Aussie Skips Recycling

Bellfrog St Site Upgrade

Phase 2 Detailed Site Investigation

For

State Significant
Development Application

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Statement of capacity

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Acknowledgement of Country

4Pillars acknowledges the Traditional Owners of the land on which this site is located, the people of the Eora and Dharug nations. We pay our respects to their Elders past and present.

Disclosure statement

Mr James Hammond, CEO of 4Pillars is engaged, via an EnviroNow services agreement, to provide environmental consulting services to Aussie Skips Recycling Pty Ltd.

This document has been prepared by 4Pillars and Mr Hammond in their capacity as independent environmental professionals. The statements and conclusions of this document are based on an objective evaluation of the available facts and data.

No incentive or deterrence has been proffered to 4Pillars, any employee or shareholder of 4Pillars in relation to reaching a particular conclusion or achieving a particular outcome in relation to this matter.

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To the best of our knowledge, the contents of this report and the statements and conclusions made in this report are a true and accurate reflection of site activities and they are neither false nor misleading.

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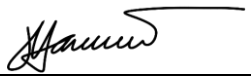
Document Control

Date	Version number	Author	Reviewer	Signature
4 March 2025	Rev0	Mr James Karagiannis Dr Gunnar Haid	Mr James Hammond	
19 June 2025	Rev01	Mr James Karagiannis	Mr James Hammond	

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Executive Summary

4Pillars Environmental Consulting Pty Ltd (**4Pillars**) have prepared this Detailed Site Investigation (**DSI**) report to support Aussies Skips (**Aussies**), State Significant Development Application (**SSDA**) to upgrade their existing waste facility Site located at 13 Bellfrog Street, Greenacre NSW 2190 (the **Site**).

This DSI is required as part of the response to the Secretary's Environmental Assessment Requirements (**SEARs**). This investigation has been taken in consideration with the *NSW EPA Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites (April 2020) (*the Reporting Guidelines*)*.

The principal objectives of this DSI were to identify on-site sources of contamination and provide an assessment of the extent and nature of site contamination, if any exists. It involved a review of site history (using publicly available information) and information gathered from a site inspection, as well as sampling of on-site soils (and groundwater if encountered). This assessment also considers whether surface materials at the site pose any risks to the environment or human health.

The Site is located in a predominantly commercial/industrial area and is operated as a resource recovery facility. The proposed development includes upgrades to the existing waste facility. The Site is predominantly covered with concrete hardstand, with the only exposed vegetation including a "vegetated swale" area to the north-east corner of the Site

The Site's history can reasonably be summarised as part of an area that had been quarried for commercial use as far back as 1943. The quarry had been back-filled sometime between 1998 and 2004, where it was then developed into and industrial business park. The Site is located within a Class 5 Acid Sulfate Soil Risk Category, however no intrusive earthworks are included in the proposed development and therefore no further investigation into potential ASS is considered necessary.

Two surface soil samples were collected from the vegetated swale area (0.4m depth) and submitted to the selected NATA accredited laboratory for analysis. The surface soil material in the vegetated swale was found to consist of medium-grained sandy-silty fill, of dark brown to light brown in colour. Samples were dry to moist, with medium plasticity. Minor ash was observed in both samples. Visible assessment of samples did not indicate the presence of asbestos in the soils or the Site's surface, nor was any ACM visible in any of the soil borings. Two surface water samples were collected in the adjacent Coxs Creek to identify any groundwater migration off-site. Samples were collected upstream and downstream, relative to the Site, in order to narrow the source and pathway to the Site. Three sub-slab vapour samples were collected using Summa Cannisters to assess the presence of soil vapour. Results of the laboratory analysed soil samples showed concentrations of all analytes to be below the adopted site criteria. The impact is considered to pose a low risk and does not warrant further investigation. Results of the laboratory analysed surface water samples showed concentrations of all analytes to be below the adopted site criteria, except for cadmium, copper and zinc in sample US, and copper and zinc in sample DS. No patternable increase in contaminant concentration has been observed between upstream and downstream samples, indicating that contamination is inherent to Coxs Creek and not attributable to the Site. Elevated cadmium, copper and zinc levels are not considered to be the result of on-site impact and no further assessment into groundwater or surface water at the Site is considered necessary.

Results of the laboratory analysed soil vapour samples showed concentrations of all analytes to be below the adopted site criteria with the exception of methane in one location (V2). A second soil vapour survey focussing on the area of methane impact was conducted. No methane concentrations in the subsurface were detected.

4Pillars recommends additional measurements of methane at all vapour sampling points should be conducted on a twice-yearly basis to increase confidence surrounding methane risk and establish a patternable dataset of methane concentration. A threshold level of 1% (volume/volume) is to be adopted to inform further investigations – as outlined in Section 5.3 of the NSW EPA Solid Waste Landfills Environmental Guidelines 2016. Where the threshold is consistently exceeded in the first year of monitoring, further investigation should be undertaken. These measurements should be carried out for at least one year at which point the frequency of measurements should be reviewed.

Based on the information outlined in this report, it is considered that the Site is suitable for the proposed land use without any further environmental assessment.

1 Introduction

4Pillars Environmental Consulting Pty Ltd (**4Pillars**) have prepared this Detailed Site Investigation (**DSI**) report to support Aussies Skips (**Aussies**), State Significant Development Application (**SSDA**) to upgrade their existing waste facility Site located at 13 Bellfrog Street, Greenacre NSW 2190 (the **Site**).

This DSI is required as part of the response to the Secretary's Environmental Assessment Requirements (**SEARs**). The SEARs state the need for a:

site contamination assessment in accordance with *Managing Land Contamination Planning Guidelines: SEPP 55 – Remediation of Land (DUAP, 1988)*, including:

- Characterisation of the nature and extent of any contamination on the site and surrounding area

This investigation has been taken in consideration with the *NSW EPA Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites (April 2020)* (the Reporting Guidelines). The site contamination assessment is to be conducted in accordance with the *Managing Land Contamination Planning Guidelines: SEPP 55 – Remediation of Land (DUAP, 1988)*, as outlined in the SEARs.

1.1 Objectives

The principal objectives of this DSI were to identify on & off-site sources of contamination and provide an assessment of the extent and nature of site contamination, if any exists, by reviewing the Site history (using publicly available information) and conducting intrusive ground investigations. This assessment also considers whether the Site poses any risks to the environment or human health.

1.2 Scope of work

4Pillars' scope of work was as follows:

- Desktop review to assess the Site conditions.
- Review of site history.
- Identification of potential areas of environmental concern (AECs) and associated contaminants of potential concern (COPCs).
- Development of a Conceptual Site Model (CSM).
- Conduct site inspections including sampling of soils and, if encountered, groundwater.
- Perform a Tier 1 Risk assessment.
- Preparation and delivery of a report detailing the above with recommendations.

1.3 The Proposal

The proposed upgrades to the existing waste facility will include the construction and operation of a materials recovery facility (MRF). The proposal includes minor demolition, alterations to existing site components, installation of a fixed waste processing plant and site infrastructure, construction of environmental conservation measures, and the ongoing operation of the MRF.

The MRF will have two main buildings, a waste receival building and a processing building. These will be connected by an enclosed conveyor. There will be an open yard between these buildings to allow truck access for delivery of waste and dispatch of recovered products and residual waste.

The MRF will accept and recycle, construction and demolition (C&D) waste, commercial and industrial (C&I) waste and non-putrescible municipal solid waste (MSW), including building and demolition (B&D) wastes such as brick, asphalt, concrete and metals. It is proposed that up to 199,000 t of waste will be accepted and processed in any 12-month period. It is proposed to amend the site's operating hours compared to those currently approved.

MRF operations will include:

- receipt of waste via heavy road vehicles
- storage of waste in the receival building
- handling of waste by the conveyor and mobile plant
- processing of waste, including sifting, picking and screening, using mobile plant and the fixed waste processing plant

- storage of recovered products and residual waste
- dispatch of recovered products and residual waste by heavy road vehicles
- ancillary activities including operation of a workshop, employee parking, overnight truck parking, equipment storage, maintenance, diesel fuel storage in a self-contained fuel tank, water treatment, waste sampling, quality assurance and use of the site's existing facilities.

There is no works proposed to the hardstand or the vegetated swale area and proposed works are not anticipated to extend into the subsurface. There will be no expansion of the existing footprint.

Further information on the Proposed development can be obtained in the Environmental Impact Statement.

1.4 Key guidelines and regulations

The provisions of the *State Environmental Planning Policy (Resilience and Hazards) 2021* (referred to herein as SEPP R&H) (formerly *SEPP 55 – Remediation of Land*) relate to any properties where uncertainty exists regarding the site history and potential contamination. As such, this DSI has been written with reference to the following relevant legislation, regulations, relevant technical standards and guidelines

- *State Environmental Planning Policy (Resilience and Hazards) 2021* (formerly SEPP 55)*;*
- NSW Environment Protection Authority *Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites 2020;* and
- *National Environmental Protection (Assessment of Site Contamination) Measure (NEPM) 1999* (as amended 2013).
- The SEARs.

2 Methodology

The below figure outlines an overview of key steps completed as part of this DSI assessment. Detailed methodologies are provided in some sections were relevant.

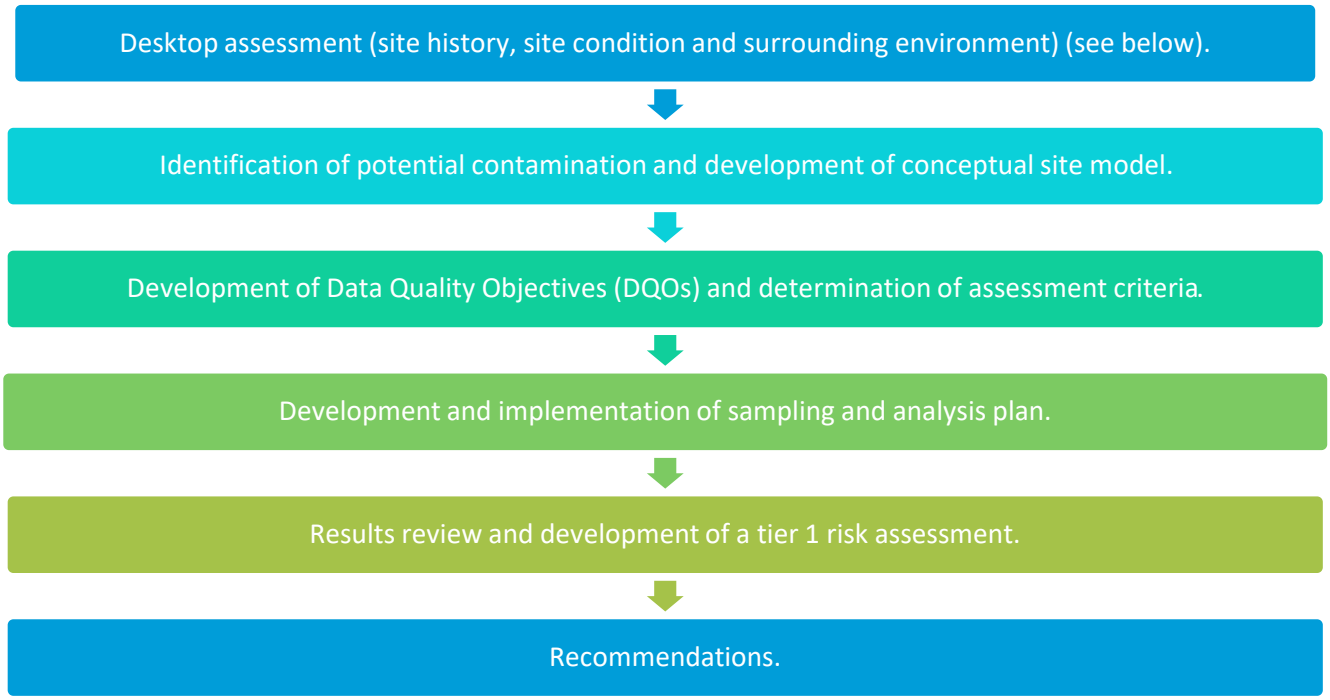

Figure 1: Methodology overview.

2.1 Desktop assessment

The Desktop assessment included:

- Review of geological maps.
- Review of available groundwater data.

- Acid Sulfate Soil Risk Maps
- Historical aerial photographs.
- Historical contamination assessment (if any).
- Historical Land Title search (if appropriate).
- NSW Environment Protection Authority (EPA) Contaminated Land Register searches.
- Review of past development applications for the Site.
- Interviews with on-site personnel.

3 Site Details and the Existing Environment

3.1 Site overview

Table 1: Site overview.

<table>
<tr><td colspan="2">Site overview</td></tr>
<tr><td>Site common name</td><td>Aussie Recycling Greenacre</td></tr>
<tr><td>Lot(s) and Street Address</td><td>LOT 15 DP1133214 13 Bellfrog Street, Greenacre, 2190, NSW</td></tr>
<tr><td>Local Government Area</td><td>Strathfield</td></tr>
<tr><td>Local Environmental Plan & Development Control Plan</td><td>- Strathfield Local Environmental Plan 2012
- Strathfield Consolidated Development Control Plan 2005</td></tr>
<tr><td>Zoning</td><td>E4 – General Industrial (Strathfield Local Environmental Plan 2012)</td></tr>
<tr><td>Current site use</td><td>Waste facility</td></tr>
<tr><td>Operator</td><td>Aussie Skips Recycling Pty Ltd (ABN 23 614 855 506)</td></tr>
<tr><td colspan="2">Active Approvals</td></tr>
<tr><td>Active Development Consent(s)</td><td>
<table>
<tr><th>Development consent ID</th><th>Date determined</th><th>Purpose</th></tr>
<tr><td>DA2012/175 (Strathfield City Council)</td><td>19/02/2013</td><td>“Construction of an industrial warehouse building with an associated workshop and use as a materials handling yard".</td></tr>
<tr><td>CDC 210597</td><td>19/03/2021</td><td>‘Proposed Roof Awning extension and Installation of 2 in ground Weighbridges and inground Wheel Rumble’.</td></tr>
</table>
DA2012/175 is the current consent and is referred to as the ‘Consent’ throughout this report.
</td></tr>
<tr><td>Environment Protection Licence (EPL)</td><td>Environment Protection Licence number: 21389
Scheduled activities: Waste storage
There are three existing licensed monitoring points identified in the current EPL, all of which are for noise monitoring and all are residential receivers to the south, south-west, and west of the Site.</td></tr>
<tr><td>Total permitted waste received per annum</td><td>Waste Storage: 199,000 tonnes in any 12-month period.
8,000 tonnes at any one time.</td></tr>
<tr><td>Other approvals</td><td>None</td></tr>
<tr><td colspan="2">Site features</td></tr>
<tr><td>Total site area</td><td>Entire Site approximately 6,525 m^2.</td></tr>
<tr><td>Infrastructure on site</td><td>Warehouse, workshop, awning, waste storage bays, in-ground wheel rumble, four above ground tanks, dual in-ground weighbridges, on site parking, street fronting industrial fence, gate on driveway and concrete hardstand.</td></tr>
<tr><td>Underlying soil landscape and geology</td><td>The Site is mapped as being within the Birrong Landscape (9130bt) (NSW DPE eSpade tool and the Penrith 1:100,000 Geological Map (Sheet 9130bg).
<table>
<tr><th>Geology</th><th>Soils</th><th>Landscape</th></tr>
<tr><td>Dominated by silt and clay sized alluvial materials derived from the Wianamatta Group. The Wianamatta Group consists mostly of shale with some carbonaceous claystone, laminate, and occasional</td><td>Deep (>250 cm) Yellow Podzolic Soils and Yellow Solodic Soils on older alluvial terraces. Deep (>250 cm) Solodic Soils and Yellow Solonetz on current floodplain.</td><td>Level to gently undulating alluvial floodplain draining Wianamatta Group shales. Local relief up to 5m, slopes <3%. Broad valley flats. Extensively cleared tall</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><td></td><td><table><tr><td>fine to medium grain lithic sandstones.</td><td></td><td>open-forest and woodland.</td></tr></table></td></tr>
<tr><td>Watercourse(s) present</td><td>The nearest surface water body to the Site is Coxs Creek, bordering the Site to the east adjacent the vegetated swale. The channels of Coxs Creek are concrete lined, and the creek ultimately drains into the Cooks River within the Strathfield Local Government Area. Coxs Creek is part of the Upper Cooks River catchment system comprising a network of minor street drains managed by the council and trunk drainage lines controlled by Sydney Water Corporation.</td></tr>
<tr><td>Topography</td><td>The Site is approximately 17 m AHD.
The surrounding area is generally level to gently undulating alluvial floodplains with local relief <5m and slope gradients <3%. Broad concave valleys. Most drainage lines have been converted to lined concrete and brick channels.</td></tr>
<tr><td>Vegetation present on Site</td><td>Site is mostly cleared of vegetation.</td></tr>
<tr><td>Site access</td><td>Obtained via a driveway from Bellfrog Street.</td></tr>
<tr><td>Other Site features</td><td></td></tr>
<tr><td>Surrounding site uses</td><td>The Site is located in an area of industrial activity, and is bounded on all sides by industrial sites, including warehouses (to the west and east), a 24-hour concrete batching plant (to the north), and factory units to the south.</td></tr>
<tr><td>Distance to closest residential receiver or dwelling not associated with the Site</td><td>The nearest residential assessment locations to site are located 110 metres (m) to the south and west of the yard at Juno Parade and Wentworth Street, Greenacre.</td></tr>
<tr><td colspan="2">Hazards present on Site</td></tr>
<tr><td>Bushfire prone land</td><td>Not identified on Site or within 1 km of the Site.</td></tr>
<tr><td>Flood prone land</td><td>Not identified on Site.</td></tr>
<tr><td>Landslide risk</td><td>Not identified on Site or within 1 km of the Site</td></tr>
<tr><td>Contaminated land</td><td>Contaminated land was not identified on Site or within 1 km of the Sites (according to the EPA’s Contaminated Land Register at January 2025).</td></tr>
<tr><td colspan="2">Protection Areas / Constraints</td></tr>
<tr><td>Indigenous heritage</td><td>No Aboriginal Site are recorded in or near the above Site
No Aboriginal places have been declared in or near the Site (within 200 m) (AHIMS search).</td></tr>
<tr><td>Build and European heritage</td><td>The proposed development exists on a brownfield site, containing no items of environmental heritage within the Site or within the immediate vicinity of the site. As such, the proposed development does not breach any items mentioned in the NSW Heritage Act 1977.<table><tr><td>State Heritage Inventory</td><td>No items identified on Site or within 200 m of the Site</td></tr><tr><td>State Heritage Register Curtilage (non-EPI)</td><td>No items identified on Site or within 200 m of the Site</td></tr><tr><td>National heritage Lists</td><td>Site not identified on this list.</td></tr><tr><td>Commonwealth Heritage lists</td><td>Site not identified on this list.</td></tr></table></td></tr>
<tr><td>Biodiversity Values</td><td>Not identified on Site. Biodiverse land identified approximately 500 m to the west of the Site.</td></tr>
</table>

