waste containment systems in the preceding two years;

2) The sampling and laboratory results of the monitoring program listed in Table 11.1 of the RLMP; and

3) The interpretation of the sampling and laboratory results with respect to the performance of the waste containment systems.

D. The report must be reviewed by a site auditor accredited under the Act in relation to the performance of waste containment systems.

E. The first report and the auditor's review of the report must be provided to the EPA within 24 months from the date of this notice.

F. The subsequent reports and the auditor's review of the reports must be submitted to the EPA in a frequency of once every two years until such time that the EPA varies the frequency of the submission.

5. Notification of change of owner/occupier

At least 30 days prior to the recipient ceasing to be the owner or occupier of the land to which this notice applies the recipient must give written notification to the EPA of the name and contact details of the prospective owner or occupier.

[Signed]

NIALL JOHNSTON
Manager Contaminated Sites

Date: 23 January 2009

NOTE:

Breaches of this Notice
A person who fails to comply with a notice issued under section 28 of the Act is guilty of an offence. Heavy penalties may be imposed where a person fails to comply with directions given in a notice issued under section 28 of the Act.

Information recorded by the EPA
Section 58 of the Contaminated Land Management Act 1997 and clause 6 of the Contaminated Land Regulation requires the EPA to maintain a public record. A copy of this notice will be included in the public record.

3.5 Golf Driving Range

Former names: Homebush Common, Southern Threshold, State Sports Centre Precinct

3.5.1 Summary

The Golf Driving Range landfill (consolidated landfill from 3 separate landfills operating from the 1960s to 1980s) covers an area of 6.2 hectares adjoining Boundary Creek. The final landform was capped and landscaped, and a combined subsoil landfill gas capture system and extraction leachate system was installed.

Remediation was initially completed in 1994, however additional remediation works were undertaken between 1998 – 1999 with additional fill being added. This additional load increased leachate production so further works were conducted to automate leachate collection and connect it to LLWP. This was completed by 2000. An Independent Site Auditor issued a Site Audit Statement on 14 December 2000 (WRR85) declaring the site suitable for use as "*Park, recreational open space and playing field*"

Subject to:

- preparation and implementation of an auditor approved Environmental Management Plan including but not limited to controls to alteration of landforms and excavations to a depth of 0.5 metres
- Implementation of an auditor approved groundwater monitoring program to assess the impact of residual soil contamination on groundwater quality and potential risk to the environment

The Golf Driving Range landfill and leachate interception and pumping system require ongoing management to ensure system integrity and environmental protection, and to meet legal requirements. Site-specific key management objectives and responses are described in Table 3.5.1

3.5.2 Site history

The Golf Driving Range (GDR) landfill is a consolidation of 3 separate landfills from the State Sports Centre Precinct. The precinct was used for the uncontrolled tipping of municipal waste from 1965 to 1982. Waste was stockpiled in three separate landfills over a 42 hectare site north of the rail line; the Western, Northern (now the Golf Driving Range) and Southern landfills. The waste comprised a heterogeneous mix of a wide variety of constituents including variable quantities of putrescible fill.

A remediation strategy for the State Sports Centre site was developed in 1991. Part of the remediation strategy was to consolidate contamination and implement some forms of environmental protection. This included the placement of a low-permeability clay cap and sub-surface drainage system, the installation of a leachate collection system and clay cut-off wall and the redirection and protection of Boundary Creek.

Works were undertaken to consolidate the three landfills into one. Between 1991 and 1993, 130,000 m^3 of waste was shifted from the Western and Southern landfills to overlay the Northern landfill and create a 15 metre high mound. The Western and Southern landfills were then validated by visual inspection and testing of residual soils to ensure that all traces of contamination were removed prior to backfilling with clean imported fill. Remediation of the GDR was initially complete in March 1994 when the site was landscaped.

The original intent was to discharge collected leachate directly to sewer. Changes in Trade Waste requirements however, resulted in sewer discharge being abandoned in 1995 and the construction of a rising main to discharge the leachate to the Kronos Hill system was implemented. While the design and construction of this pipe was being finalised, leachate was extracted and disposed of to the Waste Service NSW Lidcombe Liquid Waste Plant by licensed liquid waste haulage vehicles. The pipe was commissioned in late 1998. To the north of the GDR landfill is an engineered mound, the Bicentennial Marker, which is a site feature made from construction rubble and road base.

Table 3.5.1 Site-specific management objectives for Golf Driving Range

OBJECTIVE	RESPONSE	MONITORING*	MANAGEMENT TARGETS
Comply with conditions of a Notice issued under *Contaminated Lands Management Act 1997*	Manage Golf Driving Range landfill for use as a parklands/open space / playing fields, in accordance with the Remediated Lands Management Plan and associated procedures.	Regular review of Remediated Lands Management Plan and associated procedures for effectiveness.	1. An auditor-approved Remediated Lands Management Plan is developed and implemented. Requirements of the Remediated Lands Management Strategy are applied to all management, operation and development activities. 2. An auditor-approved site-specific environmental monitoring program is implemented 3. No construction of buildings, alteration of landforms, or excavations below 0.5m, without regulatory authority approval
Maintain integrity of waste containment	Waste exposure and surface water infiltration managed by waste encapsulation, surface capping, and subsurface drainage system	Regular visual inspections	4. System components in good condition 5. Capping has no evident surface cracks, potholes, depressions, fissures, erosion or exposure of waste 6. Good vegetation cover on vegetated areas, with no evident vegetation die-off or bare patches. Soil irrigated as required to maintain cover. 7. No discoloured soil or pools of visually evident leachate at toe and batter (particularly after heavy rain when groundwater tables are elevated). 8. Stormwater detention ponds have no evident scouring and good plant growth 9. Proper reinstatement after excavations so erosion risk is minimised. 10. No offensive odour emanating from site
Prevent leachate migration to groundwater and surface waters	Manage the leachate collection and transfer system to maintain an inward hydraulic gradient between the containment mound and Boundary Creek	SCADA Static water level and chemical monitoring	11. PP6 is maintained below 101.2 (analysis of past monitoring data allows for an additional 1.3m safety factor) 12. Key leachate indicators are not detected in groundwater outside the leachate collection drain 13. Leachate drains are operating freely – as confirmed by pump operational data and water level measurements in pump pits and leachate drains
Manage surface gas emissions	Two gas extraction systems installed – on turfed landfill surface, and at adjacent P3 Carpark	Operational checks of fans	14. Excavations at P3 carpark and at Golf Driving Range avoid damage to subterranean infrastructure 15. Fans at golf amenities block and P3 carpark are operational

* see section 11 for detailed program

As part of Olympic Overlay works, the GDR was recontoured during late 1999 / early 2000. The earthworks incorporated some waste movement and recontouring, restoration of the clay cap, minor modifications to the leachate system, the installation of a gas drainage layer and the restructure of the sub-surface drainage system. The site was approved for use as "*Park, recreational open space, playing field*" by an independent site auditor in 2000.

The site was used as a major public recreation / food concession area during the 2000 Olympic Games.

3.5.3 Operational overview

The strategic location of the leachate collection drain is designed to intercept the contaminated water before it can flow beyond the site boundaries. A typical chemical composition of leachate from the GDR is provided in Table 3.5.2.

The drains are graded, so that the collected leachate flows to one of two pumping pits (PP6 and 7). Leachate is stored in the pumping pits until the pump identifies that the height of leachate begins to rise within the pit. At this point, pumping is automatically activated. Leachate combined from the two pits is discharged via a rising main to PP1 of the Kronos Hill leachate system and eventually to LLWP.

Automation of the system is controlled from the SCADA system. Details of the SCADA system are found in section 6. The system monitors the levels in each pumping pit, which pumps are operating, the volume of leachate discharged from the system and the rate of leachate discharge.

The CADD drawing of the Golf Driving Range landfill in Appendix 4 shows the position of the leachate drain, collection sumps and monitoring piezometers.

3.5.4 System components

3.5.4.1 Waste Containment System

The purpose of the waste containment system is to encapsulate contaminated waste material, preventing the exposure to both people and the environment.

The waste containment system consists of:

Capping – Capping consists of a 650mm thick layer of validated low-permeability clay spread over the waste. Immediately above the clay capping is a 300mm layer of drainage sand. 100mm of topsoil and turf overlies the drainage media. The capping reduces stormwater infiltration thus reducing the generation of leachate. The capping also allows the landfill to be used for recreation by eliminating the risk of human exposure to contaminants.

Vertical cut-off barrier – A compacted clay wall / bentonite liner is constructed along the Northern edge of Boundary Creek (that is, between the leachate drain and the creek). The materials combine to act as an impermeable barrier and prevent leachate from migrating toward the creek. The liner is laid into residual clays and to the height of the gabions which are located along the creek bank (RL102.0). An impermeable liner is also laid along the creek bed to restrict any groundwater inflow.

Residual clay – The waste is placed on low-permeability residual clays to limit the downward migration of waste and leachate.

3.5.4.2 Leachate Collection System

The purpose of the leachate collection system is to intercept leachate, preventing contamination of the natural ground and surface waters. The collection system is also responsible for diverting leachate to the transfer system (pumping pits).

The leachate collection system consists of:

Leachate drain – The leachate drain is a longitudinal trench excavated approximately one metre into residual clays. In the trench, an 'Atlantis' polyethylene drainage cell is encapsulated with filter

mesh and overtopped with approximately 1500mm of drainage sand. The drain is located around the down-gradient perimeter of the landfill. Thus, the natural outward flow of leachate is intercepted by the sand and leachate filters into the drain. Gravity allows the leachate to travel through the drain and be directed into the nearest pumping pit.

Pumping pits – Each pumping pit is made of a precast concrete well, installed vertically onto a concrete base slab. The interface is sealed with an epoxy mortar. A concrete lid and ladder rungs provide access for maintenance and cleaning. A small capped hole within the concrete lid provides convenient access for inspection. The pit acts as a reservoir, storing collected leachate until such time that it is pumped to the transfer system. A total of two pumping pits (Pump Pits 6 and 7) are located along the leachate drain.

Piezometers – The piezometers are a length of 50mm poly-pipe installed vertically into the leachate drain or on the outside of the cut of walls. The top of the piezometer is located above the ground in a lockable protective monument. The piezometer enables access for extraction of samples for analysis and measurements of leachate and groundwater levels.

Sumps – A series of three sumps enable additional sampling and leachate level monitoring to be undertaken. The sumps consist of a 200mm diameter plastic pipe installed vertically into the fill, backfilled with blue metal. The sumps are constructed outside the leachate drain, along the bank of Boundary Creek. The sumps were installed following groundwater studies of the GDR landfill in 1998. Leachate seeps were identified along the creek bank during these studies. The sumps were installed to collect the seeps before they could migrate to Boundary Creek. One piezometer (9a) is also located outside the leachate drain to assist with the early identification of seeps.

Pumping wells – A series of two pumping wells enables sampling and leachate level monitoring to be undertaken. The wells consist of a 200mm diameter plastic pipe installed vertically into the leachate drain. The wells were also constructed during 1998 groundwater studies of the GDR landfill. The wells were installed to provide additional, temporary points for leachate extraction. These wells are not required for pumping and are usually dry.

3.5.4.3 Leachate Transfer System

The purpose of the leachate transfer system is to extract leachate from the pumping pits and transfer it to the treatment plant. The leachate transfer system consists of:

Submersible pumps – Both pumping pits are fitted with a submersible pump. The pump is located at the bottom of the pit, connected to the top by a galvanised steel chain (the chain allows the pump to be removed from the pit for maintenance and service). The pumps are programmed to operate automatically. The pumps operate in a by-pass mode, whereby PP6 bypasses PP7. PP 6 and 7 then share the rising main, discharging the combined leachate to the Kronos Hill leachate system and eventually to the LLWP.

Level sensors – To prevent pump pit overflows, each pit contains one analog level transducer. The sensor is activated by the pressure of water in the pit relaying the information in % of leachate in the pit.

Pump control – Control of pumping from PP6 and 7 is coordinated by a Grundfos CU300, located on the gabion wall adjacent to Boundary Creek. The control panel consists of an electrical circuit board and a number of switches and acts as the electrical control for the pumps. The control panel is powered from a light pole on Shirley Strickland Avenue. The control panel also provides 'manual override' switches to allow isolation of equipment for servicing.

System Control - Automation of the system is controlled from the SCADA system maintained at PMC. The system uses miri AD2000 to monitor the levels and volume and rate of leachate discharge.

Hydraulic Valve - Pumping to Kronos Hill system through the rising main is controlled by a valve at PP1. When PP1 is at 'high level' the valve will close, preventing the flow of liquid through the rising main. The valve will also shut when the power to PP1 control panel (and thus the link between the

GDR and Kronos Hill systems) is cut off. This emergency function prevents the GDR system continuing to pump after a power failure.

Discharge pipe / non-return valve – A discharge pipe carries leachate from each pump to the top of the pit where it connects with the main discharge line. A non-return valve is fitted at the junction of these pipes to prevent leachate from draining back down the pipe and into the pit when the pipe is full.

Discharge line – There are two discharge lines for the GDR system. A 50mm pipe links PP6 to the main discharge pipe, in the valve pit adjacent to PP7. A 75mm pipe connects PP7 to PP1 at Kronos Hill. The discharge lines are constructed approximately 600mm below the surface. The pipes are a conduit for the transfer of leachate from the system to PP1 and eventually to the LLWP.

Flow meters – Electromagnetic flow meters are installed on the discharge of each pump pit to monitor individual pit performance. The display for these flow meters is located in the control cabinet. An additional flow meter is located at the discharge line outlet at Pump Pit 1 to monitor performance of the overall system. The flow meters allow both the rate and volume of discharge to be measured.

3.5.4.4 Sub-surface Drainage System

The sub-surface drainage system is designed to intercept stormwater infiltration, preventing it from entering the landfill and producing additional leachate. The sub-surface drainage system consists of an agricultural pipe located within the top of the clay cap. The pipe lies beneath a 300mm thick layer of drainage sand. Sub-surface drains are located in a herringbone pattern beneath the areas of the site which have minimal stormwater run-off (i.e. the flat, turfed section of the site).

Collected sub-surface waters are diverted via gravity, to the stormwater detention ponds located on the South-Eastern perimeter of the site.

3.5.4.5 Gas Extraction Systems

There are two gas extraction systems at the GDR Landfill.

1. A gas drainage layer is installed beneath the turfed section of the site, to intercept methane and other landfill gases before they reach the surface. The gas drainage system consists of a matrix of 160mm diameter MDPE pipes, located beneath the clay cap. A 400mm thick layer of drainage aggregate is located immediately above the pipe. The pipe is perforated on the under side allowing gases to be collected and entrapped. Collected gases are extracted, and vented into the atmosphere, by a fan situated at the rear of the golf amenities building.

2. A gas extraction system is located beneath the P3 Car Park to prevent gas accumulation. The system consists of a gas drainage blanket which collects and directs gases to venting pits. Gases are extracted by continuously operated fans and discharged via stacks, which extend from the pits to a height of 5 metres above the upper floor level of the car park.

3.5.5 System management

The landfill is managed in accordance with the objectives, strategy and specifications of the SOPA Remediated Land Management Plan.

Landfill management is a combination of preventative inspection and maintenance, and where required, supply of materials and corrective works of the hydraulic and electrical infrastructure. Regular reports are supplied to SOPA detailing works carried out and potential issues that require action.

The leachate transfer system is remotely monitored via the SCADA system (Section 6). This provides continuously updated data regarding the performance of the transfer system with comprehensive operational and maintenance data.

3.5.6 Contingency plans

Contingency plans and a series of Standard Operating Procedures (section 7) have been developed to address those situations where a system malfunction may lead to environmental harm.

The pump pits and drains provide a reservoir that can store leachate for several days in event of system failure, allowing time for repairs or alternative disposal to be arranged. The SCADA system remotely monitors leachate levels in the pump pits, and can automatically turn on or shut down pumps where levels exceed trigger points (thus preventing overflows), and log alarms for action by contractors. The SCADA system is monitored daily.

Contingency plans for high-risk events at the Golf Driving Range landfill are:

System component / issue	*Response*
Pump failure	Replace pump within 48 hours. Tanker extraction if required
System control / electrical / power failure	Repair components ASAP. Tanker extraction and treatment of leachate at LLWP if required.
Hydraulic failure (pipe rupture, failure of valve)	Repair components ASAP. Tanker extraction and treatment of leachate at LLWP if required
Liquid waste plant reaches capacity	Dispose of leachate through alternative means eg other treatment plant.

3.5.7 Leachate composition

Typical compositional analysis of leachate collecting in PP6 and PP7 at the Golf Driving Range is detailed in the Table 3.5.2 following.

Table 3.5.2 Typical leachate chemical composition – Golf Driving Range July 2007

Analyte	Unit	PP6	PP7	Analyte	Unit	PP6	PP7
Alkalinity	mg/L	295	690	NO_3	mg/L	0.04	7.6
Al	mg/L	<0.05	<0.05	NO_2	mg/L	0.27	0.52
NH_3	mg/L	6.5	33	N (total)	mg/L	8.2	36
As	mg/L	<0.01	<0.01	K	mg/L	47	66
HCO_3	mg/L	360	840	PAH	ug/L	4.73	0
BOD	mg/L	10	81	P (total)	mg/L		0.02
Ca	mg/L	64	180	Na	mg/L	295	460
CO_3	mg/L	<1	<1	SO_4	mg/L	135	155
Cl	mg/L	420	780	TDS	mg/L	1160	2110
Cu	mg/L	<0.001	0.003	TPH C6-9	ug/L	<25	<25
CN	mg/L	<0.005	0.02	TPH C10-36	ug/L	460	1890
F	mg/L	0.39	0.37	Zn	mg/L	0.014	0.012
Fe	mg/L	0.05	0.01	insitu DO	(ppm)	12.30%	30.91%
Pb	mg/L	<0.001	<0.001	insitu EC	(mS/cm)	2.043	3.78
Mg	mg/L	26	67	insitu temp.	`C	17	13.6
Mn	mg/L	0.28	0.19	insitu redox	(mV)	-59	-71
				insitu pH		6.81	6.65

3.5.8 Environmental monitoring

A comprehensive environmental monitoring program is conducted as detailed in Section 11, with the following objectives:

- Assess the effectiveness of the containment structure.
- Identify off-site or on-site movement of leachate.

- Comply with the environmental monitoring requirements established in a Notice issued under the Contaminated Lands Management Act 1997.
- Enable performance assessment and reporting

The south eastern border of the Golf Driving Range with Boundary Creek has been previously identified as the direction of groundwater flow. This pathway has been isolated by means of leachate drains and impermeable lining. Two pump pits store collected leachate prior to it being transported to LLWP via rising main. There are several monitoring piezometers along the leachate drain length and three sumps located on the outer side of the drain adjacent to Boundary Creek which are used to monitor potential off site migration of contaminants.

Soil Volatile Organic Compound (VOC) emanation from the landfill is controlled by a sub-surface gas collection and extraction system. A site horticultural maintenance plan includes fertilising and mowing with the provision of surface irrigation.

3.5.8.1 Leachate analytes

In 2006, SOPA commissioned a review of leachate chemical quality from all landfills to:

- Define the crucial analytes required to monitor the integrity of the remediated land and determine potential environmental harm;
- Define the analytes regarded as superfluous after 6 years of data collection;
- Determine whether the chemical leachate monitoring data adequately helps identify potential leachate migration from remediated land;
- Identify any areas of remediated lands that may require additional monitoring and/or monitoring protocols initiated;
- Optimise a monitoring program that will be significantly more cost effective to SOPA.

[Hanitro Pty Ltd 2006. Leachate and Groundwater Chemical Monitoring Review at Sydney Olympic Park. Report to Sydney Olympic Park Authority].

Assessment of data from chemical monitoring of PP6 and PP7 identified the chemicals of concern that are derived from the original pollution source. Interestingly, BOD results which usually mimic ammonia levels are regularly <50 mg/L except for two occasions in 2002 and 2003. The chemical of concern regularly detected are:

- Ammonia (500 mg/L maximum)
- BOD (110 mg/L maximum)

Hydrocarbon contaminants that are typical of putrescible tip leachate arising from engine oils and greases, are found in low concentrations except for one occasion in 2001 where 0.10 mg/L PAHs were detected in PP6. Typical maximum concentrations since then are

- Total C6 – C36 Petroleum Hydrocarbons (3.2 mg/L maximum)
- Polycyclic aromatic Hydrocarbons (0.014 mg/L maximum)

Also in low concentration are the following heavy metals/metalloids potentially derived from the original pollution source:

- Zinc (0.014 mg/L maximum)
- Cyanide (0.01 mg/L – detected once since 2001 in PP7)
- Copper (0.005 mg/L maximum)
- Lead (0.003 mg/L)

Four other heavy metal or metalloid ions are also regularly detected in the leachate within the containment structures. It should be noted however that these four elements are natural components of estuarine clays, estuarine sediments and sea water and are unlikely to represent a specific pollution source.

- Iron (0.11 mg/L maximum)
- Manganese (0.97 mg/L maximum)

- Boron (1.6 mg/L maximum)
- Barium (2.4 mg/L maximum)

The groundwater monitoring program has not detected the heavy metals arsenic, cadmium, chromium, lead and mercury in leachate from the Golf Driving Range.

A variety of monovalent and divalent cations and anions are also regularly detected in this leachate source (sodium, potassium, calcium, magnesium, chloride, sulphate, nitrate, bicarbonate and fluoride). These analytes are typically found in natural sources such as clays and sea water and do not represent a specific pollution source.

A group of analytes previously analysed in GDR leachate analyses are regarded as being superfluous. These analytes were either:

- Never detected in leachate, (arsenic, cadmium, lead and mercury).
- Infrequently detected and near PQL (chromium).
- Typical natural mineral components of the local geology, (boron, barium, calcium, magnesium, iron, manganese, sodium and potassium).
- Typical natural anion components of seawater, saline clay soils or town water (chloride, fluoride, sulphate, carbonate, bicarbonate and hydroxide).

The current monitoring program reflects the outcomes of this review; analytes to be tested for at this landfill are identified in Table 11.2.

3.5.8.2 Gas monitoring review

SOPA commissioned a review of remediated lands gas monitoring data in 2007. Quarterly gas monitoring had been conducted since January 2001, and over six years of subsurface accumulated gas monitoring data and surface gas monitoring data for the Golf Driving Range landfill was analysed. Depleted oxygen levels were evident in some system components in some samples, surface gas concentrations of methane, oxygen, hydrogen sulfide and carbon monoxide were recorded at non-detectable or background levels.

The review concluded that the subsurface accumulative gas monitoring and surface gas monitoring program could be discontinued at the Golf Driving Range landfill. [Review of the remediated lands gas monitoring program at Sydney Olympic Park. October 2007. Environmental Earth Sciences report to Sydney Olympic Park Authority].

3.5.8.3 Assessment of containment effectiveness

The SCADA system continuously monitors leachate levels and activates the pumps. Containment effectiveness is assessed by reviewing SCADA operational data regarding leachate level management in the Australia Avenue arm of the leachate drain (below design level of RL 101.2), and assessing concentration of groundwater contaminants downgradient from the leachate drain. Manual static water level monitoring provides a check of operational data.

8 WORKS AND DEVELOPMENT ON REMEDIATED LANDFILLS

Any works or development on remediated landfills at Sydney Olympic Park must address the following:

(i) Persons conducting works on remediated landfills must hold a SOPA Work Permit, and comply with Permit conditions. Prior to issue of this Permit, SOPA will assess proposed works for matters including consistency with the SOPA Remediated Lands Management Plan, the Parklands Plan of Management, and legislative requirements.

(ii) Proposed works and developments on all remediated landfills (both within and outside the Parklands) must be consistent with the principles and guidelines stated in Table 8 and with the objectives identified for each individual landfill established in Section 3 of this Plan.

(iii) Major works and development on remediated landfills are outside the scope of this Plan; any such proposals must be consider the strategies contained in Section 1 of this Plan, be individually assessed, and any necessary regulatory consents, approvals or licences obtained prior to commencement. Major works include construction of buildings, changes to physical or engineered infrastructure, excavations deeper than 0.5 metres that disturb a surface area greater than 80 square metres, or works that alter landforms including changes to contour drains and gradients.

(iv) Excavations deeper than 0.5m are prohibited on remediated landfills, except with approval of the Department of Environment and Climate Change. Approval has been granted for certain types of excavations, where they are conducted in accordance with the Standard Work Method in section 8.1 of the SOPA Remediated Lands Management Plan. SOPA must report on such excavations biannually.

Table 8 Principles and guidelines for proposed works and developments on remediated lands at Sydney Olympic Park

Generally works or activities that disturb or affect the integrity of the containment system should not occur. Works may occur to improve containment or reduce potential or threatened risk to human or environmental health. Changed uses may be appropriate where new technologies and practices provide a greater community good than the risk associated with containment system disturbance.

Before proceeding with any construction, works or activities associated with the containment system or any of the natural or built elements located over or adjacent to containment system, these works must be assessed and justified against the following:

- *Protection of waste containment features, including pipelines, membranes, bunds and caps.*
- *Collection and application of relevant data to understand and/or improve management of remediated land or leachate, including new uses*
- *Assessment of potential adverse impact on human health or environmental damage.*
- *Compliance with relevant occupational health and safety plans and environmental protection requirements.*
- *Identification of potential technological or knowledge improvement and educational opportunities provided by the site remediation program.*
- *Sustainable management practices and processes.*

[extract: Parklands Plan of Management (PoM Part 2 s5.2), Sydney Olympic Park Authority 2003]

8.1 Standard Work Method: Minor excavation works on remediated landfills at Sydney Olympic Park

8.1.1 Purpose

This method applies to approved minor excavation works in any of the lands identified in the Plan: Sydney Olympic Park Remediated Landfill Systems (Drawing 001-GG-0112) as subject to a CLM s28 notice.

8.1.2 Background

Remediation of Sydney Olympic Park has resulted in the formation of ten engineered remediated landfill areas. Typically these have 1 metre of clay capping over a consolidated waste containment mound, and subsurface cut-off walls and drainage systems. Disturbance to the cover and subsurface infrastructure must be managed to minimise environmental and health risks. Excavations deeper than 0.5m are prohibited on remediated landfills, except with the approval of the Department of Environment and Climate Change. Approval has been granted for certain types of excavations, where they are conducted in accordance with this Standard Work Method. SOPA must report on such excavations annually.

8.1.3 Responsibility

The SOPA Project Manager is responsible for ensuring:

- compliance with the Parklands Plan of Management (excavations over 0.5m deep are identified as a 'restricted activity' in relevant precincts)
- proposed excavations are of a type approved by DECC, and identified in this Standard Work Method
- this Work Method Statement is appropriately incorporated into relevant tender briefs, and contractor Work Permit Applications, and is implemented during the works.
- records of completed works (precinct, date, purpose and nature of work) are provided to SOPA Manager Environment & Ecology for reporting to DECC.
- Contractors are responsible for conducting works in accordance with approval conditions

8.1.4 Scope

This procedure applies only to works or activities that result in disturbance of a total land surface area of not more than 80m2 and that are listed in Table 8.1. It does NOT apply to major remediation works or where major excavation activities are required for construction of buildings. In these instances separate approval from the regulatory authority is required.

All permitted works must be conducted in accordance with the minor excavation works procedure (s8.1.5).

Table 8.1 Minor excavation works conditionally approved by DECC

Minor excavation works (deeper than 0.5m) permitted if the activity disturbs **no more than 80 square metres** of land surface area and **will not** result in the penetration of the clay capping

- Installation or investigation of services (gas, electricity, water, sewage, irrigation, leachate or communications) by means of open-cut or horizontal boring
- Installation or removal of posts, poles or support structures
- Installation of pathways or drainage lines
- Installation or removal of trees
- Installation or decommissioning of piezometers
- Environmental or geotechnical investigations
- Test pit investigations
- Emergency restoration works
- Other excavation and trenching activities that are part of a routine maintenance program

Minor excavation works (deeper than 0.5m) permitted if the activity disturbs **no more than 80 square metres** of land surface area and **will** result in the penetration of the clay capping or the disturbance of the buried waste

- Installation or decommissioning of groundwater monitoring/extraction wells or piezometers
- Installation or removal of posts, poles or support structures
- Environmental or geotechnical investigations resulting in minimal disturbance of waste oand creation of spoil, or
- Removal of trees

All permitted works must be conducted in accordance with standard Work Method

8.1.5 Minor Excavation Works Procedure

All works

1. Check proposed works are consistent with Table 8.1
2. Identify underground services and endangered species habitats within the works footprint
3. Obtain a SOPA Work Permit
4. Cordon the works footprint off from the general public
5. Separate excavated topsoil and capping for reuse
6. Store excavated material on the high side of the excavation so that any liquid travels back into the pit.
7. Where stockpiles are kept for more than one day: cover excavated material and place erosion control measures around them
8. At the completion of works, replace excavated material in the reverse order that it was removed
9. Replace clay capping in 300mm layers
10. Compact each layer with a powered compactor (whacker-packer) to a compaction density of 98%
11. Replace 100mm topsoil on clay capping
12. Fully restore landscape and irrigation
13. Use any excess spoil (from capping or topsoil) on-site for landscaping (this material has been previously validated; further validation is not required), or dispose off-site to a licensed landfill
14. Survey the location of new ground levels or new services/structures; provide information to SOPA CADD unit in electronic format within one week of completion of works

Works that penetrate the clay capping

Gas detection

15. Monitor gas levels during works
16. If methane levels exceed 5% LEL, implement constant natural airflow
17. Address risk of accumulated gas in the design and construction of new structures – fill voids or include ventilation in design

Compaction of replaced waste

18. Compact waste with excavator bucket while being placed back into the excavation
19. Place liner or geofabric on top of waste prior to compacting the clay capping

Spoil from the waste mass

20. Place spoil from within the waste mass into labelled drums or skips. Test material for subsequent disposal to a licensed facility (at the contractors expense)
21. Seal all drums and bins, and cordon the area if contractors leave the worksite.

Survey

22. Survey the exact worksite bounaries to provide baseline information for assessing possible settlement. Provide information to SOPA CADD unit in electronic format within one week of completion of works

Installation of poles, piezometers, other structures

23. Fill the void around the structure with a cement/bentonite (1:9 mix) slurry mix to the surface
24. Pump the slurry under pressure to avoid bridging
25. If the structure is hollow, fill it with a cement/bentonite slurry to the ground surface, or vent it, to avoid gas build-up (excluding piezometers)

Decomissioning/removal of structures

26. Fully remove the structure from the ground where possible
27. Fill the void with a cement/bentonite (1:9 mix) slurry mix (or a compacted validated clay) to 500mm from the surface
28. Restore and compact the clay capping, topsoil & landscaping
29. If it is not possible to remove the structure from the ground: cut it 500mm below the ground surface. If hollow, fill it with a cement/bentonite (1:9 mix) slurry mix. To avoid bridging, pump slurry under pressure.

9 MANAGEMENT OF UNEXPECTED WASTE

Comprehensive soil testing was conducted across the whole of Sydney Olympic Park in the 1990s on a grid-pattern basis, to identify areas requiring remediation (Coffey 1992). It is possible that some small patches of waste were undetected by this survey; in other cases, waste was left in situ (eg adjacent to creeklines, under Hill Road), and infrastructure such as cut-off walls and leachate drains installed to collect and contain leachate from this waste.

Waste may be potentially be found during excavation of areas of Sydney Olympic Park that are not mapped as remediated lands, posing risks to contractors, public and the environment.

The following procedure applies:

1. Restrict public access to the area.
2. Report the location and nature of the waste to SOPA for further investigation
3. Assess occupational, public and environmental risks. Particularly consider potential explosive or toxic gases, toxic chemicals, and buried unexploded ordnance.
4. Induct contractors on risks and procedures, and provide personal protection equipment as required. Avoid naked flames, sparks, and no eating or drinking.
5. Place excavated material back into the trench or remove it from the site. Any material to be removed from site must be placed in labelled skip bins or similar and tested for subsequent disposal to a licensed facility.

10 OCCUPATIONAL HEALTH &SAFETY

All persons undertaking works at the Park are required to hold a SOPA Work Permit; applicants must provide documents including Safe Work Method Statements in support of Permit applications. Issue of a SOPA Work Permit does not mean that SOPA has 'approved' the content of an applicant's Safe Work Method Statement - applicants are responsible for ensuring that their Safe Work Method Statements effectively address potential hazards, and comply with legislative requirements.

The remediated landfills and associated leachate collection and transfer infrastructure present potential hazards to persons directly involved in remediation system management and maintenance, and also to persons undertaking unrelated works on or near these lands.

Potential hazards likely to be associated with typical management activities on the landfill systems are identified in Table 10.1. These hazards were identified from review of landfill system design and environmental monitoring results, and an earlier risk review commissioned by the Authority (*Occupational Health and Safety Plan for Remediated landfill Areas at Homebush Bay* (Dr Garry Smith, Smith Environmental 2001). Work Permit applicants should consider these hazards in developing project-specific Safe Work Method Statements.

Table 10.1 Potential landfill-related occupational health and safety hazards

	Activity	Potential hazard*
1	**Soil disturbance below 0.5m** eg digging, earthmoving, construction, borehole drilling *Note: Excavations below 0.5m require DECC approval*	Dermal chemical contact Asbestos contact Vapour chemical contact Explosive gases Unexploded ordance (within Woo-la-ra landfill and the NNR acid sulphate cells)
2	**Leachate collection infrastructure** - pump pit / manhole / storage tank / piezometers / sumps / tar pit / oil separator Eg inspection, maintenance, hydraulic, electical	Dermal chemical contact Vapour chemical contact Low oxygen levels Explosive gases Fall, entrapment, drowning
3	**Construction / welding / drilling**	Vapour chemical contact Explosive gases Grassfire
4	**Subterranean services – installation and maintenance** Eg plumbing / drainage / pipework / irrigation / electrical / telecommunications / gas	Dermal chemical contact Vapour chemical contact Low oxygen levels Explosive gases
5	**Landscaping** Management activities no deeper than 0.5m	Dermal chemical contact with seeps or overlows Vapour chemical contact, particularly within fenced piezometer and pump pit enclosures Explosive gases (hot tools, smoking) Grassfire (hot tools, smoking)
6	**Gas extraction system servicing** At Golf Driving range – amenities building and P3 Carpark	Vapour chemical contact Explosive gases
7	**Pond maintenance** Haslams Reach, Bicentennial Park evaporation ponds, Wilson Park treatment ponds	Dermal chemical contact – all ponds (note DNAPL in northern end of Wilson Park Treatment pond 1) Dermal algae contact Vapour chemical contact Explosive gases Fall, entrapment, drowning
8	**Site monitoring** eg inspection, sampling, ecological survey; particularly within ponds, fenced piezometer and pump pit enclosures	Dermal chemical contact with seeps or spills Vapour chemical contact Explosive gases

*see section 3 of the SOPA Remediated Lands Management Plan for information on individual landfill characteristics including: waste type, leachate composition, surface gas and subsurface accumulated gas monitoring results

Appendix C: Bore Logs

Landfill Gas Bore LFG01

PROJECT NUMBER 2207292
PROJECT NAME FDC GWS Giants LFGRA
CLIENT FDC GWS Giants
ADDRESS 1 Olympic Boulevard, Olympic Park NSW
DRILLING DATE 17/05/2023

DRILLING METHOD HA
TOTAL DEPTH 2.0 mbgl
DIAMETER 150mm
CASING 0-1 mbgl
SCREEN 1-2 mbgl

COORDINATES -
COORD SYS -
COMPLETION -
SURFACE ELEVATION -
WELL TOC

COMMENTS

LOGGED BY DT
CHECKED BY GB

Material Description	Graphic Log	Drilling Method	Bore Diagram	Depth (m)	PID (ppm)	Samples	Analysed	Additional Observations
TOPSOIL: Grass.		HA		0.1				
FILL: Sandy Silt, dark brown, loose, poorly sorted, fine-medium grained, moist.				0.2 0.3 0.4 0.5	0.0	LFG01_0.5		
Increasing clay content and cohesion.				0.6 0.7				
FILL: Sandy Clay, dark grey to black, poorly sorted, soft, fine-medium grained, low-medium plasticity, slightly moist.				0.8 0.9 1	0.0	LFG01_1.0		
Decreasing sand content.				1.1 1.2 1.3 1.4 1.5	0.0	LFG01_1.5		
				1.6 1.7 1.8 1.9 2	0.0	LFG01_2.0		
EOH at 2.0 mbgl.				2.1 2.2 2.3 2.4				

Disclaimer This bore log is intended for environmental not geotechnical purposes.
produced by ESlog.ESdat.net on 15 Jun 2023

Landfill Gas Bore LFG02

PROJECT NUMBER 2207292
PROJECT NAME FDC GWS Giants LFGRA
CLIENT FDC GWS Giants
ADDRESS 1 Olympic Boulevard, Olympic Park NSW
DRILLING DATE 17/05/2023

DRILLING METHOD HA
TOTAL DEPTH 2.0 mbgl
DIAMETER 150mm
CASING 0-1 mbgl
SCREEN 1-1.5 mbgl

COORDINATES -
COORD SYS -
COMPLETION -
SURFACE ELEVATION -
WELL TOC

COMMENTS

LOGGED BY DT
CHECKED BY GB

Material Description	Graphic Log	Drilling Method	Bore Diagram	Depth (m)	PID (ppm)	Samples	Analysed	Additional Observations
TOPSOIL: Grass.		HA		0.1				
FILL: Sandy Gravel, yellow/brown, loose, angular grains, dark brown silts.				0.2 0.3 0.4 0.5	0.0	LFG02_0.5		
Appearing clays, increasing cohesion.				0.6 0.7 0.8 0.9 1	0.0	LFG02_1.0		
FILL: Clayey Silt, wood fragments, sand and gravel, dark red/brown colour, low plasticity.				1.1 1.2 1.3 1.4 1.5	0.0	LFG02_1.5		
FILL: Clay, minor sand, red/brown, firm, high plasticity.				1.6 1.7				
FILL: Silty Clay, fragments of wood, glass and metal, black, soft, medium-high plasticity, present.				1.8 1.9 2	0.0	LFG02_2.0		Minor decomposition odour.
EOH at 2.0 mbgl.				2.1 2.2 2.3 2.4				

Disclaimer This bore log is intended for environmental not geotechnical purposes.
produced by ESlog.ESdat.net on 15 Jun 2023

Landfill Gas Bore LFG03

PROJECT NUMBER 2207292
PROJECT NAME FDC GWS Giants LFGRA
CLIENT FDC GWS Giants
ADDRESS 1 Olympic Boulevard, Olympic Park NSW
DRILLING DATE 17/05/2023

DRILLING METHOD HA/SA
TOTAL DEPTH 5.0 mbgl
DIAMETER 150mm
CASING 0 - 2.9 mbgl
SCREEN 2.9 - 4.9 mbgl

COORDINATES -
COORD SYS -
COMPLETION -
SURFACE ELEVATION -
WELL TOC

COMMENTS

LOGGED BY DT
CHECKED BY GB

Material Description	Drilling Method	Depth (m)	PID (ppm)	Samples	Analysed	Additional Observations
TOPSOIL: Grass.	HA	0.2				
FILL: Silty Sand, grass roots, dark brown, poorly sorted, fine grained.		0.4	0.0	LFG03_0.5		
FILL: Gravels <30mm, angular, hard and compact, concrete fragments, silts and sands.		0.6				
FILL: Sandy Silt, dark brown, poorly sorted, hard and compacted, fine-medium grained, dry.		0.8				
FILL: Clay, minor coarse sands, dark grey, soft, medium-high plasticity.		1	0.0	LFG03_1.0		
Increasing sand content.		1.2				
		1.4	0.0	LFG03_1.5		
		1.6				
		1.8				
		2	0.0	LFG03_2.0		
	SA	2.2				
FILL: Clay, red/brown with yellow mottling, soft, medium-high plasticity.		2.4				
		2.6				
		2.8				
		3	0.0	LFG03_3.0		
		3.2				
		3.4	0.0	LFG03_3.4		Minor decomposition odour.
FILL: Sandy Clay, medium grained and poorly sorted sands, white/cream, soft, low-medium plasticity.		3.6				
		3.8				
FILL: Silty Clay, fragments of wood, glass and metal, black, soft, medium-high plasticity.		4	10.70	LFG03_4.0		Strong decomposition odour.
		4.2				
		4.4				
		4.6				
		4.8				
		5	0.0	LFG03_5.0		
EOH at 5.0 mbgl.		5.2				
		5.4				

Disclaimer This bore log is intended for environmental not geotechnical purposes.
produced by ESlog.ESdat.net on 15 Jun 2023

Landfill Gas Bore LFG04

PROJECT NUMBER 2207292
PROJECT NAME FDC GWS Giants LFGRA
CLIENT FDC GWS Giants
ADDRESS 1 Olympic Boulevard, Olympic Park NSW
DRILLING DATE 17/05/2023

DRILLING METHOD HA/SA
TOTAL DEPTH 6.0 mbgl
DIAMETER 150mm
CASING 0 - 4 mbgl
SCREEN 4 - 6 mbgl

COORDINATES -
COORD SYS -
COMPLETION -
SURFACE ELEVATION -
WELL TOC

COMMENTS

LOGGED BY DT
CHECKED BY GB

Material Description	Graphic Log	Drilling Method	Bore Diagram	Depth (m)	PID (ppm)	Samples	Analysed	Additional Observations
TOPSOIL: Grass.		HA						
FILL: Sandy Silt, fine-medium grained sands, minor gravels <5mm, light brown, loose, poorly sorted.				0.5	0.0	LFG04_0.5		
Very hard layer.				1	0.0	LFG04_1.0		
FILL: Clayey Silt, light brown with red/yellow mottling, soft, low plasticity.				1.5	0.0	LFG04_1.5		
FILL: Clayey Silt, waste fragments black, soft, medium-high plasticity.		SA		2	0.0	LFG04_2.0		Some decomposition odour.
				2.5				
Waste fragments visible.				3	0.0	LFG04_3.0		
FILL: Clay, brick, glass and wood fragments, dark grey with significant red/brown mottling, soft, medium-high plasticity.				3.5				
				4	0.0	LFG04_4.0		
				4.5				
FILL: Silty Clay, wood, glass and metal fragments, black, soft, medium-high plasticity.				5	0.0	LFG04_5.0		Strong decomposition odour.
				5.5				
				6	0.0	LFG04_6.0		
EOH at 6.0 mbgl.								

Disclaimer This bore log is intended for environmental not geotechnical purposes.
produced by ESlog.ESdat.net on 15 Jun 2023

Soil Bore SB01

PROJECT NUMBER 2207292
PROJECT NAME FDC GWS Giants LFGRA
CLIENT FDC GWS Giants
ADDRESS 1 Olympic Boulevard, Olympic Park NSW
DRILLING DATE 17/05/2023

DRILLING METHOD HA
TOTAL DEPTH 1.3 mbgl
DIAMETER
CASING
SCREEN

COORDINATES -
COORD SYS -
COMPLETION -
SURFACE ELEVATION -
WELL TOC

COMMENTS

LOGGED BY DT
CHECKED BY GB

Material Description	Graphic Log	Drilling Method	Bore Diagram	Depth (m)	PID (ppm)	Samples	Analysed	Additional Observations
TOPSOIL: Grass.		HA		0.1				
FILL: Silty Sand, grass roots, dark brown, poorly sorted, fine-medium grained.				0.2				
				0.3				
				0.4				
				0.5	0.0	SB01_0.5		
FILL: Sandy, gravelly Clay, gravels <5mm, some silts, red brown, firm, low plasticity.				0.6				
				0.7				
				0.8				
				0.9				
				1	0.0	SB01_1.0		
Larger road base-type gravels.				1.1				
				1.2				
				1.3	0.0	SB01_1.3		
EOH at 1.3 mbgl: Refusal on hard layer.				1.4				
				1.5				
				1.6				
				1.7				
				1.8				
				1.9				

Disclaimer This bore log is intended for environmental not geotechnical purposes.
produced by ESlog.ESdat.net on 15 Jun 2023

Appendix D: Equipment Calibration Certificates

Equipment Calibration Form
RKI GX-6000 PID

UNIT IDENTIFICATION	
Model Number	GX-6000
Serial Number	51M0139203-4RN
Unit Type	RKI GX-6000 PID/LEL

INSEPCTION RECORD / CONDITION REPORT					
Inlet Flow Adequate/Clear	☒	**Pump**			
Alarm Limits	**PID**	High	100 ppm	Low	5 ppm
	LEL	High	10%	Low	5%

CALIBRATION DETAILS				
Sensor	**Span Gas**	**Value**	**Reading**	**Gas Bottle No.**
PID	Isobutylene	100 ppm	100 ppm	**10009-6**
	Air	0 ppm	0 ppm	
LEL	CH_4	50%	50%	**10011-3**
Calibration Successful	☒			

Calibrated by: **Declan Tennent**

Calibration date: **13/05/2023**

Next calibration due: **20/05/2023**

Gas Calibration Certificate

Instrument GA5000
Serial No. G508343
Sensors CH4, CO2, O2, CO, H2S

Air-Met Scientific Pty Ltd
1300 137 067

Item	Test	Pass	Comments
Battery	Charge Condition	✓	
	Fuses	✓	
	Capacity	✓	
	Recharge OK?	✓	
Switch/keypad	Operation	✓	
Display	Intensity	✓	
	Operation (segments)	✓	
Grill Filter	Condition	✓	
	Seal	✓	
Pump	Operation	✓	
	Filter	✓	
	Flow	✓	
	Valves, Diaphragm	✓	
PCB	Condition	✓	
Connectors	Condition	✓	
Sensor	O2	✓	
	CH4	✓	
	CO2	✓	
	CO	✓	
	H2S	✓	
Alarms	Beeper	✓	
	Settings	✓	
Software	Version		
Datalogger	Operation		
Download	Operation		
Other tests:			

Certificate of Calibration

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

Diffusion mode Aspirated mode

Sensor	Serial no	Calibration gas and concentration	Certified	Gas bottle No	Instrument Reading
O2		20.9% Vol O2		Fresh Air	20.9% Vol O2
CH4		60% Vol CH4	NATA	SY483	60% Vol CH4
CO2		40% Vol CO2	NATA	SY483	40% Vol CO2
CO		103ppm CO	NATA	SY397	103ppm CO
H2S		25ppm H2S	NATA	SY397	25ppm H2S
CH4		2.5% Vol CH4	NATA	SY397	2.5% Vol CH4

Calibrated by: **Alex Buist**

Calibration date: **24/05/2023**

Next calibration due: **20/11/2023**

Gas Calibration Certificate

airmet

Air-Met Scientific Pty Ltd
1300 137 067

Instrument GA5000
Serial No. G508345
Sensors CH4, O2, CO, H2S

Item	Test	Pass	Comments
Battery	Charge Condition	✓	
	Fuses	✓	
	Capacity	✓	
	Recharge OK?	✓	
Switch/keypad	Operation	✓	
Display	Intensity	✓	
	Operation (segments)	✓	
Grill Filter	Condition	✓	
	Seal	✓	
Pump	Operation	✓	
	Filter	✓	
	Flow	✓	
	Valves, Diaphragm	✓	
PCB	Condition	✓	
Connectors	Condition	✓	
Sensor	O2	✓	
	CH4	✓	
	CO2	✓	
	H2S	✓	
	CO	✓	
Alarms	Beeper	✓	
	Settings	✓	
Software	Version		
Datalogger	Operation		
Download	Operation		
Other tests:			

Certificate of Calibration

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

Diffusion mode Aspirated mode

Sensor	Serial no	Calibration gas and concentration	Certified	Gas bottle No	Instrument Reading
O2		20.9% O2		Fresh Air	20.8% O2
H2S		24ppm H2S	NATA	SY396	25ppm H2S
CO		100ppm CO	NATA	SY396	100ppm CO
CH4		2.5% CH4	NATA	SY396	2.5%CH4
CH4		60% CH4	NATA	SY443	60% CH4
CO2		40% CO2	NATA	SY443	40% CO2

Calibrated By: **Izack Muhlbock**

Calibration date: **19/06/2023**

Next calibration due: **16/12/2023**

CERTIFICATION OF CALIBRATION

Issued by: QED Environmental Systems Ltd.

Calibration certificate number 19255 H-09418

Instrument Laser One **Serial Number** 19255

Description of the calibration procedure:

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

Gas verification from 0-1000ppm CH4

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

Uncertainty	0.40	%
Max % error	0.40	% FS

Gas verification from 0-100% vol CH4

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

Uncertainty	0.10	%
Max % error	0.10	% FS

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

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

Uncertainty	0.00	%
Max % error	0.00	% FS

CERTIFICATION OF CALIBRATION

Issued by: QED Environmental Systems Ltd.

Environmental conditions during calibration

Temp.	18.5	C
Pressure	977	mBar

Gas bottles used for calibration

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

Calibration results: Pass

Next scheduled calibration: 03/04/2024

Calibration date: 03/04/2023

Issued by: Keeley Knight

Gas Calibration Certificate

airmet

Air-Met Scientific Pty Ltd
1300 137 067

Instrument GA5000
Serial No. G508342
Sensors CH4, CO2, O2, CO, H2S

Item	Test	Pass	Comments
Battery	Charge Condition	✓	
	Fuses	✓	
	Capacity	✓	
	Recharge OK?	✓	
Switch/keypad	Operation	✓	
Display	Intensity	✓	
	Operation (segments)	✓	
Grill Filter	Condition	✓	
	Seal	✓	
Pump	Operation	✓	
	Filter	✓	
	Flow	✓	
	Valves, Diaphragm	✓	
PCB	Condition	✓	
Connectors	Condition	✓	
Sensor	O2	✓	
	CH4	✓	
	CO2	✓	
	CO	✓	
	H2S	✓	
Alarms	*Beeper*	✓	
	Settings	✓	
Software	*Version*		
Datalogger	*Operation*		
Download	*Operation*		
Other tests:			

Certificate of Calibration

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

Diffusion mode *Aspirated mode*

Sensor	*Serial no*	Calibration gas and concentration	Certified	Gas bottle No	Instrument Reading
O2		20.9% O2		Fresh Air	20.9% O2
H2S		24ppm H2S	NATA	SY396	25ppm H2S
CO		103ppm CO	NATA	SY396	103ppm CO
CH4		2.5% CH4	NATA	SY396	2.5% CH4
CH4		60% CH4	NATA	SY483	60% CH4
CO2		40% CO2	NATA	SY483	40% CO2

Calibrated by: **Jesse Stenroos**

Calibration date: **13/06/23**

Next calibration due: **10/12/2023**

ThermoFisher SCIENTIFIC

Thermo Fisher Scientific Australia Pty Ltd
ABN 52 058 390 917
5 Caribbean Drive
Scoresby VIC 3179
Phone: 1 300 736 767
Fax: 03 9763 1169

Portable Gas Detector Calibration Report
Service Call: SV2305010042

Customer: Air Met Scientific
Address: 7 – 11 Ceylon Street
Nunawading 3131

Attention: Mee Lan Liew

Item	Test	Fail	Pass	Comments	Qty	Part code	List	Disc.
Battery	NiCd, NiMH, Dry cell, Lead acid, Li Ion		✓					
	Charger, Power supply							
Pump	Flow		✓					
Filter	Filter, fittings etc	✓		Renewed inline filters	2	Misc		
Alarms	Audible, visual, external							
	Alarm code							
Display	Operation		✓					
Switches	Operation		✓					
PCB	Operation		✓					
Connectors	Condition		✓					
Firmware	Version		✓					
Data Logger	Operation							
Case	Condition		✓					
Sensors	Oxygen Lo/Hi OXY		✓	S/n:				
	Toxic 1 Inst/STEL/TWA H2S		✓	S/n:				
	Toxic 2 Inst/STEL/TWA CO		✓	S/n:				
	Toxic 3 Inst/STEL/TWA CO_2		✓	S/n:				
	LEL Alarm 1, Alarm 2 CH_4		✓	S/n:				
	% VOL, PID, IR, other Alarm 1, Alarm 2			S/n:				
Other tests								

Engineers report	Date	Start	Finish	Parts total		
Calibrated and tested unit				Labour		
Renewed inline filters				Calibration Cal 5		
				Travel		
				Freight		
Model: Geotech GA5000 S/N: G508342				**Total**		

Calibration Certificate

All sensors have been Zeroed prior to calibration. Head span tested to 20% of SPAN gas

Sensor	Type	Serial no/ Date code	D/C	Span Gas	Conc.	Traceability Lot no#	CF	Before		After cal
								Span	Head Span	SPAN
Oxy	**AIR**			**AIR**	**20.9%**	**AIR**		✓		**20.9%**
Tox 1	**H2S**			**H2S**	**25ppm**	**1510491**		✓		**25ppm**
Tox 2	**CO**			**CO**	**100ppm**	**1510491**		✓		**100ppm**
Tox 3	**CO2**			**CO2**	**40%vol**	**402360911-24**		✓		**40%vol**
Exp	**Flam**			**CH4**	**60%vol**	**402360911-24**		✓		**60%vol**

Calibrated/Repaired by: Stephen Hicks Calibration/Repair date: 22/05/2023 Next due: 22/05/2024

Appendix E: Laboratory Analytical Reports and COC Documentation

SAMPLES RECEIVED WITHOUT COC

CLIENT:	Arc Environmental	CARRIER:	CLIENT
PROJECT / QUOTE:	2207292	CONNOTE #:	
CONTACT NAME:	Jay Parmansche. / Alex Mikov	AWB #:	
CONTACT NUMBER:	0434 560 177	# OF ESKIES: 1	SECURITY SEAL: Y N (N/A)
SAMPLER NAME:	AM	TYPE OF ESKIES:	Large
SAMPLER NUMBER:		ESKY NUMBERS:	
SAMPLES RECEIVED BY:	Jack	# OF SAMPLES:	
DATE/TIME RECEIVED:	18/05/23 1730 CLIENT SERVICES NOTIFIED BY: Jack	TEMPERATURE:	8.2°C -1a.