Acid sulphate soil	*A review* of the Strathfield Local Environmental Plan 2012 *indicates that the Site is located within a Class 5 Acid Sulfate Soils risk zone. The Strathfield LEP defines Class 5 Acid Sulfate Zones as:* Works within 500 meters of adjacent Class 1, 2, 3 or 4 land that is below 5 metres Australian Height Datum and by which the water table is likely to be lowered below 1 metre Australian Height Datum on adjacent Class 1, 2, 3, or 4 land.
Drinking water catchment	Not identified on Site or within 1 km of the Site.
Mineral and resource land	Not identified on Site or within 1 km of the Site.
Riparian land and watercourses	Coxs Creek, bordering the Site to the east.
Scenic land protection	Not identified on Site or within 1 km of the Site.
Terrestrial biodiversity	Not identified on Site. Biodiverse land identified approximately 500 m to the west of the Site.
Environmentally sensitive land	Not identified on Site or within 1 km of the Site.
Applicable SEPPs or other	
Applicable SEPPS	• SEPP (Biodiversity and Conservation) 2021 • SEPP (Exempt and Complying Development Codes) 2008 • SEPP (Housing) 2021 • SEPP (Industry and Employment) 2021 • SEPP (Planning Systems) 2021 • SEPP (Primary Production) 2021 • SEPP (Resilience and Hazards) 2021 • SEPP (Resources and Energy) 2021 • SEPP (Sustainable Buildings) 2022 • SEPP (Transport and Infrastructure) 2021 • SEPP No 65—Design Quality of Residential Apartment Development

3.2 Site description

The following description of the Site has been informed via two site inspections undertake by 4Pillars employees on *2* August 2023 and 24 August 2023.

The Site has a size of approximately 6,525 m^2 and is rectangular/trapezoidal in shape (Figure 3). The Site is operational as a recycling facility, whereby soil material is received and processed for re-distribution. Entrance to the Site is accessed via Bellfrog St to the south, where the Site sits at the end of a cul-de-sac. A driveway which includes a wash grid and weighbridge allows for vehicle access for mainly trucks carting material to and from the Site. The main features of the Site include a weighbridge next to the driveway, material bays along the northern wall, workshop to the centre east, warehouse to the south and a small, vegetated area in the eastern corner (herein referred to as "vegetated swale").

The Site sits level and is approximately 80% covered in hardstand, except for the small, vegetated swale area. An approximate 3m metal fence surrounds all boundaries of the Site. A stormwater collection system is present on Site, whereby surface water is captured and stored within a below ground stormwater retention pit, located west of the workshop. Stormwater is further pumped and stored into four above ground stormwater tanks, located at the rear of the workshop (east), and adjacent to the vegetated swale area. The captured stormwater is reused for the on-site dust suppression sprinkler system.

3.3 Current Surrounding Land Uses

During the inspection, the following land uses surrounding the area were observed:

- North: Commercial Industrial buildings.
- South: Commercial Industrial, followed by low-density residential and then Juno Parade.
- East: Commercial Industrial and Coxs Creek followed by more commercial land use.

- West: Commercial Industrial buildings and Bellfrog St.

3.4 Surface drainage and groundwater

The nearest surface water body to the Site is Coxs Creek, bordering the Site to the east adjacent the vegetated swale. The channels of Coxs Creek are concrete lined, and the creek ultimately drains into the Cooks River within the Strathfield Local Government Area. Coxs Creek is part of the Upper Cooks River catchment system comprising a network of minor street drains managed by the council and trunk drainage lines controlled by Sydney Water Corporation. Culverts located under the railway crossings are the responsibility of Rail Access Corporation. Four main drainage lines are found in the sub-catchment, all of them are urban streams receiving road and stormwater runoff and are considered to be more of a stormwater drainage system than an aquatic ecosystem.

The existing water management system on the Site consists of drains installed within the hardstand which collect water into a first flush tank (12KL) and then into a larger underground sedimentation tank (120KL). Once the sedimentation tank begins to reach capacity, water is pumped into three large above ground storage tanks (46.4KL each). The stored water is then used to supply sprinklers for dust suppression on the hardstand during operations. The underground sedimentation tank is located beneath the awnings of the workshop in the north-east of the Site, and the above ground storage tanks are located behind the workshop and adjacent to the vegetated swale area.

3.4.1 Groundwater

A search of registered groundwater bores within 500m of the Site reported no results. The Site is currently connected to the municipal water supply, hence likelihood of water extraction at the Site in the future can be discounted.

3.5 History and past use

In order to develop the Conceptual Site Model (CSM) and inform the Site investigation, a review of historical information was completed. This review included freely available aerial imagery. Historical aerial photographs were sourced from NearMap and NSW Historical Imagery portal. Relevant aerial imagery can be found in Figure 4.

The suburb of Greenacre is located in south-western Sydney, approximately 20km south-west of Sydney Central Business District (CBD). Most of Greenacre is part of Canterbury-Bankstown Council, however the large logistical and industrial area located in the east (where the Site is located), was transferred to Strathfield Council in 1949.

The Site and the adjoining properties was formerly a large open quarry, which was filled with imported soil material. This is stated in the Statement of Environmental Effects (SEE) completed by Borg Architects that accompanied the establishment of the industrial Site (DA No. 2012/175 approved 19/2/13 referred to at the 2013 SEE). This is further seen in historical imagery of the Site as presented in Figure 4. Quarrying operations began prior to 1943, with quarrying occurring directly under the Site's footprint between 1971 and 1991. Quarrying activities ceased at the Site between 1991 and 1998 and the Site was filled between 1998 and 2005 (range is given for times as historical imagery is not yearly). The Site sat vacant until establishment as an industrial premise in 2014.

Table 2: Summary of historical aerial photographs.

Year	Description
1943	Earliest available historical aerial imagery. The Site is undeveloped grassland, potentially used for agricultural purposes. Quarrying operations appear to have commenced in an area north-west of the Site.
1955	The surrounding area has experienced significant residential and commercial industrial development. The quarry to the north-east has expanded, potentially into the subject Site. Access roads appear throughout the area.
1971	Quarrying operations have begun at the subject Site. Increased residential development to the west and south. Commercial development to the north and east.
1982	Quarrying continues at the Site.
1991	Quarrying operations have concluded. The quarry put has been filled with water. The subject site extends partially into the water filled pit and the banks of the quarry.
2004	Quarry pit has been drained and back-filled with imported material.
2005	Quarry has been filled and levelled. There are no structures on Site, apart from a holding yard to the south-east. Site is vacant.
2014	Site has begun development into current operations.

2023	Site remains operating as Aussies Recycling Pty Ltd from 2014 until present.

3.5.1 summary

The information obtained from the historical sources reviewed has been found to be in general agreement with other sources. The Site's history can reasonably be summarised as a block of land that was part of a commercial quarry in the past. The quarry had been filled sometime between 1998 and 2004, when it was developed into an industrial business park, as it stands today.

3.6 Historical Land and Title Search

Given the results of the historical research outlined above and the fact that the Site presumably has been occupied by two owners since at least 1943, a search of the Land Titles for the Site was not considered necessary and hence not undertaken.

3.7 Heritage

The proposed development exists on a brownfield site, containing no items of environmental heritage within the Site or within the immediate vicinity of the site. As such, the proposed development does not breach any items mentioned in the *NSW Heritage Act 1977.*

3.8 Contaminated land register search

A search of the NSW EPA database of notices under the Contaminated Land Management Act 1997 (CLM Act) and the list of NSW contaminated sites notified to the EPA conducted on 21 January produced 0 results within the suburb of Greenacre or surrounding suburbs of Strathfield South, Belfield, Belmore or Lakemba.

3.9 Acid Sulphate Soils

A review of the Strathfield Local Environmental Plan 2012 indicates that the Site is located within a Class 5 Acid Sulfate Soils risk zone. The Strathfield LEP defines Class 5 Acid Sulfate Zones as:

> *Works within 500 meters of adjacent Class 1, 2, 3 or 4 land that is below 5 metres Australian Height Datum and by which the water table is likely to be lowered below 1 metre Australian Height Datum on adjacent Class 1, 2, 3, or 4 land.*

3.10 SafeWork NSW Records

Based on the limited time frames available for the project and on information obtained as part of 4Pillars' Site History Research procedure, along with site observations, a search of records of SafeWork NSW was not undertaken for this Site.

4 Conceptual site model

A Conceptual Site Model (CSM) is a representation of site related information regarding contamination sources, receptors and exposure pathways between those sources and receptors. Based on the information presented above, the following Conceptual Site Model is presented.

4.1.1 Historical land use considerations

The historical land-use of the Site as a quarry would not typically introduce substantial contamination due to operation. The importation of uncontrolled fill to fill in the quarry on the Site may introduce contamination via 'top-down' and 'bottom-up' pathways, potentially affecting sub-surface soils and groundwater. Potential volatile contaminants within the source fill material may migrate into enclosed spaces on the surface via vapour intrusion and pose as a hazard to occupants. This potential contamination source may also migrate offsite and affect nearby receptors, mainly Coxs Creek to the east of the Site and associated downstream ecosystems. As the proposed development does not include any invasive groundworks or excavation, hazards from soil exposure are limited to the vegetated swale to the north-east of the Site.

4.1.2 Acid sulphate considerations

Considering that the proposed development does not include substantial soil disturbances and previous history as a quarry, an assessment of Acid Sulfate Soils was not considered necessary.

4.1.3 Per and Poly-Fluoroalkyl Substances (PFAS) considerations

Information published by NSW Health provides the following information:

NSW Environment Protection Authority (EPA) has established a PFAS investigation program and is prioritising sites around NSW where PFAS has been used in significant quantities. The investigation focuses on airports, firefighting training facilities and some industrial sites, particularly those sites where it is determined that there are exposure pathways to these chemicals through bore water usage, surface water usage or fishing.

It also appears that the main concern regarding pathways of this contaminant is centred around water movement from or to a site. Due to surrounding industrial land usage however, PFAS was included as a Contaminant of Potential Concern.

4.2 Potential Contamination Sources, Areas and Contaminants of Concern

Based on the Site history review and the observations made during the Site visits, potential Areas of Environmental Concern (AECs) associated with Contaminants of Potential Concern (CoPCs) that have been identified to potentially be present on-site are summarised in the below table:

Table 3: Summary of AEC.

Potential AECs / Activity	Contaminants of Potential Concern
Presence of a fill layer on Site.	Polycyclic Aromatic Hydrocarbons (PAH), Total Recoverable Hydrocarbons (TRH), Benzene, Toluene, Ethylbenzene and Xylene (BTEX), Asbestos, Organochlorine Pesticides (OC), Organophosphorus Pesticides (OP), Heavy metals (As, Cd, Cr, Cu, Pb, Ni, Zn, Hg), Polychlorinated Biphenols (PCB), Asbestos, Polyfluoroalkyl-substances (PFAS), Volatile Organic Carbons (VOCs), Chlorinated Hydrocarbons (CHCs).
History of the general area for commercial or industrial land use and past landfill activities at the Site	Heavy metals, BTEX, TRH, PAH, OC, OP, PCB, PFAS. Soil vapours, in particular methane.
Heavy Machinery and vehicles used for operation.	BTEX, TRH, PAH and lead.

4.3 Mechanism for Contamination, Affected Media, Receptors and Exposure Pathways

The following table outlines the mechanisms for contamination, potentially affected media, receptors and exposure pathways relevant to the potential contamination sources/AEC identified in for the Site:

Table 4: Conceptual Site Model Summary.

Item	Description
Potential mechanism for contamination	• Fill material – importation of impacted material, 'top-down' impacts (e.g. placement of fill, leaching from surficial material etc), or sub-surface release (e.g. impacts from buried material). • General commercial land use - 'top-down' impacts (e.g., placement of fill, leaching from surficial material, etc). 'On-site' migration of contaminant plumes through groundwater movement or surface water runoff. • Heavy vehicle use – 'top-down' impacts from spills and wash-off, handling of chemicals. 'Bottom-up' impact from the subsurface (mainly via groundwater) or sub-surface release (e.g., from leaking separator pit, pipework or underground tanks).
Affected Media	Soils, soil vapours and surface water have been identified as potentially affected media.
Receptor identification	Human receptors include Site users and workers, construction workers and intrusive maintenance workers during the proposed development. Off-site human receptors include adjacent land users (residential, commercial and public open space land use scenarios). Ecological receptors include terrestrial organisms and plants within unpaved areas (including proposed landscaped areas) and the aquatic organisms in the adjacent creek and downstream waterways.
Potential exposure pathways	Human receptor related potential exposure pathways include ingestion, dermal absorption and inhalation of dust (all contaminants) and vapours (volatile TRH, BTEX, CHC, VOC). The potential for exposure would typically be associated with the construction works, and future use of the Site. Potential ecological receptor exposure pathways include primary contact and ingestion. Exposure during future Site use could occur via direct contact with soil in unpaved areas such as gardens, inhalation of airborne asbestos fibres during soil disturbance, or inhalation of vapours within enclosed spaces such as buildings.
Potential Exposure Mechanism	The following have been identified as potential exposure mechanisms for site contamination: • Vapour intrusion into the existing and proposed buildings (either from soil contamination or volatilisation of contaminants from groundwater); • Contact (dermal, ingestion or inhalation) with exposed soils in landscaped areas and/or unpaved areas; and • Migration of groundwater off-site and into nearby water bodies, including aquatic ecosystems.
Presence of preferential pathways for contaminant movement	Man-made preferential pathways such as sewers and telecommunication trenches are present at the Site. Subsurface utilities and pipes, especially the fill material surrounding them, are a common preferential pathway that may be present at this Site.

5 Data Quality Objectives (DQOs)

The Data Quality Objectives (DQO) process is a systematic planning tool based on the scientific method for establishing criteria for data quality and for developing data collection designs. The DQOs define the experimental process required to test a hypothesis.

The purpose of the DQO is to ensure that efforts relating to data collection are cost effective, by eliminating unnecessary, duplicative or overly precise data whilst at the same time, ensuring the data collected is of sufficient quality and quantity to support defensible decision making. The DQO process for this project has been derived from the USEPA (2000) "Guidance for the Data Quality Objective Process" and the NEPM (1999) "Guideline on site characterisation".

The DQO process consists of seven steps, which were designed to clarify the study objectives, define the appropriate type of data and specify tolerable levels of potential decision errors. The seven-step DQO process adopted for this preliminary soil investigation program is summarised as follows:

Step 1 Defining the Problem. The first step in the DQO process is to 'define the problem' that has initiated the investigation.

Step 2 Identify the Decision. The second step in the process is to define the decision statements that the study will attempt to resolve.

Step 3 Identify Inputs to the Decision. In this step, the different types of information needed to resolve the decision statement are identified.

Step 4 Define the Study Boundaries.

Step 5 Develop a Decision Rule.

Step 6 Specify Limits on Decision Errors.

Step 7 Optimise the Design for Obtaining the Data.

5.1 Define the Problem

Activities related to the former land use and its surrounds, and the potential presence of a shallow fill layer across the Site may have affected the soils from a contamination perspective.

5.2 Identify the Decision

Objectives of the investigations are outlined in Section 1.1. The decisions to be made are based on these objectives. They can be summarised as:

- Are any Areas of Environmental Concern (AEC) or sources of contamination present at the Site that have not been addressed previously?
- Do analytical results indicate the presence of contamination above the Adopted Site Criteria?
- Do risks associated with contamination exist?
- Is the Site suitable for its intended future use? Can it be made suitable for its intended future use?
- Is further investigation or action required?