Environmental Division
Sydney
Work Order Reference
ES2316686

Telephone : + 61-2-8784 8555

LAB ID	SAMPLE DETAILS: SAMPLE ID	DATE	MATRIX	NUMBER OF CONTAINERS	ADDITIONAL INFORMATION / COMMENTS
1	SB1 0.5	17/05/23	S		OTHER INFORMATION: ☐ MICRO ☐ BIOSECURITY ☐ BROKEN CONTAINERS ☑ COC EMAILED to be emailed ☐ ALS COMPASS
2	SB1 1.3	↓	S		
3	CFG1 1.0	↓	S		
4					
5					
			TOTAL		

CORRESPONDENCE (DATE, INITIALS - DETAILS OF CORRESPONDENCE):

Black trolley

ARC ENVIRONMENTAL

CONTACT

JAY PARMANSCHE

FOR COC

0434 560 177

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **ES2316686**

Client	: **ARC ENVIRONMENTAL**	Laboratory	: Environmental Division Sydney
Contact	: MR JAY PARMANSCHE	Contact	: Katie Davis
Address	: Suite 103, 7 Jeffcott Street WEST MELBOURNE	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: jay@arcenvironmental.com.au	E-mail	: katie.davis@alsglobal.com
Telephone	: 03 8383 1950	Telephone	: +61-2-8784 8555
Facsimile	: ----	Facsimile	: +61-2-8784 8500
Project	: ----	Page	: 1 of 3
Order number	: ----	Quote number	: EM2017ARCENV0001 (MEBQ/216/21 Primary work)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	:		

Dates

Date Samples Received	: 18-May-2023 19:30	Issue Date	: 23-May-2023
Client Requested Due Date	: 29-May-2023	Scheduled Reporting Date	: **29-May-2023**

Delivery Details

Mode of Delivery	: Client Drop Off	Security Seal	: Not Available
No. of coolers/boxes	: 1	Temperature	: 8.2' C - Ice present
Receipt Detail	:	No. of samples received / analysed	: 30 / 19

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Sample QC2 forwarded to Eurofins for analysis.**
- **23/05/23: This is an updated SRN which indicates Asbestos for samples 3, 6, 17, 19, 22-26, P-7/4 suite for samples 6, 18 AND the samples with prefix LFG on the jars have been changed.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- **Sample(s) requiring volatile organic compound analysis received in airtight containers (ZHE).**
- **Asbestos analysis will be conducted by ALS Newcastle.**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	(On Hold) SOIL No analysis requested	SOIL - EA002 pH (1:5)	SOIL - EA055-103 Moisture Content	SOIL - EA200G Asbestos Identification in Soils -	SOIL - ED040S Soluble Major Anions	SOIL - P- 7/4 - Short Suite NSW DECCW Waste Classification (SCC) -	SOIL - S-26 8 metals/TRH/BTEXN/PAH
ES2316686-001	18-May-2023 00:00	LFG3 0.5		✓	✓		✓		✓
ES2316686-002	18-May-2023 00:00	LFG3 1.0	✓						
ES2316686-003	18-May-2023 00:00	LFG3 1.5		✓	✓	✓	✓		✓
ES2316686-004	18-May-2023 00:00	LFG3 2.0	✓						
ES2316686-005	18-May-2023 00:00	LFG3 3.0	✓						
ES2316686-006	18-May-2023 00:00	LFG3 3.4			✓	✓		✓	
ES2316686-007	18-May-2023 00:00	LFG3 4.0		✓	✓		✓		✓
ES2316686-008	18-May-2023 00:00	LFG3 5.0	✓						
ES2316686-009	18-May-2023 00:00	LFG4 0.5		✓	✓		✓		✓
ES2316686-010	18-May-2023 00:00	LFG4 1.0	✓						
ES2316686-011	18-May-2023 00:00	LFG4 1.5	✓						
ES2316686-012	18-May-2023 00:00	LFG4 2.0		✓	✓		✓		✓
ES2316686-013	18-May-2023 00:00	LFG4 3.0	✓						
ES2316686-014	18-May-2023 00:00	LFG4 4.0	✓						
ES2316686-015	18-May-2023 00:00	LFG4 5.0		✓	✓		✓		✓
ES2316686-016	18-May-2023 00:00	LFG4 6.0	✓						
ES2316686-017	18-May-2023 00:00	LFG1 0.5		✓	✓	✓	✓		✓
ES2316686-018	18-May-2023 00:00	LFG1 1.0			✓			✓	
ES2316686-019	18-May-2023 00:00	LFG1 1.5		✓	✓	✓	✓		✓
ES2316686-020	18-May-2023 00:00	LFG1 2.0	✓						
ES2316686-021	18-May-2023 00:00	LFG2 0.5		✓	✓		✓		✓
ES2316686-022	18-May-2023 00:00	LFG2 1.0				✓			
ES2316686-023	18-May-2023 00:00	LFG2 1.5		✓	✓	✓	✓		✓
ES2316686-024	18-May-2023 00:00	LFG2 2.0				✓			
ES2316686-025	18-May-2023 00:00	SB1 0.5		✓	✓	✓	✓		✓
ES2316686-026	18-May-2023 00:00	SB1 1.0		✓	✓	✓	✓		✓
ES2316686-027	18-May-2023 00:00	SB1 1.3	✓						
ES2316686-029	18-May-2023 00:00	QC1			✓				✓

Matrix: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - EA200 Asbestos Identification in Soils -	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)	SOIL - S-18 TRH(C6-C9)/BTEXN
ES2316686-006	18-May-2023 00:00	LFG3 3.4		✓	
ES2316686-012	18-May-2023 00:00	LFG4 2.0	✓		
ES2316686-015	18-May-2023 00:00	LFG4 5.0	✓	✓	
ES2316686-028	08-May-2023 00:00	TRB1 TRIP BLANK			✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - W-04 TRH/BTEXN
ES2316686-030	18-May-2023 00:00	RB1	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ESDAT REPORTING

- EDI Format - ESDAT (ESDAT)	Email	arcenvironmental@esdat.com.au
- Electronic SRN for ESdat (ESRN_ESDAT)	Email	arcenvironmental@esdat.com.au

JAY PARMANSCHE

- *AU Certificate of Analysis - NATA (COA)	Email	jay@arcenvironmental.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	jay@arcenvironmental.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	jay@arcenvironmental.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	jay@arcenvironmental.com.au
- A4 - AU Tax Invoice (INV)	Email	jay@arcenvironmental.com.au
- Chain of Custody (CoC) (COC)	Email	jay@arcenvironmental.com.au
- EDI Format - ENMRG (ENMRG)	Email	jay@arcenvironmental.com.au
- EDI Format - ESDAT (ESDAT)	Email	jay@arcenvironmental.com.au

Inter-Laboratory Testing

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

(SOIL) EA200: AS 4964 - 2004 Identification of Asbestos in Soils

(SOIL) EK040T: Fluoride Total

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES2316686**	Page	: 1 of 14
Client	: **ARC ENVIRONMENTAL**	Laboratory	: Environmental Division Sydney
Contact	: MR JAY PARMANSCHE	Telephone	: +61-2-8784 8555
Project	: ----	Date Samples Received	: 18-May-2023
Site	: ----	Issue Date	: 30-May-2023
Sampler	: ----	No. of samples received	: 30
Order number	: ----	No. of samples analysed	: 19

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Matrix Spike outliers occur.**
- **Duplicate outliers exist - please see following pages for full details.**
- **Laboratory Control outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Duplicate (DUP) RPDs							
EG005(ED093)T: Total Metals by ICP-AES	ES2317303--018	Anonymous	**Lead**	7439-92-1	29.2 %	0% - 20%	**RPD exceeds LOR based limits**
Laboratory Control Spike (LCS) Recoveries							
EP075(SIM)A: Phenolic Compounds	QC-5074623-002	----	**Phenol**	108-95-2	58.5 %	71.0-125%	**Recovery less than lower control limit**
EP075(SIM)A: Phenolic Compounds	QC-5074623-002	----	**2.4.6-Trichlorophenol**	88-06-2	147 %	54.0-114%	**Recovery greater than upper control limit**
EP075(SIM)A: Phenolic Compounds	QC-5074623-002	----	**2.4.5-Trichlorophenol**	95-95-4	122 %	60.0-114%	**Recovery greater than upper control limit**
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	QC-5074623-002	----	**Anthracene**	120-12-7	67.7 %	77.0-127%	**Recovery less than lower control limit**
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	QC-5074623-002	----	**Benzo(g.h.i)perylene**	191-24-2	62.7 %	63.0-121%	**Recovery less than lower control limit**

Outliers : Analysis Holding Time Compliance

Matrix: **SOIL**

Method / Container / Client Sample ID(s)		Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA002: pH 1:5 (Soils)							
Soil Glass Jar - Unpreserved							
LFG3 0.5,	LFG3 1.5,	----	----	----	25-May-2023	24-May-2023	**1**
LFG3 4.0,	LFG4 0.5,						
LFG4 2.0,	LFG4 5.0,						
LFG1 0.5,	LFG1 1.5,						
LFG2 0.5,	LFG2 1.5,						
SB1 0.5,	SB1 1.0						
EP080/071: Total Petroleum Hydrocarbons							
Soil Glass Jar - Unpreserved							
TRB1 - TRIP BLANK		----	----	----	23-May-2023	22-May-2023	**1**
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Soil Glass Jar - Unpreserved							
TRB1 - TRIP BLANK		----	----	----	23-May-2023	22-May-2023	**1**
EP080: BTEXN							
Soil Glass Jar - Unpreserved							
TRB1 - TRIP BLANK		----	----	----	23-May-2023	22-May-2023	**1**

Outliers : Frequency of Quality Control Samples

Matrix: **SOIL**

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC 1	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Major Anions - Soluble	1	12	8.33	10.00	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
	0				
Laboratory Duplicates (DUP)					
TRH - Semivolatile Fraction	0	6	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
TRH - Semivolatile Fraction	0	6	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: ✗ = Holding time breach ; ✓ = Within holding time.

Method / ***Container*** / Client Sample ID(s)		***Sample Date***	*Extraction / Preparation*			*Analysis*		
			Date extracted	*Due for extraction*	*Evaluation*	***Date analysed***	*Due for analysis*	*Evaluation*
EA002: pH 1:5 (Soils)								
Soil Glass Jar - Unpreserved (EA002)								
LFG3 0.5,	LFG3 1.5,	**18-May-2023**	**24-May-2023**	25-May-2023	✓	**25-May-2023**	24-May-2023	✗
LFG3 4.0,	LFG4 0.5,							
LFG4 2.0,	LFG4 5.0,							
LFG1 0.5,	LFG1 1.5,							
LFG2 0.5,	LFG2 1.5,							
SB1 0.5,	SB1 1.0							
EA055: Moisture Content (Dried @ 105-110°C)								
Soil Glass Jar - Unpreserved (EA055)								
LFG3 0.5,	LFG3 1.5,	**18-May-2023**	**----**	----	----	**24-May-2023**	01-Jun-2023	✓
LFG3 3.4,	LFG3 4.0,							
LFG4 0.5,	LFG4 2.0,							
LFG4 5.0,	LFG1 0.5,							
LFG1 1.0,	LFG1 1.5,							
LFG2 0.5,	LFG2 1.5,							
SB1 0.5,	SB1 1.0							
Soil Glass Jar - Unpreserved (EA055)								
QC1		**18-May-2023**	**----**	----	----	**25-May-2023**	01-Jun-2023	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA200: AS 4964 - 2004 Identification of Asbestos in Soils							
Snap Lock Bag (EA200)							
LFG4 2.0, LFG4 5.0	**18-May-2023**	**----**	----	----	**24-May-2023**	14-Nov-2023	✓
Snap Lock Bag - ACM/Asbestos Grab Bag (EA200)							
LFG3 1.5, LFG3 3.4, LFG1 0.5, LFG1 1.5, LFG2 1.0, LFG2 1.5, LFG2 2.0, SB1 0.5, SB1 1.0	**18-May-2023**	**----**	----	----	**24-May-2023**	14-Nov-2023	✓
ED040S: Soluble Major Anions							
Soil Glass Jar - Unpreserved (ED040S)							
LFG3 0.5, LFG3 1.5, LFG3 4.0, LFG4 0.5, LFG4 2.0, LFG4 5.0, LFG1 0.5, LFG1 1.5, LFG2 0.5, LFG2 1.5, SB1 0.5, SB1 1.0	**18-May-2023**	**24-May-2023**	15-Jun-2023	✓	**25-May-2023**	21-Jun-2023	✓
EG005(ED093)T: Total Metals by ICP-AES							
Soil Glass Jar - Unpreserved (EG005T)							
LFG3 0.5, LFG3 1.5, LFG3 4.0, LFG4 0.5, LFG4 2.0, LFG4 5.0, LFG1 0.5, LFG1 1.5, LFG2 0.5, LFG2 1.5, SB1 0.5, SB1 1.0	**18-May-2023**	**24-May-2023**	14-Nov-2023	✓	**25-May-2023**	14-Nov-2023	✓
Soil Glass Jar - Unpreserved (EG005T)							
LFG3 3.4, LFG1 1.0, QC1	**18-May-2023**	**25-May-2023**	14-Nov-2023	✓	**26-May-2023**	14-Nov-2023	✓
EG035T: Total Recoverable Mercury by FIMS							
Soil Glass Jar - Unpreserved (EG035T)							
LFG3 0.5, LFG3 1.5, LFG3 4.0, LFG4 0.5, LFG4 2.0, LFG4 5.0, LFG1 0.5, LFG1 1.5, LFG2 0.5, LFG2 1.5, SB1 0.5, SB1 1.0	**18-May-2023**	**24-May-2023**	15-Jun-2023	✓	**26-May-2023**	15-Jun-2023	✓
Soil Glass Jar - Unpreserved (EG035T)							
LFG3 3.4, LFG1 1.0, QC1	**18-May-2023**	**25-May-2023**	15-Jun-2023	✓	**29-May-2023**	15-Jun-2023	✓
EG048: Hexavalent Chromium (Alkaline Digest)							
Soil Glass Jar - Unpreserved (EG048G)							
LFG3 3.4, LFG1 1.0	**18-May-2023**	**26-May-2023**	15-Jun-2023	✓	**26-May-2023**	02-Jun-2023	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK026SF: Total CN by Segmented Flow Analyser							
Soil Glass Jar - Unpreserved (EK026SF)							
LFG3 3.4, LFG1 1.0	**18-May-2023**	**24-May-2023**	01-Jun-2023	✓	**25-May-2023**	07-Jun-2023	✓
EK028SF: Weak Acid Dissociable CN by Segmented Flow Analyser							
Soil Glass Jar - Unpreserved (EK028SF)							
LFG3 3.4, LFG1 1.0	**18-May-2023**	**24-May-2023**	01-Jun-2023	✓	**25-May-2023**	07-Jun-2023	✓
EK040T: Fluoride Total							
Snap Lock Bag (EK040T)							
LFG3 3.4, LFG1 1.0	**18-May-2023**	**29-May-2023**	15-Jun-2023	✓	**30-May-2023**	15-Jun-2023	✓
EP066: Polychlorinated Biphenyls (PCB)							
Soil Glass Jar - Unpreserved (EP066)							
LFG3 3.4	**18-May-2023**	**25-May-2023**	01-Jun-2023	✓	**27-May-2023**	04-Jul-2023	✓
Soil Glass Jar - Unpreserved (EP066)							
LFG1 1.0	**18-May-2023**	**25-May-2023**	01-Jun-2023	✓	**29-May-2023**	04-Jul-2023	✓
EP068A: Organochlorine Pesticides (OC)							
Soil Glass Jar - Unpreserved (EP068)							
LFG1 1.0	**18-May-2023**	**25-May-2023**	01-Jun-2023	✓	**27-May-2023**	04-Jul-2023	✓
Soil Glass Jar - Unpreserved (EP068)							
LFG3 3.4	**18-May-2023**	**25-May-2023**	01-Jun-2023	✓	**29-May-2023**	04-Jul-2023	✓
EP068B: Organophosphorus Pesticides (OP)							
Soil Glass Jar - Unpreserved (EP068)							
LFG1 1.0	**18-May-2023**	**25-May-2023**	01-Jun-2023	✓	**27-May-2023**	04-Jul-2023	✓
Soil Glass Jar - Unpreserved (EP068)							
LFG3 3.4	**18-May-2023**	**25-May-2023**	01-Jun-2023	✓	**29-May-2023**	04-Jul-2023	✓
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup							
Soil Glass Jar - Unpreserved (EP071SG-S)							
LFG3 3.4, LFG1 1.0	**18-May-2023**	**25-May-2023**	01-Jun-2023	✓	**29-May-2023**	04-Jul-2023	✓
EP071 SG-S: Total Petroleum Hydrocarbons in Soil - Silica gel cleanup							
Soil Glass Jar - Unpreserved (EP071SG-S)							
LFG3 3.4, LFG1 1.0	**18-May-2023**	**25-May-2023**	01-Jun-2023	✓	**29-May-2023**	04-Jul-2023	✓
EP074A: Monocyclic Aromatic Hydrocarbons							
Soil Glass Jar - Unpreserved (EP074)							
LFG3 3.4, LFG1 1.0	**18-May-2023**	**24-May-2023**	25-May-2023	✓	**25-May-2023**	25-May-2023	✓
EP074B: Oxygenated Compounds							
Soil Glass Jar - Unpreserved (EP074)							
LFG3 3.4, LFG1 1.0	**18-May-2023**	**24-May-2023**	25-May-2023	✓	**25-May-2023**	25-May-2023	✓
EP074E: Halogenated Aliphatic Compounds							
Soil Glass Jar - Unpreserved (EP074)							
LFG3 3.4, LFG1 1.0	**18-May-2023**	**24-May-2023**	25-May-2023	✓	**25-May-2023**	25-May-2023	✓
EP074F: Halogenated Aromatic Compounds							
Soil Glass Jar - Unpreserved (EP074)							
LFG3 3.4, LFG1 1.0	**18-May-2023**	**24-May-2023**	25-May-2023	✓	**25-May-2023**	25-May-2023	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP074G: Trihalomethanes							
Soil Glass Jar - Unpreserved (EP074)							
LFG3 3.4, LFG1 1.0	18-May-2023	24-May-2023	25-May-2023	✓	25-May-2023	25-May-2023	✓
EP075(SIM)A: Phenolic Compounds							
Soil Glass Jar - Unpreserved (EP075(SIM))							
LFG3 3.4	18-May-2023	25-May-2023	01-Jun-2023	✓	27-May-2023	04-Jul-2023	✓
Soil Glass Jar - Unpreserved (EP075(SIM))							
LFG1 1.0	18-May-2023	25-May-2023	01-Jun-2023	✓	29-May-2023	04-Jul-2023	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Soil Glass Jar - Unpreserved (EP075(SIM))							
LFG3 3.4	18-May-2023	25-May-2023	01-Jun-2023	✓	27-May-2023	04-Jul-2023	✓
Soil Glass Jar - Unpreserved (EP075(SIM))							
LFG1 1.0	18-May-2023	25-May-2023	01-Jun-2023	✓	29-May-2023	04-Jul-2023	✓
Soil Glass Jar - Unpreserved (EP075(SIM))							
LFG3 0.5, LFG3 1.5, LFG3 4.0, LFG4 0.5, LFG4 2.0, LFG4 5.0, LFG1 0.5, LFG2 0.5, LFG2 1.5, SB1 0.5, SB1 1.0, QC1	18-May-2023	26-May-2023	01-Jun-2023	✓	27-May-2023	05-Jul-2023	✓
Soil Glass Jar - Unpreserved (EP075(SIM))							
LFG1 1.5	18-May-2023	26-May-2023	01-Jun-2023	✓	28-May-2023	05-Jul-2023	✓
EP080/071: Total Petroleum Hydrocarbons							
Soil Glass Jar - Unpreserved (EP080)							
TRB1 - TRIP BLANK	08-May-2023	22-May-2023	22-May-2023	✓	23-May-2023	22-May-2023	×
Soil Glass Jar - Unpreserved (EP080)							
LFG3 3.4, LFG1 1.0	18-May-2023	24-May-2023	01-Jun-2023	✓	25-May-2023	01-Jun-2023	✓
Soil Glass Jar - Unpreserved (EP080)							
LFG3 0.5, LFG3 1.5, LFG3 4.0, LFG4 0.5, LFG4 2.0, LFG4 5.0, LFG1 0.5, LFG1 1.5, LFG2 0.5, LFG2 1.5, SB1 0.5, SB1 1.0, QC1	18-May-2023	25-May-2023	01-Jun-2023	✓	26-May-2023	01-Jun-2023	✓
Soil Glass Jar - Unpreserved (EP071)							
LFG3 0.5, LFG3 1.5, LFG3 4.0, LFG4 0.5, LFG4 2.0, LFG4 5.0, LFG1 0.5, LFG1 1.5, LFG2 0.5, LFG2 1.5, SB1 0.5, SB1 1.0, QC1	18-May-2023	26-May-2023	01-Jun-2023	✓	27-May-2023	05-Jul-2023	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Soil Glass Jar - Unpreserved (EP080) TRB1 - TRIP BLANK	**08-May-2023**	**22-May-2023**	22-May-2023	✓	**23-May-2023**	22-May-2023	×
Soil Glass Jar - Unpreserved (EP080) LFG3 3.4, LFG1 1.0	**18-May-2023**	**24-May-2023**	01-Jun-2023	✓	**25-May-2023**	01-Jun-2023	✓
Soil Glass Jar - Unpreserved (EP080) LFG3 0.5, LFG3 1.5, LFG3 4.0, LFG4 0.5, LFG4 2.0, LFG4 5.0, LFG1 0.5, LFG1 1.5, LFG2 0.5, LFG2 1.5, SB1 0.5, SB1 1.0, QC1	**18-May-2023**	**25-May-2023**	01-Jun-2023	✓	**26-May-2023**	01-Jun-2023	✓
Soil Glass Jar - Unpreserved (EP071) LFG3 0.5, LFG3 1.5, LFG3 4.0, LFG4 0.5, LFG4 2.0, LFG4 5.0, LFG1 0.5, LFG1 1.5, LFG2 0.5, LFG2 1.5, SB1 0.5, SB1 1.0, QC1	**18-May-2023**	**26-May-2023**	01-Jun-2023	✓	**27-May-2023**	05-Jul-2023	✓
EP080: BTEXN							
Soil Glass Jar - Unpreserved (EP080) TRB1 - TRIP BLANK	**08-May-2023**	**22-May-2023**	22-May-2023	✓	**23-May-2023**	22-May-2023	×
Soil Glass Jar - Unpreserved (EP080) LFG3 0.5, LFG3 1.5, LFG3 4.0, LFG4 0.5, LFG4 2.0, LFG4 5.0, LFG1 0.5, LFG1 1.5, LFG2 0.5, LFG2 1.5, SB1 0.5, SB1 1.0, QC1	**18-May-2023**	**25-May-2023**	01-Jun-2023	✓	**26-May-2023**	01-Jun-2023	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE Soil Jar (EP231X) LFG4 5.0	**18-May-2023**	**25-May-2023**	14-Nov-2023	✓	**26-May-2023**	04-Jul-2023	✓
Soil Glass Jar - Unpreserved (EP231X) LFG3 3.4	**18-May-2023**	**25-May-2023**	14-Nov-2023	✓	**26-May-2023**	04-Jul-2023	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE Soil Jar (EP231X) LFG4 5.0	**18-May-2023**	**25-May-2023**	14-Nov-2023	✓	**26-May-2023**	04-Jul-2023	✓
Soil Glass Jar - Unpreserved (EP231X) LFG3 3.4	**18-May-2023**	**25-May-2023**	14-Nov-2023	✓	**26-May-2023**	04-Jul-2023	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X) LFG4 5.0	18-May-2023	25-May-2023	14-Nov-2023	✓	26-May-2023	04-Jul-2023	✓
Soil Glass Jar - Unpreserved (EP231X) LFG3 3.4	18-May-2023	25-May-2023	14-Nov-2023	✓	26-May-2023	04-Jul-2023	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X) LFG4 5.0	18-May-2023	25-May-2023	14-Nov-2023	✓	26-May-2023	04-Jul-2023	✓
Soil Glass Jar - Unpreserved (EP231X) LFG3 3.4	18-May-2023	25-May-2023	14-Nov-2023	✓	26-May-2023	04-Jul-2023	✓
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X) LFG4 5.0	18-May-2023	25-May-2023	14-Nov-2023	✓	26-May-2023	04-Jul-2023	✓
Soil Glass Jar - Unpreserved (EP231X) LFG3 3.4	18-May-2023	25-May-2023	14-Nov-2023	✓	26-May-2023	04-Jul-2023	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071) RB1	18-May-2023	23-May-2023	25-May-2023	✓	26-May-2023	02-Jul-2023	✓
Amber VOC Vial - Sulfuric Acid (EP080) RB1	18-May-2023	26-May-2023	01-Jun-2023	✓	26-May-2023	01-Jun-2023	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071) RB1	18-May-2023	23-May-2023	25-May-2023	✓	26-May-2023	02-Jul-2023	✓
Amber VOC Vial - Sulfuric Acid (EP080) RB1	18-May-2023	26-May-2023	01-Jun-2023	✓	26-May-2023	01-Jun-2023	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080) RB1	18-May-2023	26-May-2023	01-Jun-2023	✓	26-May-2023	01-Jun-2023	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	1	4	**25.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Anions - Soluble	ED040S	1	12	**8.33**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	5	46	**10.87**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	4	27	**14.81**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	2	**50.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	2	**50.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	1	6	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Fluoride	EK040T	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	4	33	**12.12**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	4	33	**12.12**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	3	30	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction (Silica Gel Clean Up)	EP071SG-S	1	2	**50.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	4	33	**12.12**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	1	3	**33.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
WAD Cyanide by Segmented Flow Analyser	EK028SF	1	7	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	2	4	**50.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Anions - Soluble	ED040S	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	3	27	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	2	6	**33.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Fluoride	EK040T	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	33	**6.06**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	33	**6.06**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	30	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction (Silica Gel Clean Up)	EP071SG-S	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	3	33	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
WAD Cyanide by Segmented Flow Analyser	EK028SF	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
Major Anions - Soluble	ED040S	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	3	27	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Fluoride	EK040T	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	33	**6.06**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	33	**6.06**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	30	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction (Silica Gel Clean Up)	EP071SG-S	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	3	33	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
WAD Cyanide by Segmented Flow Analyser	EK028SF	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	2	4	**50.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	3	27	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Fluoride	EK040T	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	33	**6.06**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	33	**6.06**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	30	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction (Silica Gel Clean Up)	EP071SG-S	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	3	33	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
WAD Cyanide by Segmented Flow Analyser	EK028SF	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
TRH - Semivolatile Fraction	EP071	0	6	**0.00**	**10.00**	✗	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
TRH - Semivolatile Fraction	EP071	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
TRH - Semivolatile Fraction	EP071	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
TRH - Semivolatile Fraction	EP071	0	6	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH (1:5)	EA002	SOIL	In house: Referenced to Rayment and Lyons 4A1 and APHA 4500H+. pH is determined on soil samples after a 1:5 soil/water leach. This method is compliant with NEPM Schedule B(3).
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Asbestos Identification in Soils	EA200	SOIL	AS 4964 Method for the qualitative identification of asbestos in bulk samples Analysis by Polarised Light Microscopy including dispersion staining
Major Anions - Soluble	ED040S	SOIL	In house: Soluble Anions are determined off a 1:5 soil / water extract by ICPAES.
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to APHA 3112 Hg - B (Flow-injection (SnCl2) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3)
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	SOIL	In house: Referenced to USEPA SW846, Method 3060. Hexavalent chromium is extracted by alkaline digestion. The digest is determined by photometrically by automatic discrete analyser, following pH adjustment. The instrument uses colour development using dephenylcarbazide. Each run of samples is measured against a five-point calibration curve. This method is compliant with NEPM Schedule B(3)
Total Cyanide by Segmented Flow Analyser	EK026SF	SOIL	In house: Referenced to APHA 4500-CN C / ASTM D7511 / ISO 14403. Caustic leachates of soil samples are introduced into an automated segmented flow analyser. Complex bound cyanide is decomposed in a continuously flowing stream, at a pH of 3.8, by the effect of UV light. A UV-B lamp (312 nm) and a decomposition spiral of borosilicate glass are used to filter out UV light with a wavelength of less than 290 nm thus preventing the conversion of thiocyanate into cyanide. The hydrogen cyanide present at a pH of 3.8 is separated by gas dialysis. The hydrogen cyanide is then determined photometrically, based on the reaction of cyanide with chloramine-T to form cyanogen chloride. This then reacts with 4-pyridine carboxylic acid and 1,3-dimethylbarbituric acid to give a red colour which is measured at 600 nm. This method is compliant with NEPM Schedule B(3).
WAD Cyanide by Segmented Flow Analyser	EK028SF	SOIL	In house: Referenced to APHA 4500-CN C&O / ISO 14403. Caustic leachates of soil samples are introduced into an automated segmented flow analyser. Hydrogen cyanide is liberated from a slightly acidified (pH 4.5) and is dialysed. Tight cyanide complexes that would not be amenable to oxidation by chlorine are not converted. Iron cyanide complexes are precipitated with zinc acetate. Liberated HCN diffuses through a membrane into a stream of sodium hydroxide where it is carried as CN- The cyanide in caustic solution is buffered to pH 5.2 and further converted to cyanogen chloride by reaction with chloramine-T. Cyanogen chloride subsequently reacts with 4-pyridine carboxylic and 1,3-dimethylbarbituric acids to give a red colour complex. This colour is measured at 600 nm. This method is compliant with NEPM Schedule B(3).

Analytical Methods	Method	Matrix	Method Descriptions
Total Fluoride	EK040T	SOIL	(In-house) Total fluoride is determined by ion specific electrode (ISE) in a solution obtained after a Sodium Carbonate / Potassium Carbonate fusion dissolution.
Polychlorinated Biphenyls (PCB)	EP066	SOIL	In house: Referenced to USEPA SW 846 - 8270 Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3).
Pesticides by GCMS	EP068	SOIL	In house: Referenced to USEPA SW 846 - 8270 Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This technique is compliant with NEPM Schedule B(3).
TRH - Semivolatile Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015 Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM Schedule B(3).
TRH - Semivolatile Fraction (Silica Gel Clean Up)	EP071SG-S	SOIL	In house: Referenced to USEPA SW 846 - 8015. Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM Schedule B(3).
Volatile Organic Compounds	EP074	SOIL	In house: Referenced to USEPA SW 846 - 8260 Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3).
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270. Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM Schedule B(3) amended.
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-house: Analysis of soils by solvent extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM using internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015 The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260 Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
NaOH leach for CN in Soils	CN-PR	SOIL	In house: APHA 4500 CN. Samples are extracted by end-over-end tumbling with NaOH.
Alkaline digestion for Hexavalent Chromium	EG048PR	SOIL	In house: Referenced to USEPA SW846, Method 3060A.
Total Fluoride	EK040T-PR	SOIL	In house: Samples are fused with Sodium Carbonate / Potassium Carbonate flux.

Preparation Methods	Method	Matrix	Method Descriptions
1:5 solid / water leach for soluble analytes	EN34	SOIL	10 g of soil is mixed with 50 mL of reagent grade water and tumbled end over end for 1 hour. Water soluble salts are leached from the soil by the continuous suspension. Samples are settled and the water filtered off for analysis.
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM Schedule B(3).
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.
QuECheRS Extraction of Solids	ORG71	SOIL	In house: Sequential extractions with Acetonitrile/Methanol by shaking. Extraction efficiency aided by the addition of salts under acidic conditions. Where relevant, interferences from co-extracted organics are removed with dispersive clean-up media (dSPE). The extract is either diluted or concentrated and exchanged into the analytical solvent.
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for purging.

CERTIFICATE OF ANALYSIS

Work Order	: **ES2316686**	Page	: 1 of 26
Client	: **ARC ENVIRONMENTAL**	Laboratory	: Environmental Division Sydney
Contact	: MR JAY PARMANSCHE	Contact	: Katie Davis
Address	: Suite 103, 7 Jeffcott Street WEST MELBOURNE	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: 03 8383 1950	Telephone	: +61-2-8784 8555
Project	: ----	Date Samples Received	: 18-May-2023 19:30
Order number	: ----	Date Analysis Commenced	: 22-May-2023
C-O-C number	: ----	Issue Date	: 30-May-2023 16:58
Sampler	: ----		
Site	: ----		
Quote number	: MEBQ/216/21 Primary work		
No. of samples received	: 30		
No. of samples analysed	: 19		

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
- Descriptive Results
- Surrogate Control Limits

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
Alana Smylie	Team Leader - Asbestos	Newcastle - Asbestos, Mayfield West, NSW
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Inorganics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW
Zoran Grozdanovski	Team Leader - Chemistry	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.

- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP068: Where reported, Total Chlordane (sum) is the sum of the reported concentrations of cis-Chlordane and trans-Chlordane at or above the LOR.
- EP068: Where reported, Total OCP is the sum of the reported concentrations of all Organochlorine Pesticides at or above LOR.
- EP074: Where reported, Total Trihalomethanes is the sum of the reported concentrations of all Trihalomethanes at or above the LOR.
- EP074: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP074: Where reported, Sum of chlorinated hydrocarbons includes carbon tetrachloride, chlorobenzene, chloroform, 1,2-dichlorobenzene, 1,4-dichlorobenzene, 1,2-dichloroethane, 1,1-dichloroethene, cis-1,2-dichlorothene, trans-1,2-dichlorothene, 1,1,1,2-tetrachloroethane, 1,1,2,2-tetrachloroethane, 1,2,4-trichlorobenzene, 1,1,1-trichloroethane, 1,1,2-trichloroethane, trichloroethene, vinyl chloride, hexachlorobutadiene and methylene chloride.
- EP074: Where reported, Total Trimethylbenzenes is the sum of the reported concentrations of 1.2.3-Trimethylbenzene, 1.2.4-Trimethylbenzene and 1.3.5-Trimethylbenzene at or above the LOR.
- EP075(SIM): Where reported, Total Cresol is the sum of the reported concentrations of 2-Methylphenol and 3- & 4-Methylphenol at or above the LOR.
- EG005T: Poor precision was obtained for Lead on sample ES2317303 # 018. Confirmed by re-digestion and reanalysis.
- EP071: Results of sample QC1 have been confirmed by re-extraction and re-analysis.
- EA200 'Am' Amosite (brown asbestos)
- EA200 'Cr' Crocidolite (blue asbestos)
- EA200 'Trace' - Asbestos fibres ("Free Fibres") detected by trace analysis per AS4964. The result can be interpreted that the sample contains detectable 'respirable' asbestos fibres
- EA200: Asbestos Identification Samples were analysed by Polarised Light Microscopy including dispersion staining.
- EA200 Legend
- EA200 'Ch' Chrysotile (white asbestos)
- EA200: 'UMF' Unknown Mineral Fibres. "-" indicates fibres detected may or may not be asbestos fibres. Confirmation by alternative techniques is recommended.
- EA200: For samples larger than 30g, the <2mm fraction may be sub-sampled prior to trace analysis as outlined in ISO23909:2008(E) Sect 6.3.2-2
- EA200: 'Yes' - Asbestos detected by polarised light microscopy including dispersion staining.

- EA200: 'No*' - No asbestos found, at the reporting limit of 0.1g/kg, by polarised light microscopy including dispersion staining. Asbestos material was detected and positively identified at concentrations estimated to be below 0.1g/kg.
- EA200: 'No' - No asbestos found at the reporting limit 0.1g/kg, by polarised light microscopy including dispersion staining.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	LFG3 0.5	LFG3 1.5	LFG3 3.4	LFG3 4.0	LFG4 0.5
			Sampling date / time	18-May-2023 00:00	18-May-2023 00:00	18-May-2023 00:00	18-May-2023 00:00	18-May-2023 00:00
Compound	CAS Number	LOR	Unit	ES2316686-001	ES2316686-003	ES2316686-006	ES2316686-007	ES2316686-009
				Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	9.2	9.8	----	8.4	8.7
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	8.9	15.0	15.4	18.9	11.6
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Asbestos Detected	1332-21-4	0.1	g/kg	----	No	No	----	----
Asbestos (Trace)	1332-21-4	-	Fibres	----	No	No	----	----
Asbestos Type	1332-21-4	-	--	----	-	-	----	----
Sample weight (dry)	----	0.01	g	----	55.3	45.9	----	----
APPROVED IDENTIFIER:	----	-	--	----	A. SMYLIE	A. SMYLIE	----	----
Synthetic Mineral Fibre	----	-	--	----	No	No	----	----
Organic Fibre	----	-	--	----	No	No	----	----
ED040S: Soluble Major Anions								
Sulfate as SO4 2-	14808-79-8	10	mg/kg	130	420	----	260	130
EG005(ED093)T: Total Metals by ICP-AES								
Beryllium	7440-41-7	1	mg/kg	----	----	<1	----	----
Molybdenum	7439-98-7	2	mg/kg	----	----	<2	----	----
Selenium	7782-49-2	5	mg/kg	----	----	<5	----	----
Silver	7440-22-4	2	mg/kg	----	----	<2	----	----
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	10	6
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	14	20	----	28	15
Copper	7440-50-8	5	mg/kg	19	24	----	40	26
Lead	7439-92-1	5	mg/kg	27	45	26	473	40
Nickel	7440-02-0	2	mg/kg	11	12	6	22	12
Zinc	7440-66-6	5	mg/kg	50	55	----	337	101
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	0.1	0.2
EG048: Hexavalent Chromium (Alkaline Digest)								
Hexavalent Chromium	18540-29-9	0.5	mg/kg	----	----	<0.5	----	----
EK026SF: Total CN by Segmented Flow Analyser								
Total Cyanide	57-12-5	1	mg/kg	----	----	<1	----	----
EK028SF: Weak Acid Dissociable CN by Segmented Flow Analyser								
Weak Acid Dissociable Cyanide	----	1	mg/kg	----	----	<1	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	LFG3 0.5	LFG3 1.5	LFG3 3.4	LFG3 4.0	LFG4 0.5
			Sampling date / time	18-May-2023 00:00	18-May-2023 00:00	18-May-2023 00:00	18-May-2023 00:00	18-May-2023 00:00
Compound	CAS Number	LOR	Unit	ES2316686-001	ES2316686-003	ES2316686-006	ES2316686-007	ES2316686-009
				Result	Result	Result	Result	Result
EK040T: Fluoride Total								
Fluoride	16984-48-8	40	mg/kg	----	----	**180**	----	----
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	----	----	<0.1	----	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	----	----	<0.05	----	----
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	----	----	<0.05	----	----
beta-BHC	319-85-7	0.05	mg/kg	----	----	<0.05	----	----
gamma-BHC	58-89-9	0.05	mg/kg	----	----	<0.05	----	----
delta-BHC	319-86-8	0.05	mg/kg	----	----	<0.05	----	----
Heptachlor	76-44-8	0.05	mg/kg	----	----	<0.05	----	----
Aldrin	309-00-2	0.05	mg/kg	----	----	<0.05	----	----
Heptachlor epoxide	1024-57-3	0.05	mg/kg	----	----	<0.05	----	----
^ Total Chlordane (sum)	----	0.05	mg/kg	----	----	<0.05	----	----
trans-Chlordane	5103-74-2	0.05	mg/kg	----	----	<0.05	----	----
alpha-Endosulfan	959-98-8	0.05	mg/kg	----	----	<0.05	----	----
cis-Chlordane	5103-71-9	0.05	mg/kg	----	----	<0.05	----	----
Dieldrin	60-57-1	0.05	mg/kg	----	----	<0.05	----	----
4.4`-DDE	72-55-9	0.05	mg/kg	----	----	<0.05	----	----
Endrin	72-20-8	0.05	mg/kg	----	----	<0.05	----	----
beta-Endosulfan	33213-65-9	0.05	mg/kg	----	----	<0.05	----	----
4.4`-DDD	72-54-8	0.05	mg/kg	----	----	<0.05	----	----
Endrin aldehyde	7421-93-4	0.05	mg/kg	----	----	<0.05	----	----
Endosulfan sulfate	1031-07-8	0.05	mg/kg	----	----	<0.05	----	----
4.4`-DDT	50-29-3	0.2	mg/kg	----	----	<0.2	----	----
EP068B: Organophosphorus Pesticides (OP)								
Chlorpyrifos	2921-88-2	0.05	mg/kg	----	----	<0.05	----	----
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup								
>C10 - C16 Fraction	----	50	mg/kg	----	----	<50	----	----
>C16 - C34 Fraction	----	100	mg/kg	----	----	<100	----	----
>C34 - C40 Fraction	----	100	mg/kg	----	----	<100	----	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	----	----	<50	----	----
EP071 SG-S: Total Petroleum Hydrocarbons in Soil - Silica gel cleanup								
C10 - C14 Fraction	----	50	mg/kg	----	----	<50	----	----
C15 - C28 Fraction	----	100	mg/kg	----	----	<100	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	LFG3 0.5	LFG3 1.5	LFG3 3.4	LFG3 4.0	LFG4 0.5
				Sampling date / time	18-May-2023 00:00	18-May-2023 00:00	18-May-2023 00:00	18-May-2023 00:00	18-May-2023 00:00
Compound	CAS Number	LOR	Unit		ES2316686-001	ES2316686-003	ES2316686-006	ES2316686-007	ES2316686-009
					Result	Result	Result	Result	Result
EP071 SG-S: Total Petroleum Hydrocarbons in Soil - Silica gel cleanup - Continued									
C29 - C36 Fraction	----	100	mg/kg		----	----	<100	----	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg		----	----	<50	----	----
EP074A: Monocyclic Aromatic Hydrocarbons									
Benzene	71-43-2	0.2	mg/kg		----	----	<0.2	----	----
Toluene	108-88-3	0.5	mg/kg		----	----	<0.5	----	----
Ethylbenzene	100-41-4	0.5	mg/kg		----	----	<0.5	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		----	----	<0.5	----	----
Styrene	100-42-5	0.5	mg/kg		----	----	<0.5	----	----
ortho-Xylene	95-47-6	0.5	mg/kg		----	----	<0.5	----	----
EP074B: Oxygenated Compounds									
2-Butanone (MEK)	78-93-3	5	mg/kg		----	----	<5	----	----
EP074E: Halogenated Aliphatic Compounds									
Vinyl chloride	75-01-4	4	mg/kg		----	----	<4	----	----
1.1-Dichloroethene	75-35-4	0.5	mg/kg		----	----	<0.5	----	----
Methylene chloride	75-09-2	0.5	mg/kg		----	----	<0.5	----	----
1.1.1-Trichloroethane	71-55-6	0.5	mg/kg		----	----	<0.5	----	----
Carbon Tetrachloride	56-23-5	0.5	mg/kg		----	----	<0.5	----	----
1.2-Dichloroethane	107-06-2	0.5	mg/kg		----	----	<0.5	----	----
Trichloroethene	79-01-6	0.5	mg/kg		----	----	<0.5	----	----
1.1.2-Trichloroethane	79-00-5	0.5	mg/kg		----	----	<0.5	----	----
Tetrachloroethene	127-18-4	0.5	mg/kg		----	----	<0.5	----	----
1.1.1.2-Tetrachloroethane	630-20-6	0.5	mg/kg		----	----	<0.5	----	----
1.1.2.2-Tetrachloroethane	79-34-5	0.5	mg/kg		----	----	<0.5	----	----
EP074F: Halogenated Aromatic Compounds									
Chlorobenzene	108-90-7	0.5	mg/kg		----	----	<0.5	----	----
EP074G: Trihalomethanes									
Chloroform	67-66-3	0.5	mg/kg		----	----	<0.5	----	----
EP075(SIM)A: Phenolic Compounds									
Phenol	108-95-2	0.5	mg/kg		----	----	<0.5	----	----
2-Methylphenol	95-48-7	0.5	mg/kg		----	----	<0.5	----	----
3- & 4-Methylphenol	1319-77-3	1	mg/kg		----	----	<1	----	----
4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg		----	----	<0.5	----	----
2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg		----	----	<0.5	----	----
2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg		----	----	<0.5	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	LFG3 0.5	LFG3 1.5	LFG3 3.4	LFG3 4.0	LFG4 0.5
			Sampling date / time	18-May-2023 00:00	18-May-2023 00:00	18-May-2023 00:00	18-May-2023 00:00	18-May-2023 00:00
Compound	CAS Number	LOR	Unit	ES2316686-001	ES2316686-003	ES2316686-006	ES2316686-007	ES2316686-009
				Result	Result	Result	Result	Result
EP075(SIM)A: Phenolic Compounds - Continued								
Pentachlorophenol	87-86-5	2	mg/kg	----	----	<2	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	1.8	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	1.3	<0.5	0.6	<0.5
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	1.0	3.4	<0.5	1.2	0.8
Pyrene	129-00-0	0.5	mg/kg	0.8	3.3	<0.5	1.1	0.7
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	1.5	<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg	<0.5	1.4	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	1.7	<0.5	0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	0.8	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	1.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	0.7	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	0.9	<0.5	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	1.8	16.5	<0.5	5.2	1.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	2.0	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	0.6	2.2	0.6	0.6	0.6
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	1.2	2.5	1.2	1.2	1.2
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg	<50	<50	----	<50	<50
C15 - C28 Fraction	----	100	mg/kg	<100	110	----	520	<100
C29 - C36 Fraction	----	100	mg/kg	<100	120	----	300	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	230	----	820	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	14	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	----	14	<10
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	----	50	<50
>C16 - C34 Fraction	----	100	mg/kg	110	190	----	730	<100

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	LFG3 0.5	LFG3 1.5	LFG3 3.4	LFG3 4.0	LFG4 0.5
				Sampling date / time	18-May-2023 00:00	18-May-2023 00:00	18-May-2023 00:00	18-May-2023 00:00	18-May-2023 00:00
Compound	CAS Number	LOR	Unit		ES2316686-001	ES2316686-003	ES2316686-006	ES2316686-007	ES2316686-009
					Result	Result	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
>C34 - C40 Fraction	----	100	mg/kg		<100	**100**	----	**170**	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		**110**	**290**	----	**950**	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	----	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	----	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	----	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	----	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	----	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	----	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	----	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5	----	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	----	**2**	<1
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg		----	----	<0.0002	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg		----	----	<0.0002	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		----	----	<0.0002	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg		----	----	<0.0002	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		----	----	<0.0002	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg		----	----	<0.0002	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg		----	----	<0.001	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg		----	----	<0.0002	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		----	----	<0.0002	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		----	----	<0.0002	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		----	----	<0.0002	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg		----	----	<0.0002	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg		----	----	<0.0002	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	LFG3 0.5	LFG3 1.5	LFG3 3.4	LFG3 4.0	LFG4 0.5
				Sampling date / time	18-May-2023 00:00	18-May-2023 00:00	18-May-2023 00:00	18-May-2023 00:00	18-May-2023 00:00
Compound	CAS Number	LOR	Unit		ES2316686-001	ES2316686-003	ES2316686-006	ES2316686-007	ES2316686-009
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		----	----	<0.0002	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		----	----	<0.0002	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		----	----	<0.0002	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		----	----	<0.0005	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		----	----	<0.0002	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		----	----	<0.0005	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		----	----	<0.0005	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		----	----	<0.0005	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		----	----	<0.0005	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		----	----	<0.0002	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		----	----	<0.0002	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		----	----	<0.0005	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		----	----	<0.0005	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		----	----	<0.0005	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		----	----	<0.0005	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		----	----	<0.0002	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	LFG3 0.5	LFG3 1.5	LFG3 3.4	LFG3 4.0	LFG4 0.5
			Sampling date / time	18-May-2023 00:00	18-May-2023 00:00	18-May-2023 00:00	18-May-2023 00:00	18-May-2023 00:00
Compound	CAS Number	LOR	Unit	ES2316686-001	ES2316686-003	ES2316686-006	ES2316686-007	ES2316686-009
				Result	Result	Result	Result	Result
EP231P: PFAS Sums - Continued								
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	----	----	<0.0002	----	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	----	----	<0.0002	----	----
EP066S: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	0.1	%	----	----	111	----	----
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.05	%	----	----	111	----	----
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.05	%	----	----	116	----	----
EP074S: VOC Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.5	%	----	----	126	----	----
Toluene-D8	2037-26-5	0.5	%	----	----	105	----	----
4-Bromofluorobenzene	460-00-4	0.5	%	----	----	96.0	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	88.1	87.6	83.4	94.9	88.4
2-Chlorophenol-D4	93951-73-6	0.5	%	82.8	83.0	83.4	89.8	81.8
2.4.6-Tribromophenol	118-79-6	0.5	%	62.4	55.7	98.1	80.0	55.3
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	92.5	93.0	87.8	99.7	94.8
Anthracene-d10	1719-06-8	0.5	%	89.4	91.1	94.9	97.4	93.2
4-Terphenyl-d14	1718-51-0	0.5	%	98.2	99.8	97.2	105	101
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	89.1	91.3	99.5	85.9	88.5
Toluene-D8	2037-26-5	0.2	%	103	99.4	100.0	99.5	99.2
4-Bromofluorobenzene	460-00-4	0.2	%	111	99.0	97.0	109	106
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	----	----	118	----	----
13C8-PFOA	----	0.0002	%	----	----	108	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	LFG4 2.0	LFG4 5.0	LFG1 0.5	LFG1 1.0	LFG1 1.5
			Sampling date / time	18-May-2023 00:00	18-May-2023 00:00	18-May-2023 00:00	18-May-2023 00:00	18-May-2023 00:00
Compound	CAS Number	LOR	Unit	ES2316686-012	ES2316686-015	ES2316686-017	ES2316686-018	ES2316686-019
				Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	8.0	8.3	8.2	----	7.9
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	14.4	17.9	19.0	15.1	15.8
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Asbestos Detected	1332-21-4	0.1	g/kg	No	No*	No	----	No
Asbestos (Trace)	1332-21-4	-	Fibres	----	----	No	----	No
Asbestos (Trace)	1332-21-4	5	Fibres	No	No	----	----	----
Asbestos Type	1332-21-4	-	--	-	Ch	-	----	-
Sample weight (dry)	----	0.01	g	378	223	43.9	----	54.1
APPROVED IDENTIFIER:	----	-	--	A. SMYLIE	A. SMYLIE	A. SMYLIE	----	A. SMYLIE
Synthetic Mineral Fibre	----	-	--	No	No	No	----	No
Organic Fibre	----	-	--	No	No	No	----	No
ED040S: Soluble Major Anions								
Sulfate as SO4 2-	14808-79-8	10	mg/kg	50	220	140	----	60
EG005(ED093)T: Total Metals by ICP-AES								
Beryllium	7440-41-7	1	mg/kg	----	----	----	<1	----
Molybdenum	7439-98-7	2	mg/kg	----	----	----	<2	----
Selenium	7782-49-2	5	mg/kg	----	----	----	<5	----
Silver	7440-22-4	2	mg/kg	----	----	----	<2	----
Arsenic	7440-38-2	5	mg/kg	6	14	<5	<5	<5
Cadmium	7440-43-9	1	mg/kg	<1	1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	13	54	8	----	11
Copper	7440-50-8	5	mg/kg	14	42	16	----	16
Lead	7439-92-1	5	mg/kg	26	108	33	26	31
Nickel	7440-02-0	2	mg/kg	7	12	7	5	7
Zinc	7440-66-6	5	mg/kg	60	226	66	----	47
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	0.2	<0.1	<0.1	0.1
EG048: Hexavalent Chromium (Alkaline Digest)								
Hexavalent Chromium	18540-29-9	0.5	mg/kg	----	----	----	<0.5	----
EK026SF: Total CN by Segmented Flow Analyser								
Total Cyanide	57-12-5	1	mg/kg	----	----	----	<1	----
EK028SF: Weak Acid Dissociable CN by Segmented Flow Analyser								

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	LFG4 2.0	LFG4 5.0	LFG1 0.5	LFG1 1.0	LFG1 1.5
				Sampling date / time	18-May-2023 00:00	18-May-2023 00:00	18-May-2023 00:00	18-May-2023 00:00	18-May-2023 00:00
Compound	CAS Number	LOR	Unit		ES2316686-012	ES2316686-015	ES2316686-017	ES2316686-018	ES2316686-019
					Result	Result	Result	Result	Result
EK028SF: Weak Acid Dissociable CN by Segmented Flow Analyser - Continued									
Weak Acid Dissociable Cyanide	----	1	mg/kg		----	----	----	<1	----
EK040T: Fluoride Total									
Fluoride	16984-48-8	40	mg/kg		----	----	----	**90**	----
EP066: Polychlorinated Biphenyls (PCB)									
Total Polychlorinated biphenyls	----	0.1	mg/kg		----	----	----	<0.1	----
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.05	mg/kg		----	----	----	<0.05	----
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg		----	----	----	<0.05	----
beta-BHC	319-85-7	0.05	mg/kg		----	----	----	<0.05	----
gamma-BHC	58-89-9	0.05	mg/kg		----	----	----	<0.05	----
delta-BHC	319-86-8	0.05	mg/kg		----	----	----	<0.05	----
Heptachlor	76-44-8	0.05	mg/kg		----	----	----	<0.05	----
Aldrin	309-00-2	0.05	mg/kg		----	----	----	<0.05	----
Heptachlor epoxide	1024-57-3	0.05	mg/kg		----	----	----	<0.05	----
^ Total Chlordane (sum)	----	0.05	mg/kg		----	----	----	<0.05	----
trans-Chlordane	5103-74-2	0.05	mg/kg		----	----	----	<0.05	----
alpha-Endosulfan	959-98-8	0.05	mg/kg		----	----	----	<0.05	----
cis-Chlordane	5103-71-9	0.05	mg/kg		----	----	----	<0.05	----
Dieldrin	60-57-1	0.05	mg/kg		----	----	----	<0.05	----
4.4`-DDE	72-55-9	0.05	mg/kg		----	----	----	<0.05	----
Endrin	72-20-8	0.05	mg/kg		----	----	----	<0.05	----
beta-Endosulfan	33213-65-9	0.05	mg/kg		----	----	----	<0.05	----
4.4`-DDD	72-54-8	0.05	mg/kg		----	----	----	<0.05	----
Endrin aldehyde	7421-93-4	0.05	mg/kg		----	----	----	<0.05	----
Endosulfan sulfate	1031-07-8	0.05	mg/kg		----	----	----	<0.05	----
4.4`-DDT	50-29-3	0.2	mg/kg		----	----	----	<0.2	----
EP068B: Organophosphorus Pesticides (OP)									
Chlorpyrifos	2921-88-2	0.05	mg/kg		----	----	----	<0.05	----
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	50	mg/kg		----	----	----	<50	----
>C16 - C34 Fraction	----	100	mg/kg		----	----	----	<100	----
>C34 - C40 Fraction	----	100	mg/kg		----	----	----	<100	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		----	----	----	<50	----
EP071 SG-S: Total Petroleum Hydrocarbons in Soil - Silica gel cleanup									

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	LFG4 2.0	LFG4 5.0	LFG1 0.5	LFG1 1.0	LFG1 1.5
				Sampling date / time	18-May-2023 00:00	18-May-2023 00:00	18-May-2023 00:00	18-May-2023 00:00	18-May-2023 00:00
Compound	CAS Number	LOR	Unit		ES2316686-012	ES2316686-015	ES2316686-017	ES2316686-018	ES2316686-019
					Result	Result	Result	Result	Result
EP071 SG-S: Total Petroleum Hydrocarbons in Soil - Silica gel cleanup - Continued									
C10 - C14 Fraction	----	50	mg/kg		----	----	----	<50	----
C15 - C28 Fraction	----	100	mg/kg		----	----	----	<100	----
C29 - C36 Fraction	----	100	mg/kg		----	----	----	<100	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg		----	----	----	<50	----
EP074A: Monocyclic Aromatic Hydrocarbons									
Benzene	71-43-2	0.2	mg/kg		----	----	----	<0.2	----
Toluene	108-88-3	0.5	mg/kg		----	----	----	<0.5	----
Ethylbenzene	100-41-4	0.5	mg/kg		----	----	----	<0.5	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		----	----	----	<0.5	----
Styrene	100-42-5	0.5	mg/kg		----	----	----	<0.5	----
ortho-Xylene	95-47-6	0.5	mg/kg		----	----	----	<0.5	----
EP074B: Oxygenated Compounds									
2-Butanone (MEK)	78-93-3	5	mg/kg		----	----	----	<5	----
EP074E: Halogenated Aliphatic Compounds									
Vinyl chloride	75-01-4	4	mg/kg		----	----	----	<4	----
1.1-Dichloroethene	75-35-4	0.5	mg/kg		----	----	----	<0.5	----
Methylene chloride	75-09-2	0.5	mg/kg		----	----	----	<0.5	----
1.1.1-Trichloroethane	71-55-6	0.5	mg/kg		----	----	----	<0.5	----
Carbon Tetrachloride	56-23-5	0.5	mg/kg		----	----	----	<0.5	----
1.2-Dichloroethane	107-06-2	0.5	mg/kg		----	----	----	<0.5	----
Trichloroethene	79-01-6	0.5	mg/kg		----	----	----	<0.5	----
1.1.2-Trichloroethane	79-00-5	0.5	mg/kg		----	----	----	<0.5	----
Tetrachloroethene	127-18-4	0.5	mg/kg		----	----	----	<0.5	----
1.1.1.2-Tetrachloroethane	630-20-6	0.5	mg/kg		----	----	----	<0.5	----
1.1.2.2-Tetrachloroethane	79-34-5	0.5	mg/kg		----	----	----	<0.5	----
EP074F: Halogenated Aromatic Compounds									
Chlorobenzene	108-90-7	0.5	mg/kg		----	----	----	<0.5	----
EP074G: Trihalomethanes									
Chloroform	67-66-3	0.5	mg/kg		----	----	----	<0.5	----
EP075(SIM)A: Phenolic Compounds									
Phenol	108-95-2	0.5	mg/kg		----	----	----	<0.5	----
2-Methylphenol	95-48-7	0.5	mg/kg		----	----	----	<0.5	----
3- & 4-Methylphenol	1319-77-3	1	mg/kg		----	----	----	<1	----
4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg		----	----	----	<0.5	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	LFG4 2.0	LFG4 5.0	LFG1 0.5	LFG1 1.0	LFG1 1.5
				Sampling date / time	18-May-2023 00:00	18-May-2023 00:00	18-May-2023 00:00	18-May-2023 00:00	18-May-2023 00:00
Compound	CAS Number	LOR	Unit		ES2316686-012	ES2316686-015	ES2316686-017	ES2316686-018	ES2316686-019
					Result	Result	Result	Result	Result
EP075(SIM)A: Phenolic Compounds - Continued									
2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg		----	----	----	<0.5	----
2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg		----	----	----	<0.5	----
Pentachlorophenol	87-86-5	2	mg/kg		----	----	----	<2	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	**1.1**	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	**0.6**	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg		**0.6**	**0.9**	<0.5	<0.5	**0.5**
Pyrene	129-00-0	0.5	mg/kg		**0.6**	**0.9**	<0.5	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		**1.2**	**3.5**	<0.5	<0.5	**0.5**
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		**0.6**	**0.6**	**0.6**	**0.6**	**0.6**
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		**1.2**	**1.2**	**1.2**	**1.2**	**1.2**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	----	<50
C15 - C28 Fraction	----	100	mg/kg		<100	**950**	<100	----	<100
C29 - C36 Fraction	----	100	mg/kg		<100	**600**	<100	----	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	**1550**	<50	----	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	**12**	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	**12**	<10	----	<10