5.3 Identify the Inputs to the Decision

Key data required to resolve the project problem primarily includes the current concentrations of contaminants in the soils, the pathways for contaminant movement, the location of sensitive receptors and the threshold criteria to be used to assess the significance of any identified contamination.

Information sources assisting in addressing the decisions outlines above include the following:

- Review existing information for the Site.
- Information gathered regarding the Site.
- Sampling of soils and vapour.
- Observations made during the site visits.
- Laboratory analysis of samples for the CoPC.
- The CSM.
- The results of the QA/QC process.

- The Adopted Site Criteria.

5.4 Define the Boundaries of the Study

The boundaries of the study are limited to the extent of the Site as defined in Section 3, and the depth of sampling.

5.5 Develop a Decision Rule

The analytical results will be assessed against the site-specific assessment criteria presented in Section 5.9. Where applicable, statistical analysis will be used to assess laboratory data for soil samples against the assessment criteria. Exceedances will be evaluated and considered in the context of the CSM and a preliminary risk evaluation based on contamination levels, pathways and potential receptors.

Where data sets are large enough, they will be assessed against the following criteria:

- The 95% Upper Confidence Limit (UCL) of the concentration of contaminants should be less than the assessment criteria.
- UCLs will be calculated using ProUCL[1] and the distribution type and UCL recommended by the software will be accepted.
- No single value exceeds 250% of the relevant criterion.
- All data used in UCL calculations need to be from the same soil layer.
- Statistical calculations are generally not required if all analytical results are below the assessment criterion.

5.6 Specify Limits on Decision Errors

In order to ensure the confident use of the collected data a number of quality assurance parameters were used and are as follows:

- Completeness.
- Accuracy.
- Precision.
- Sensitivity.
- Holding times. and
- Representativeness.

These parameters were used to determine the course of any inconsistencies in the collected data.

5.6.1 Completeness

The following documentation demonstrates the completeness of valid measurements compared to the total number of measurements made:

- Chain of Custody forms.
- Sample receipt forms.
- All sample results reported.
- All laboratory duplicates reported and RPDs calculated.
- The matrix spike and matrix spike duplicates (MS/MSD) data reported and RPDs calculated.
- Spike recovery acceptable limits reported. and
- NATA stamp on reports.

5.6.2 Accuracy

Accuracy is the level of agreement between an experimental determination and the true value of the parameter being measured. Reference samples or matrix spikes are used to determine the accuracy of the analytical technique. The percentage recovery for spiked samples, calculated by the laboratory, are required to be within the acceptance limits for the methods used. The detailed recovery acceptance levels vary between laboratories and methodologies. Laboratory reports will be checked for adherence to acceptance criteria outlined in the reports.

[1] USA Environmental Protection Agency "Statistical Software ProUCL 5.1.00 for Environmental Applications for Data Sets with and without Nondetect Observations" https://www.epa.gov/land-research/proucl-software

5.6.3 Precision

Replicate analyses are used to determine the precision or reproducibility of results. Precision is normally measured as the relative percentage difference (RPD) between samples. The RPD should be within the recommended range for field duplicates and within the levels outlined in the laboratory reports for laboratory duplicates.

5.6.4 Sensitivity

The practical quantitation limit (PQL) is a measure of how sensitively the analytical technique/instrument quantify the concentration of a present compound. The PQLs achieved by the laboratories should be within the criteria for each compound analysed for sufficient confidence to be placed in the results obtained.

5.6.5 Laboratory Blanks

Laboratory blanks are used to monitor unintentionally introduced contaminants to the sample in the laboratory, for example organic or inorganic residues contained on glassware or cleaning reagents. In order to comply with QC acceptance criteria, no detectable concentrations of target compounds should be found in blank samples.

5.6.6 Field Duplicates

Intra-laboratory field duplicates (blind or field duplicates) are used to monitor the precision of the sampling technique. They also provide an indication of heterogeneity of the sample matrix. The RPDs of all field duplicates should be generally within the recommended range outlined in laboratory reports for all compounds tested. Field Duplicates should be obtained and analysed at an approximate ratio of 1:10. It is noted that if the sampled matrix is of a heterogeneous or clayey nature (such as fill material, coarse grained material or material containing foreign matter and the like), the value that field duplicates add to the ability to monitor sampling technique precision is limited.

5.6.7 Representativeness

Representativeness indicates how accurately and precisely the collected data represent the characteristics of a population, parameter variations at a sampling point, or an environmental condition. Representativeness is primarily dependent upon the design and implementation of the sampling program. Representativeness of the data is partially ensured by the avoidance of cross-contamination, adherence to sample handing and analysis protocols and use of proper chain-of-custody and documentation procedures.

5.7 Optimise the Design of Obtaining Data

The purpose of this step is to identify a resource-effective data collection approach for generating data to meet the project objectives. The overall data set will be optimised by reviewing the data as the project proceeds. When necessary, adjustments will be made to sampling and the analytical program.

5.8 Holding Times

The time between the field sampling and analyte result will be as short as possible in order to prevent any biological, chemical or physical alteration of the analyte. Holding times required by the laboratory for each sample will be complied with.

5.9 Site Assessment Criteria

5.9.1 Soil

Assessment criteria were selected from Schedule B1 Guidelines on Investigation Levels for Soil and Groundwater (*National Environment Protection (Assessment of Site Contamination) Measure 1999*, amended 2013) and the January 2018 PFAS National Environmental Management Plan. NEPM states the definition for an industrial land use scenario as:

> *Typical commercial or light industrial properties, consisting of single or multistorey buildings where work area are on the ground floor (constructed on a ground level slab) or above surface structures (such as basement car parks or storage areas).*

Considering the Sites proposed development of upgrades to its existing industrial site, HIL/HSL D for commercial/industrial land use is most applicable for the Site.

The guidelines selected as relevant screening criteria for soil include were as follows:

- Health Investigation levels (HILs) for soil contaminants – Commercial/Industrial (HIL-D).
- Soil Health Screening Levels (HSLs) for vapour intrusion – Commercial/Industrial (HSL D); 0m - <1m in Sand.
- Soil Health Screening Levels for Direct Contact (CRC Care 2011).
- Ecological Investigation Levels (EILs) for soil contaminants – Commercial and Industrial.

EILs for selected metals were calculated based on the conservative added contaminant limit (ACL) values for soils with a pH of 5.5 or more (neutral to slightly acidic soils) presented in Schedule B(1) of NEPM (2013) and published ambient background concentration (ABC) values (50th percentile for background levels in old suburbs with high traffic).

5.9.2 Surface Water/Groundwater

Due to the lack of invasive sub-surface excavation during the proposed development, on-site impact to groundwater has been nullified. The presence of imported fill material however may present as a contamination source, whereby contaminates travel off-site via groundwater migration, until being received by ecological receptors, in this instance, Coxs Creek.

In order to identify potential impact to Cox's Creek due to migration off-site, surface water upstream and downstream of the Site will be collected. Laboratory analysis of this surface water will determine whether the subject Site has contributed, as a source, contamination to off-site ecological receptors. In the instance that an increased pattern of off-site contamination has been identified in Cox's Creek between upstream and downstream samples, a more extensive groundwater assessment is to be conducted.

Laboratory results for surface water will be compared against criteria published in the following guidelines:

- Australian and New Zealand guidelines for fresh and marine water quality (ANZG 2018) – Species protection level 95% in Fresh Water.

5.9.3 Soil Vapour

Assessment criteria were selected from NEPM Schedule B1 Guidelines on Investigation Levels for Soil and Groundwater. The guidelines selected as relevant screening criteria for soil vapour were as follows:

- NEPM Schedule B1; Interim soil vapour health investigation levels for volatile organic chlorinated compounds – Commercial/Industrial (HIL-D).
- NEPM Schedule B1; Soil vapour health screening levels for vapour intrusion – Commercial/Industrial (HSL-D); Sand at 0m to <1m.

6 Field Works and Sampling Program

6.1 Overview of field works

Two Site inspections were completed as part of this DSI, a summary of this is outlined below:

Table 5: Field work overview.

Field work name	Date	Works completed
First Site inspection	02/08/23	- Soil sampling - Surface water sampling - Soil vapour sampling
Second Site inspection	24/08/23	- Soil vapour sampling

6.2 First Site Inspection

The first site inspection, which included a sub-surface soil, soil vapour and surface water sampling, was conducted on 2 August 2023. Sampling was undertaken by J Karagiannis and G Haid.

6.2.1 Soil sampling

Surface soil sampling was conducted in the "vegetated swale" area in the north-eastern corner of the Site. This area is approximately 400m^2 and contained primarily tall grass and some small shrubbery. The vegetated swale area slopes towards the north-east, towards Coxs Creek. The centre and down gradient area were wet and swampy, as opposed to the up gradient and perimeter of the areas, which were dry.

Two near surface soil samples were obtained using a hand auger, at an approximate 0.4 m depth. Samples were identified as *S1-0.4* and *S2-0.4*. Sample locations are presented in (Figure 3).

The sampled material consisted of medium grained sandy-silty fill, dark to light brown in colour and low plasticity. All soil samples were thoroughly inspected for signs of contamination such as discolouration or olfactory abnormalities. Minor ash was observed in both samples. No asbestos containing material was observed in any of the soil samples.

Samples were collected in laboratory provided Teflon-lined glass soil jars and Teflon free plastic jars for PFAS analysis. Sample containers were filled completely, to the extent possible, to minimise headspace. Disposable nitrile gloves were worn and changed between each sampling location and care was taken to ensure cross contamination between layers and boreholes was avoided to the greatest extent possible. Auger equipment was brushed clean between each borehole and rinsed where deemed necessary. A chain of custody (CoC) form was filled in with the sample names, project ID, sampling date and required analyses. This documentation and the samples were then delivered to the laboratory within 24 hours of sampling for analysis. CoC documentation is presented in Appendix 2.

6.2.2 Surface Water Sampling

Surface water was collected from Coxs Creek, a stormwater canal located to the east of the Site, which flows in a northerly direction. Coxs Creek is considered an ecological receptor for contamination and surface water sampling was conducted to assess whether a source and pathway has been established from the Site and into the creek. Samples were taken from upstream and downstream locations, relative to the Site. This strategic sampling was implemented to narrow the extent of potentially contaminating activity to the Site only and reduce external contribution from neighbouring property.

Two surface water samples, identified as *US-Surface* and *DS-Surface,* were collected from Coxs Creek. Samples were collected into laboratory provided unpreserved plastic inorganics bottle, nitric acid preserved plastic metals bottle, unpreserved amber glass semi-volatile organics bottle and a pair of sulphuric acid preserved amber glass volatile organics vials. Sample locations are presented in (Figure 3).

Sample containers were filled completely to minimise headspace. Disposable nitrile gloves were worn and changed between each sampling location and care was taken to ensure cross contamination between sampling locations was avoided to the greatest extent possible. A chain of custody (CoC) form was filled in with the sample names, project ID, sampling date and required analyses. This documentation and the samples were then delivered to the laboratory in chilled eskies, within required holding time, for analysis. CoC documentation is presented in Appendix 2: Laboratory Reports.

6.2.3 Soil Vapour Sampling

Soil Vapour sampling was conducted at three locations on the Site (V1, V2 & V3). Locations included the warehouse (V1), west of the workshop (V2) and near a western material bay (V3) (Figure 3). Soil vapour sampling was conducted to determine whether a potential source of volatile contaminants is present within the sub-surface and whether there is a pathway that may affect any on-site receptors – in this instance, on-site workers within any enclosed spaces.

Three samples were collected using a laboratory provided 1-litre SUMMA Cannister set with a 30-minute flow restrictor. Firstly, using a hammer drill, a 16mm hole was drilled through the concrete floor slab and a further 5cm into the sub-surface material. Gloves, a P2 particulate filter mask, safety glasses and hearing protection was worn during drilling. A brass soil Vapor Pin with silicon sheathing was hammered into the hole until the base of the Vapor Pin assembly thread was flush with the slab surface. The silicon sheathing ensures an air-tight seal between the sub-slab vapour and ambient air. A Vapor Pin installation/extraction tool was used as not to damage the pin during installation and extraction.

Secondly, the Summa cannister was subject to pre-extraction vacuum and leak checks by attaching the vacuum gauge to the Quickfit fitting on the top of the cannister. The valve was then opened on the cannister, and the initial vacuum reading was noted on the COC – whereby the vacuum should read -30 inches of mercury ("Hg). Leak testing was completed by attaching the flow restrictor assembly to the cannister but leaving the endcap on. The cannister valve was then opened for 1 second before being closed. The flow restrictor gauge was then observed to see whether the vacuum within the train started to fall. If the vacuum does not fall, then the sampling train is considered leak proof.

Following this, ¼ inch Teflon tubing was attached to the top of the Vapor Pin and purged by siphoning the ambient air within the tubing approximately 4 times using a 50 mL syringe. After purging, the other end of the tubing was connected to the flow restrictor sampling train via a ¼ inch Swagelok nut and ferrule. Once all components of the sampling train had been prepared, assembled and installed, a shroud containing an isopropyl alcohol (IPA) spiked rag was placed atop of the Vapour Pin sampling point, but not covering the Summa Cannister. This is done to check for leaks between the ambient air and sub-slab vapour. The Summa Cannister valve was then opened, and the time was recorded on the COC. The flow restrictor gauge was observed for approximately 30 minutes or until the vacuum reached between -10 and -5 inches of mercury ("Hg). Once this was achieved, the Summa Cannister valve was closed and time and vacuum reading noted on the COC.

Samples were submitted to NATA accredited laboratory, Envirolab, and analysed against USEPA TO15 methodology.

6.2.4 Analytical Schedule

A total of 3 soil vapour, 2 soil and 2 surface water samples were collected and submitted to the laboratory. Samples were submitted to NATA accredited laboratory Envirolab Services in Chatswood, NSW. Analytical methods complied with NEPM and NSW EPA requirements, with Practical Quantitation Limits (PQLs) and Limits of Reporting (LOR) used in the laboratory tests suitable for comparison against the assessment criteria. Samples were analysed in accordance with the analytical schedule in the CSM, as summarised in Table 6 and Table 7.

Table 6: Analytical Schedule – Soil & Water.

Matrix Type	Sample ID	Depth (m)	TRH/BTEX	PAH	8 Metals (As, Cd, Cr, Cu, Pb, Ni, Zn, Hg)	OC/OP Pesticides	PCB	PFAS
Soil	S1-0.4	0.4	x	x	x	x	x	x
	S2-0.4	0.4	x	x	x	x	x	x
Water	US-Surface	-	x	x	x	-	-	-
	DS-Surface	-	x	x	x	-	-	-
X = sample analysed | - = sample not analysed								

Table 7: Analytical Schedule - Air.

Matrix Type	Sample ID	Depth (m)	TO15	Total Petroleum Hydrocarbons (TPH)	General Gas Analysis
Air	V1	-	x	x	x
	V2	-	x	x	x
	V3	-	x	x	x

6.2.5 Asbestos Disclaimer

A meaningful assessment of asbestos in soils is difficult to achieve and generally outside of the scope of initial investigations. When deemed necessary, the methodology outlined in the NEPM requires large amounts of sample to be field screened (and small soil amounts to be laboratory tested) which by its nature causes significant disturbance and damage to on-site surfaces.

A key management message provided in NEPM (2013) Schedule B1 Section 4.10 is that:

> *'As a general guide, where sites are contaminated with bonded ACM only (i.e. no insulation materials or other non-bonded asbestos products) assessment for the presence/absence of free fibres by laboratory analysis is only warranted where greater than 10% of the total bonded ACM is significantly damaged i.e. present as small pieces less than 7 mm x 7 mm or can be crushed/crumbled with hand pressure (significant FA [fibrous asbestos] and/or AF [asbestos fines] is present)' (comment in square brackets added by 4Pillars).*

Following the above guide, sampling for asbestos fibres in soils using methods outlined in either AS4964-2004 or NEPM (2013) are only reasonably called for when ACM sheets have been visually identified on the surface of a site or in samples obtained from the subsurface.

Analysis for asbestos fibres in soil samples was therefore not considered necessary. It was however undertaken in three soil samples as a precautionary measure.

6.3 Adjusted Sampling Density and Contaminants of Potential Concern

It is acknowledged that the 2022 NSW EPA Sampling Design Guidelines (SDGs) require a minimum of 17 samples to be analysed for a site of this size to be adequately characterised. The following considerations were taken into account during the design phase of the sampling program.

- The proposed future Site use is for a commercial industrial recycling facility and which under the current proposed development, minimises human exposure to possible on-site contaminants.
- The vast majority of the Site area is covered with concrete thus severely restricting the pathway of potential contaminants in subsurface soils to make contact with on-site (mainly human) receptors.
- The main concern at the Site is not necessarily whether contamination above the adopted site assessment criteria (see Section 5.9) is present, but whether such contamination (if present) finds a pathway to reach a receptor.
- Such receptors would be humans (on-site workers or employees, trades people) both on-site and off-site (see Conceptual Site Model in Section 4). Industry standard protocols are expected to be in place for any works associated with underground services works.
- It is possible that the deployed sampling density did not capture contaminated areas of a size required by the SDGs. While such presence of contaminants is possible (but not identified) on the Site, the risk associated with such impact would be considered minimal under the current proposal or foreseeable site uses, given the lack of a receptor-contaminant linkage.
- Ecological receptors on-site are of a lesser consideration considering the proposed development and the presence of minor on-site vegetation.
- Nevertheless, Coxs Creek bordering the Site immediately to the east, is an ecological receptor for contamination potentially arising from the Site. This could happen via either surface water run-off or via contaminated groundwater flow.