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	LFG4 2.0	LFG4 5.0	LFG1 0.5	LFG1 1.0	LFG1 1.5
				Sampling date / time	18-May-2023 00:00	18-May-2023 00:00	18-May-2023 00:00	18-May-2023 00:00	18-May-2023 00:00
Compound	CAS Number	LOR	Unit		ES2316686-012	ES2316686-015	ES2316686-017	ES2316686-018	ES2316686-019
					Result	Result	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
>C10 - C16 Fraction	----	50	mg/kg		<50	**60**	<50	----	<50
>C16 - C34 Fraction	----	100	mg/kg		<100	**1380**	<100	----	<100
>C34 - C40 Fraction	----	100	mg/kg		<100	**330**	<100	----	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	**1770**	<50	----	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	**60**	<50	----	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	----	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	----	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	----	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	----	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	----	<0.5
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	----	<0.2
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5	<0.5	----	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	----	<1
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg		----	<0.0002	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg		----	<0.0002	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		----	<0.0002	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg		----	<0.0002	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		----	**0.0008**	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg		----	<0.0002	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg		----	<0.001	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg		----	<0.0002	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		----	<0.0002	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		----	<0.0002	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		----	<0.0002	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg		----	<0.0002	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	LFG4 2.0	LFG4 5.0	LFG1 0.5	LFG1 1.0	LFG1 1.5
				Sampling date / time	18-May-2023 00:00	18-May-2023 00:00	18-May-2023 00:00	18-May-2023 00:00	18-May-2023 00:00
Compound	CAS Number	LOR	Unit		ES2316686-012	ES2316686-015	ES2316686-017	ES2316686-018	ES2316686-019
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg		----	<0.0002	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		----	<0.0002	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		----	<0.0002	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		----	<0.0002	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		----	<0.0005	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		----	<0.0002	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		----	<0.0005	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		----	<0.0005	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		----	<0.0005	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		----	<0.0005	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		----	<0.0002	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		----	**0.0042**	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		----	<0.0005	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		----	<0.0005	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		----	<0.0005	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		----	<0.0005	----	----	----
EP231P: PFAS Sums									

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	LFG4 2.0	LFG4 5.0	LFG1 0.5	LFG1 1.0	LFG1 1.5
				Sampling date / time	18-May-2023 00:00	18-May-2023 00:00	18-May-2023 00:00	18-May-2023 00:00	18-May-2023 00:00
Compound	CAS Number	LOR	Unit		ES2316686-012	ES2316686-015	ES2316686-017	ES2316686-018	ES2316686-019
					Result	Result	Result	Result	Result
EP231P: PFAS Sums - Continued									
Sum of PFAS	----	0.0002	mg/kg		----	0.0050	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		----	0.0008	----	----	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		----	0.0008	----	----	----
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%		----	----	----	100	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%		----	----	----	103	----
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%		----	----	----	111	----
EP074S: VOC Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.5	%		----	----	----	98.1	----
Toluene-D8	2037-26-5	0.5	%		----	----	----	107	----
4-Bromofluorobenzene	460-00-4	0.5	%		----	----	----	92.7	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		89.7	95.5	92.8	84.0	91.6
2-Chlorophenol-D4	93951-73-6	0.5	%		84.8	91.7	86.5	100	86.1
2.4.6-Tribromophenol	118-79-6	0.5	%		57.7	57.9	67.8	93.2	55.8
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		94.2	99.8	94.5	86.8	94.3
Anthracene-d10	1719-06-8	0.5	%		92.1	98.8	96.1	97.2	93.3
4-Terphenyl-d14	1718-51-0	0.5	%		99.9	108	100	104	102
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		93.0	98.0	90.4	107	91.8
Toluene-D8	2037-26-5	0.2	%		106	109	99.1	108	100
4-Bromofluorobenzene	460-00-4	0.2	%		106	110	101	103	101
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		----	114	----	----	----
13C8-PFOA	----	0.0002	%		----	108	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	LFG2 0.5	LFG2 1.0	LFG2 1.5	LFG2 2.0	SB1 0.5
			Sampling date / time	18-May-2023 00:00	18-May-2023 00:00	18-May-2023 00:00	18-May-2023 00:00	18-May-2023 00:00
Compound	CAS Number	LOR	Unit	ES2316686-021	ES2316686-022	ES2316686-023	ES2316686-024	ES2316686-025
				Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	8.8	----	8.3	----	8.6
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	6.5	----	13.8	----	9.0
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Asbestos Detected	1332-21-4	0.1	g/kg	----	No	No	No	No
Asbestos (Trace)	1332-21-4	-	Fibres	----	No	No	No	No
Asbestos Type	1332-21-4	-	--	----	-	-	-	-
Sample weight (dry)	----	0.01	g	----	50.9	55.2	42.0	61.2
APPROVED IDENTIFIER:	----	-	--	----	A. SMYLIE	A. SMYLIE	A. SMYLIE	A. SMYLIE
Synthetic Mineral Fibre	----	-	--	----	No	No	No	No
Organic Fibre	----	-	--	----	No	No	No	No
ED040S: Soluble Major Anions								
Sulfate as SO4 2-	14808-79-8	10	mg/kg	20	----	80	----	170
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	----	8	----	<5
Cadmium	7440-43-9	1	mg/kg	<1	----	<1	----	<1
Chromium	7440-47-3	2	mg/kg	10	----	14	----	10
Copper	7440-50-8	5	mg/kg	17	----	28	----	22
Lead	7439-92-1	5	mg/kg	27	----	42	----	34
Nickel	7440-02-0	2	mg/kg	8	----	6	----	13
Zinc	7440-66-6	5	mg/kg	50	----	45	----	55
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	0.1	----	0.3	----	<0.1
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	----	<0.5	----	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	----	<0.5	----	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	----	<0.5	----	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	----	<0.5	----	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	----	<0.5	----	<0.5
Anthracene	120-12-7	0.5	mg/kg	<0.5	----	<0.5	----	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	----	0.6	----	<0.5
Pyrene	129-00-0	0.5	mg/kg	<0.5	----	0.7	----	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	----	<0.5	----	<0.5
Chrysene	218-01-9	0.5	mg/kg	<0.5	----	<0.5	----	<0.5

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	LFG2 0.5	LFG2 1.0	LFG2 1.5	LFG2 2.0	SB1 0.5
				Sampling date / time	18-May-2023 00:00	18-May-2023 00:00	18-May-2023 00:00	18-May-2023 00:00	18-May-2023 00:00
Compound	CAS Number	LOR	Unit		ES2316686-021	ES2316686-022	ES2316686-023	ES2316686-024	ES2316686-025
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	----	<0.5	----	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	----	<0.5	----	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	----	<0.5	----	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	----	<0.5	----	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	----	<0.5	----	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	----	<0.5	----	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		<0.5	----	**1.3**	----	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		<0.5	----	<0.5	----	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		**0.6**	----	**0.6**	----	**0.6**
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		**1.2**	----	**1.2**	----	**1.2**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	----	<10	----	<10
C10 - C14 Fraction	----	50	mg/kg		<50	----	<50	----	<50
C15 - C28 Fraction	----	100	mg/kg		<100	----	<100	----	<100
C29 - C36 Fraction	----	100	mg/kg		<100	----	<100	----	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	----	<50	----	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	----	<10	----	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	----	<10	----	<10
>C10 - C16 Fraction	----	50	mg/kg		<50	----	<50	----	<50
>C16 - C34 Fraction	----	100	mg/kg		<100	----	<100	----	<100
>C34 - C40 Fraction	----	100	mg/kg		<100	----	<100	----	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	----	<50	----	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	----	<50	----	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	----	<0.2	----	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	----	<0.5	----	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	----	<0.5	----	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	----	<0.5	----	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	----	<0.5	----	<0.5
^ Sum of BTEX	----	0.2	mg/kg		<0.2	----	<0.2	----	<0.2
^ Total Xylenes	----	0.5	mg/kg		<0.5	----	<0.5	----	<0.5

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	LFG2 0.5	LFG2 1.0	LFG2 1.5	LFG2 2.0	SB1 0.5
				Sampling date / time	18-May-2023 00:00	18-May-2023 00:00	18-May-2023 00:00	18-May-2023 00:00	18-May-2023 00:00
Compound	CAS Number	LOR	Unit		ES2316686-021	ES2316686-022	ES2316686-023	ES2316686-024	ES2316686-025
					Result	Result	Result	Result	Result
EP080: BTEXN - Continued									
Naphthalene	91-20-3	1	mg/kg		<1	----	<1	----	<1
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		**82.3**	----	**91.9**	----	**86.2**
2-Chlorophenol-D4	93951-73-6	0.5	%		**96.2**	----	**99.4**	----	**91.1**
2.4.6-Tribromophenol	118-79-6	0.5	%		**69.1**	----	**80.1**	----	**68.2**
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		**93.3**	----	**99.5**	----	**85.6**
Anthracene-d10	1719-06-8	0.5	%		**103**	----	**107**	----	**107**
4-Terphenyl-d14	1718-51-0	0.5	%		**80.9**	----	**87.8**	----	**72.4**
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		**92.9**	----	**92.6**	----	**94.3**
Toluene-D8	2037-26-5	0.2	%		**101**	----	**103**	----	**103**
4-Bromofluorobenzene	460-00-4	0.2	%		**105**	----	**103**	----	**103**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	SB1 1.0	TRB1 TRIP BLANK	QC1	----	----
				Sampling date / time	18-May-2023 00:00	08-May-2023 00:00	18-May-2023 00:00	----	----
Compound	CAS Number	LOR	Unit		ES2316686-026	ES2316686-028	ES2316686-029	--------	--------
					Result	Result	Result	----	----
EA002: pH 1:5 (Soils)									
pH Value	----	0.1	pH Unit		8.7	----	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		10.8	----	18.6	----	----
EA200: AS 4964 - 2004 Identification of Asbestos in Soils									
Asbestos Detected	1332-21-4	0.1	g/kg		No	----	----	----	----
Asbestos (Trace)	1332-21-4	-	Fibres		No	----	----	----	----
Asbestos Type	1332-21-4	-	--		-	----	----	----	----
Sample weight (dry)	----	0.01	g		45.1	----	----	----	----
APPROVED IDENTIFIER:	----	-	--		A. SMYLIE	----	----	----	----
Synthetic Mineral Fibre	----	-	--		No	----	----	----	----
Organic Fibre	----	-	--		No	----	----	----	----
ED040S: Soluble Major Anions									
Sulfate as SO4 2-	14808-79-8	10	mg/kg		150	----	----	----	----
EG005(ED093)T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	----	8	----	----
Cadmium	7440-43-9	1	mg/kg		<1	----	<1	----	----
Chromium	7440-47-3	2	mg/kg		8	----	18	----	----
Copper	7440-50-8	5	mg/kg		9	----	41	----	----
Lead	7439-92-1	5	mg/kg		18	----	232	----	----
Nickel	7440-02-0	2	mg/kg		7	----	9	----	----
Zinc	7440-66-6	5	mg/kg		37	----	141	----	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	----	0.1	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	----	3.3	----	----
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	----	<0.5	----	----
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	----	<0.5	----	----
Fluorene	86-73-7	0.5	mg/kg		<0.5	----	<0.5	----	----
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	----	<0.5	----	----
Anthracene	120-12-7	0.5	mg/kg		<0.5	----	<0.5	----	----
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	----	0.8	----	----
Pyrene	129-00-0	0.5	mg/kg		<0.5	----	0.7	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	----	<0.5	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	SB1 1.0	TRB1 TRIP BLANK	QC1	----	----
				Sampling date / time	18-May-2023 00:00	08-May-2023 00:00	18-May-2023 00:00	----	----
Compound	CAS Number	LOR	Unit		ES2316686-026	ES2316686-028	ES2316686-029	--------	--------
					Result	Result	Result	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Chrysene	218-01-9	0.5	mg/kg		<0.5	----	<0.5	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	----	<0.5	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	----	<0.5	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	----	<0.5	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	----	<0.5	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	----	<0.5	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	----	<0.5	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		<0.5	----	**4.8**	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		<0.5	----	<0.5	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		**0.6**	----	**0.6**	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		**1.2**	----	**1.2**	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	----	----
C10 - C14 Fraction	----	50	mg/kg		<50	----	<50	----	----
C15 - C28 Fraction	----	100	mg/kg		<100	----	**110**	----	----
C29 - C36 Fraction	----	100	mg/kg		<100	----	<100	----	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	----	**110**	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	----	----
>C10 - C16 Fraction	----	50	mg/kg		<50	----	<50	----	----
>C16 - C34 Fraction	----	100	mg/kg		<100	----	**140**	----	----
>C34 - C40 Fraction	----	100	mg/kg		<100	----	<100	----	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	----	**140**	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	----	<50	----	----
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	----	----
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	SB1 1.0	TRB1 TRIP BLANK	QC1	----	----
				Sampling date / time	18-May-2023 00:00	08-May-2023 00:00	18-May-2023 00:00	----	----
Compound	CAS Number	LOR	Unit		ES2316686-026	ES2316686-028	ES2316686-029	--------	--------
					Result	Result	Result	----	----
EP080: BTEXN - Continued									
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
Naphthalene	91-20-3	1	mg/kg		<1	<1	2	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		91.9	----	84.6	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%		97.1	----	96.4	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%		86.0	----	84.6	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		111	----	85.9	----	----
Anthracene-d10	1719-06-8	0.5	%		107	----	105	----	----
4-Terphenyl-d14	1718-51-0	0.5	%		82.1	----	91.6	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		91.9	101	97.6	----	----
Toluene-D8	2037-26-5	0.2	%		99.2	98.8	105	----	----
4-Bromofluorobenzene	460-00-4	0.2	%		100	91.7	106	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	RB1	----	----	----	----
				Sampling date / time	18-May-2023 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES2316686-030	--------	--------	--------	--------
					Result	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	----	----	----	----
C10 - C14 Fraction	----	50	µg/L		<50	----	----	----	----
C15 - C28 Fraction	----	100	µg/L		<100	----	----	----	----
C29 - C36 Fraction	----	50	µg/L		<50	----	----	----	----
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	----	----	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	----	----	----	----
>C10 - C16 Fraction	----	100	µg/L		<100	----	----	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	----	----	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	----	----	----	----
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	----	----	----	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	----	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	----	----	----	----
Toluene	108-88-3	2	µg/L		<2	----	----	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	----	----	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	----	----	----	----
^ **Total Xylenes**	----	2	µg/L		<2	----	----	----	----
^ **Sum of BTEX**	----	1	µg/L		<1	----	----	----	----
Naphthalene	91-20-3	5	µg/L		<5	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**99.2**	----	----	----	----
Toluene-D8	2037-26-5	2	%		**102**	----	----	----	----
4-Bromofluorobenzene	460-00-4	2	%		**94.8**	----	----	----	----

Analytical Results

Descriptive Results

Sub-Matrix: **SOIL**

Method: Compound	Sample ID - Sampling date / time	Analytical Results
EA200: AS 4964 - 2004 Identification of Asbestos in Soils		
EA200: Description	LFG4 2.0 - 18-May-2023 00:00	Soil sample.
EA200: Description	LFG4 5.0 - 18-May-2023 00:00	Soil sample containing one loose asbestos fibre bundle approximately 5x0.5x0.5mm.
EA200: Description	LFG3 1.5 - 18-May-2023 00:00	Soil sample.
EA200: Description	LFG3 3.4 - 18-May-2023 00:00	Soil sample.
EA200: Description	LFG1 0.5 - 18-May-2023 00:00	Soil sample.
EA200: Description	LFG1 1.5 - 18-May-2023 00:00	Soil sample.
EA200: Description	LFG2 1.0 - 18-May-2023 00:00	Soil sample.
EA200: Description	LFG2 1.5 - 18-May-2023 00:00	Soil sample.
EA200: Description	LFG2 2.0 - 18-May-2023 00:00	Soil sample.
EA200: Description	SB1 0.5 - 18-May-2023 00:00	Soil sample.
EA200: Description	SB1 1.0 - 18-May-2023 00:00	Soil sample.

Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	39	149
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	49	147
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	35	143
EP074S: VOC Surrogates			
1.2-Dichloroethane-D4	17060-07-0	64	130
Toluene-D8	2037-26-5	66	136
4-Bromofluorobenzene	460-00-4	60	122
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	63	123
2-Chlorophenol-D4	93951-73-6	66	122
2.4.6-Tribromophenol	118-79-6	40	138
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	70	122
Anthracene-d10	1719-06-8	66	128
4-Terphenyl-d14	1718-51-0	65	129
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	63	125
Toluene-D8	2037-26-5	67	124
4-Bromofluorobenzene	460-00-4	66	131
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	72	143
Toluene-D8	2037-26-5	75	131
4-Bromofluorobenzene	460-00-4	73	137

Inter-Laboratory Testing

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

(SOIL) EK040T: Fluoride Total

(SOIL) EA200: AS 4964 - 2004 Identification of Asbestos in Soils

BRISBANE 2 Byth Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com
GLADSTONE 46 Callemondah Drive Clinton QLD 4680 Ph: 07 7471 5600 E: gladstone@alsglobal.com
Ph: 03 8549 9600 E:samples.melbourne@alsglobal.com
MUDGEE 1/20 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com
Ph: 02 4423 2063 E:newcra@alsglobal.com
PERTH 24 Rigali Way Wangara WA 6065 Ph: 08 9405 5301 E: samples.perth@alsglobal.com

If sourced from an ALS Laboratory: please tick →

Client Supplied Canister(s)? Y / N

K3

CLIENT: FDC Construction	TURNAROUND REQUIREMENTS: ☑ Standard TAT (List due date): (Standard TAT may be extended for multiple sequential analysis suites) ☐ Non Standard or urgent TAT (List due date):	LABORATORY USE ONLY (Circle) Received to initial and date/time	
OFFICE:		Custody Seal Intact? Rec Lab Y / N NE Y / N N/A	
PROJECT: FDC GWS Giants Audit PROJECT NO: 22077202	ALS QUOTE NO.: ARC Standard	Valves closed on Receipt? Rec Lab Y / N NE Y / N N/A	
CANISTER REQUEST NO: PURCHASE ORDER NO.: 4 "	COUNTRY OF ORIGIN:	COC SEQUENCE NUMBER (Circle) COC: 1 2 3 4 5 6 7	Canister/Sampler Complete and Not Damaged Yes No
PROJECT MANAGER: Jay Parmanscle	CONTACT PH:	OF: 1 2 3 4 5 6 7	Other comment: Temperature °C: 21.3
SAMPLER: DT	SAMPLER MOBILE: 0439 919 543	RELINQUISHED BY: Declan Tennero Signature and date/time	RELINQUISHED BY: Signature and date/time
COC Emailed to ALS? (YES / NO)	EDD FORMAT (or default):	RECEIVED BY: JN 27.6.23 1030 Signature and date/time	RECEIVED BY: Signature and date/time
Email Reports to (will default to PM if no other addresses are listed): declan@arcenvironmental.com.au		RELINQUISHED BY: Signature and date/time	RELINQUISHED BY: Signature and date/time
Email Invoice to (will default to PM if no other addresses are listed):		RECEIVED BY: Signature and date/time	RECEIVED BY: Signature and date/time

COMMENTS/SPECIAL HANDLING/REPLACEMENT OR RETURN INSTRUCTIONS:

GAS SAMPLE CONTAINER INFORMATION

ANALYSES REQUESTED

ALS USE ONLY	CANISTER / SAMPLE DETAILS					Canister Gauge Pressures (PSI)		Refer to Canister Verification Reports and COAs for pressures measured by the Lab										Additional Information
								Reporting Requirements					Suite Codes must be listed to attract suite price					
								LORs			Units							
LAB ID	CANISTER SERIAL NO.	FLOW CONTROLLER SERIAL NO.	CLIENT SAMPLE ID	DATE / TIME SAMPLED	MATRIX (eg Air, Soil Gas)	Pre-Sampling	Post Sampling	Ambient Air	Soil Gas (NEPM)	Other / Indoor	ppbv, µg/m³	ppmv, mg/m³	TO-15 VOCs*	Light hydro-carbons + gases	IPA			
	12385	555137	LFL01_220623	22/06	soil gas	-30	-5						x	x	x			x 82 analytes
	14189	555190	LFL02_220623	"	"	-30	-5						x	x	x			
	14229	055082	LFL03_220623			-30	-5						x	x	x			
	10768	555267	LFL04_220623			-30	-5						x	x	x			
	5489	055082	QC01_220623	↓	↓	-30	-5						x	x	x			

Environmental Division
Newcastle
Work Order Reference
EN2306447

Telephone : +61 2 4014 2500

Job Specific Instructions:

GAS CANISTER SAMPLING EQUIPMENT

DISPATCH RECORD

Enquiries: Client Services – Newcastle, Phone: +61 (02) 4014 2500, E-mail: alsenviro.newcastle@alsglobal.com

Client / Office:	ARC Environmental	ALS USE ONLY	
Contact:	James Haylan	Request Received By:	DH 05/06
Telephone:	0414 737 512	Deliver By:	20/06
ALS Quotation:		Dispatch By:	16/06
Delivery Address:	GWS GIANTS CENTRE OF EXCELLENCE, 1 OLYMPIC BOULEVARD,	Workorder:	
	OLYMPIC PARK, NSW 2127	Agreed Rent Free Period:	21 days

Special Instructions: _____

Equipment Request

CANISTERS

No	Canister Type	Size	Gauge	Valve	Cap	Rental[1]	Leak Checked	Certified OK
5	Entech Silonite MiniCan™	1.4L	No	QT	Yes	$120 ea	✓	10/6/23

Analyst's Initials & Date

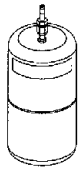
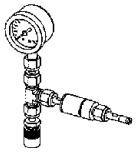
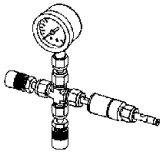
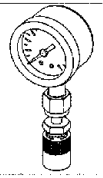
CONNECTORS AND FLOW CONTROL

No	Equipment Type	Duration (hrs)	Flow (ml/min)	T-Piece	Gauge	Certified	Sealed / Vacuum	Connection Q Quick Connect S Swagelok	Rental[1]
	Passive sampler - TWA			No	Yes	Yes	Yes / No	Q	Incl Above
3	Soil gas sampling train - single		60ml/min	No	Yes	Yes	Yes / Yes	Q	Incl Above
1	Soil gas sampling train - duplicate		60ml/min	Yes	Yes	Yes	Yes / Yes	Q	Incl Above
4	Quick-connect fittings – female QT	-	-	-	-	-	-	Q	$120 ea. Replacement
1	Quick-connect fittings – male QT	-	-	-	-	-	-	Q	$120 ea. Replacement
1	Pressure Gauge – QT	-	-	-	-	-	Yes / Yes	Q	$250 ea. Replacement
	T-Piece – QT	-	-	Yes	No	No	Yes / Yes	Q	$300 ea. Replacement
	T-Piece – Swagelok	-	-	Yes	No	No	-	S	$250 ea. Replacement
	Additional ¼" Swagelok nuts/ferrules	-	-	-	-	-	-	S	$5 ea. Replacement
1	Sampling Kit Case – Soil Gas	-	-	-	-	-	Yes / -	-	$200 Replacement
4m	Other (Specify)			tubing					

[1] Refer to Acceptance of Terms

ALS use only:	Clean Certificates Included (Y / N)	Leak Check OK (Y / N)	Recorded by: JN	Packed by: JS	
Canister Sampling Guide Included (Y / N)	Blank COC Included (Y / N)	Dispatch Time / Date: 16.6.23			
Courier: TNT	Consignment Note #: 154823370	# Boxes: 1	Dispatched By: JN		

ALS Supplied Equipment

Item	Quantity	Item Description	Serial Number(s)
	5	1.4 L Silonite™ MiniCan	14229 ✓ 12385 ✓ 14189 ✓ 10768 ✓ 5489 ✓
	3	Soil gas sampler - Compact	267 ✓ 137 ✓ 190 ✓
	1	Soil gas sampler - Duplicate	082 ✓
	1	QT vacuum gauge	E.160 ✓ -28" Hg
	4	Female QT to ¼" tube connector	4 ✓
	1	Male QT to ¼" tube connector	✓

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EN2306447**

Client	: **ARC ENVIRONMENTAL**	Laboratory	: Environmental Division Newcastle
Contact	: MR JAY PARMANSCHE	Contact	: Katie Davis
Address	: Suite 103, 7 Jeffcott Street WEST MELBOURNE	Address	: 5/585 Maitland Road Mayfield West NSW Australia 2304
E-mail	: jay@arcenvironmental.com.au	E-mail	: katie.davis@alsglobal.com
Telephone	: 03 8383 1950	Telephone	: +61 2 4014 2500
Facsimile	: ----	Facsimile	: +61 2 4967 7382
Project	: 2207292 FDL GWS Giants Audit	Page	: 1 of 2
Order number	: 2207292	Quote number	: EM2017ARCENV0001 (MEBQ/216/21 Primary work)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: DECLAN TENNENT		

Dates

Date Samples Received	: 27-Jun-2023 10:30	Issue Date	: 27-Jun-2023
Client Requested Due Date	: 04-Jul-2023	Scheduled Reporting Date	: **04-Jul-2023**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: ----	Temperature	: 21.3
Receipt Detail	:	No. of samples received / analysed	: 5 / 5

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Sample Disposal - Aqueous Chemistry (3 weeks), Aqueous Microbiological (1 week), Solid (2 months ± 1 week) from receipt of samples.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Any sample identifications that cannot be displayed entirely in the analysis summary table will be listed below.

EN2306447-001	: [22-Jun-2023]	: LFG01_220623 - C12385_S137
EN2306447-002	: [22-Jun-2023]	: LFG02_220623 - C14189_S190
EN2306447-003	: [22-Jun-2023]	: LFG03_220623 - C14229_S082
EN2306447-004	: [22-Jun-2023]	: LFG04_220623 - C10768_S267
EN2306447-005	: [22-Jun-2023]	: QC01_220623 - C5489_S082

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **AIR**

Laboratory sample ID	*Sampling date / time*	*Sample ID*	AIR - CAN-1.4L-SAMPLE Canister Sampling - Field Data (1.4 litre canister)	AIR - EP101-15X-SG TO15X - Soil Vapour	AIR - EP101-IPA-SG Isopropyl Alcohol - Soil Vapour	AIR - EP104 Permanent and Natural Gases - Full Suite
EN2306447-001	22-Jun-2023 00:00	LFG01_220623 C12385...	✓	✓	✓	✓
EN2306447-002	22-Jun-2023 00:00	LFG02_220623 C14189...	✓	✓	✓	✓
EN2306447-003	22-Jun-2023 00:00	LFG03_220623 C14229...	✓	✓	✓	✓
EN2306447-004	22-Jun-2023 00:00	LFG04_220623 C10768...	✓	✓	✓	✓
EN2306447-005	22-Jun-2023 00:00	QC01_220623 C5489_S...	✓	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

DECLAN TENNENT

- *AU Certificate of Analysis - NATA (COA)	Email	declan@arcenvironmental.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	declan@arcenvironmental.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	declan@arcenvironmental.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	declan@arcenvironmental.com.au
- Chain of Custody (CoC) (COC)	Email	declan@arcenvironmental.com.au
- EDI Format - ENMRG (ENMRG)	Email	declan@arcenvironmental.com.au
- EDI Format - ESDAT (ESDAT)	Email	declan@arcenvironmental.com.au

JAY PARMANSCHE

- A4 - AU Tax Invoice (INV)	Email	jay@arcenvironmental.com.au

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EN2306447**	Page	: 1 of 4
Client	: **ARC ENVIRONMENTAL**	Laboratory	: Environmental Division Newcastle
Contact	: MR JAY PARMANSCHE	Telephone	: +61 2 4014 2500
Project	: 2207292 FDL GWS Giants Audit	Date Samples Received	: 27-Jun-2023
Site	: ----	Issue Date	: 04-Jul-2023
Sampler	: DECLAN TENNENT	No. of samples received	: 5
Order number	: 2207292	No. of samples analysed	: 5

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **AIR**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP101: VOCs by USEPA Method TO15r							
Gas Canister - ALS Stainless Steel Silonite (EP101-15X) LFG01_220623 - C12385_S137, LFG02_220623 - C14189_S190, LFG03_220623 - C14229_S082, LFG04_220623 - C10768_S267, QC01_220623 - C5489_S082	**22-Jun-2023**	**----**	----	----	**04-Jul-2023**	22-Jul-2023	✓
EP104: Light Hydrocarbons							
Gas Canister - ALS Stainless Steel Silonite (EP104) LFG03_220623 - C14229_S082	**22-Jun-2023**	**----**	----	----	**07-Mar-2023**	22-Jul-2023	✓
Gas Canister - ALS Stainless Steel Silonite (EP104) LFG01_220623 - C12385_S137, LFG02_220623 - C14189_S190, LFG04_220623 - C10768_S267, QC01_220623 - C5489_S082	**22-Jun-2023**	**----**	----	----	**29-Jun-2023**	22-Jul-2023	✓
EP104: Permanent Gases							
Gas Canister - ALS Stainless Steel Silonite (EP104) LFG03_220623 - C14229_S082	**22-Jun-2023**	**----**	----	----	**07-Mar-2023**	22-Jul-2023	✓
Gas Canister - ALS Stainless Steel Silonite (EP104) LFG01_220623 - C12385_S137, LFG02_220623 - C14189_S190, LFG04_220623 - C10768_S267, QC01_220623 - C5489_S082	**22-Jun-2023**	**----**	----	----	**29-Jun-2023**	22-Jul-2023	✓
Sampling Quality Assurance							
Gas Canister - ALS Stainless Steel Silonite (CAN-001) LFG01_220623 - C12385_S137, LFG02_220623 - C14189_S190, LFG03_220623 - C14229_S082, LFG04_220623 - C10768_S267, QC01_220623 - C5489_S082	**22-Jun-2023**	**----**	----	----	**27-Jun-2023**	21-Jun-2024	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **AIR**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Duplicate Control Samples (DCS)							
Permanent Gases and Light Hydrocarbons	EP104	2	7	**28.57**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
VOCs in Air by USEPA TO15r - Extended Suite	EP101-15X	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Duplicates (DUP)							
Permanent Gases and Light Hydrocarbons	EP104	1	7	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
VOCs in Air by USEPA TO15r - Extended Suite	EP101-15X	1	9	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Permanent Gases and Light Hydrocarbons	EP104	2	7	**28.57**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
VOCs in Air by USEPA TO15r - Extended Suite	EP101-15X	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Permanent Gases and Light Hydrocarbons	EP104	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
VOCs in Air by USEPA TO15r - Extended Suite	EP101-15X	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Canister Sampling - Field Data	CAN-001	AIR	In house: Referenced to USEPA TO14 / TO15
VOCs in Air by USEPA TO15r - Extended Suite	EP101-15X	AIR	In house: Referenced to USEPA TO15r Volatile Organic Compounds in Air by USEPA TO15. Extended Suite
VOCs in Air by USEPA TO15r - Extended Suite (mass/volume)	EP101-15X-MV	AIR	USEPA TO15r VOCs in Air Results recalculated as mass/volume concentrations from volume/volume concentrations at a given temperature and pressure.
Permanent Gases and Light Hydrocarbons	EP104	AIR	Hydrocarbons by GC-FID, Permanent gases by GC-TCD. In house: Referenced to ASTM D1945, applied to permanent gases and light hydrocarbons (C1-C4) using packed/capillary GC.
Permanent Gases and Light Hydrocarbons (mass/volume)	EP104-MV	AIR	Permanent Gases and Light Hydrocarbons - Results recalculated as mass/volume concentrations from molar percentage composition at a given temperature and pressure.

CERTIFICATE OF ANALYSIS

Work Order	: **EN2306447**	Page	: 1 of 9
Client	: **ARC ENVIRONMENTAL**	Laboratory	: Environmental Division Newcastle
Contact	: MR JAY PARMANSCHE	Contact	: Katie Davis
Address	: Suite 103, 7 Jeffcott Street WEST MELBOURNE	Address	: 5/585 Maitland Road Mayfield West NSW Australia 2304
Telephone	: 03 8383 1950	Telephone	: +61 2 4014 2500
Project	: 2207292 FDL GWS Giants Audit	Date Samples Received	: 27-Jun-2023 10:30
Order number	: 2207292	Date Analysis Commenced	: 07-Mar-2023
C-O-C number	: ----	Issue Date	: 04-Jul-2023 18:27
Sampler	: DECLAN TENNENT		
Site	: ----		
Quote number	: MEBQ/216/21 Primary work		
No. of samples received	: 5		
No. of samples analysed	: 5		

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
- Surrogate Control Limits

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
Dale Semple	Analyst	Newcastle - Organics, Mayfield West, NSW
Daniel Junek	Senior Organic Chemist	Newcastle - Organics, Mayfield West, NSW
Daniel Junek	Senior Organic Chemist	Newcastle, 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.

- CAN-001: Results for Pressure - As Received are measured under controlled conditions using calibrated laboratory gauges. These results are expressed as an absolute pressure. Equivalent gauge pressures may be calculated by subtracting the Pressure - Laboratory Atmosphere.
- CAN-001: Results for Pressure - Gauge As Received are obtained from uncalibrated field gauges and are indicative only. These results may not precisely match calibrated gauge readings and may vary from field measurements due to changes in temperature and pressure.
- CAN-001: Results for Vacuum - As Received are calculated from the pressures of the canister and laboratory atmosphere at the time of receipt, and are expressed as a measure of the vacuum remaining. A positive value indicates that the canister was below atmospheric pressure upon receipt.
- EP101: Particular samples required dilution due to the presence of high level hydrocarbons. Where applicable, LOR values have been adjusted accordingly.
- EP101: Results reported in mg/m³ are calculated from PPMV results based on a temperature of 25°C and atmospheric pressure of 101.3 kPa.
- EP104: Results reported in mg/m³ are calculated from Mol% results based on a temperature of 25°C and atmospheric pressure of 101.3 kPa
- EP104: Sample canisters were received at sub-ambient pressures and required dilution in the laboratory prior to analysis. LOR values have been adjusted accordingly

Analytical Results

Sub-Matrix: SOIL GAS
(Matrix: AIR)

Compound	CAS Number	LOR	Unit	Sample ID	LFG01_220623 C12385_S137	LFG02_220623 C14189_S190	LFG03_220623 C14229_S082	LFG04_220623 C10768_S267	QC01_220623 C5489_S082
				Sampling date / time	22-Jun-2023 00:00	22-Jun-2023 00:00	22-Jun-2023 00:00	22-Jun-2023 00:00	22-Jun-2023 00:00
					EN2306447-001	EN2306447-002	EN2306447-003	EN2306447-004	EN2306447-005
					Result	Result	Result	Result	Result
EP101: VOCs by USEPA Method TO15 (Calculated Concentration)									
Freon 12	75-71-8	0.250	mg/m³		<0.250	<0.250	<0.250	<0.250	<0.250
Chloromethane	74-87-3	0.100	mg/m³		<0.100	<0.100	<0.100	<0.100	<0.100
Freon 114	76-14-2	0.350	mg/m³		<0.350	<0.350	**0.908**	**0.618**	**0.936**
Vinyl chloride	75-01-4	0.0051	mg/m³		<0.0051	<0.0051	<0.0638	**0.0238**	<0.0638
Bromomethane	74-83-9	0.190	mg/m³		<0.190	<0.190	<0.190	<0.190	<0.190
Chloroethane	75-00-3	0.130	mg/m³		<0.130	<0.130	<0.130	<0.130	<0.130
Freon 11	75-69-4	0.280	mg/m³		<0.280	<0.280	<0.280	<0.280	<0.280
1.1-Dichloroethene	75-35-4	0.200	mg/m³		<0.200	<0.200	<0.200	<0.200	<0.200
Dichloromethane	75-09-2	0.170	mg/m³		<0.170	<0.170	<0.170	<0.170	<0.170
Freon 113	76-13-1	0.380	mg/m³		<0.380	<0.380	<0.380	<0.380	<0.380
1.1-Dichloroethane	75-34-3	0.200	mg/m³		<0.200	<0.200	<0.200	<0.200	<0.200
cis-1.2-Dichloroethene	156-59-2	0.0200	mg/m³		<0.0200	<0.0200	<0.100	<0.0200	<0.100
Chloroform	67-66-3	0.240	mg/m³		<0.240	<0.240	<0.240	<0.240	<0.240
1.2-Dichloroethane	107-06-2	0.200	mg/m³		<0.200	<0.200	<0.200	<0.200	<0.200
1.1.1-Trichloroethane	71-55-6	0.270	mg/m³		<0.270	<0.270	<0.270	<0.270	<0.270
Benzene	71-43-2	0.100	mg/m³		<0.100	<0.100	**1.18**	**0.418**	**1.19**
Carbon Tetrachloride	56-23-5	0.310	mg/m³		<0.310	<0.310	<0.310	<0.310	<0.310
1.2-Dichloropropane	78-87-5	0.230	mg/m³		<0.230	<0.230	<0.230	<0.230	<0.230
Trichloroethene	79-01-6	0.0054	mg/m³		<0.0054	<0.0054	<0.135	<0.0270	<0.135
cis-1.3-Dichloropropylene	10061-01-5	0.230	mg/m³		<0.230	<0.230	<0.230	<0.230	<0.230
trans-1.3-Dichloropropene	10061-02-6	0.230	mg/m³		<0.230	<0.230	<0.230	<0.230	<0.230
1.1.2-Trichloroethane	79-00-5	0.270	mg/m³		<0.270	<0.270	<0.270	<0.270	<0.270
Toluene	108-88-3	0.190	mg/m³		<0.190	<0.190	<0.190	<0.190	<0.190
1.2-Dibromoethane (EDB)	106-93-4	0.380	mg/m³		<0.380	<0.380	<0.380	<0.380	<0.380
Tetrachloroethene	127-18-4	0.340	mg/m³		<0.340	<0.340	<0.340	<0.340	<0.340
Chlorobenzene	108-90-7	0.230	mg/m³		<0.230	<0.230	<0.230	<0.230	<0.230
Ethylbenzene	100-41-4	0.220	mg/m³		<0.220	<0.220	**0.282**	<0.220	**0.281**
meta- & para-Xylene	108-38-3 106-42-3	0.430	mg/m³		<0.430	<0.430	<0.430	<0.430	<0.430
Styrene	100-42-5	0.210	mg/m³		<0.210	<0.210	<0.210	<0.210	<0.210
1.1.2.2-Tetrachloroethane	79-34-5	0.340	mg/m³		<0.340	<0.340	<0.340	<0.340	<0.340
ortho-Xylene	95-47-6	0.220	mg/m³		<0.220	<0.220	<0.220	<0.220	<0.220
4-Ethyltoluene	622-96-8	0.240	mg/m³		<0.240	<0.240	<0.240	<0.240	<0.240
Total Xylenes	----	0.650	mg/m³		<0.650	<0.650	<0.650	<0.650	<0.650
1.3.5-Trimethylbenzene	108-67-8	0.240	mg/m³		<0.240	<0.240	<0.240	<0.240	<0.240

Analytical Results

Sub-Matrix: SOIL GAS (Matrix: AIR)

Compound	CAS Number	LOR	Unit	Sample ID	LFG01_220623 C12385_S137	LFG02_220623 C14189_S190	LFG03_220623 C14229_S082	LFG04_220623 C10768_S267	QC01_220623 C5489_S082
				Sampling date / time	22-Jun-2023 00:00	22-Jun-2023 00:00	22-Jun-2023 00:00	22-Jun-2023 00:00	22-Jun-2023 00:00
					EN2306447-001	EN2306447-002	EN2306447-003	EN2306447-004	EN2306447-005
					Result	Result	Result	Result	Result
EP101: VOCs by USEPA Method TO15 (Calculated Concentration) - Continued									
1.2.4-Trimethylbenzene	95-63-6	0.240	mg/m³		<0.240	<0.240	<0.240	<0.240	<0.240
1.3-Dichlorobenzene	541-73-1	0.300	mg/m³		<0.300	<0.300	<0.300	<0.300	<0.300
Benzylchloride	100-44-7	0.260	mg/m³		<0.260	<0.260	<0.260	<0.260	<0.260
1.4-Dichlorobenzene	106-46-7	0.300	mg/m³		<0.300	<0.300	<0.300	<0.300	<0.300
1.2-Dichlorobenzene	95-50-1	0.300	mg/m³		<0.300	<0.300	<0.300	<0.300	<0.300
1.2.4-Trichlorobenzene	120-82-1	0.370	mg/m³		<0.370	<0.370	<0.370	<0.370	<0.370
Hexachlorobutadiene	87-68-3	0.530	mg/m³		<0.530	<0.530	<0.530	<0.530	<0.530
Acetone	67-64-1	0.120	mg/m³		<0.120	<0.120	<0.120	<0.120	<0.120
Bromodichloromethane	75-27-4	0.340	mg/m³		<0.340	<0.340	<0.340	<0.340	<0.340
1.3-Butadiene	106-99-0	0.110	mg/m³		<0.110	<0.110	<0.110	<0.110	<0.110
Carbon disulfide	75-15-0	0.160	mg/m³		<0.160	<0.160	<0.160	<0.160	<0.160
2-Chlorotoluene	95-49-8	0.260	mg/m³		<0.260	<0.260	<0.260	<0.260	<0.260
1-Chloro-2-propene (Allyl chloride)	107-05-1	0.160	mg/m³		<0.160	<0.160	<0.160	<0.160	<0.160
Cyclohexane	110-82-7	0.170	mg/m³		<0.170	<0.170	**4.54**	**0.791**	**4.61**
Dibromochloromethane	124-48-1	0.430	mg/m³		<0.430	<0.430	<0.430	<0.430	<0.430
1.4-Dioxane	123-91-1	0.180	mg/m³		<0.180	<0.180	<0.180	<0.180	<0.180
Ethylacetate	9002-89-5	0.180	mg/m³		<0.180	<0.180	<0.180	<0.180	<0.180
trans-1.2-Dichloroethene	156-60-5	0.200	mg/m³		<0.200	<0.200	<0.200	<0.200	<0.200
Heptane	142-82-5	0.200	mg/m³		<0.200	<0.200	**1.28**	**0.257**	**1.29**
Hexane	110-54-3	0.180	mg/m³		<0.180	<0.180	**43.0**	**1.12**	**43.3**
Isooctane	540-84-1	0.230	mg/m³		<0.230	<0.230	**13.4**	**2.64**	**13.5**
Isopropyl Alcohol	67-63-0	0.120	mg/m³		**0.715**	**0.147**	**0.432**	**0.260**	**0.280**
2-Butanone (MEK)	78-93-3	0.150	mg/m³		<0.150	<0.150	<0.150	<0.150	<0.150
Methyl iso-Butyl ketone	108-10-1	0.200	mg/m³		<0.200	<0.200	<0.200	<0.200	<0.200
2-Hexanone (MBK)	591-78-6	0.200	mg/m³		<0.200	<0.200	<0.200	<0.200	<0.200
Propene	115-07-1	0.0900	mg/m³		<0.0900	<0.0900	<0.0900	<0.0900	<0.0900
Methyl tert-Butyl Ether (MTBE)	1634-04-4	0.180	mg/m³		<0.180	<0.180	<0.180	<0.180	<0.180
Tetrahydrofuran	109-99-9	0.150	mg/m³		<0.150	<0.150	<0.150	<0.150	<0.150
Bromoform	75-25-2	0.520	mg/m³		<0.520	<0.520	<0.520	<0.520	<0.520
Vinyl Acetate	108-05-4	0.180	mg/m³		<0.180	<0.180	<0.180	<0.180	<0.180
Vinyl bromide	593-60-2	0.220	mg/m³		<0.220	<0.220	<0.220	<0.220	<0.220
Ethanol	64-17-5	0.0900	mg/m³		<0.0900	<0.0900	<0.0900	<0.0900	<0.0900
Acetonitrile	75-05-8	0.0800	mg/m³		<0.0800	<0.0800	<0.0800	<0.0800	<0.0800

Analytical Results

Sub-Matrix: SOIL GAS (Matrix: AIR)

Compound	CAS Number	LOR	Unit	Sample ID	LFG01_220623 C12385_S137	LFG02_220623 C14189_S190	LFG03_220623 C14229_S082	LFG04_220623 C10768_S267	QC01_220623 C5489_S082
				Sampling date / time	22-Jun-2023 00:00	22-Jun-2023 00:00	22-Jun-2023 00:00	22-Jun-2023 00:00	22-Jun-2023 00:00
					EN2306447-001	EN2306447-002	EN2306447-003	EN2306447-004	EN2306447-005
					Result	Result	Result	Result	Result
EP101: VOCs by USEPA Method TO15 (Calculated Concentration) - Continued									
Acrolein	107-02-8	0.110	mg/m³		<0.110	<0.110	<0.110	<0.110	<0.110
Acrylonitrile	107-13-1	0.110	mg/m³		<0.110	<0.110	<0.110	<0.110	<0.110
tert-Butyl alcohol	75-65-0	0.150	mg/m³		<0.150	<0.150	<0.150	<0.150	<0.150
2-Chloro-1.3-butadiene	126-99-8	0.180	mg/m³		<0.180	<0.180	<0.180	<0.180	<0.180
Di-isopropyl Ether	108-20-3	0.210	mg/m³		<0.210	<0.210	<0.210	<0.210	<0.210
Ethyl tert-Butyl Ether (ETBE)	637-92-3	0.210	mg/m³		<0.210	<0.210	<0.210	<0.210	<0.210
tert-Amyl Methyl Ether (TAME)	994-05-8	0.210	mg/m³		<0.210	<0.210	<0.210	<0.210	<0.210
Methyl Methacrylate	80-62-6	0.210	mg/m³		<0.210	<0.210	<0.210	<0.210	<0.210
1.1.1.2-Tetrachloroethane	630-20-6	0.340	mg/m³		<0.340	<0.340	<0.340	<0.340	<0.340
Isopropylbenzene	98-82-8	0.250	mg/m³		<0.250	<0.250	**1.27**	**0.953**	**1.26**
n-Propylbenzene	103-65-1	0.250	mg/m³		<0.250	<0.250	**0.485**	**0.629**	**0.468**
tert-Butylbenzene	98-06-6	0.270	mg/m³		<0.270	<0.270	<0.270	<0.270	<0.270
sec-Butylbenzene	135-98-8	0.270	mg/m³		<0.270	<0.270	<0.270	**0.460**	<0.270
2-isopropyltoluene	527-84-4	0.270	mg/m³		<0.270	<0.270	<0.270	<0.270	<0.270
n-Butylbenzene	104-51-8	0.270	mg/m³		<0.270	<0.270	<0.270	<0.270	<0.270
Naphthalene	91-20-3	0.100	mg/m³		<0.100	<0.100	<0.100	<0.100	<0.100
EP101: VOCs by USEPA Method TO15r									
Freon 12	75-71-8	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
Chloromethane	74-87-3	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
Freon 114	76-14-2	0.0500	ppmv		<0.0500	<0.0500	**0.130**	**0.0884**	**0.134**
Vinyl chloride	75-01-4	0.0020	ppmv		<0.0020	<0.0020	<0.0250	**0.0093**	<0.0250
Bromomethane	74-83-9	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
Chloroethane	75-00-3	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
Freon 11	75-69-4	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
1.1-Dichloroethene	75-35-4	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
Dichloromethane	75-09-2	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
Freon 113	76-13-1	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
1.1-Dichloroethane	75-34-3	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
cis-1.2-Dichloroethene	156-59-2	0.0050	ppmv		<0.0050	<0.0050	<0.0250	<0.0050	<0.0250
Chloroform	67-66-3	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
1.2-Dichloroethane	107-06-2	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
1.1.1-Trichloroethane	71-55-6	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
Benzene	71-43-2	0.0300	ppmv		<0.0300	<0.0300	**0.370**	**0.131**	**0.374**
Carbon Tetrachloride	56-23-5	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500

Analytical Results

Sub-Matrix: SOIL GAS (Matrix: AIR)				Sample ID	LFG01_220623 C12385_S137	LFG02_220623 C14189_S190	LFG03_220623 C14229_S082	LFG04_220623 C10768_S267	QC01_220623 C5489_S082
				Sampling date / time	22-Jun-2023 00:00	22-Jun-2023 00:00	22-Jun-2023 00:00	22-Jun-2023 00:00	22-Jun-2023 00:00
Compound	CAS Number	LOR	Unit		EN2306447-001	EN2306447-002	EN2306447-003	EN2306447-004	EN2306447-005
					Result	Result	Result	Result	Result
EP101: VOCs by USEPA Method TO15r - Continued									
1.2-Dichloropropane	78-87-5	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
Trichloroethene	79-01-6	0.0010	ppmv		<0.0010	<0.0010	<0.0250	<0.0050	<0.0250
cis-1.3-Dichloropropylene	10061-01-5	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
trans-1.3-Dichloropropene	10061-02-6	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
1.1.2-Trichloroethane	79-00-5	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
Toluene	108-88-3	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
1.2-Dibromoethane (EDB)	106-93-4	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
Tetrachloroethene	127-18-4	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
Chlorobenzene	108-90-7	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
Ethylbenzene	100-41-4	0.0500	ppmv		<0.0500	<0.0500	**0.0650**	<0.0500	**0.0648**
meta- & para-Xylene	108-38-3 106-42-3	0.100	ppmv		<0.100	<0.100	<0.100	<0.100	<0.100
Styrene	100-42-5	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
1.1.2.2-Tetrachloroethane	79-34-5	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
ortho-Xylene	95-47-6	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
4-Ethyltoluene	622-96-8	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
1.3.5-Trimethylbenzene	108-67-8	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
1.2.4-Trimethylbenzene	95-63-6	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
1.3-Dichlorobenzene	541-73-1	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
Benzylchloride	100-44-7	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
1.4-Dichlorobenzene	106-46-7	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
1.2-Dichlorobenzene	95-50-1	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
1.2.4-Trichlorobenzene	120-82-1	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
Hexachlorobutadiene	87-68-3	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
Acetone	67-64-1	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
Bromodichloromethane	75-27-4	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
1.3-Butadiene	106-99-0	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
Carbon disulfide	75-15-0	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
2-Chlorotoluene	95-49-8	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
1-Chloro-2-propene (Allyl chloride)	107-05-1	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
Cyclohexane	110-82-7	0.0500	ppmv		<0.0500	<0.0500	**1.32**	**0.230**	**1.34**
Dibromochloromethane	124-48-1	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
1.4-Dioxane	123-91-1	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
Ethylacetate	9002-89-5	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500

Analytical Results

Sub-Matrix: SOIL GAS (Matrix: AIR)				Sample ID	LFG01_220623 C12385_S137	LFG02_220623 C14189_S190	LFG03_220623 C14229_S082	LFG04_220623 C10768_S267	QC01_220623 C5489_S082
				Sampling date / time	22-Jun-2023 00:00	22-Jun-2023 00:00	22-Jun-2023 00:00	22-Jun-2023 00:00	22-Jun-2023 00:00
Compound	CAS Number	LOR	Unit		EN2306447-001	EN2306447-002	EN2306447-003	EN2306447-004	EN2306447-005
					Result	Result	Result	Result	Result
EP101: VOCs by USEPA Method TO15r - Continued									
trans-1.2-Dichloroethene	156-60-5	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
Heptane	142-82-5	0.0500	ppmv		<0.0500	<0.0500	**0.313**	**0.0628**	**0.316**
Hexane	110-54-3	0.0500	ppmv		<0.0500	<0.0500	**12.2**	**0.317**	**12.3**
Isooctane	540-84-1	0.0500	ppmv		<0.0500	<0.0500	**2.86**	**0.565**	**2.89**
Isopropyl Alcohol	67-63-0	0.0500	ppmv		**0.291**	**0.0600**	**0.176**	**0.106**	**0.114**
2-Butanone (MEK)	78-93-3	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
Methyl iso-Butyl ketone	108-10-1	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
2-Hexanone (MBK)	591-78-6	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
Propene	115-07-1	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
Methyl tert-Butyl Ether (MTBE)	1634-04-4	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
Tetrahydrofuran	109-99-9	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
Bromoform	75-25-2	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
Vinyl Acetate	108-05-4	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
Vinyl bromide	593-60-2	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
Ethanol	64-17-5	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
Acetonitrile	75-05-8	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
Acrolein	107-02-8	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
Acrylonitrile	107-13-1	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
tert-Butyl alcohol	75-65-0	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
2-Chloro-1.3-butadiene	126-99-8	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
Di-isopropyl Ether	108-20-3	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
Ethyl tert-Butyl Ether (ETBE)	637-92-3	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
tert-Amyl Methyl Ether (TAME)	994-05-8	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
Methyl Methacrylate	80-62-6	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
1.1.1.2-Tetrachloroethane	630-20-6	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
Isopropylbenzene	98-82-8	0.0500	ppmv		<0.0500	<0.0500	**0.258**	**0.194**	**0.257**
n-Propylbenzene	103-65-1	0.0500	ppmv		<0.0500	<0.0500	**0.0987**	**0.128**	**0.0952**
tert-Butylbenzene	98-06-6	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
sec-Butylbenzene	135-98-8	0.0500	ppmv		<0.0500	<0.0500	<0.0500	**0.0838**	<0.0500
2-isopropyltoluene	527-84-4	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
n-Butylbenzene	104-51-8	0.0500	ppmv		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
Naphthalene	91-20-3	0.0190	ppmv		<0.0190	<0.0190	<0.0250	<0.0190	<0.0250
EP104: Light Hydrocarbons									
Methane	74-82-8	0.005	Mol %		**0.584**	**0.357**	**65.2**	**46.6**	**65.4**

Analytical Results

Sub-Matrix: SOIL GAS (Matrix: AIR)				Sample ID	LFG01_220623 C12385_S137	LFG02_220623 C14189_S190	LFG03_220623 C14229_S082	LFG04_220623 C10768_S267	QC01_220623 C5489_S082
				Sampling date / time	22-Jun-2023 00:00	22-Jun-2023 00:00	22-Jun-2023 00:00	22-Jun-2023 00:00	22-Jun-2023 00:00
Compound	CAS Number	LOR	Unit		EN2306447-001	EN2306447-002	EN2306447-003	EN2306447-004	EN2306447-005
					Result	Result	Result	Result	Result
EP104: Light Hydrocarbons - Continued									
Ethane	74-84-0	0.005	Mol %		<0.010	<0.010	<0.010	<0.010	<0.010
Ethene	74-85-1	0.005	Mol %		<0.010	<0.010	<0.010	<0.010	<0.010
Propane	74-98-6	0.005	Mol %		<0.010	<0.010	<0.010	<0.010	<0.010
Butane	106-97-8	0.005	Mol %		<0.010	<0.010	<0.010	<0.010	<0.010
EP104: Light Hydrocarbons (Calc Conc)									
Methane	74-82-8	33	mg/m³		**3820**	**2330**	**426000**	**305000**	**428000**
Ethane	74-84-0	60	mg/m³		<120	<120	<120	<120	<120
Ethene	74-85-1	55	mg/m³		<110	<110	<110	<110	<110
Propane	74-98-6	90	mg/m³		<180	<180	<180	<180	<180
Butane	106-97-8	120	mg/m³		<240	<240	<240	<240	<240
EP104: Permanent Gases									
Carbon Dioxide	124-38-9	0.005	Mol %		**4.25**	**3.33**	**12.2**	**10.1**	**12.2**
Carbon Monoxide	630-08-0	0.005	Mol %		<0.010	<0.010	<0.010	<0.010	<0.010
Hydrogen	1333-74-0	0.005	Mol %		<0.010	<0.010	<0.010	<0.010	<0.010
Helium	7440-59-7	0.005	Mol %		<0.010	<0.010	<0.010	<0.010	<0.010
Oxygen	7782-44-7	0.10	Mol %		**17.8**	**18.2**	**1.55**	**1.11**	**1.50**
Inert Gases (N2. Ar) by difference	----	0.10	Mol %		**77.4**	**78.1**	**21.0**	**42.2**	**20.9**
EP104: Permanent Gases (Calc Conc)									
Carbon Dioxide	124-38-9	90	mg/m³		**76500**	**59900**	**219000**	**182000**	**220000**
Carbon Monoxide	630-08-0	60	mg/m³		<120	<120	<120	<120	<120
Hydrogen	1333-74-0	4	mg/m³		<8	<8	<8	<8	<8
Helium	7440-59-7	8	mg/m³		<16	<16	<16	<16	<16
Oxygen	7782-44-7	1310	mg/m³		**234000**	**238000**	**20300**	**14600**	**19600**
Inert Gases (N2. Ar) by difference	----	1100	mg/m³		**885000**	**894000**	**241000**	**483000**	**239000**
Sampling Quality Assurance									
Pressure - As received	PRESSURE	0.1	kPaa		**93.9**	**98.3**	**97.3**	**86.2**	**97.6**
Pressure - Laboratory Atmosphere	----	0.1	kPaa		**101**	**101**	**101**	**101**	**101**
Temperature as Received	----	0.1	°C		**21.0**	**21.0**	**21.0**	**21.0**	**21.0**
Vacuum - As received	----	0.03	Inches Hg		**2.18**	**0.88**	**1.18**	**4.49**	**1.09**
USEPA Air Toxics Method TO15r Surrogates									
4-Bromofluorobenzene	460-00-4	0.5	%		**97.1**	**93.2**	**93.2**	**93.9**	**94.0**