The sampling program developed for the Site hence focused mainly on addressing the following salient points:

- Of the main CoPC listed in the CSM (Section 4), only volatile compounds (VOC) have the potential to complete the contaminant – receptor linkage required to cause harm to future site users. Hence the determination of whether VOCs are present in the subsurface of the Site became a major focus point of this investigation.
- A small area in the north-eastern site section does have the potential for humans to be in contact with on-site soils.

Based on the above, the collection of near surface soils from the grassed area and the collection of water samples from Coxs Creek was considered adequate. Drilling through the concrete surface that forms a barrier for most contamination pathways at many more locations (as suggested in the general Sampling Design Guidelines) would not provide any additional useful information.

The question whether VOCs were present (the only contaminant that could potentially penetrate the concrete surface and cause harm to receptors) was addressed via the subsurface soil vapour assessment detailed in Section 6.2.3.

6.4 Second Site Inspection

A second Site inspection was conducted on 24 August 2023 to further investigate concerns surrounding positive methane detection of 3.5% in sample V2 during the initial inspection (see section 7 for results). The Site inspection was conducted by J Karagiannis and G Haid and involved the installation of six permanent stainless steel vapour pins for the purposes of soil vapour sampling and measurements. Six vapour pins (V1-V6) were installed within the concrete slab and into the subsurface throughout the site, following manufacturers instruction.

These measurements were undertaken to further investigate the presence of methane across the site, particularly surrounding Sample Point V2. Vapour pin locations are displayed in the Site Map (Figure 3). It is important to note that pins V1-V3 were installed in the exact location of the above air samples of the same name and Samples V4, V5 and V6 were specifically placed within a 5m radius of Sample V2.

Following installation of the pins, a *Geotech GA5000 Portable Landfill and Contaminated Land Gas Analyser* was used to measure real time Methane, Carbon Dioxide, Oxygen, Hydrogen Sulphide and Carbon Monoxide gas percentage. The internal flow rate in L/h was also measured. Results of each measured analyte from all samples are presented in Table 12 below.

7 Analytical Results

A summary of laboratory results from the investigation is provided below (laboratory reports are provided in Appendix 2: Laboratory Reports). The following key findings were reported by the laboratory:

7.1 Human Health Criteria (HIL/HSL) Soil

BTEXN / TRH:

All samples reported concentrations below the assessment criteria for human health.

Eight Priority Heavy Metals:

All samples reported concentrations below the assessment criteria for human health.

PAHs:

All samples reported concentrations below the assessment criteria for human health.

Benzo(a)pyrene as TEQ (A calculation that combines weighted concentrations of a number of select PAHs):

All samples reported concentrations below the assessment criteria for human health.

OCP, OPP & PCBs:

All analysed samples reported concentrations of OCP, OPP & PCBs below the assessment criteria for human health.

Asbestos:

No visible asbestos was detected in the observed soil material.

PFAS:

All samples reported concentrations below the assessment criteria for human health.

7.2 Environmental and Ecological Criteria (ESL) Soil

A summary of the analysis result when compared to the Ecological Site Criteria (see Section 5.9) is provided below.

BTEXN / TRH:

All samples reported BTEX concentrations below the ecological assessment criteria.

Eight Priority Heavy Metals:

All samples reported heavy metal concentrations below the ecological assessment criteria.

PAHs:

All samples reported PAHs concentrations below the ecological assessment criteria.

OCP, OPP & PCBs:

All analysed samples reported concentrations of OCP, OPP & PCBs below the ecological assessment criteria.

7.3 Surface Water

Eight Priority Heavy Metals:

All samples reported heavy metal concentrations below the adopted assessment criteria, with the exception of:

- Cadmium within sample US.
- Copper within samples US & DS.
- Zinc within samples US & DS.

BTEXN/TRH/PAH:

All samples were below the adopted assessment criteria for human and ecological health.

7.4 Soil Vapour

BTEXN / TRH / VOCs:

All samples reported concentrations below the assessment criteria for human health.

- Methane reported 3.5% parts per billion by volume (ppbv) in sample V2 collected on 02/08/24. As per the Department of Natural Resources, Mines and Energy best practice guidelines *"Methane management in underground coal mines"* (2019), methane is explosive between 5% - 15%. Noting the positive detection of methane at V2, further investigation was undertaken which included the installation of 3 additional monitoring points around V2 (V4, V5 and V6). As shown in Table 12, methane levels at any level of concern were not detected on the day of sampling.
- Isopropyl Alcohol was detected in all samples.

Table 8: Summary Results Table – Soil (samples obtained 02/08/23).

		METALS								BTEXN					PAHs			TRHs			
Analyte		**As**	**Cd**	**Cr(6+)**[1]	**Cu**	**Pb**	**Hg**	**Ni**	**Zn**	**Benzene**	**Toluene**	**Ethyl-benzene**	**Total Xylenes**	**Naphtha-lene**	**Total PAHs**	**Carcinogenic (as BaP TEQ**[2] **(half LOR))**	**B(a)P**	**F1**[3] **(BTEXN – C6-C10)**	**F2**[4] **(naphthalene - >C10-C16)**	**F3 (>C16-C34)**	**F4 (>C34-C40)**
Unit of measurement		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
Assessment criteria																					
NEPM Sch B1 (2013) HIL-D Table 1A(1)		3,000	900	3,600	240,000	1,500	730	6,000	400,000	NA	NA	NA	NA	NA	4,000	40	NA	NA	NA	NA	NA
NEPM Sch B1 (2013) HSL-D (Table 1A(3))		NA	NA	NA	NA	NA	NA	NA	NA	3	NA	NA	230	NL	NA	NA	NA	260	NA	NA	NA
NEPM Sch B1 (2013) EIL (Commercial/Industriall)[5]		160	NA	325	127	2,025	NA	61	293	NA	NA	NA	NA	370	NA	NA	NA	NA	NA	NA	NA
NEPM Sch B1 (2013) ESL (Commercial/Industrial Table 1B(5-6))		NA	NA	NA	NA	NA	NA	NA	NA	75	135	165	180	NA	NA	NA	0.7	215	170	1,700	3,300
Laboratory Analysis																					
Limit of reporting (LOR)		4	0.4	1	1	1	0.1	1	1	0.2	0.5	1	3	1	0.5	0.5	0.5	10	50	100	100
SAMPLE ID	**Depth (m)**																				
S1-0.4	0.4	BDL	BDL	7	12	13	BDL	4	34	BDL	BDL	BDL	BDL	BDL	0.05	BDL	0.05	BDL	BDL	BDL	BDL
S2-0.4	0.4	6	BDL	14	28	28	BDL	7	72	BDL	BDL	BDL	BDL	BDL	1.7	BDL	0.2	BDL	BDL	BDL	BDL
MAX		6	NA	14	28	28	NA	7	72	NA	NA	NA	NA	NA	1.7	NA	0.2	NA	NA	NA	NA
Key		Red Cells indicate values that exceed relevant Human Health Threshold Level Green shaded cells indicate an exceedance of an environmental or ecological threshold level BDL – Below Detection Limit (refer to laboratory reports for details) NA – Not applicable '-' - indicates not tested																			
Footnote		1- For metals Cr6+, the assessment criteria are based on Chromium hexavalent (Cr6+) and results are based on total Chromium (Cr) 2- HIL is based on the toxicity equivalent quotient (TEQ) of 8 carcinogenic PAHs and their potency relative to B(a)P) adopted by CCME 2008 (see Schedule B 1 Guidelines on Investigation Levels for Soil and Groundwater (NEPM 2013) 3- F1 is the subtraction of the sum of BTEX concentrations from C6-C10 4- F2 is the subtraction of naphthalene from >C10-C16 5 - Background levels using the 50th percentile in old suburbs with high traffic were used as per Olszowy et al (1995) and added to the ACL provided in NEPM 2013 6 – 95% UCL calculated using half the LOR where sample reports BDL.																			

Table 9: Summary Results Table – Soil continued.

		OCPs								OPPs	PCBs	PFAS	
Analyte		DDD+DDE+DDT	Aldrin +Dieldrin[1]	Total Chlordane[2]	Total Endosulfans[3]	Endrin	Heptachlor	Hexachlorobenzene (HCB)	Methoxychlor	Chlorpyrifos	Total PCBs[4]	PFOS + PFHxS	PFOA
Unit of measurement		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Assessment criteria													
NEPM Sch B1 (2013) HIL-A		3,600	45	530	2000	100	50	80	2,500	2,000	7	NA	NA
NEPM Sch B1 (2013) EIL (Table 1B(5))		640 (DDT only)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PFAS NEMP (2020) Table 2 HIL-A		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	20	50
Laboratory Analysis													
Limit of reporting (LOR)		0.1	<0.2	<0.2	<0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.0002	0.0002
SAMPLE ID	Depth (m)												
S1-0.4	0.4	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.0004	0.0001
S2-0.4	0.4	BDL	BDL	0.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.0018	0.0005
MAX		NA	NA	0.2	NA	NA	NA	NA	NA	NA	NA	0.0018	0.0005
Key		Red Cells indicate values that exceed relevant Human Health Threshold Level Green shaded cells indicate an exceedance of an environmental or ecological threshold level BDL – Below Detection Limit (refer to laboratory reports for details). NA – Not applicable '-' - indicates not tested											
Footnote		1- Laboratory does not analyse Aldrin + Dieldrin, but Aldrin and Dieldrin separately. 2- Laboratory does not analyse Total Chlordane, but gamma-Chlordane and alpha-Chlordane separately. 3- Laboratory does not analyse Total Endosulfans, but Endosulfan I, Endosulfan II, and Endosulfan Sulphate separately. 4- Positive values shown only. 5 – 95% UCL calculated using half the LOR where sample reports BDL.										

Table 10: Summary Results Table – Surface Water (samples obtained 02/08/23).

	Heavy Metals								BTEXN					TRH				Polycyclic Aromatic Hydrocarbons (PAH)				
Analyte	**As**	**Cd**	**Cr (6+)[1]**	**Cu**	**Pb**	**Hg**	**Ni**	**Zn**	**Benzene**	**Toluene**	**Ethyl-benzene**	**Total Xylenes**	**Naphthalene**	**F1[(2)]**	**F2[(3)]**	**F3 (C16-C34)**	**F4 (C34-C40)**	**Anthracene**	**Benzo(a)pyrene**	**Fluoranthene**	**Naphthalene**	**Phenanthrene**
Unit of measurement	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Assessment Criteria																						
NEPM Sch B1 GIL Fresh Water 95%	24 (As III) 13 (As V)	0.2	1.0	1.4	3.4	0.06	11	8	950	-	-	200	16	-	-	-	-	-	-	-	-	-
NEPM Sch B1 GIL Marine Water 95%	-	0.7	27 (3+) 4.4 (6+)	1.3	4.4	0.1	7	15	500	-	-	-	50	-	-	-	-	-	-	-	-	-
NEPM Sch B1 HSL A & B Vapour Intrusion (sand 2-<4m)	-	-	-	-	-	-	-	-	800	-	-	-	-	1,000	1,00	-	-	-	-	-	-	-
ANZG (2018) Fresh water 80% - 95%	24 (As III)	0.2	3.3 (3+) 1.0 (6+)	1.4	3.4	0.6	11	8	950	180	80	75 (m) / 350 (o)	16	-	-	-	-	0.01	0.1	1.0	16	0.6
ANZG (2018) Marine water 80% - 95%	-	5.5	27 (3+) 4.4 (6+)	1.3	4.4	0.4	70[4]	15	700	180	80	75 (m)	70	-	-	-	-	-	-	-	-	-
Laboratory Analysis																						
Limit of Reporting (LOR)	1	0.1	1	1	1	0.1	1	5	1	2	2	2	5	20	100	100	100	0.1	0.1	0.1	0.1	0.1
Sample ID																						
US (upstream)	2	0.4	2	13	1	BDL	4	15	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
DS (downstream)	1	0.1	BDL	11	BDL	BDL	1	13	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Key	Shaded Cells indicate values that exceed a threshold level BDL – Below Detection Limit (refer to laboratory reports for details). '-' - indicates not tested or not applicable																					
Footnotes	1 - For metals Cr6+, the assessment criteria are based on Chromium hexavalent (Cr6+) and results are based on total Chromium (Cr) 2 - F1 is the subtraction of the sum of BTEX concentrations from C6-C10 3 - F2 is the subtraction of naphthalene from >C10-C16 4 – ANZG (2018) Fresh Water value presented as most appropriate criteria. Level of species protection varies dependent on guidelines recommendation.																					

Table 11: Summary Results Table – Soil Vapour (samples obtained 02/08/23).

Analyte	Unit	PQL[1]	Method	HIL/HSL D[(2)] [µg/m³]	V1	V2	V3
Propylene	µg/m³	0.9	TO15	-	13	590	<0.9
Dichlorodifluoromethane	µg/m³	2.5	TO15	-	<2.5	<2.5	<2.5
Chloromethane	µg/m³	1.0	TO15	-	<1.0	<1.0	<2
1,2-Dichlorotetrafluoroethane	µg/m³	2.5	TO15	-	<2.5	<2.5	<2.5
Vinyl chloride	µg/m³	1.3	TO15	100	<1.3	<1.3	<1.3
1,3-Butadiene	µg/m³	1.1	TO15	-	<1.1	<1.1	<1.1
Bromomethane	µg/m³	1.9	TO15	-	<4	<4	<1.9
Chloroethane	µg/m³	1.3	TO15	-	<1.3	<1.3	<1.3
Ethanol	µg/m³	9	TO15	-	830	620	70
Acrolein	µg/m³	11	TO15	-	<11	<11	<11
Trichlorofluoromethane (Freon 11)	µg/m³	2.8	TO15	-	8	<2.8	<2.8
Acetone	µg/m³	11.9	TO15	-	180	140	20
Isopropyl Alcohol	µg/m³	12	TO15	-	40	30	1200
1,1-Dichloroethene	µg/m³	2.0	TO15	-	<2	<2.0	<2
1,1,2-Trichlorotrifluoroethane	µg/m³	3.8	TO15	-	<3.8	<3.8	<3.8
Methylene chloride (Dichloromethane)	µg/m³	17	USEPA 18	-	<17	<17	<17
Carbon Disulfide	µg/m³	16	TO15	-	<16	100	<16
trans-1,2-dichloroethene	µg/m³	2.0	TO15	-	<2	<2.0	<2
MTBE	µg/m³	1.8	TO15	-	<1.8	<1.8	<1.8
1,1- Dichloroethane	µg/m³	2.0	TO15	-	<2	<2.0	<2
Vinyl Acetate	µg/m³	1.8	TO15	-	<1.8	<1.8	<1.8
MEK	µg/m³	15	TO15	-	<15	17	<15
Hexane	µg/m³	1.8	TO15	-	130	300	8
cis-1,2-Dichloroethene	µg/m³	2.0	TO15	300	<2	<2	<2
Ethyl Acetate	µg/m³	1.8	TO15	-	<1.8	<1.8	<1.8
Chloroform	µg/m³	2.4	TO15	-	5	<2.4	<2.4
Tetrahydrofuran	µg/m³	1.5	TO15	-	<1.5	<1.5	<1.5
1,1,1-Trichloroethane	µg/m³	2.7	TO15	230,000	10	<2.7	<2.7
1,2-Dichloroethane	µg/m³	2.0	TO15	-	<2	<2	<2
Benzene	µg/m³	1.6	TO15	4,000	5	18	<1.6
Carbon tetrachloride	µg/m³	3.1	TO15	-	<3.1	<3.1	<3.1
Cyclohexane	µg/m³	1.7	TO15	-	140	<1.7	<1.7
Heptane	µg/m³	2.0	TO15	-	99	640	<2
Trichloroethene	µg/m³	2.7	TO15	80	4	5	<2.7
1,2-Dichloropropane	µg/m³	2.3	TO15	-	<2.3	<2.3	<2.3
1,4-Dioxane	µg/m³	1.8	TO15	-	<1.8	<1.8	<1.8
Bromodichloromethane	µg/m³	3.4	TO15	-	<3.4	<3.4	<3.4
Methyl Methacrylate	µg/m³	2.0	TO15	-	<2	<2	<2
MIBK	µg/m³	20	TO15	-	<20	<20	<20
cis-1,3-Dichloropropene	µg/m³	2.3	TO15	-	<2.3	<2.3	<2.3
trans-1,3-Dichloropropene	µg/m³	2.3	TO15	-	<2.3	<2.3	<2.3
Toluene	µg/m³	1.9	TO15	4,800,000	27	10	4
1,1,2-Trichloroethane	µg/m³	2.7	TO15	-	<2.7	<2.7	<2.7
Methyl Butyl Ketone	µg/m³	2.0	TO15	-	<2	<2	<2
Dibromochloromethane	µg/m³	1.6	TO15	-	<1.6	<1.6	<1.6
Tetrachloroethene	µg/m³	3.4	TO15	8000	<3.4	52	<3.4
1,2-Dibromoethane	µg/m³	3.8	TO15	-	<3.8	<3.8	<3.8
Chlorobenzene	µg/m³	2.3	TO15	-	<2.3	<2.3	<2.3
Ethylbenzene	µg/m³	2.2	TO15	1,300,000	7	8	<2.2
m-& p-Xylene	µg/m³	4.3	TO15	840,000	20	30	<4.3
Styrene	µg/m³	2.1	TO15		<2.1	<2.1	<2.1
o-Xylene	µg/m³	2.2	TO15	840,000	10	31	<2.2
Bromoform	µg/m³	5.2	TO15	-	<5.2	<5.2	<5.2
1,1,2,2-Tetrachloroethane	µg/m³	3.4	TO15	-	<3.4	<3.4	<3.4
4-ethyl toluene	µg/m³	2.5	TO15	-	<2.5	10	<2.5
1,3,5-Trimethylbenzene	µg/m³	2.5	TO15	-	<2.5	58	<2.5
1,2,4-Trimethylbenzene	µg/m³	2.5	TO15	-	<2.5	10	<2.5
1,3-Dichlorobenzene	µg/m³	3.0	TO15	-	<3	<3	<3
Benzyl chloride	µg/m³	2.6	TO15	-	<2.6	<2.6	<2.6
1,4-Dichlorobenzene	µg/m³	3.0	TO15	-	4	5	<3
1,2-Dichlorobenzene	µg/m³	3.0	TO15	-	<3	<3	<3
1,2,4-Trichlorobenzene	µg/m³	3.7	TO15	-	<3.7	<3.7	<3.7
Naphthalene	µg/m³	2.6	TO15	-	<2.6	<2.6	<2.6
Hexachloro-1,3-butadiene	µg/m³	5.3	TO15	-	<5.3	<5.3	<5.3
TPH C5 - C8 Aliphatic	µg/m³	200	AT-005	-	1400	110000	540
TPH C9 - C12 Aliphatic	µg/m³	50	AT-005	-	51	4900	<50
TPH C9 - C10 Aromatic	µg/m³	100	AT-005	-	<100	140	<100
TPH C6 - C10 - BTEX (F1)	µg/m³	200	TO15	200,000	690	120000	<200