Surrogate Control Limits

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

UPDATED COC

Sample information								Tests Required																Comments
Sample ID	Client Sample ID or information	Depth	Date sampled	Type of sample	PID	BRIEF DESCRIPTION	CONTAINERS	TRH BTEX, PAH, METALS, SULFATE, PH	NSW EPA SOIL CLASS SHORT SUITE	TRH BTEX, PAH, METALS	TRH C6-C9, BTEX	TRH, BTEX	ASBESTOS (PRESENCE ABSENCE)	PFAS										Provide as much information about the sample as you can
1	LGF3	0.5	18/5/23	S	0.0	OVERLYING SANDY LOAM	1 JAR	1																
2	LGF3	1.0	18/5/23	S	0.0	CLAY CAPPING	1 JAR																	
3	LGF3	1.5	18/5/23	S	0.0	CLAY CAPPING	1 JAR	1					1											
4	LGF3	2.0	18/5/23	S	0.0	CLAY CAPPING	1 JAR																	
5	LGF3	3.0	18/5/23	S	0.0	CLAY CAPPING	1 JAR																	
6	LGF3	3.4	18/5/23	S	0.0	WASTE	1 JAR		1				1	1										
7	LGF3	4.0	18/5/23	S	10.7	WASTE	1 JAR, 1 PFAS JAR, 1 BAG	1																
8	LGF3	5.0	18/5/23	S	0.0	WASTE	1 JAR, 1 PFAS JAR, 1 BAG																	
9	LGF4	0.5	18/5/23	S	0.0	OVERLYING SANDY LOAM	1 JAR	1																
10	LGF4	1.0	18/5/23	S	0.0	SILTY CLAY	1 JAR																	
11	LGF4	1.5	18/5/23	S	0.0	CLAY WITH SOME WASTES	1 JAR																	
12	LGF4	2.0	18/5/23	S	0.0	CLAY WITH SOME WASTES	1 JAR, 1 PFAS JAR, 1 BAG	1					1											
13	LGF4	3.0	18/5/23	S	0.0	CLAY CAPPING	1 JAR, 1 PFAS JAR, 1 BAG																	
14	LGF4	4.0	18/5/23	S	0.0	CLAY CAPPING	1 JAR																	
15	LGF4	5.0	18/5/23	S	0.0	WASTE	1 JAR, 1 PFAS JAR, 1 BAG	1					1	1										
16	LGF4	6.0	18/5/23	S	0.0	WASTE	1 JAR, 1 PFAS JAR, 1 BAG																	
17	LGF1	0.5	18/5/23	S	0.0	OVERLYING SANDY LOAM	1 JAR	1					1											
18	LGF1	1.0	18/5/23	S	0.0	CLAY CAPPING	1 JAR		1															
19	LGF1	1.5	18/5/23	S	0.0	CLAY CAPPING	1 JAR	1					1											
20	LGF1	2.0	18/5/23	S	0.0	CLAY CAPPING	1 JAR																	
21	LGF2	0.5	18/5/23	S	0.0	SANDY GRAVEL	1 JAR	1																
22	LGF2	1.0	18/5/23	S	0.0	CLAY SILT	1 JAR						1											
23	LGF2	1.5	18/5/23	S	0.0	CLAY CAPPING	1 JAR	1					1											
24	LGF2	2.0	18/5/23	S	0.0	WASTE ?	1 JAR						1											
25	SB1	0.5	18/5/23	S	0.0	OVERLYING SANDY LOAM	1 JAR	1					1											
26	SB1	1.0	18/5/23	S	0.0	GRAVELLY CLAY	1 JAR	1					1											
27	SB1	1.3	18/5/23	S	0.0	HARD GRAVELS AND SILTS	1 JAR																	
28	TRB1		18/5/23	S			1 JAR				1													
29	QC1		18/5/23	S			1 JAR			1														
30	QC2		18/5/23	S			1 JAR			1														
31	RB1		18/5/23	W			1 x 200ml BOT, 2 x VOA					1												SEND TO EXTERNAL LAB
								12	2	2	1	1	11	2										

Environmental Division Sydney
Work Order Reference
ES2316686

Telephone : +61-2-8784 8555

Eurofins QC2 (Asbestos)

ES2316686

Relinquished by ((	**ARC Environmental**	**Received by (Company):**	***Lab use only:***
Print Name:	**Jay Parmansche**	**Print Name:**	**Samples Received: Cool or Ambient (circle one)**
Date & Time:	**19/05/2023**	**Date & Time:**	**Temperature Received at: (if applicable)**
Signature:		**Signature:**	**Transported by: Hand delivered / courier**

Eurofins 23/5/23
3:12pm
5.1°C

992509

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www.eurofins.com.au EnviroSales@eurofins.com

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Rolleston,
Christchurch 7675
Tel: +64 3 343 5201
IANZ# 1290

Sample Receipt Advice

Company name:	ARC Environmental Pty Ltd
Contact name:	Jay Parmansche
Project name:	Not provided
Project ID:	Not provided
Turnaround time:	5 Day
Date/Time received	May 23, 2023 3:12 PM
Eurofins reference	992509

Sample Information

✓	A detailed list of analytes logged into our LIMS, is included in the attached summary table.
✓	All samples have been received as described on the above COC.
✓	COC has been completed correctly.
✓	Attempt to chill was evident.
✓	Appropriately preserved sample containers have been used.
✓	All samples were received in good condition.
✓	Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
✓	Appropriate sample containers have been used.
✓	Sample containers for volatile analysis received with zero headspace.
✗	Split sample sent to requested external lab.
✗	Some samples have been subcontracted.
N/A	Custody Seals intact (if used).

Notes

Contact

If you have any questions with respect to these samples, please contact your Analytical Services Manager:

Harry Bacalis on phone : or by email: HarryBacalis@eurofins.com

Results will be delivered electronically via email to Jay Parmansche - jay@arcenvironmental.com.au.

Note: A copy of these results will also be delivered to the general ARC Environmental Pty Ltd email address.

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web: www.eurofins.com.au
email: EnviroSales@eurofins.com

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Tel: +64 3 343 5201
IANZ# 1290

Company Name: ARC Environmental Pty Ltd
Address: 40 Heller St
Brunswick West
VIC 3055

Project Name:

Order No.:
Report #: 992509
Phone: 03 8383 1950
Fax:

Received: May 23, 2023 3:12 PM
Due: May 30, 2023
Priority: 5 Day
Contact Name: Jay Parmansche

Eurofins Analytical Services Manager : Harry Bacalis

Sample Detail						Polycyclic Aromatic Hydrocarbons	Metals M8	BTEX	Moisture Set	Total Recoverable Hydrocarbons
Sydney Laboratory - NATA # 1261 Site # 18217						X	X	X	X	X
External Laboratory										
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**					
1	QC2	May 18, 2023		Soil	S23-My0060518	X	X	X	X	X
Test Counts						1	1	1	1	1

ARC Environmental Pty Ltd
40 Heller St
Brunswick West
VIC 3055

NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection, proficiency testing scheme providers and reference materials producers reports and certificates.

Attention: **Jay Parmansche**

Report **992509-S**
Project name
Received Date May 23, 2023

Client Sample ID			**QC2**
Sample Matrix			**Soil**
Eurofins Sample No.			**S23-My0060518**
Date Sampled			**May 18, 2023**
Test/Reference	LOR	Unit	
Total Recoverable Hydrocarbons			
TRH C6-C9	20	mg/kg	< 20
TRH C10-C14	20	mg/kg	< 20
TRH C15-C28	50	mg/kg	< 50
TRH C29-C36	50	mg/kg	53
TRH C10-C36 (Total)	50	mg/kg	53
TRH C6-C10	20	mg/kg	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20
TRH >C10-C16	50	mg/kg	< 50
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50
TRH >C16-C34	100	mg/kg	< 100
TRH >C34-C40	100	mg/kg	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100
BTEX			
Benzene	0.1	mg/kg	< 0.1
Toluene	0.1	mg/kg	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2
o-Xylene	0.1	mg/kg	< 0.1
Xylenes - Total*	0.3	mg/kg	< 0.3
4-Bromofluorobenzene (surr.)	1	%	92
Total Recoverable Hydrocarbons - 2013 NEPM Fractions			
Naphthalene[N02]	0.5	mg/kg	< 0.5
Polycyclic Aromatic Hydrocarbons			
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2
Acenaphthene	0.5	mg/kg	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5
Anthracene	0.5	mg/kg	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5
Chrysene	0.5	mg/kg	< 0.5
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5

Client Sample ID			QC2
Sample Matrix			**Soil**
Eurofins Sample No.			**S23-My0060518**
Date Sampled			**May 18, 2023**
Test/Reference	LOR	Unit	
Polycyclic Aromatic Hydrocarbons			
Fluoranthene	0.5	mg/kg	< 0.5
Fluorene	0.5	mg/kg	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5
Naphthalene	0.5	mg/kg	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5
Pyrene	0.5	mg/kg	< 0.5
Total PAH*	0.5	mg/kg	< 0.5
2-Fluorobiphenyl (surr.)	1	%	112
p-Terphenyl-d14 (surr.)	1	%	110
Heavy Metals			
Arsenic	2	mg/kg	7.1
Cadmium	0.4	mg/kg	< 0.4
Chromium	5	mg/kg	16
Copper	5	mg/kg	29
Lead	5	mg/kg	41
Mercury	0.1	mg/kg	0.2
Nickel	5	mg/kg	14
Zinc	5	mg/kg	87
Sample Properties			
% Moisture	1	%	15

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Sydney	May 27, 2023	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Sydney	May 27, 2023	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Sydney	May 27, 2023	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
BTEX	Sydney	May 27, 2023	14 Days
- Method: LTM-ORG-2010 BTEX and Volatile TRH			
Polycyclic Aromatic Hydrocarbons	Sydney	May 27, 2023	14 Days
- Method: LTM-ORG-2130 PAH and Phenols in Soil and Water			
Metals M8	Sydney	May 27, 2023	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
% Moisture	Sydney	May 24, 2023	14 Days
- Method: LTM-GEN-7080 Moisture			

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Company Name: ARC Environmental Pty Ltd
Address: 40 Heller St
Brunswick West
VIC 3055

Project Name:

Order No.:
Report #: 992509
Phone: 03 8383 1950
Fax:

Received: May 23, 2023 3:12 PM
Due: May 30, 2023
Priority: 5 Day
Contact Name: Jay Parmansche

Eurofins Analytical Services Manager : Harry Bacalis

Sample Detail						Polycyclic Aromatic Hydrocarbons	Metals M8	BTEX	Moisture Set	Total Recoverable Hydrocarbons
Sydney Laboratory - NATA # 1261 Site # 18217						X	X	X	X	X
External Laboratory										
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**					
1	QC2	May 18, 2023		Soil	S23-My0060518	X	X	X	X	X
Test Counts						1	1	1	1	1

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Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

Units

mg/kg: milligrams per kilogram
mg/L: milligrams per litre
µg/L: micrograms per litre
ppm: parts per million
ppb: parts per billion
%: Percentage
org/100 mL: Organisms per 100 millilitres
NTU: Nephelometric Turbidity Units
MPN/100 mL: Most Probable Number of organisms per 100 millilitres
CFU: Colony forming unit

Terms

APHA	American Public Health Association
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
TBTO	Tributyltin oxide (*bis*-tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment however free tributyltin was measured and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 5.4
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should be used as a guide only and may be different when site specific Sampling Analysis and Quality Plan (SAQP) have been implemented

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR: No Limit

Results between 10-20 times the LOR: RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

NOTE: pH duplicates are reported as a range not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.4 where no positive PFAS results have been reported have been reviewed and no data was affected.

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore, laboratory analysis is unlikely to be completed within holding time.Analysis will begin as soon as possible after sample receipt.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons							
TRH C6-C9	mg/kg	< 20			20	Pass	
TRH C10-C14	mg/kg	< 20			20	Pass	
TRH C15-C28	mg/kg	< 50			50	Pass	
TRH C29-C36	mg/kg	< 50			50	Pass	
TRH C6-C10	mg/kg	< 20			20	Pass	
TRH >C10-C16	mg/kg	< 50			50	Pass	
TRH >C16-C34	mg/kg	< 100			100	Pass	
TRH >C34-C40	mg/kg	< 100			100	Pass	
Method Blank							
BTEX							
Benzene	mg/kg	< 0.1			0.1	Pass	
Toluene	mg/kg	< 0.1			0.1	Pass	
Ethylbenzene	mg/kg	< 0.1			0.1	Pass	
m&p-Xylenes	mg/kg	< 0.2			0.2	Pass	
o-Xylene	mg/kg	< 0.1			0.1	Pass	
Xylenes - Total*	mg/kg	< 0.3			0.3	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/kg	< 0.5			0.5	Pass	
Method Blank							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	mg/kg	< 0.5			0.5	Pass	
Acenaphthylene	mg/kg	< 0.5			0.5	Pass	
Anthracene	mg/kg	< 0.5			0.5	Pass	
Benz(a)anthracene	mg/kg	< 0.5			0.5	Pass	
Benzo(a)pyrene	mg/kg	< 0.5			0.5	Pass	
Benzo(b&j)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Benzo(g.h.i)perylene	mg/kg	< 0.5			0.5	Pass	
Benzo(k)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Chrysene	mg/kg	< 0.5			0.5	Pass	
Dibenz(a.h)anthracene	mg/kg	< 0.5			0.5	Pass	
Fluoranthene	mg/kg	< 0.5			0.5	Pass	
Fluorene	mg/kg	< 0.5			0.5	Pass	
Indeno(1.2.3-cd)pyrene	mg/kg	< 0.5			0.5	Pass	
Naphthalene	mg/kg	< 0.5			0.5	Pass	
Phenanthrene	mg/kg	< 0.5			0.5	Pass	
Pyrene	mg/kg	< 0.5			0.5	Pass	
Method Blank							
Heavy Metals							
Arsenic	mg/kg	< 2			2	Pass	
Cadmium	mg/kg	< 0.4			0.4	Pass	
Chromium	mg/kg	< 5			5	Pass	
Copper	mg/kg	< 5			5	Pass	
Lead	mg/kg	< 5			5	Pass	
Mercury	mg/kg	< 0.1			0.1	Pass	
Nickel	mg/kg	< 5			5	Pass	
Zinc	mg/kg	< 5			5	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons							
TRH C6-C9	%	96			70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
TRH C10-C14	%	119			70-130	Pass	
TRH C6-C10	%	99			70-130	Pass	
TRH >C10-C16	%	119			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	105			70-130	Pass	
Toluene	%	94			70-130	Pass	
Ethylbenzene	%	94			70-130	Pass	
m&p-Xylenes	%	98			70-130	Pass	
o-Xylene	%	104			70-130	Pass	
Xylenes - Total*	%	100			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	87			70-130	Pass	
LCS - % Recovery							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	%	106			70-130	Pass	
Acenaphthylene	%	106			70-130	Pass	
Anthracene	%	103			70-130	Pass	
Benz(a)anthracene	%	102			70-130	Pass	
Benzo(a)pyrene	%	106			70-130	Pass	
Benzo(b&j)fluoranthene	%	103			70-130	Pass	
Benzo(g.h.i)perylene	%	108			70-130	Pass	
Benzo(k)fluoranthene	%	113			70-130	Pass	
Chrysene	%	92			70-130	Pass	
Dibenz(a.h)anthracene	%	97			70-130	Pass	
Fluoranthene	%	104			70-130	Pass	
Fluorene	%	106			70-130	Pass	
Indeno(1.2.3-cd)pyrene	%	98			70-130	Pass	
Naphthalene	%	103			70-130	Pass	
Phenanthrene	%	100			70-130	Pass	
Pyrene	%	106			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic	%	101			80-120	Pass	
Cadmium	%	103			80-120	Pass	
Chromium	%	103			80-120	Pass	
Copper	%	101			80-120	Pass	
Lead	%	106			80-120	Pass	
Mercury	%	102			80-120	Pass	
Nickel	%	101			80-120	Pass	
Zinc	%	102			80-120	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Total Recoverable Hydrocarbons				Result 1					
TRH C6-C9	S23-My0067691	NCP	%	72			70-130	Pass	
TRH C10-C14	S23-My0060489	NCP	%	129			70-130	Pass	
TRH C6-C10	S23-My0067691	NCP	%	77			70-130	Pass	
TRH >C10-C16	S23-My0058557	NCP	%	115			70-130	Pass	
Spike - % Recovery									
BTEX				Result 1					
Benzene	S23-My0067691	NCP	%	82			70-130	Pass	
Toluene	S23-My0067691	NCP	%	72			70-130	Pass	
Ethylbenzene	S23-My0067691	NCP	%	76			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
m&p-Xylenes	S23-My0067691	NCP	%	81			70-130	Pass	
o-Xylene	S23-My0067691	NCP	%	83			70-130	Pass	
Xylenes - Total*	S23-My0067691	NCP	%	82			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	S23-My0067691	NCP	%	82			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	S23-My0062640	NCP	%	104			75-125	Pass	
Cadmium	S23-My0062640	NCP	%	108			75-125	Pass	
Chromium	S23-My0062640	NCP	%	104			75-125	Pass	
Copper	S23-My0062640	NCP	%	98			75-125	Pass	
Lead	S23-My0062640	NCP	%	103			75-125	Pass	
Mercury	S23-My0062640	NCP	%	107			75-125	Pass	
Nickel	S23-My0062640	NCP	%	100			75-125	Pass	
Zinc	S23-My0062640	NCP	%	90			75-125	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Total Recoverable Hydrocarbons				Result 1	Result 2	RPD			
TRH C6-C9	S23-My0060498	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C10-C14	S23-My0049773	NCP	mg/kg	2300	1700	29	30%	Pass	
TRH C15-C28	S23-My0049773	NCP	mg/kg	5700	4500	23	30%	Pass	
TRH C29-C36	S23-My0049773	NCP	mg/kg	300	270	8.7	30%	Pass	
TRH C6-C10	S23-My0060498	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH >C10-C16	S23-My0049773	NCP	mg/kg	4500	3400	27	30%	Pass	
TRH >C16-C34	S23-My0049773	NCP	mg/kg	3900	3200	22	30%	Pass	
TRH >C34-C40	S23-My0049773	NCP	mg/kg	250	240	6.6	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	S23-My0060498	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	S23-My0060498	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	S23-My0060498	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	S23-My0060498	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	S23-My0060498	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total*	S23-My0060498	NCP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	S23-My0060498	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Acenaphthene	S23-My0060130	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Acenaphthylene	S23-My0060130	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Anthracene	S23-My0060130	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benz(a)anthracene	S23-My0060130	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(a)pyrene	S23-My0060130	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(b&j)fluoranthene	S23-My0060130	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(g.h.i)perylene	S23-My0060130	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(k)fluoranthene	S23-My0060130	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Chrysene	S23-My0060130	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Dibenz(a.h)anthracene	S23-My0060130	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluoranthene	S23-My0060130	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluorene	S23-My0060130	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Indeno(1.2.3-cd)pyrene	S23-My0060130	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Naphthalene	S23-My0060130	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	

Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Phenanthrene	S23-My0060130	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Pyrene	S23-My0060130	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S23-My0060624	NCP	mg/kg	170	160	1.0	30%	Pass	
Cadmium	S23-My0060624	NCP	mg/kg	2.9	3.1	7.6	30%	Pass	
Chromium	S23-My0060624	NCP	mg/kg	18	17	6.6	30%	Pass	
Copper	S23-My0060624	NCP	mg/kg	2000	2100	3.3	30%	Pass	
Lead	S23-My0060624	NCP	mg/kg	980	1000	5.6	30%	Pass	
Mercury	S23-My0060624	NCP	mg/kg	1.8	2.0	10	30%	Pass	
Nickel	S23-My0060624	NCP	mg/kg	16	16	4.1	30%	Pass	
Zinc	S23-My0060624	NCP	mg/kg	280	290	2.0	30%	Pass	
Duplicate									
Sample Properties				Result 1	Result 2	RPD			
% Moisture	S23-My0060503	NCP	%	9.0	9.1	<1	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
N07	Please note:- These two PAH isomers closely co-elute using the most contemporary analytical methods and both the reported concentration (and the TEQ) apply specifically to the total of the two co-eluting PAHs

Authorised by:

Amy Meunier	Analytical Services Manager
Raymond Siu	Senior Analyst-Volatile
Roopesh Rangarajan	Senior Analyst-Organic
Fang Yee Tan	Senior Analyst-Metal

Glenn Jackson
Managing Director

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

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Appendix F: Field Sheets

LFG Bore Monitoring Form

Project Name:	GWS GIANTS		**Date:**	25/05/23	
Project Number:	2207292		**Field Staff:**	JSP	
Site Address:				**Equipment:**	GA5000
Weather Conditions:	FINE, OVERCAST	**Barometric Pressure (mb):**	1015	**Relative Pressure (Pa):**	0.02 mb.
Borehole ID:	LFG03	**Bore Condition:**	GOOD	**Max Gas Flow Rate** (Take before gas readings):	-0.0 L/hr (-0.2 L/hr after)
Depth to Water (Take after gas readings):	-	**Rainfall** (mm in past 24 hours):	NONE		

	Time (start)	CO (ppm)	CH4 (%v/v)	CO2 (%v/v)	O2 (%v/v)	Balance (%v/v)	H2S (ppm)	Comments
Ambient	15:45	0	0.2	0.0	20.9	78.8	0	
Bore	15:47	7	62.8	8.8	0.2	28.1	0	
	15:48	8	63.1	8.9	0.1	28.0	0	
	15:49	7	63.1	8.8	0.1	28.0	0	
	15:50	7	63.1	8.9	0.0	28.0	0	
	15:51	7	63.1	8.9	0.0	28.0	0	
Maximum	-							

LFG Bore Monitoring Form

Project Name:	HWS HANTS		**Date:**	25/05/25	
Project Number:	2207292		**Field Staff:**	JSP	
Site Address:				**Equipment:**	GA5000
Weather Conditions:	FINE, OVERCAST	**Barometric Pressure (mb):**	1015	**Relative Pressure (Pa):**	-0.14
Borehole ID:	LFG04	**Bore Condition:**	Good	**Max Gas Flow Rate** (Take before gas readings):	-0.1 L/hr (-0.2 L/hr after)
Depth to Water (Take after gas readings):	-	**Rainfall** (mm in past 24 hours):	NONE		

	Time (start)	CO (ppm)	CH4 (%v/v)	CO2 (%v/v)	O2 (%v/v)	Balance (%v/v)	H2S (ppm)	Comments
Ambient	15:34	0	0.1	0.0	20.9	78.9	0	
Bore	15:36	1	87.8	5.6	0.2	5.9	0	
	15:37	1	88.7	5.6	0.0	5.5	0	
	15:38	0	88.9	5.6	0.0	5.3	0	
	15:39	0	89.1	5.6	0.0	5.3	0	
	15:40	0	89.1	5.6	0.0	5.3	0	
Maximum	-							

LFG Bore Monitoring Form

Project Name:	GWS GIANTS		**Date:**	25/05/23	
Project Number:	2207292		**Field Staff:**	JSP.	
Site Address:				**Equipment:**	GA5000
Weather Conditions:	FINE, OVERCAST	**Barometric Pressure (mb):**	1015	**Relative Pressure (Pa):**	-0.12
Borehole ID:	LFG01	**Bore Condition:**	Good	**Max Gas Flow Rate** (Take before gas readings):	5.1 L/hr.
Depth to Water (Take after gas readings):	-	**Rainfall** (mm in past 24 hours):	0mm		(0.1 L/hr after)

	Time (start)	CO (ppm)	CH4 (%v/v)	CO2 (%v/v)	O2 (%v/v)	Balance (%v/v)	H2S (ppm)	Comments
Ambient	15:03	0	0.1	0.0	20.9	79.0	0	
Bore	15:05	0	0.1	0.1	20.8	79.1	0	
	15:06	9	2.5	6.5	17.2	73.5	0	
	15:07	7	6.2	7.5	15.1	71.3	0	
	15:08	1	2.1	7.7	14.9	75.5	0	
	15:09	0	1.2	6.6	16.6	75.8	0	
	15:10	0	0.8	5.6	17.8	75.9	0	
	15:11	0	0.7	5.0	18.4	76.0	0	
	15:12	0	0.6	4.6	18.7	76.1	0	
Maximum	-							

LFG Bore Monitoring Form

Project Name:	GWS GIANTS		**Date:**	25/05/23	
Project Number:	2207292		**Field Staff:**	JSP	
Site Address:				**Equipment:**	GA5000
Weather Conditions:	FINE, OVERCAST	**Barometric Pressure (mb):**	1015	**Relative Pressure (Pa):**	-0.12 mb.
Borehole ID:	LFG02	**Bore Condition:**	Good	**Max Gas Flow Rate** (Take before gas readings):	-0.20 L/h.
Depth to Water (Take after gas readings):	-	**Rainfall** (mm in past 24 hours):	None.		

	Time (start)	CO (ppm)	CH4 (%v/v)	CO2 (%v/v)	O2 (%v/v)	Balance (%v/v)	H2S (ppm)	Comments
Ambient	15:24	0	0.1	0.0	20.9	79.0	0	
Bore	15:26	2	0.1	6.5	13.5	79.9	0	
	15:27	1	0.1	6.6	13.4	79.9	0	
	15:28	1	0.1	6.6	13.4	79.9	0	
	15:29	1	0.1	6.6	13.4	79.9	0	
	15:30	1	0.1	6.6	13.4	79.9	0	
Maximum	-							

LFG Bore Monitoring Form

AFC ENVIRONMENTAL

Project Name:	GWS GIANTS	**Date:**	16/6/23		
Project Number:	2207292	**Field Staff:**	AM		
Site Address:				**Equipment:**	GA5000
Weather Conditions:	SUNNY	**Barometric Pressure (mb):**	1021.5	**Relative Pressure (Pa):**	- 0.05 mb
Borehole ID:	LFG-3	**Bore Condition:**	GOOD / NO COVER ON POST	**Max Gas Flow Rate** (Take before gas readings):	+ 0.2 L/h
Depth to Water (Take after gas readings):	-	**Rainfall** (mm in past 24 hours):	NIL		AFTER + 0.1 L/h

	Time (start)	CO (ppm)	CH4 (%v/v)	CO2 (%v/v)	O2 (%v/v)	Balance (%v/v)	H2S (ppm)	Comments
Ambient	11.05	0	0	0	20.8	79.2	0	
Bore	11:10	0	63.9	12.6	0.4	22.9	1	
	11.12	1	63.9	12.5	0.4	23.3	1	
	11:17	1	62.5	12.3	0.7	24.5	1	
	11:20	1	63.1	12.6	0.5	23.7	7	H2S UP / RUN SAMPLE LONGER
	11.22	0	64.3	13.2	0.5	21.8	9	
	11.25	0	65.5	13.2	0.5	20.8	9	
	~~H2S~~							
Maximum	-							

LFG Bore Monitoring Form

AEC ENVIRONMENTAL

Project Name:	GWS GIANTS			Date:	16/6/23
Project Number:	2207292			Field Staff:	AM
Site Address:				Equipment:	GA5000
Weather Conditions:	SUNNY	Barometric Pressure (mb):	1021.85	Relative Pressure (Pa):	-0.04 mb
Borehole ID:	LFG 4	Bore Condition:	GOOD	Max Gas Flow Rate (Take before gas readings):	+0.1 L/h
Depth to Water (Take after gas readings):	-	Rainfall (mm in past 24 hours):	NONE		AFTER 0.0 L/h

	Time (start)	CO (ppm) ✓	CH4 (%v/v) ✓	CO2 (%v/v) ✓	O2 (%v/v) ✓	Balance (%v/v) ✓	H2S (ppm) ✓	Comments
Ambient	10.17	1	0	0.0	20.7	79.2	0	
Bore	10.20	1	67.7	9.8	0.1	22.4	1	
	10.22	2	66.9	9.9	0.0	23.5	3	
	10.25	1	63.4	10.0	0.3	26.8	5	
	10.28	2	57.9	10.3	0.3	32.0	7	
	10:31	2	54.6	10.4	0.3	35.2	7	
	10.35	2	46.8	10.7	0.4	43.8	8	
								FLOW AFTER 0.0L/h
Maximum	-	2	67.7	10.7	20.7	79.2	7	

LFG Bore Monitoring Form

Project Name:	GWS GIANTS		**Date:**	16/6/23	
Project Number:	2207292		**Field Staff:**	A.M	
Site Address:				**Equipment:**	GA 5000
Weather Conditions:	SUNNY	**Barometric Pressure (mb):**	1021.71	**Relative Pressure (Pa):**	+0.02 mb
Borehole ID:	LFG-2	**Bore Condition:**	GOOD	**Max Gas Flow Rate** (Take before gas readings):	0.0 L/h
Depth to Water (Take after gas readings):	—	**Rainfall** (mm in past 24 hours):	NIL		AFR 0.0 L/h

	Time (start)	CO (ppm)	CH4 (%v/v)	CO2 (%v/v)	O2 (%v/v)	Balance (%v/v)	H2S (ppm)	Comments
Ambient	10.44	0	0	0	20.9	79.1	0	
Bore	10.48	1	0.0	5.5	16.7	78	0	
	10.50	1	0.0	5.4	16.7	78	0	
	10:53	1	0.0	4.6	17.6	77.8	0	
	10.56	1	0.0	3.1	19.1	77.9	0	
	10.59	1	0.0	2.7	19.3	78.0	0	
Maximum	-	1	0	5.5	19.3	79	0	

LFG Bore Monitoring Form

AFC ENVIRONMENTAL

Project Name:	GWS GIANTS			Date:	16/6/23
Project Number:	2207292			Field Staff:	AM
Site Address:				Equipment:	GA 5000
Weather Conditions:	SUNNY	Barometric Pressure (mb):	1021.09	Relative Pressure (Pa):	+0.18
Borehole ID:	LFG-1	Bore Condition:	GOOD	Max Gas Flow Rate (Take before gas readings):	- 8.5 L/h
Depth to Water (Take after gas readings):	-	Rainfall (mm in past 24 hours):	NIL		(-2.2 L/h)

	Time (start)	CO (ppm)	CH4 (%v/v)	CO2 (%v/v)	O2 (%v/v)	Balance (%v/v)	H2S (ppm)	Comments
Ambient	11:34	0	0	0	21.5	78.5	0	
Bore	11:35	0	1.7	5.3	17.0	74.0	0	
	11:42	0	0.6	5.7	18.4	75.4	0	
	11:44	1	0.5	4.5	19.2	75.4	0	
	11:48	0	0.3	3.3	20.7	75.7	0	
	11:51	0	0.3	2.9	20.5	76.1	0	
Maximum	-							

Vapour Monitoring Field Sheet - Summa Canisters

ARC ENVIRONMENTAL

Project Information

Date: 27/06/23	Site: UWG L.O.E
Vapour Monitoring Well ID: LFH01	Project No: 2207242
Sample ID: LFH01_220623	Laboratory Used: ALS
Sampler name: DT	

Equipment Information

Pump used (type/ID): H/Pump	Rotometer/Flow Meter (type/ID):
Multi-Gas Meter (type/ID) GA-5000	Timer ID: I-phone
PID (type/lamp/ID): Gx-6000	LEL (Type/ID): Gx-6000

Leak Testing

Leak Test Performed (Y/N):	Yes
Method:	Isopropyl
Time:	12.56
Results*:	55.6

* Reference additional field sheets, if necessary

Purging

Planned Target Flow Rate (ml/min): 60mL/min	Planned Purge Volume (L) 1000mL
Purge Start Time: 12.56	Purge Stop Time:
Purge Rate (ml/min)	Total Purge Volume:

Sampling

Summa Type:	ALS 1.4 L Mini		
Flow Controller ID:	555137		
Canister ID:	12385		
Start Time:	12.56		
Start Pressure:	-30		
Flow Rate (ml/min)	60mL		
Stop Time:	1.21		
Stop Pressure:	-5		
Total Volume Collected:	~1.3L		

Field Readings

PID (ppm):	0.0	Time: 12.47	CH4 (ppm):	0.2	Time: 12.47
PID (ppm):	0.0	Time: 1.22	CH4 (ppm):	0.4	Time: 1.22
LEL (%):	0	Time: 12.47	CO2 (ppm):	4.6	Time: 12.47
LEL (%):	0	Time: 1.22	CO2 (ppm):	3.9	Time: 1.22
Oxygen (%):	17.8	Time: 12.47	CO (ppm):	1	12.47
Oxygen (%):	18.8	Time: 1.22	CO (ppm)	1	1.22

Weather Information

Outside Temperature: 14°C	Barometric Pressure: 1017
Wind Speed/Direction: 0 km/L	Humidity: 61.1
Significant rain within 12 hours of sampling?: Yes.	

Additional Notes (e.g. condition of well, changes observed, photo notes, etc.)

N/A.

Notes: Flow rate through sample train should be approximately 100mL/min.
Purging only to include bore sand pack if new installation.

Vapour Monitoring Field Sheet - Summa Canisters

Project Information

Date: 22/08/2023	Site: GWS Gichen C.O.E, NSW
Vapour Monitoring Well ID: LFL02	Project No: 2207292
Sample ID: LFL02-220823	Laboratory Used: ALS
Sampler name: DT	

Equipment Information

Pump used (type/ID): H/Pump	Rotometer/Flow Meter (type/ID):
Multi-Gas Meter (type/ID) GA5000	Timer ID: I-phone
PID (type/lamp/ID): GX-6000	LEL (Type/ID): GX-600V

Leak Testing

Leak Test Performed (Y/N): Yes	
Method: Isopropyl	
Time: 3.39	
Results*: 177.5	* Reference additional field sheets, if necessary

Purging

Planned Target Flow Rate (ml/min): 60	Planned Purge Volume (L) ~1000mL
Purge Start Time: 3.37	Purge Stop Time: 4.05
Purge Rate (ml/min) 60	Total Purge Volume: ~1000mL

Sampling

Summa Type:	ALS 1.4L Mini		
Flow Controller ID:	555190		
Canister ID:	14189		
Start Time:	3.37		
Start Pressure:	-30		
Flow Rate (ml/min)	60		
Stop Time:	4.05		
Stop Pressure:	-5		
Total Volume Collected:	~1.3L		

Field Readings

PID (ppm):	-	Time:	-	CH4 (ppm): 0.0	Time: 3.35
PID (ppm):	-	Time:	-	CH4 (ppm): 0.0	Time: 4.08
LEL (%):	-	Time:	-	CO2 (ppm): 3.8	Time: 3.35
LEL (%):	-	Time:	-	CO2 (ppm): 3.4	Time: 4.08
Oxygen (%):	18.7	Time:	3.35	CO (ppm) 1	3.35
Oxygen (%):	19.6	Time:	4.04	CO (ppm) 1	4.08

Weather Information

Outside Temperature: 13°C	Barometric Pressure: 1016mb
Wind Speed/Direction: 7km/L NW	Humidity: 74%
Significant rain within 12 hours of sampling?: Yes.	

Additional Notes (e.g. condition of well, changes observed, photo notes, etc.)

-

Notes: Flow rate through sample train should be approximately 100mL/min.
Purging only to include bore sand pack if new installation.

Vapour Monitoring Field Sheet - Summa Canisters

ARC ENVIRONMENTAL

Project Information

Date: 22/06/2023	Site: GWS Giants C.O.E
Vapour Monitoring Well ID: LFH03	Project No: 2207292
Sample ID: LFH03_220623	Laboratory Used: ALS
Sampler name: Declan	

Equipment Information

Pump used (type/ID): H Pump.	Rotometer/Flow Meter (type/ID):
Multi-Gas Meter (type/ID) GA5000	Timer ID: I-phone
PID (type/lamp/ID): GX-6000	LEL (Type/ID): GX-6000

Leak Testing

Leak Test Performed (Y/N): YES	
Method: Isopropyl	
Time: 1.58 pm	
Results*: 52.8	* Reference additional field sheets, if necessary

Purging

Planned Target Flow Rate (ml/min): 60mL/min	Planned Purge Volume (L) ~1000mL
Purge Start Time: 1.56pm	Purge Stop Time:
Purge Rate (ml/min) 60mL/min	Total Purge Volume: ~1000mL

Sampling

Summa Type:	ALS 1.4L MTH	ALS 1.4L MTH	
Flow Controller ID:	DSS082	DSS082	
Canister ID:	14229	5489	
Start Time:	1.56 pm	"	
Start Pressure:	-30	"	
Flow Rate (ml/min)	~60mL/min	"	
Stop Time:	2.37pm	"	
Stop Pressure:	-4	"	
Total Volume Collected:	~1.3L	"	

Field Readings

PID (ppm): ~~2.4~~ -	Time: 1.39		CH4 (ppm): 69.8	Time: 1.39	
PID (ppm): -	Time: 2.39		CH4 (ppm): 73.6	Time: 2.39	
LEL (%): 8 -	Time: 1.39		CO2 (ppm): 12.2	Time: 1.39	
LEL (%): -	Time: 2.39		CO2 (ppm): 13.0	Time: 2.39	
Oxygen (%): 1.2	Time: 1.39		CO (ppm) 2	Time: 1.39	
Oxygen (%): 0.7	Time: 2.39		CO (ppm) 1	Time: 2.39	

Weather Information

Outside Temperature: ~14°C	Barometric Pressure: 1017
Wind Speed/Direction: 0 km/L	Humidity: 61%
Significant rain within 12 hours of sampling?: Yes	

Additional Notes (e.g. condition of well, changes observed, photo notes, etc.)

Notes: Flow rate through sample train should be approximately 100mL/min.
Purging only to include bore sand pack if new installation.

Vapour Monitoring Field Sheet - Summa Canisters

Project Information

Date: 22/06/2023	Site: AWS Giants C.D.E, NSW
Vapour Monitoring Well ID: LFH04	Project No: 2207292
Sample ID: LFH04_220623	Laboratory Used: ALS
Sampler name: Declan	

Equipment Information

Pump used (type/ID): H/Pump	Rotometer/Flow Meter (type/ID):
Multi-Gas Meter (type/ID) GA5000	Timer ID: I-phone
PID (type/lamp/ID): GX-6000	LEL (Type/ID): GX-6000

Leak Testing

Leak Test Performed (Y/N): Yes	
Method: Isopropyl	
Time: 3.03	
Results*: 176.3	* Reference additional field sheets, if necessary

Purging

Planned Target Flow Rate (ml/min): 60	Planned Purge Volume (L) ~1000mL
Purge Start Time: 3.01	Purge Stop Time: 3.24
Purge Rate (ml/min) 60	Total Purge Volume: ~1000mL

Sampling

Summa Type:	ALS 1.4L Mini		
Flow Controller ID:	555267		
Canister ID:	10768		
Start Time:	3:01		
Start Pressure:	-30		
Flow Rate (ml/min)	60.		
Stop Time:	-5		
Stop Pressure:	3.24		
Total Volume Collected:	~1.3L		

Field Readings

PID (ppm): -	Time: 3.00	CH4 (ppm): 47.9	Time: 3.00
PID (ppm): -	Time: 3.27	CH4 (ppm): 48.2	Time: 3.27
LEL (%): -	Time: 3.00	CO2 (ppm): 10.6	Time: 3.00
LEL (%): -	Time: 3.27	CO2 (ppm): 10.6	Time: 3.27
Oxygen (%): 0.1	Time: 3.00	CO (ppm): 2	3.00
Oxygen (%): 0.1	Time: 3.27	CO (ppm): 1	3.27

Weather Information

Outside Temperature: 14°C	Barometric Pressure: 1016
Wind Speed/Direction: 2km/L NW	Humidity: 73%
Significant rain within 12 hours of sampling?: Yes	

Additional Notes (e.g. condition of well, changes observed, photo notes, etc.)

Notes: Flow rate through sample train should be approximately 100mL/min.
Purging only to include bore sand pack if new installation.

LFG Bore Monitoring Form

ARC ENVIRONMENTAL

Project Name:	2207292 → FDC GWS Giants Andilo	**Date:**	22/06/23
Project Number:	2207292	**Field Staff:**	Declan
Site Address:	GWS Giants C.B.E, NSW	**Equipment:**	GA-5000
Weather Conditions:	14°C, Clear	**Barometric Pressure (mb):**	1017mb
Borehole ID:	LFG01	**Bore Condition:**	Good
Depth to Water (Take after gas readings):	-	**Rainfall** (mm in past 24 hours):	Yes
		Relative Pressure (Pa):	-0.05mb
		Max Gas Flow Rate (Take before gas readings):	0.1 l/h / 0.1 l/h (BEFORE / AFTER)

	Time (start)	CO (ppm)	CH4 (%v/v)	CO2 (%v/v)	O2 (%v/v)	Balance (%v/v)	H2S (ppm)	Comments
Ambient	12.19	1	0.0	0.1	20.6	79.3	0	
Bore	12.26	1	1.1	4.4	18.8	75.7	0	
	12.27	2	1.6	6.0	17.9	74.4	0	
	12.28	1	2.3	6.7	16.6	74.5	0	
	12.29	1	2.5	8.2	13.4	76.0	0	
	12.30	1	0.9	9.0	10.6	79.2	0	
	12.31	1	0.7	8.8	12.6	78.4	0	
	12.32	1	0.5	7.1	14.6	77.8	0	
	12.33	1	0.4	6.9	15.1	77.4	0	
Maximum	-	2	2.5	9.0	18.8	79.3	0	

LFG Bore Monitoring Form

ARC ENVIRONMENTAL

Project Name:	FDS GWS Giants Audit		**Date:**	22/06/2023	
Project Number:	2207292		**Field Staff:**	Dellan	
Site Address:	GWS Giants C+O.E, NSW			**Equipment:**	GA5000
Weather Conditions:	15°C, Overcast	**Barometric Pressure (mb):**	1016	**Relative Pressure (Pa):**	0.07kL
Borehole ID:	HFH02	**Bore Condition:**	Good	**Max Gas Flow Rate** (Take before gas readings):	0.0 l/h BEFORE / 0.2 l/h AFTER
Depth to Water (Take after gas readings):	-	**Rainfall** (mm in past 24 hours):	Yes		

	Time (start)	CO (ppm)	CH4 (%v/v)	CO2 (%v/v)	O2 (%v/v)	Balance (%v/v)	H2S (ppm)	Comments
Ambient	3.08	1	0.0	0.1	21.0	79.0	0	
Bore	3.12	1	0.0	5.0	16.6	78.4	0	
	3.13	1	0.0	5.1	16.9	78.1	0	
	3.14	1	0.0	5.0	17.0	78.0	0	
	3.15	1	0.0	4.9	17.2	77.9	0	
	3.16	1	0.0	4.7	17.5	77.8	0	
Maximum	-	1	0.0	5.1	17.5	78.4	0	

LFG Bore Monitoring Form

Project Name:	FDC GWS Giants Andib		**Date:**	22/06/2023	
Project Number:	2207292		**Field Staff:**	Declan	
Site Address:	GWS Giants COE, NSW			**Equipment:**	GA-5000
Weather Conditions:	14°C Clear	**Barometric Pressure (mb):**	1017 mb	**Relative Pressure (Pa):**	0.07mb
Borehole ID:	LFG03	**Bore Condition:**	Good	**Max Gas Flow Rate** (Take before gas readings):	0.0 L/h Before / 0.2 L/h After
Depth to Water (Take after gas readings):	-	**Rainfall** (mm in past 24 hours):	Yes		

	Time (start)	CO (ppm)	CH4 (%v/v)	CO2 (%v/v)	O2 (%v/v)	Balance (%v/v)	H2S (ppm)	Comments
Ambient	1.09	1	0.0	0.1	20.8	79.2	0	
Bore	1.13	1	74.5	12.7	0.7	12.0	0	
	1.14	1	74.9	12.9	0.1	12.2	0	
	1.15	1	74.8	12.8	0.0	12.4	0	
	1.16	1	74.8	12.9	0.0	12.3	0	
	1.17	1	75.0	12.9	0.0	12.2	0	
Maximum	-	1	75.0	12.9	0.7			

LFG Bore Monitoring Form

ARC ENVIRONMENTAL

Project Name:	FDC GWS Giants Audit		**Date:**	22/06/2023	
Project Number:	2207292		**Field Staff:**	Declan	
Site Address:	GWS Giants C.O.E, NSW			**Equipment:**	GA5000
Weather Conditions:	15°C, Overcast	**Barometric Pressure (mb):**	1016 mb	**Relative Pressure (Pa):**	0.07 mb
Borehole ID:	AFG04	**Bore Condition:**	Good	**Max Gas Flow Rate** (Take before gas readings):	0.1 l/h / 0.3 l/h (BEFORE / AFTER)
Depth to Water (Take after gas readings):	-	**Rainfall** (mm in past 24 hours):	Yes		

	Time (start)	CO (ppm)	CH4 (%v/v)	CO2 (%v/v)	O2 (%v/v)	Balance (%v/v)	H2S (ppm)	Comments
Ambient	2.14	1	0.0	0.1	21.2	78.8	0	
Bore	2.17	2	47.3	10.7	0.3	41.8	0	
	2.18	1	47.7	10.7	0.0	41.5	0	
	2.19	2	47.8	10.7	0.0	41.5	0	
	2.20	1	47.8	10.7	0.0	41.5	0	
	2.21	2	47.9	10.7	0.0	41.4	0	
Maximum	-	2	47.9	10.7	0.3	41.8	0	

Appendix G: BoM Weather Data

Bankstown, New South Wales
May 2023 Daily Weather Observations

Australian Government
Bureau of Meteorology

Date	Day	Temps		Rain	Evap	Sun	Max wind gust			9am						3pm					
		Min	Max				Dirn	Spd	Time	Temp	RH	Cld	Dirn	Spd	MSLP	Temp	RH	Cld	Dirn	Spd	MSLP
		°C	°C	mm	mm	hours		km/h	local	°C	%	eighths		km/h	hPa	°C	%	eighths		km/h	hPa
1	Mo	7.6	20.8	0.2			W	30	15:57	14.0	75		NW	6	1015.3	20.4	38	2	W	11	1011.6
2	Tu	7.3	22.3	0			WSW	37	12:28	16.6	62		WNW	13	1016.2	21.7	42	4	W	13	1014.2
3	We	7.8	24.3	0			WNW	52	10:52	19.0	56		N	17	1014.3	23.7	26		WNW	22	1010.7
4	Th	7.5	20.9	0			WNW	37	00:57	14.4	52		WSW	13	1020.0	19.4	47		ESE	9	1018.3
5	Fr	8.3	22.2	0			NNE	26	15:17	13.5	72		W	7	1019.7	21.4	38		N	15	1015.0
6	Sa	6.2	22.1	0			W	24	12:21	12.8	73		WSW	6	1019.4	21.4	34		WSW	9	1015.5
7	Su	7.8	16.5	0			SW	52	21:33	12.5	68	8	W	15	1016.3	16.0	33		W	24	1012.9
8	Mo	7.0	17.6	7.0			WSW	52	09:47	12.7	43		WSW	20	1015.2	17.1	29	8	SW	17	1015.7
9	Tu	6.7	20.1	0			SW	31	09:57	13.6	55		WSW	9	1021.6	18.0	46	8	SSW	13	1021.7
10	We	8.9	20.3	0			E	24	14:35	13.6	58		W	11	1027.5	19.2	44		ESE	13	1025.4
11	Th	8.0	21.8	0			ESE	22	15:48	13.9	72		WNW	9	1030.5	20.1	48	2	NNE	11	1027.2
12	Fr	7.1	24.1	0			NE	17	16:25	13.2	80		WNW	7	1030.3	24.0	31		ENE	9	1026.8
13	Sa	9.0	21.8	0			SE	33	16:04	14.7	79		W	7	1032.2	18.9	68	8	ESE	17	1029.6
14	Su	10.8	20.7	5.2			ESE	26	14:40	15.7	83	1	WNW	4	1030.9	19.0	70	4	SE	19	1027.0
15	Mo	9.4	21.4	0.2			SE	24	14:28	13.0	97	8	WNW	6	1026.5	18.7	72	7	E	15	1022.3
16	Tu	8.4	22.3	0.2			SSW	33	23:59	13.4	90		N	7	1020.4	21.1	48	2	SSE	19	1016.9
17	We	11.1	18.7	0			S	39	11:18	13.9	67	2	WSW	9	1023.8	16.7	49	6	S	19	1022.3
18	Th	7.5	17.4	0.2			S	28	14:24	12.7	66	7	SW	15	1021.6	17.1	55	8	SSE	19	1017.7
19	Fr	6.4	19.3	0			SW	24	09:04	11.1	65		WSW	13	1019.0	18.9	31		WSW	9	1014.8
20	Sa	3.5	19.1	0			WSW	35	15:35	11.2	64		NW	7	1017.2	18.2	37		W	19	1013.7
21	Su	5.9	19.3	0			WSW	57	13:40	14.6	54	1	NW	7	1014.5	17.6	43		W	30	1014.1
22	Mo	4.0	20.9	0			WNW	19	10:35	11.6	65		W	7	1026.9	19.7	28		WNW	2	1024.1
23	Tu	3.1	20.7	0			E	20	15:13	10.4	66		NNW	7	1028.9	19.1	42		ESE	15	1025.9
24	We	4.5	21.7	0			WNW	15	09:21	9.5	78		NW	7	1027.5	20.8	31		WNW	7	1023.3
25	Th	2.8	19.4	0			NNW	19	10:51	9.1	86			Calm	1020.9	19.3	37	7	N	7	1015.0
26	Fr	7.1	16.6	0			SSE	52	10:27	12.3	60	8	SSW	4	1011.6	15.5	49	8	SW	19	1014.5
27	Sa	2.9	18.5	0			WSW	30	15:23	9.8	66		WNW	9	1019.1	16.6	44		WSW	15	1015.1
28	Su	0.7	17.9	0			WNW	35	14:22	8.1	71		WNW	7	1016.5	16.8	41	2	W	19	1013.1
29	Mo	4.6	21.1	0			W	39	14:03	11.1	73		SE	4	1017.1	20.0	35		W	20	1015.7
30	Tu	4.0	21.4	0			WSW	31	13:53	11.6	69		NW	6	1023.8	20.9	40		W	17	1020.0
31	We	4.8	21.4	0			NNW	20	13:52	12.9	76	4	WNW	6	1021.1	20.6	50	4	WNW	9	1016.5
Statistics for May 2023																					
	Mean	6.5	20.4							12.8	69	4		8	1021.5	19.3	42	5		14	1018.6
	Lowest	0.7	16.5							8.1	43	1		Calm	1011.6	15.5	26	2	WNW	2	1010.7
	Highest	11.1	24.3	7.0			WSW	57		19.0	97	8	WSW	20	1032.2	24.0	72	8	W	30	1029.6
	Total			13.0																	

Observations were drawn from Bankstown Airport AWS {station 066137}

Some cloud observations are from automated equipment; these are somewhat different to those made by a human observer and may not appear every day.

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Bankstown, New South Wales
June 2023 Daily Weather Observations

Australian Government
Bureau of Meteorology

Date	Day	Temps		Rain	Evap	Sun	Max wind gust			9am						3pm					
		Min	Max				Dirn	Spd	Time	Temp	RH	Cld	Dirn	Spd	MSLP	Temp	RH	Cld	Dirn	Spd	MSLP
		°C	°C	mm	mm	hours		km/h	local	°C	%	eighths		km/h	hPa	°C	%	eighths		km/h	hPa
1	Th	9.6	21.3	0			N	19	13:01	13.3	85	8		Calm	1018.2	19.5	58	7		Calm	1017.0
2	Fr	8.8	21.6	0			NNE	20	13:51	14.7	85	8	NW	7	1025.5	20.0	67	5	E	13	1022.6
3	Sa	12.3	24.7	0			SE	31	14:55	14.4	99	7	NW	6	1025.4	22.8	51	5	SE	24	1023.1
4	Su	14.3	18.5	0			ESE	33	15:22	17.5	68	8	SSE	13	1033.4	17.7	60	8	ESE	22	1031.8
5	Mo	11.1	20.0	0.2			ENE	30	15:08	14.4	83	7	SW	7	1032.6	19.2	52	8	N	7	1028.2
6	Tu	11.1	20.4	0			NE	22	15:02	14.0	93	8		Calm	1029.8	20.2	56	5	NE	13	1026.1
7	We	8.5	21.3	0			NE	30	12:06	13.2	94	1		Calm	1027.2	21.0	56		NE	11	1022.7
8	Th	7.9	18.6	0			N	30	13:26	11.6	99	8	W	4	1017.4	15.6	84	8	N	13	1011.6
9	Fr	3.8	20.8	0.2			W	33	14:31	10.2	96		ESE	6	1016.6	20.0	38		WNW	20	1014.7
10	Sa	3.3	18.9	0.8			WSW	26	11:36	10.8	76		WNW	6	1023.5	18.6	35		NW	7	1021.3
11	Su	2.4	18.8	0			SE	19	16:36	8.9	77		WNW	7	1026.6	18.1	40		ENE	2	1022.4
12	Mo	3.6	20.7	0			NNW	13	11:10	7.6	97	3		Calm	1022.9	20.1	49	1	WNW	4	1017.6
13	Tu	6.2	20.8	0			WNW	33	18:27	11.1	99			Calm	1015.0	19.6	51		N	9	1010.4
14	We	5.9	18.5	0			WNW	43	14:41	13.7	57		NW	7	1013.4	18.0	27		W	17	1012.5
15	Th	4.0	18.9	0			WSW	33	12:47	9.8	64		WNW	7	1018.1	18.2	38		WNW	17	1015.3
16	Fr	2.8	20.4	0			SW	24	12:07	9.1	74		WNW	9	1022.2	19.9	39		W	7	1019.6
17	Sa	2.9	19.8	0			NW	13	11:46	8.0	95		W	7	1022.8	19.5	35		N	7	1017.0
18	Su	0.6	19.8	0			WNW	48	15:18	6.2	93			Calm	1016.2	18.1	34	6	WNW	17	1012.7
19	Mo	0.3	17.6	0			WNW	39	21:21	4.3	90			Calm	1017.1	17.0	29		NW	19	1011.6
20	Tu	2.8	16.4	0			WSW	28	14:13	9.2	54		W	9	1020.8	15.9	31		SSE	11	1019.9
21	We	0.8	17.2	0			WNW	17	09:32	7.3	69		NW	9	1025.2	16.2	33		N	4	1022.1
22	Th	4.3	15.2	0			NW	13	12:01	8.7	75	8	NW	9	1021.0	14.4	59	8	NW	2	1015.8
23	Fr	8.5	19.2	7.2			WNW	39	12:18	11.5	90		N	9	1009.3	18.9	33	1	WNW	17	1006.5
24	Sa	3.9	20.5	0			WNW	30	13:02	11.7	67		NNW	4	1014.6	20.2	28		NW	11	1010.5
25	Su	2.1	20.6	0			WNW	48	12:57	10.5	68			Calm	1012.9	19.9	22		WNW	20	1009.8
26	Mo	7.9	19.2	0			W	57	17:46	15.3	42		NNE	11	1013.7	18.2	32		W	22	1012.7
27	Tu	6.5	18.4	0			WNW	28	12:52	12.7	59		NW	7	1022.0	17.9	40	1	SW	15	1018.6
28	We	10.3	11.6	1.2			NNW	17	12:41	10.7	90	8	NW	7	1017.9	10.5	90	8	WNW	2	1013.1
29	Th	5.7	15.7	3.6			SW	30	11:24	10.2	68		WSW	11	1017.5	15.2	38		SW	19	1015.6
30	Fr	5.9	18.5	0			WSW	37	15:40	12.6	51		W	15	1018.2	17.9	39		WSW	20	1016.9
Statistics for June 2023																					
Mean		5.9	19.1							11.1	78	6		5	1020.6	18.3	44	5		12	1017.3
Lowest		0.3	11.6							4.3	42	1		Calm	1009.3	10.5	22	1		Calm	1006.5
Highest		14.3	24.7	7.2			W	57		17.5	99	8	W	15	1033.4	22.8	90	8	SE	24	1031.8
Total				13.2																	

Observations were drawn from Bankstown Airport AWS {station 066137}
Some cloud observations are from automated equipment; these are somewhat different to those made by a human observer and may not appear every day.

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