Analyte	Unit	PQL[1]	Method	HIL/HSL D[(2)] [µg/m³]	V1	V2	V3
TPH >C10 - C12 - Naphthalene (F2)	µg/m³	40	TO15	40,000	<40	1600	<40
Methane (CH4)	%	0.01	AT-003	-	<0.01	3.5	<0.01

Footnotes:
Shaded Cells indicate values that exceed a guideline threshold level.
[1] Practical Quantitation Limit (lowest reportable concentration).
[2] Human health-based Investigation Level Commercial/Industrial includes premises such as shops, offices, factories and industrial sites. HSL D values selected from 0m to <1m in sand. NEPM Sch B1 (2013) HSL-D Table 1A(5) and HIL-D Table 1A(2).

Table 12: Summary results from GA5000 Gas Measurements (samples obtained 24/08/23).

	Methane % (CH4)	Carbon Dioxide % (CO2)	Oxygen % (O2)	Hydrogen Sulphide [ppm] (H2S)	Carbon Monoxide [ppm] (CO)	Internal Flow [l/h]
V1	0	0	3.2	0	1	0
V2*	-	-	-	-	-	-
V3	0.1	0.5	1.9	0	1	0.1
V4	0	0.1	13.8	0	2	0
V5	0	7.5	5.4	0	1	0
V6	0	7.9	7.0	0	1	0

* V2 unable to be measured due to the presence of water below the slab

8 Quality Control and Quality Assurance

The following QA/QC procedures were followed:

8.1 Completeness

The following documentation supporting the completeness of the results has been included in Appendix 2: Laboratory Reports, of this report:

- Chain of Custody forms.
- Sample receipt forms.
- Sample analysis results.
- Laboratory duplicate results.
- Surrogate spike data.
- Spike recovery acceptable limits.

8.2 Accuracy

The percentage recovery for spiked samples, calculated by the laboratory, are required to be within the acceptance limits for the methods used. All laboratory reports show that recoveries fell within the acceptance criteria outlined in the reports and that the required frequency of spikes was achieved.

8.3 Precision

The laboratory carried out internal QA/QC programs including analysis of laboratory duplicates. The results are contained in Appendix 2: Laboratory Reports. Laboratory Relative Percentage Differences (RPD) data was checked in all reports and found to be within the laboratory's acceptance criteria for all samples.

Intra-laboratory field duplicate (blind or field duplicates) samples are used to determine the precision associated with all or part of the sample collection and measurement process. Field duplicates also provide a measurement of sample matrix heterogeneity. Field duplicates are two independent samples collected as closely as possible, from the same point in space and time. The two samples are collected from the same source using the same type of sampling equipment. Each field duplicate is collected and stored in separate sample containers and transported in the same shipping container[2].

The results of the analyses on blind duplicate sample pairs are assessed by calculating the Relative Percent Differences (RPDs) between the results. The RPD is calculated as the difference between the results divided by their mean value and expressed as an absolute percentage value. If the RPD exceeds the value adopted for any analytes, additional investigation will be required, or justification provided for not conducting additional investigation.

The RPDs of all field duplicates should be within the recommended range outlined below for all compounds tested. Field Duplicates should be obtained and analysed at an approximate ratio of 1:20. It is noted that if the sampled matrix is of a heterogeneous nature (such as fill material, coarse grained material or material containing foreign matter and the like), the value that field duplicates add to the ability to monitor sample collection and measurement process precision is limited.

RPD values are considered acceptable if they are less than:

- 30% for inorganics and 50% for organics for results greater than ten times the laboratory Practical Quantitation Limit (PQL);
- 50% for inorganics and 70% for organics for results between five and ten times the PQL; and
- 100% for results less than five times the laboratory PQL.

Due to the minimal soil sampling as part of this assessment, compounded by presence of heterogenous fill material, no intra-laboratory samples were obtained during this assessment. We also refer to Section 8.7 for more information.

The laboratory results are overall considered acceptable for this investigation.

8.4 Sensitivity

[2] Lee, C C. Environmental Engineering Dictionary. 4th ed., Government Institutes, 2005.30

All laboratory PQLs for soil were below the assessment criteria for soil analysis. This is considered acceptable under the circumstances of this investigation.

8.5 Laboratory Blanks

Results for all laboratory blanks were reported to be below the PQL.

8.6 Holding Times

All samples were submitted to the laboratories and all extractions commenced within adequate holding times as evidenced by the COC documentation and sample receipts provided as part of the laboratory reports in Appendix 2: Laboratory Reports.

8.7 Field Duplicates, Inter Laboratory Duplicates and Rinsate Samples

It must be mentioned that that from a strictly scientific point of view and without taking the status of NEPM (2013) as a legislative instrument into account, the suitability of field duplicates as a data quality control mechanism in environmental investigations is of questionable value.

The submission of intra-laboratory duplicate samples is designed to be a scientific single blinded controlled experiment. Such an experimental setup requires that one single input parameter is investigated by controlling for (keeping constant) all other input parameters.

The main input parameters affecting the outcome of an intra-laboratory duplicate analysis can be grouped into the following areas:

- Quality of laboratory procedures and analytical methodologies
- Quality of sampling and field procedures to obtain identical (and representative) samples
- Heterogeneity of the sample matrix.

If the aim of a duplicate analysis is to provide a check of the precision (repeatability) of the laboratory's analysis, then the two other input parameters (sampling / field procedures and matrix heterogeneity) must be accountably controlled for. Only then can the total study error of the experiment, should one exceeding the stated quality indicator be encountered, accurately be attributed to the investigated input parameter, i.e. the laboratory procedures and analytical methodologies.

When using soil 'grab samples' as set out in the NEPM and AS4481.1 and 2, it is in the vast majority of cases impossible to control for any two of the three above-mentioned factors at the same time. As such, the results of a duplicate analysis do not represent the outcome of a controlled single blinded experiment and are hence not suitable as a means of assessing the quality for either of the above input parameters individually or the sample collection and measurement process as a whole.

We urge the reader to apply caution to any interpretation of intra and inter-laboratory duplicate samples as a means of data quality control based on RPD data.

We note that the laboratory chosen for the analysis of all samples is NATA registered and has a rigorous internal quality program in place (see laboratory reports). It is regularly audited as part of the NATA registration.

Considering the nature of this investigation and in particular in light of the above paragraphs, it is 4Pillars' opinion that the rigorous quality controls implemented by the laboratory itself are adequate for this type of investigation. Analysis of intra-laboratory duplicates obtained from heterogeneous fill materials such as the one sampled at this site inadvertently result in elevated RPD values. Such elevated RPD values are expected in such fill materials and as such the RPD values that would have been obtained from intra-laboratory duplicate samples cannot be used as a measure for repeatability (precision) of the highly procedures laboratory procedures. As such, no intra-laboratory duplicate samples were obtained during this investigation.

Inter-laboratory duplicate samples (which would add a fourth uncontrollable input parameter to the controlled experiment), would not have added to the quality control of this investigation in a meaningful way and were hence not implemented.

Trip blanks and trip spikes can be a useful part of a QC program when volatile substances are of primary concern and when prolonged time periods are expected between the sampling date and the submission of samples to the laboratory. This could for example be the case at large investigations of remote sites involving groundwater sampling.

Some volatile and semi-volatile substances were part of the CoPC as outlined in the CSM in Section 4, but based on desktop research they were not considered to be a primary target of the investigation. Samples were submitted to the

laboratory on the same day or within 24 hours of having been collected. Neither trip blanks nor trip spikes were for those reasons considered necessary to be included in the data quality assessment process of this investigation.

Potential cross contamination between sampling locations can be an issue at contamination assessments. Rinsate samples are used to assess the effectiveness of decontamination procedures. We refer to Australian Standard AS 4481.1-2005, Section 8.2.4 which states that rinsate blanks should be collected where cross-contamination of samples is likely to impact on the validity of the sampling and assessment process. Considering the laboratory detection limits for soil as per the laboratory reports in Appendix 2: Laboratory Reports are orders of magnitude lower than the Site Assessment Criteria for the CoPC at the Site, the decontamination procedures deployed during the assessment were considered adequate and did not require checking via rinsate blank samples.

The above is not valid for water samples where heterogeneity plays a diminished role. Water samples during this initial investigation were obtained to gauge whether groundwater at the site shows impact to nearby receptors and would warrant further investigation. In such screening cases the quality control measures implemented by the laboratory are in our opinion more than adequate and do not require external inspection.

8.8 Isopropyl Alcohol Shroud

The laboratory analysis of all samples showed the presence of IPA in the samples. Concentrations for IPA were 40 µg/m^3, 30 µg/m^3 and 1,200 µg/m^3 in samples V1, V2 and V3, respectively. The presence of small amounts of IPA in the subsurface of a site with a history of being landfilled is not uncommon and the encountered concentrations are not considered to indicate a failure of the seal between the vapour pin and the concrete wall.

9 Tier 1 Risk Assessment

The below diagram shows the three key conditions that need to be met for a contamination risk to exist. There needs to be a contaminant present, a receiver (i.e., human, animal, plant) who can reasonably be impacted by that contaminant and a pathway between the two. If one of the components is missing, the potential for adverse risk is low.

Risk may vary over time, as the contributing conditions change. Understanding this model is central to the development of the CSM, the assessment of results and formation of conclusions in this report.

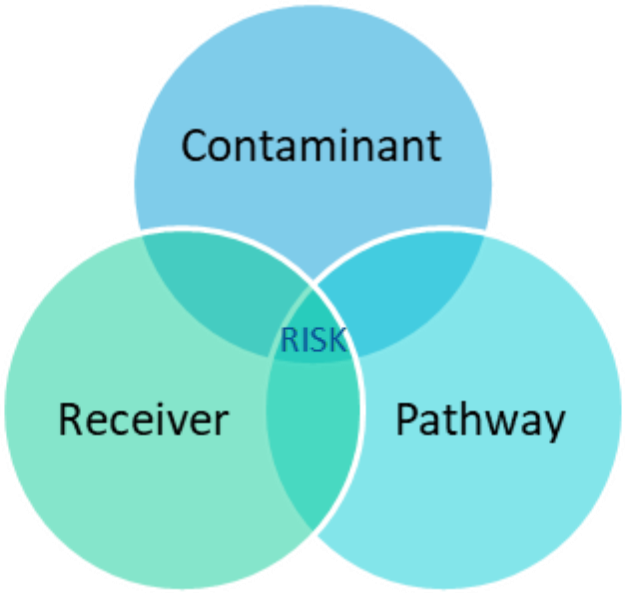

Figure 2: Conceptual diagram of risk assessment approach.

9.1 Soil

All analytes were found to be below the assessment criteria adopted for the site (See section 5.9). The Site is considered to pose a low risk to receptors from a soil impact perspective.

9.2 Surface Water

The purpose of surface water sampling was to ascertain whether potentially contaminated groundwater was migrating off-site and impacted the adjacent Coxs Creek (ecological receptor). Obtaining water samples from an upstream and a downstream sampling location of Coxs Creek, relative to the Site, narrowed a potential contamination source to the Site only, and provided information as to whether a source-pathway-receptor (SPR) linkage has been made.

Cadmium, Copper and Zinc have reported levels above the ANZG (2019) 95% Species Protection Level in Fresh Waters, however no patternable increase between Upstream and Downstream samples has been established – indicating that these guideline exceedances are inherent to Coxs Creek itself and are not caused by groundwater migration from the Site.

Significant concentrations of copper, cadmium or zinc in the fill material at the Site which would represent a potential groundwater contamination source, were not identified during the current investigation. We also note that elevated concentrations of copper, arsenic, lead and zinc are commonly encountered in groundwater in urban environments and are associated with factors such as surface water infiltration and leaking water infra-structure. It is hence 4Pillars' opinion, that groundwater at the Site does not require further investigation.

9.3 Soil Vapour

All analytes were found to be below the assessment criteria adopted for the site (See section 5.9), except for positive detection of methane at 3.5% (v/v) in Sample V2 during the first Site inspection. The Site is considered to pose a low risk to receptors from a soil vapour impact perspective.

Methane does however present a risk of asphyxiation (via oxygen displacement) or potential explosion if concentrations accumulate within enclosed spaces. In order to further assess this positive methane detection, a secondary Site inspection and increased sampling regime was implemented. This included six soil vapour sample points (V1-V6) which

were measured for methane, however showed no or detection below levels of concern (Samples V1-V3 were obtained from the same location as the vapour samples of the same name).

Soil vapour investigations are generally carried out over a prolonged period of time and involve a number of sampling events to ensure that samples have been obtained in a variety of environmental and atmospheric conditions. CRC Care (2013) outlines a model for the determination of data adequacy for making Petroleum Vapour Investigations from soil gas data based on the Margin of Safety (MOS).

The most relevant definition of the MOS for this investigation is the ratio of the assessment criteria to the measured soil gas concentration. Box 5.8 in CRC CARE provides the number of required sampling rounds or other actions required for a variety of MOS levels. If the MOS is greater than 10, in other words when the assessment criteria are more than ten times higher than the detected soil gas concentrations, a single sampling event is adequate.

It is further noted that the US based Interstate Technology and Regulatory Council (ITRC) in a 2007 publication came to a similar conclusion regarding temporal variations in soil gas concentrations. In Section D.4.10 the paper states:

> *In summary, temporal variations in soil gas concentrations, even for northern climates, are minor compared with the conservative nature of the risk-based screening levels. If soil gas values are a factor of 5–10 times below the risk-based screening levels, there likely is no need to do repeated sampling unless a major change in conditions occurs at the site (e.g., elevated water table, significant seasonal change in rainfall).*

Neither the NEPM nor the Hazardous NSW EPA Hazardous Ground Gases Guidelines[3] provide threshold levels for methane that could be used to calculate the MOS and as such the MOS cannot be calculated. Considering the obtained measurements, 4Pillars is satisfied that the levels of methane in the subsurface do not require immediate action. It is however recommended that soil vapour is measured from each of the six vapour points on a twice-yearly basis to establish a database of vapour results. A threshold level of 1% is to be adopted to inform further investigations – as outlined in Section 5.3 of the NSW EPA Solid Waste Landfills Environmental Guidelines 2016[4]. Where the threshold is consistently exceeded in the first year of monitoring, further investigation should be undertaken.

This will provide increased confidence related to the risk involved with methane. These measurements should be carried out for at least one year at which point the frequency of measurements should be reviewed.

[3] NSW EPA Contaminated Land Guidelines, Assessment and management of hazardous ground gases, December 2019 (amended May 2020).

[4] https://www.epa.nsw.gov.au/sites/default/files/solid-waste-landfill-guidelines-160259.pdf

10 Summary of findings and conclusion

Based on the results of the investigation and subject to the limitations in Section 13, the following conclusions are made:

- The Site is located in a predominantly commercial/industrial area and is approximately 6,478 m^2 in size.
- There is to be no change in land use from current. The proposed development is limited to an intensification of current activities and addition of associated infrastructure.
- The Site's history can reasonably be summarised as part of an area that had been quarried for commercial use as far back as 1943. The quarry had been back-filled sometime between 1998 and 2004, where it was then developed into and industrial business park.
- The Site is predominantly covered with hardstand, with the only exposed vegetation including a "vegetated swale" area to the north-east corner of the Site.
- The Site is located within a Class 5 Acid Sulfate Soil Risk Category, however no intrusive earthworks are included in the proposed development and therefore no further investigation into potential ASS is considered necessary.
- Two surface soil samples were collected from the vegetated swale area (0.4m depth) and submitted to the selected NATA accredited laboratory for analysis.
- The surface soil material in the vegetated swale was found to consist of medium-grained sandy-silty fill, of dark brown to light brown in colour. Samples were dry to moist, with medium plasticity. Minor ash was observed in both samples.
- Visible assessment of samples did not indicate the presence of asbestos in the soils or the Site's surface, nor was any ACM visible in any of the soil borings.
- Two surface water samples were collected in the adjacent Coxs Creek to identify any groundwater migration off-site. Samples were collected upstream and downstream, relative to the Site, in order to narrow the source and pathway to the Site.
- Three sub-slab vapour samples were collected using Summa Cannisters to assess the presence of soil vapour.
- Results of the laboratory analysed soil samples showed concentrations of all analytes to be below the adopted site criteria. The impact is considered to pose a low risk and does not warrant further investigation.
- Results of the laboratory analysed surface water samples showed concentrations of all analytes to be below the adopted site criteria, except for cadmium, copper and zinc in sample US, and copper and zinc in sample DS. No patternable increase in contaminant concentration has been observed between upstream and downstream samples, indicating that contamination is inherent to Coxs Creek and not attributable to the Site. Elevated cadmium, copper and zinc levels are not considered to be the result of on-site impact and no further assessment into groundwater or surface water at the Site is considered necessary.
- Results of the laboratory analysed soil vapour samples showed concentrations of all analytes to be below the adopted site criteria with the exception of methane in one location (V2).
- A second soil vapour survey focussing on the area of methane impact was conducted. No methane concentrations in the subsurface were detected.
- 4Pillars recommends bi-annual measurements of methane at all vapour sampling points to increase confidence surrounding methane risk until a pattern of methane concentration is established.
- Based on the information outlined in this report, it is considered that the Site is suitable for the proposed land use without any further environmental assessment.

11 Appendices

Appendix 1. Figures and Photos

Appendix 2. Laboratory Reports

12 References

- NEPM 2013 – *National Environment Protection (Assessment of Site Contamination) Measure 1999 (2013 update). Volume 2 (Schedule B).*
- *NSW EPA 2020 - Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites.*
- *NSW EPA 1995 - Sampling Design Guidelines.*
- State Environmental Planning Policy (Resilience and Hazards) 2021 (SEPP) (formerly SEPP 55).
- *CRC Care Pty Ltd (2017),Technical Report No.39, Risk-based management and remediation guidance for benzo(a)pyrene.*
- *National Chemicals Working Group of the Heads of EPAs Australia and New Zealand, PFAS National Environmental Management Plan Version 2, January 2020.*
- *NSW EPA Contaminated Land Guidelines, Assessment and management of hazardous ground gases, December 2019 (amended May 2020).*

13 Limitations of this assessment

To the best of our knowledge and based on information provided to us by the client or their representatives, the information contained in this report is accurate at the date of issue. 4Pillars has used a degree of care and skill ordinarily exercised in similar investigations by reputable members of the environmental sector in Australia. No other warranty, expressed or implied, is made or intended. The opinions and judgements expressed in this report should not be construed as legal opinions or advice. 4Pillars is also not responsible or liable for any third-Party use or reliance on this report.

The subsurface environment is often complex and variable. The conclusions presented in this report are based on limited investigation of conditions at specific locations. Adjacent areas and any stockpiled material is considered outside the scope of this report.

If there are any unexpected finds that are not consistent with this classification, 4Pillars should be notified immediately.

Appendix 1: Figures and photos

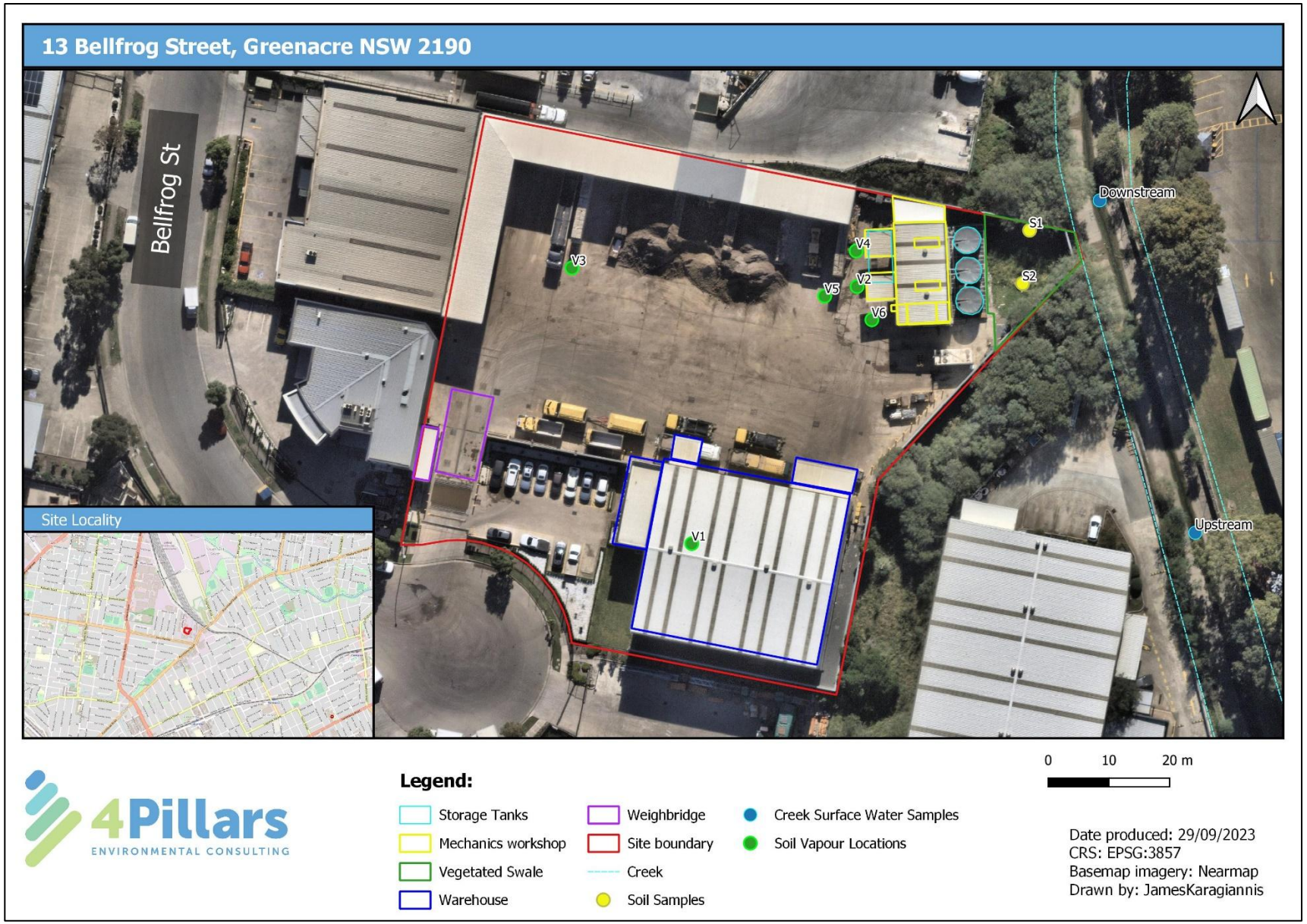

Figure 3: Site Map depicting sample locations and site locality.

Historical Aerial Imagery		
		
1943	1955	1971
		
1982	1991	2004
Drawn by: JK	**Report Reference:** 20211030AUS_AussiesBellfrog_DSI	**Key:** Red Point - Site
Date: 27/07/23	**Image Reference:** NSW Spatial Services	

Figure 4: Historical Aerial Imagery of the Site.

Photograph 1: Entrance of the Site at Bellfrog St. Facing south-east.

Photograph 2: Hardstand area of the site and material bays. Facing west.

Photograph 3: Inside of warehouse. Facing south-west

Photograph 4: Workshop area. Facing north.

Photograph 5: Vegetated Swale area. Facing north-east.

Photograph 6: Sample S1.

Photograph 7: Sample S2.

Photograph 8: Temporary Vapor Pin and silicon sheathing

Photograph 9: Summa Cannister and shroud.

Photograph 10: Surface Water sampling location (Coxs Creek). Site boundary to the left of the photo. Facing north.

Appendix 2: Laboratory Reports

CHAIN OF CUSTODY FORM

4Pillars ENVIRONMENTAL CONSULTING

4Pillars Environmental Consulting **Level 1, 5 George Street, North Strathfield NSW 2137**	**4Pillars Project Name:** 20211030-A
Contact Person: Gunnar Haid	**4Pillars Accounting Code and internal comments** Code 3
Sampler/Contact #:	
Email: Results: data@4pillars.com.au Invoice: accounts@4pillars.com.au	**Date results required:** **Turnaround time** (standard) same day 1 day 2 day 3 day

COC Sequence Number

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

General Comments: Unless otherwise specified, please do not send results directly to the project manager, please use the emails provided above.

Sample information						Required Analysis												Comments
Lab ID	Sample ID	Depth	Date/time sampled	Type of sample	Number of containers	Combo 6	PFAS short		TRH/BTEX	PAH	8 metals unfiltered							
1	S1	0.4m	2/8/23	S	2	x	x											
2	S2	0.4m	↓	S	2	x	x											
3	US	surface	↓	W	5				x	x	x							
4	DS	surface	↓	W	5				x	x	x							

Envirolab — 12 Ashley St, Chatswood NSW 2067, Ph: (02) 9910 6200

Job No: 329534

Date Received: 2/8/23

Time Received: 1720

Received By: SD

Temp: (Cool)/Ambient

Cooling: Ice/(Icepack) 8°C

Security: Intact/Broken/None

Relinquished by (Company): 4Pillars Environmental Consulting	**Received by (Company):** EVS SYD	**Laboratory use**
Print Name: James Karagiannis	**Print Name:** Sherry	**Samples Received:** (Cool) or Ambient (circle one)
Date & Time: 2/8/23 4:20pm	**Date & Time:** 2/8 1720	**Temperature Received at:** 8 (if applicable)
Signature: JK	**Signature:** SD	**Transported by:** Hand delivered / courier

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
customerservice@envirolab.com.au
www.envirolab.com.au

SAMPLE RECEIPT ADVICE

Client Details

Client	4Pillars Environmental Consulting
Attention	Gunnar Haid

Sample Login Details

Your reference	20211030-A
Envirolab Reference	329534
Date Sample Received	02/08/2023
Date Instructions Received	02/08/2023
Date Results Expected to be Reported	09/08/2023

Sample Condition

Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	2 Soil, 2 Water
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	8
Cooling Method	Ice Pack
Sampling Date Provided	YES

Comments

Nil

Please direct any queries to:

Aileen Hie	Jacinta Hurst
Phone: 02 9910 6200	**Phone: 02 9910 6200**
Fax: 02 9910 6201	**Fax: 02 9910 6201**
Email: ahie@envirolab.com.au	**Email: jhurst@envirolab.com.au**

Analysis Underway, details on the following page:

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
customerservice@envirolab.com.au
www.envirolab.com.au

Sample ID	vTRH(C6-C10)/BTEXN in Soil	svTRH (C10-C40) in Soil	PAHs in Soil	Organochlorine Pesticides in soil	Organophosphorus Pesticides in Soil	PCBs in Soil	Acid Extractable metalsin soil	PFAS in Soils Short	vTRH(C6-C10)/BTEXN in Water	svTRH (C10-C40) in Water	PAHs in Water	HM in water - total
S1-0.4	✓	✓	✓	✓	✓	✓	✓	✓				
S2-0.4	✓	✓	✓	✓	✓	✓	✓	✓				
US-Surface									✓	✓	✓	✓
DS-Surface									✓	✓	✓	✓

The '✓' indicates the testing you have requested. **THIS IS NOT A REPORT OF THE RESULTS.**

Additional Info

Sample storage - Waters are routinely disposed of approximately 1 month and soils approximately 2 months from receipt.
Requests for longer term sample storage must be received in writing.
Please contact the laboratory immediately if observed settled sediment present in water samples is to be included in the extraction and/or analysis (exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS analysis where solids are included by default.
TAT for Micro is dependent on incubation. This varies from 3 to 6 days.

Envirolab Services Pty Ltd
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12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
customerservice@envirolab.com.au
www.envirolab.com.au

CERTIFICATE OF ANALYSIS 329534

Client Details

Client	4Pillars Environmental Consulting
Attention	Gunnar Haid
Address	PO Box 476, Drummoyne, NSW, 1470

Sample Details

Your Reference	**20211030-A**
Number of Samples	2 Soil, 2 Water
Date samples received	02/08/2023
Date completed instructions received	02/08/2023

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date results requested by	09/08/2023
Date of Issue	09/08/2023

NATA Accreditation Number 2901. This document shall not be reproduced except in full.

Accredited for compliance with ISO/IEC 17025 - Testing. **Tests not covered by NATA are denoted with ***

Results Approved By
Alexander Mitchell Maclean, Senior Chemist
Dragana Tomas, Senior Chemist
Loren Bardwell, Development Chemist
Steven Luong, Senior Chemist

Authorised By
Nancy Zhang, Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil			
Our Reference		329534-1	329534-2
Your Reference	UNITS	S1	S2
Depth		0.4	0.4
Date Sampled		02/08/2023	02/08/2023
Type of sample		Soil	Soil
Date extracted	-	04/08/2023	04/08/2023
Date analysed	-	05/08/2023	05/08/2023
TRH C_6 - C_9	mg/kg	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25
Benzene	mg/kg	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1
m+p-xylene	mg/kg	<2	<2
o-Xylene	mg/kg	<1	<1
Naphthalene	mg/kg	<1	<1
Total +ve Xylenes	mg/kg	<1	<1
Surrogate aaa-Trifluorotoluene	%	110	131

svTRH (C10-C40) in Soil			
Our Reference		329534-1	329534-2
Your Reference	UNITS	S1	S2
Depth		0.4	0.4
Date Sampled		02/08/2023	02/08/2023
Type of sample		Soil	Soil
Date extracted	-	04/08/2023	04/08/2023
Date analysed	-	05/08/2023	05/08/2023
TRH C_{10} - C_{14}	mg/kg	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100
Total +ve TRH (C10-C36)	mg/kg	<50	<50
TRH >C_{10} -C_{16}	mg/kg	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50
Surrogate o-Terphenyl	%	83	83

PAHs in Soil			
Our Reference		329534-1	329534-2
Your Reference	UNITS	S1	S2
Depth		0.4	0.4
Date Sampled		02/08/2023	02/08/2023
Type of sample		Soil	Soil
Date extracted	-	04/08/2023	04/08/2023
Date analysed	-	07/08/2023	07/08/2023
Naphthalene	mg/kg	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	0.2
Anthracene	mg/kg	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	0.3
Pyrene	mg/kg	<0.1	0.3
Benzo(a)anthracene	mg/kg	<0.1	0.2
Chrysene	mg/kg	<0.1	0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	0.3
Benzo(a)pyrene	mg/kg	0.05	0.2
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	0.1
Total +ve PAH's	mg/kg	0.05	1.7
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	95	95

Organochlorine Pesticides in soil			
Our Reference		329534-1	329534-2
Your Reference	UNITS	S1	S2
Depth		0.4	0.4
Date Sampled		02/08/2023	02/08/2023
Type of sample		Soil	Soil
Date extracted	-	04/08/2023	04/08/2023
Date analysed	-	07/08/2023	07/08/2023
alpha-BHC	mg/kg	<0.1	<0.1
HCB	mg/kg	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	0.1
gamma-Chlordane	mg/kg	<0.1	0.2
alpha-chlordane	mg/kg	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1
Mirex	mg/kg	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1
Surrogate TCMX	%	102	100

Organophosphorus Pesticides in Soil			
Our Reference		329534-1	329534-2
Your Reference	UNITS	S1	S2
Depth		0.4	0.4
Date Sampled		02/08/2023	02/08/2023
Type of sample		Soil	Soil
Date extracted	-	04/08/2023	04/08/2023
Date analysed	-	07/08/2023	07/08/2023
Dichlorvos	mg/kg	<0.1	<0.1
Mevinphos	mg/kg	<0.1	<0.1
Phorate	mg/kg	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1
Disulfoton	mg/kg	<0.1	<0.1
Chlorpyrifos-methyl	mg/kg	<0.1	<0.1
Parathion-Methyl	mg/kg	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1
Fenthion	mg/kg	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1
Methidathion	mg/kg	<0.1	<0.1
Fenamiphos	mg/kg	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1
Phosalone	mg/kg	<0.1	<0.1
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1
Coumaphos	mg/kg	<0.1	<0.1
Surrogate TCMX	%	102	100

PCBs in Soil			
Our Reference		329534-1	329534-2
Your Reference	UNITS	S1	S2
Depth		0.4	0.4
Date Sampled		02/08/2023	02/08/2023
Type of sample		Soil	Soil
Date extracted	-	04/08/2023	04/08/2023
Date analysed	-	07/08/2023	07/08/2023
Aroclor 1016	mg/kg	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1
Surrogate TCMX	%	102	100

Acid Extractable metals in soil			
Our Reference		329534-1	329534-2
Your Reference	UNITS	S1	S2
Depth		0.4	0.4
Date Sampled		02/08/2023	02/08/2023
Type of sample		Soil	Soil
Date prepared	-	04/08/2023	04/08/2023
Date analysed	-	08/08/2023	08/08/2023
Arsenic	mg/kg	<4	6
Cadmium	mg/kg	<0.4	<0.4
Chromium	mg/kg	7	14
Copper	mg/kg	12	28
Lead	mg/kg	13	28
Mercury	mg/kg	<0.1	<0.1
Nickel	mg/kg	4	7
Zinc	mg/kg	34	72

Moisture			
Our Reference		329534-1	329534-2
Your Reference	UNITS	S1	S2
Depth		0.4	0.4
Date Sampled		02/08/2023	02/08/2023
Type of sample		Soil	Soil
Date prepared	-	04/08/2023	04/08/2023
Date analysed	-	07/08/2023	07/08/2023
Moisture	%	20	13

PFAS in Soils Short			
Our Reference		329534-1	329534-2
Your Reference	UNITS	S1	S2
Depth		0.4	0.4
Date Sampled		02/08/2023	02/08/2023
Type of sample		Soil	Soil
Date prepared	-	04/08/2023	04/08/2023
Date analysed	-	04/08/2023	04/08/2023
Perfluorohexanesulfonic acid - PFHxS	µg/kg	<0.1	<0.1
Perfluorooctanesulfonic acid PFOS	µg/kg	0.4	1.8
Perfluorooctanoic acid PFOA	µg/kg	0.1	0.5
6:2 FTS	µg/kg	<0.1	<0.1
8:2 FTS	µg/kg	<0.2	<0.2
Surrogate $^{13}C_8$ *PFOS*	%	101	100
Surrogate $^{13}C_2$ *PFOA*	%	91	89
Extracted ISTD $^{18}O_2$ *PFHxS*	%	85	87
Extracted ISTD $^{13}C_4$ *PFOS*	%	94	101
Extracted ISTD $^{13}C_4$ *PFOA*	%	103	110
Extracted ISTD $^{13}C_2$ *6:2FTS*	%	107	115
Extracted ISTD $^{13}C_2$ *8:2FTS*	%	124	129
Total Positive PFHxS & PFOS	µg/kg	0.4	1.8
Total Positive PFOS & PFOA	µg/kg	0.5	2.3
Total Positive PFAS	µg/kg	0.5	2.3

vTRH(C6-C10)/BTEXN in Water			
Our Reference	UNITS	329534-3	329534-4
Your Reference		US	DS
Depth		Surface	Surface
Date Sampled		02/08/2023	02/08/2023
Type of sample		Water	Water
Date extracted	-	03/08/2023	03/08/2023
Date analysed	-	04/08/2023	04/08/2023
TRH C_6 - C_9	µg/L	<10	<10
TRH C_6 - C_{10}	µg/L	<10	<10
TRH C_6 - C_{10} less BTEX (F1)	µg/L	<10	<10
Benzene	µg/L	<1	<1
Toluene	µg/L	<1	<1
Ethylbenzene	µg/L	<1	<1
m+p-xylene	µg/L	<2	<2
o-xylene	µg/L	<1	<1
Naphthalene	µg/L	<1	<1
Surrogate Dibromofluoromethane	%	101	106
Surrogate toluene-d8	%	99	101
Surrogate 4-BFB	%	99	109

svTRH (C10-C40) in Water			
Our Reference	UNITS	329534-3	329534-4
Your Reference		US	DS
Depth		Surface	Surface
Date Sampled		02/08/2023	02/08/2023
Type of sample		Water	Water
Date extracted	-	07/08/2023	07/08/2023
Date analysed	-	07/08/2023	07/08/2023
TRH C_{10} - C_{14}	µg/L	<50	<50
TRH C_{15} - C_{28}	µg/L	<100	<100
TRH C_{29} - C_{36}	µg/L	<100	<100
Total +ve TRH (C10-C36)	µg/L	<50	<50
TRH >C_{10} - C_{16}	µg/L	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	µg/L	<50	<50
TRH >C_{16} - C_{34}	µg/L	<100	<100
TRH >C_{34} - C_{40}	µg/L	<100	<100
Total +ve TRH (>C10-C40)	µg/L	<50	<50
Surrogate o-Terphenyl	%	64	68

PAHs in Water			
Our Reference	UNITS	329534-3	329534-4
Your Reference		US	DS
Depth		Surface	Surface
Date Sampled		02/08/2023	02/08/2023
Type of sample		Water	Water
Date extracted	-	07/08/2023	07/08/2023
Date analysed	-	08/08/2023	08/08/2023
Naphthalene	µg/L	<0.2	<0.2
Acenaphthylene	µg/L	<0.1	<0.1
Acenaphthene	µg/L	<0.1	<0.1
Fluorene	µg/L	<0.1	<0.1
Phenanthrene	µg/L	<0.1	<0.1
Anthracene	µg/L	<0.1	<0.1
Fluoranthene	µg/L	<0.1	<0.1
Pyrene	µg/L	<0.1	<0.1
Benzo(a)anthracene	µg/L	<0.1	<0.1
Chrysene	µg/L	<0.1	<0.1
Benzo(b,j+k)fluoranthene	µg/L	<0.2	<0.2
Benzo(a)pyrene	µg/L	<0.1	<0.1
Indeno(1,2,3-c,d)pyrene	µg/L	<0.1	<0.1
Dibenzo(a,h)anthracene	µg/L	<0.1	<0.1
Benzo(g,h,i)perylene	µg/L	<0.1	<0.1
Benzo(a)pyrene TEQ	µg/L	<0.5	<0.5
Total +ve PAH's	µg/L	<0.1	<0.1
Surrogate p-Terphenyl-d14	%	67	78

HM in water - total			
Our Reference	UNITS	329534-3	329534-4
Your Reference		US	DS
Depth		Surface	Surface
Date Sampled		02/08/2023	02/08/2023
Type of sample		Water	Water
Date prepared	-	04/08/2023	04/08/2023
Date analysed	-	04/08/2023	04/08/2023
Arsenic-Total	µg/L	2	1
Cadmium-Total	µg/L	0.4	0.1
Chromium-Total	µg/L	2	<1
Copper-Total	µg/L	13	11
Lead-Total	µg/L	1	<1
Mercury-Total	µg/L	<0.05	<0.05
Nickel-Total	µg/L	4	1
Zinc-Total	µg/L	15	13

Method ID	Methodology Summary
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Metals-022	Determination of various metals by ICP-MS. Please note for Bromine and Iodine, any forms of these elements that are present are included together in the one result reported for each of these two elements.
Org-020	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-020	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis. Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40).
Org-021	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
Org-021	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD. Note, the Total +ve PCBs PQL is reflective of the lowest individual PQL and is therefore" Total +ve PCBs" is simply a sum of the positive individual PCBs.
Org-022/025	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS/GC-MSMS.
Org-022/025	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-MS/GC-MSMS. Note, the Total +ve reported DDD+DDE+DDT PQL is reflective of the lowest individual PQL and is therefore simply a sum of the positive individually report DDD+DDE+DDT.
Org-022/025	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS/GC-MSMS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013.

Method ID	Methodology Summary
Org-022/025	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS and/or GC-MS/MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013. For soil results:- 1. 'EQ PQL'values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. 'EQ zero'values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. 'EQ half PQL'values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore "Total +ve PAHs" is simply a sum of the positive individual PAHs.
Org-023	Water samples are analysed directly by purge and trap GC-MS.
Org-023	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
Org-023	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.
Org-023	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater. Note, the Total +ve Xylene PQL is reflective of the lowest individual PQL and is therefore "Total +ve Xylenes" is simply a sum of the positive individual Xylenes.
Org-029	Soil samples are extracted with basified Methanol. Waters and soil extracts are directly injected and/or concentrated/extracted using SPE. TCLPs/ASLP leachates are centrifuged, the supernatant is then analysed (including amendment with solvent) - as per the option in AS4439.3. Analysis is undertaken with LC-MS/MS. PFAS results include the sum of branched and linear isomers where applicable. Please note that PFAS results are corrected for Extracted Internal Standards (QSM 5.4 Table B-15 terminology), which are mass labelled analytes added prior to sample preparation to assess matrix effects and verify processing of the sample. PFAS analytes without a commercially available mass labelled analogue are corrected vs a closely eluting mass labelled PFAS compound. Surrogates are also reported, in this context they are mass labelled PFAS compounds added prior to extraction but are used as monitoring compounds only (not used for result correction). Envicarb (or similar) is used discretionally to remove interfering matrix components. Please contact the laboratory if estimates of Measurement Uncertainty are required as per WA DER.

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			04/08/2023	1	04/08/2023	04/08/2023		04/08/2023	[NT]
Date analysed	-			05/08/2023	1	05/08/2023	05/08/2023		05/08/2023	[NT]
TRH C_6 - C_9	mg/kg	25	Org-023	<25	1	<25	<25	0	92	[NT]
TRH C_6 - C_{10}	mg/kg	25	Org-023	<25	1	<25	<25	0	92	[NT]
Benzene	mg/kg	0.2	Org-023	<0.2	1	<0.2	<0.2	0	78	[NT]
Toluene	mg/kg	0.5	Org-023	<0.5	1	<0.5	<0.5	0	84	[NT]
Ethylbenzene	mg/kg	1	Org-023	<1	1	<1	<1	0	96	[NT]
m+p-xylene	mg/kg	2	Org-023	<2	1	<2	<2	0	101	[NT]
o-Xylene	mg/kg	1	Org-023	<1	1	<1	<1	0	101	[NT]
Naphthalene	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-023	121	1	110	103	7	93	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			04/08/2023	1	04/08/2023	04/08/2023		04/08/2023	[NT]
Date analysed	-			05/08/2023	1	05/08/2023	05/08/2023		05/08/2023	[NT]
TRH C_{10} - C_{14}	mg/kg	50	Org-020	<50	1	<50	<50	0	123	[NT]
TRH C_{15} - C_{28}	mg/kg	100	Org-020	<100	1	<100	<100	0	127	[NT]
TRH C_{29} - C_{36}	mg/kg	100	Org-020	<100	1	<100	<100	0	114	[NT]
TRH >C_{10} -C_{16}	mg/kg	50	Org-020	<50	1	<50	<50	0	123	[NT]
TRH >C_{16} -C_{34}	mg/kg	100	Org-020	<100	1	<100	<100	0	127	[NT]
TRH >C_{34} -C_{40}	mg/kg	100	Org-020	<100	1	<100	<100	0	114	[NT]
Surrogate o-Terphenyl	%		Org-020	90	1	83	81	2	105	[NT]

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			04/08/2023	1	04/08/2023	04/08/2023		04/08/2023	[NT]
Date analysed	-			07/08/2023	1	07/08/2023	07/08/2023		07/08/2023	[NT]
Naphthalene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	97	[NT]
Acenaphthylene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	101	[NT]
Fluorene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	92	[NT]
Phenanthrene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	100	[NT]
Anthracene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	100	[NT]
Pyrene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	103	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	79	[NT]
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-022/025	<0.05	1	0.05	<0.05	0	96	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-022/025	109	1	95	96	1	97	[NT]

QUALITY CONTROL: Organochlorine Pesticides in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			04/08/2023	1	04/08/2023	04/08/2023		04/08/2023	[NT]
Date analysed	-			07/08/2023	1	07/08/2023	07/08/2023		07/08/2023	[NT]
alpha-BHC	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	98	[NT]
HCB	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	100	[NT]
gamma-BHC	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Heptachlor	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	107	[NT]
delta-BHC	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	105	[NT]
Heptachlor Epoxide	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	96	[NT]
gamma-Chlordane	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	109	[NT]
Dieldrin	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	114	[NT]
Endrin	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	88	[NT]
Endosulfan II	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDD	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	90	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	80	[NT]
Methoxychlor	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Mirex	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	110	1	102	101	1	107	[NT]

QUALITY CONTROL: Organophosphorus Pesticides in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			04/08/2023	1	04/08/2023	04/08/2023		04/08/2023	[NT]
Date analysed	-			07/08/2023	1	07/08/2023	07/08/2023		07/08/2023	[NT]
Dichlorvos	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	109	[NT]
Mevinphos	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Phorate	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Dimethoate	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Disulfoton	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Chlorpyrifos-methyl	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Parathion-Methyl	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Ronnel	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	95	[NT]
Fenitrothion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	91	[NT]
Malathion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	97	[NT]
Chlorpyriphos	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	100	[NT]
Fenthion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Parathion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	87	[NT]
Bromophos-ethyl	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Methidathion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fenamiphos	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Ethion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	82	[NT]
Phosalone	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Coumaphos	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	110	1	102	101	1	107	[NT]

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			04/08/2023	1	04/08/2023	04/08/2023		04/08/2023	[NT]
Date analysed	-			07/08/2023	1	07/08/2023	07/08/2023		07/08/2023	[NT]
Aroclor 1016	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	103	[NT]
Aroclor 1260	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-021	110	1	102	101	1	107	[NT]

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-14	329534-2
Date prepared	-			04/08/2023	1	04/08/2023	04/08/2023		04/08/2023	04/08/2023
Date analysed	-			08/08/2023	1	08/08/2023	08/08/2023		08/08/2023	08/08/2023
Arsenic	mg/kg	4	Metals-020	<4	1	<4	4	0	107	114
Cadmium	mg/kg	0.4	Metals-020	<0.4	1	<0.4	<0.4	0	101	101
Chromium	mg/kg	1	Metals-020	<1	1	7	7	0	113	109
Copper	mg/kg	1	Metals-020	<1	1	12	12	0	109	122
Lead	mg/kg	1	Metals-020	<1	1	13	13	0	111	106
Mercury	mg/kg	0.1	Metals-021	<0.1	1	<0.1	<0.1	0	123	114
Nickel	mg/kg	1	Metals-020	<1	1	4	4	0	103	104
Zinc	mg/kg	1	Metals-020	<1	1	34	33	3	107	110

QUALITY CONTROL: PFAS in Soils Short						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			04/08/2023	[NT]	[NT]	[NT]	[NT]	04/08/2023	[NT]
Date analysed	-			04/08/2023	[NT]	[NT]	[NT]	[NT]	04/08/2023	[NT]
Perfluorohexanesulfonic acid - PFHxS	µg/kg	0.1	Org-029	<0.1	[NT]	[NT]	[NT]	[NT]	113	[NT]
Perfluorooctanesulfonic acid PFOS	µg/kg	0.1	Org-029	<0.1	[NT]	[NT]	[NT]	[NT]	110	[NT]
Perfluorooctanoic acid PFOA	µg/kg	0.1	Org-029	<0.1	[NT]	[NT]	[NT]	[NT]	104	[NT]
6:2 FTS	µg/kg	0.1	Org-029	<0.1	[NT]	[NT]	[NT]	[NT]	107	[NT]
8:2 FTS	µg/kg	0.2	Org-029	<0.2	[NT]	[NT]	[NT]	[NT]	112	[NT]
Surrogate $^{13}C_8$ *PFOS*	%		Org-029	97	[NT]	[NT]	[NT]	[NT]	102	[NT]
Surrogate $^{13}C_2$ *PFOA*	%		Org-029	95	[NT]	[NT]	[NT]	[NT]	92	[NT]
Extracted ISTD $^{18}O_2$ *PFHxS*	%		Org-029	95	[NT]	[NT]	[NT]	[NT]	89	[NT]
Extracted ISTD $^{13}C_4$ *PFOS*	%		Org-029	108	[NT]	[NT]	[NT]	[NT]	100	[NT]
Extracted ISTD $^{13}C_4$ *PFOA*	%		Org-029	113	[NT]	[NT]	[NT]	[NT]	107	[NT]
Extracted ISTD $^{13}C_2$ *6:2FTS*	%		Org-029	113	[NT]	[NT]	[NT]	[NT]	104	[NT]
Extracted ISTD $^{13}C_2$ *8:2FTS*	%		Org-029	119	[NT]	[NT]	[NT]	[NT]	107	[NT]

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W3	[NT]
Date extracted	-			03/08/2023	[NT]	[NT]	[NT]	[NT]	03/08/2023	[NT]
Date analysed	-			04/08/2023	[NT]	[NT]	[NT]	[NT]	04/08/2023	[NT]
TRH C_6 - C_9	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	105	[NT]
TRH C_6 - C_{10}	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	105	[NT]
Benzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	93	[NT]
Toluene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	104	[NT]
Ethylbenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	105	[NT]
m+p-xylene	µg/L	2	Org-023	<2	[NT]	[NT]	[NT]	[NT]	111	[NT]
o-xylene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	113	[NT]
Naphthalene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-023	106	[NT]	[NT]	[NT]	[NT]	98	[NT]
Surrogate toluene-d8	%		Org-023	102	[NT]	[NT]	[NT]	[NT]	99	[NT]
Surrogate 4-BFB	%		Org-023	109	[NT]	[NT]	[NT]	[NT]	102	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			07/08/2023	[NT]	[NT]	[NT]	[NT]	07/08/2023	[NT]
Date analysed	-			07/08/2023	[NT]	[NT]	[NT]	[NT]	07/08/2023	[NT]
TRH C_{10} - C_{14}	µg/L	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	103	[NT]
TRH C_{15} - C_{28}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	107	[NT]
TRH C_{29} - C_{36}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	100	[NT]
TRH >C_{10} - C_{16}	µg/L	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	103	[NT]
TRH >C_{16} - C_{34}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	107	[NT]
TRH >C_{34} - C_{40}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	100	[NT]
Surrogate o-Terphenyl	%		Org-020	94	[NT]	[NT]	[NT]	[NT]	66	[NT]

QUALITY CONTROL: PAHs in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			07/08/2023	[NT]	[NT]	[NT]	[NT]	07/08/2023	[NT]
Date analysed	-			08/08/2023	[NT]	[NT]	[NT]	[NT]	08/08/2023	[NT]
Naphthalene	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	75	[NT]
Acenaphthylene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Acenaphthene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	78	[NT]
Fluorene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	73	[NT]
Phenanthrene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	75	[NT]
Anthracene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluoranthene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	76	[NT]
Pyrene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	77	[NT]
Benzo(a)anthracene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chrysene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	81	[NT]
Benzo(b,j+k)fluoranthene	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(a)pyrene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	68	[NT]
Indeno(1,2,3-c,d)pyrene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibenzo(a,h)anthracene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(g,h,i)perylene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-022/025	76	[NT]	[NT]	[NT]	[NT]	69	[NT]

QUALITY CONTROL: HM in water - total						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			04/08/2023	[NT]	[NT]	[NT]	[NT]	04/08/2023	[NT]
Date analysed	-			04/08/2023	[NT]	[NT]	[NT]	[NT]	04/08/2023	[NT]
Arsenic-Total	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	103	[NT]
Cadmium-Total	µg/L	0.1	Metals-022	<0.1	[NT]	[NT]	[NT]	[NT]	100	[NT]
Chromium-Total	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	101	[NT]
Copper-Total	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	101	[NT]
Lead-Total	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	101	[NT]
Mercury-Total	µg/L	0.05	Metals-021	<0.05	[NT]	[NT]	[NT]	[NT]	104	[NT]
Nickel-Total	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	101	[NT]
Zinc-Total	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	100	[NT]

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.

The recommended maximums for analytes in urine are taken from “2018 TLVs and BEIs”, as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.

Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Where matrix spike recoveries fall below the lower limit of the acceptance criteria (e.g. for non-labile or standard Organics <60%), positive result(s) in the parent sample will subsequently have a higher than typical estimated uncertainty (MU estimates supplied on request) and in these circumstances the sample result is likely biased significantly low.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.

CHAIN OF CUSTODY - CANISTERS / BAGS / TD TUBES

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See reverse side for TERMS AND CONDITIONS FOR PROVISION OF SAMPLING EQUIPMENT

ENVIROLAB GROUP

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07 3266 9532 | brisbane@envirolab.com.au

Darwin Office - Envirolab Services
Unit 20/119 Reichardt Road, Winnellie, NT 0820

Client: 4Pillars	Client Project Name / Number / Site etc. (i.e. report title): 20211230AUS-A
Contact Person: G. HAID	PO No.: Code 3
Project Mgr:	Envirolab Quote No.:
Sampler: G. HAID	Date results required:
Address:	Or choose: standard / same day / 1 day / 2 day / 3 day
	Note: Inform lab in advance if urgent turnaround is required - surcharges apply
Phone: 0402411177 Mob:	Additional report format: esdat / equis /
Email: gunner@4pillars.com.au	Lab Comments:

Sample Information											Tests Required								Comments
Envirolab Sample ID	Client Sample ID (Field Location)	Canister / TD Tube #	Soil Gas Train / Mass Flow Controller #	Leak Test Passed (Y/N)	PID Reading (ppmv)	Date of Collection	Collection Time		Canister Vacuum (Hg")		Flow Rate (Bags/TD Tubes only)	TO-15 (Cans/Bags) / TO-17 (Tubes)	TPH	5 Sulphides (Cans/Bags only)	Ozone Precursors	General Gases* (Cans/Bags only)	RGA Full List (Cans/Bags only)			
							Time On	Time Off	Initial	Final										
1	V1	3509	1867	Y	/	21/12/23	12:55pm	13:24	-30	-9		✓	✓			✓				
2	V2	3659	630	Y	/	"	14:14	[illegible]	-30			✓	/			/				
	—							14:43		-9										
3	V3	3282	1549	Y	/	"	15:00	16:04	-30	-2.5		/	/			✓				

* General Gases - Please tick one:

- ☐ 1) Methane, Oxygen, Carbon dioxide, Carbon monoxide, Nitrogen
- ☐ 2) Methane, Oxygen, Carbon dioxide, Carbon monoxide, Helium, Hydrogen
- ☐ 3) Specify analytes (NB: If both Nitrogen and Helium/Hydrogen are require, please contact the laboratory

Relinquished by (Company): 4Pillars	Received by (Company): ELS	*Lab Use Only:*
Print Name: G. HAID	Print Name: DFORD	Job Number: 329532
Date & Time: 2.8.23	Date & Time: 02/01/23 10:00	Security seal: Intact / Broken / None
Signature:	Signature:	TAT Req - SAME day / 1 / 2 / 3 / 4 / STD

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
customerservice@envirolab.com.au
www.envirolab.com.au

SAMPLE RECEIPT ADVICE

Client Details

Client	4Pillars Environmental Consulting
Attention	Gunnar Haid

Sample Login Details

Your reference	20211030AUS-A
Envirolab Reference	329532
Date Sample Received	02/08/2023
Date Instructions Received	02/08/2023
Date Results Expected to be Reported	09/08/2023

Sample Condition

Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	3 Air
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	n/a
Cooling Method	Not applicable
Sampling Date Provided	YES

Comments

Nil

Please direct any queries to:

Aileen Hie	Jacinta Hurst
Phone: 02 9910 6200	**Phone: 02 9910 6200**
Fax: 02 9910 6201	**Fax: 02 9910 6201**
Email: ahie@envirolab.com.au	**Email: jhurst@envirolab.com.au**

Analysis Underway, details on the following page:

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
customerservice@envirolab.com.au
www.envirolab.com.au

Sample ID	TO15 in Canisters/Bags	TO15 in Canisters µg/m3	TPH Air/ Air Phase Hydrocarbon	Permanent Gas analysis
V1	✓	✓	✓	✓
V2	✓	✓	✓	✓
V3	✓	✓	✓	✓

The '✓' indicates the testing you have requested. **THIS IS NOT A REPORT OF THE RESULTS.**

Additional Info

Sample storage - Waters are routinely disposed of approximately 1 month and soils approximately 2 months from receipt.
Requests for longer term sample storage must be received in writing.
Please contact the laboratory immediately if observed settled sediment present in water samples is to be included in the extraction and/or analysis (exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS analysis where solids are included by default.
TAT for Micro is dependent on incubation. This varies from 3 to 6 days.

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12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
customerservice@envirolab.com.au
www.envirolab.com.au

CERTIFICATE OF ANALYSIS 329532

Client Details

Client	4Pillars Environmental Consulting
Attention	Gunnar Haid
Address	PO Box 476, Drummoyne, NSW, 1470

Sample Details

Your Reference	**20211030AUS-A**
Number of Samples	3 Air
Date samples received	02/08/2023
Date completed instructions received	02/08/2023

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Please refer to the last page of this report for any comments relating to the results.

Report Details

Date results requested by	09/08/2023
Date of Issue	09/08/2023

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Accredited for compliance with ISO/IEC 17025 - Testing. **Tests not covered by NATA are denoted with ***

Results Approved By
Amanda Chui, Air Toxics Team Leader

Authorised By
Nancy Zhang, Laboratory Manager

TO15 in Canisters/Bags				
Our Reference		329532-1	329532-2	329532-3
Your Reference	UNITS	V1	V2	V3
Date Sampled		02/08/2023	02/08/2023	02/08/2023
Type of sample		Air	Air	Air
Air Kit Security No.		3509	3659	3282
Vacuum before Shipment	Hg"	-30	-30	-30
Vacuum before Analysis	Hg"	-8	-7	-0.6
Date prepared	-	04/08/2023	04/08/2023	04/08/2023
Date analysed	-	04/08/2023	04/08/2023	04/08/2023
Propylene	ppbv	7.3	340	<0.5
Dichlorodifluoromethane	ppbv	<0.5	<0.5	<0.5
Chloromethane	ppbv	<0.5	<0.5	<1
1,2-Dichlorotetrafluoroethane	ppbv	<0.5	<0.5	<0.5
Vinyl chloride	ppbv	<0.5	<0.5	<0.5
1,3-Butadiene	ppbv	<0.5	<0.5	<0.5
Bromomethane	ppbv	<1	<1	<0.5
Chloroethane	ppbv	<0.5	<0.5	<0.5
Ethanol	ppbv	440	330	40
Acrolein	ppbv	<5	<5	<5
Trichlorofluoromethane (Freon 11)	ppbv	1	<0.5	<0.5
Acetone	ppbv	75	61	9
Isopropyl Alcohol	ppbv	20	10	480
1,1-Dichloroethene	ppbv	<0.5	<0.5	<0.5
1,1,2-Trichlorotrifluoroethane	ppbv	<0.5	<0.5	<0.5
Methylene chloride (Dichloromethane)	ppbv	<5	<5	<5
Carbon Disulfide	ppbv	<5	40	<5
trans-1,2-dichloroethene	ppbv	<0.5	<0.5	<0.5
MTBE	ppbv	<0.5	<0.5	<0.5
1,1- Dichloroethane	ppbv	<0.5	<0.5	<0.5
Vinyl Acetate	ppbv	<0.5	<0.5	<0.5
MEK	ppbv	<5	6	<5
Hexane	ppbv	38	85	2
cis-1,2-Dichloroethene	ppbv	<0.5	<0.5	<0.5
Ethyl Acetate	ppbv	<0.5	<0.5	<0.5
Chloroform	ppbv	0.9	<0.5	<0.5
Tetrahydrofuran	ppbv	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	ppbv	2	<0.5	<0.5
1,2-Dichloroethane	ppbv	<0.5	<0.5	<0.5
Benzene	ppbv	2	5.6	<0.5
Carbon tetrachloride	ppbv	<0.5	<0.5	<0.5

TO15 in Canisters/Bags				
Our Reference		329532-1	329532-2	329532-3
Your Reference	UNITS	V1	V2	V3
Date Sampled		02/08/2023	02/08/2023	02/08/2023
Type of sample		Air	Air	Air
Air Kit Security No.		3509	3659	3282
Cyclohexane	ppbv	39	<0.5	<0.5
Heptane	ppbv	24	160	<0.5
Trichloroethene	ppbv	0.8	0.9	<0.5
1,2-Dichloropropane	ppbv	<0.5	<0.5	<0.5
1,4-Dioxane	ppbv	<0.5	<0.5	<0.5
Bromodichloromethane	ppbv	<0.5	<0.5	<0.5
Methyl Methacrylate	ppbv	<0.5	<0.5	<0.5
MIBK	ppbv	<5	<5	<5
cis-1,3-Dichloropropene	ppbv	<0.5	<0.5	<0.5
trans-1,3-Dichloropropene	ppbv	<0.5	<0.5	<0.5
Toluene	ppbv	7.3	3	1
1,1,2-Trichloroethane	ppbv	<0.5	<0.5	<0.5
Methyl Butyl Ketone	ppbv	<0.5	<0.5	<0.5
Dibromochloromethane	ppbv	<0.5	<0.5	<0.5
Tetrachloroethene	ppbv	<0.5	7.7	<0.5
1,2-Dibromoethane	ppbv	<0.5	<0.5	<0.5
Chlorobenzene	ppbv	<0.5	<0.5	<0.5
Ethylbenzene	ppbv	2	2	<0.5
m-& p-Xylene	ppbv	5	7	<1
Styrene	ppbv	<0.5	<0.5	<0.5
o-Xylene	ppbv	3	7.1	<0.5
Bromoform	ppbv	<0.5	<0.5	<0.5
1,1,2,2-Tetrachloroethane	ppbv	<0.5	<0.5	<0.5
4-ethyl toluene	ppbv	<0.5	2	<0.5
1,3,5-Trimethylbenzene	ppbv	<0.5	12	<0.5
1,2,4-Trimethylbenzene	ppbv	<0.5	3	<0.5
1,3-Dichlorobenzene	ppbv	<0.5	<0.5	<0.5
Benzyl chloride	ppbv	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	ppbv	0.7	0.8	<0.5
1,2-Dichlorobenzene	ppbv	<0.5	<0.5	<0.5
1,2,4-Trichlorobenzene	ppbv	<0.5	<0.5	<0.5
Naphthalene	ppbv	<0.5	<0.5	<0.5
Hexachloro- 1,3-butadiene	ppbv	<0.5	<0.5	<0.5
Surrogate-Bromochloromethane	% rec	125	129	129
Surrogate -1,4-Difluorobenzene	% rec	120	119	122
Surrogate-Chlorobenzene-D5	% rec	125	124	130

TO15 in Canisters µg/m3				
Our Reference		329532-1	329532-2	329532-3
Your Reference	UNITS	V1	V2	V3
Date Sampled		02/08/2023	02/08/2023	02/08/2023
Type of sample		Air	Air	Air
Air Kit Security No.		3509	3659	3282
Vacuum before Shipment	Hg"	-30	-30	-30
Vacuum before Analysis	Hg"	-8	-7	-0.6
Date prepared	-	04/08/2023	04/08/2023	04/08/2023
Date analysed	-	04/08/2023	04/08/2023	04/08/2023
Propylene	µg/m³	13	590	<0.9
Dichlorodifluoromethane	µg/m³	<2.5	<2.5	<2.5
Chloromethane	µg/m³	<1.0	<1.0	<2
1,2-Dichlorotetrafluoroethane	µg/m³	<2.5	<2.5	<2.5
Vinyl chloride	µg/m³	<1.3	<1.3	<1.3
1,3-Butadiene	µg/m³	<1.1	<1.1	<1.1
Bromomethane	µg/m³	<4	<4	<1.9
Chloroethane	µg/m³	<1.3	<1.3	<1.3
Ethanol	µg/m³	830	620	70
Acrolein	µg/m³	<11	<11	<11
Trichlorofluoromethane (Freon 11)	µg/m³	8	<2.8	<2.8
Acetone	µg/m³	180	140	20
Isopropyl Alcohol	µg/m³	40	30	1,200
1,1-Dichloroethene	µg/m³	<2	<2.0	<2
1,1,2-Trichlorotrifluoroethane	µg/m³	<3.8	<3.8	<3.8
Methylene chloride (Dichloromethane)	µg/m³	<17	<17	<17
Carbon Disulfide	µg/m³	<16	100	<16
trans-1,2-dichloroethene	µg/m³	<2	<2.0	<2
MTBE	µg/m³	<1.8	<1.8	<1.8
1,1- Dichloroethane	µg/m³	<2	<2.0	<2
Vinyl Acetate	µg/m³	<1.8	<1.8	<1.8
MEK	µg/m³	<15	17	<15
Hexane	µg/m³	130	300	8
cis-1,2-Dichloroethene	µg/m³	<2	<2	<2
Ethyl Acetate	µg/m³	<1.8	<1.8	<1.8
Chloroform	µg/m³	5	<2.4	<2.4
Tetrahydrofuran	µg/m³	<1.5	<1.5	<1.5
1,1,1-Trichloroethane	µg/m³	10	<2.7	<2.7
1,2-Dichloroethane	µg/m³	<2	<2	<2
Benzene	µg/m³	5	18	<1.6
Carbon tetrachloride	µg/m³	<3.1	<3.1	<3.1

TO15 in Canisters µg/m3				
Our Reference		329532-1	329532-2	329532-3
Your Reference	UNITS	V1	V2	V3
Date Sampled		02/08/2023	02/08/2023	02/08/2023
Type of sample		Air	Air	Air
Air Kit Security No.		3509	3659	3282
Cyclohexane	µg/m³	140	<1.7	<1.7
Heptane	µg/m³	99	640	<2
Trichloroethene	µg/m³	4	5	<2.7
1,2-Dichloropropane	µg/m³	<2.3	<2.3	<2.3
1,4-Dioxane	µg/m³	<1.8	<1.8	<1.8
Bromodichloromethane	µg/m³	<3.4	<3.4	<3.4
Methyl Methacrylate	µg/m³	<2	<2	<2
MIBK	µg/m³	<20	<20	<20
cis-1,3-Dichloropropene	µg/m³	<2.3	<2.3	<2.3
trans-1,3-Dichloropropene	µg/m³	<2.3	<2.3	<2.3
Toluene	µg/m³	27	10	4
1,1,2-Trichloroethane	µg/m³	<2.7	<2.7	<2.7
Methyl Butyl Ketone	µg/m³	<2	<2	<2
Dibromochloromethane	µg/m³	<1.6	<1.6	<1.6
Tetrachloroethene	µg/m³	<3.4	52	<3.4
1,2-Dibromoethane	µg/m³	<3.8	<3.8	<3.8
Chlorobenzene	µg/m³	<2.3	<2.3	<2.3
Ethylbenzene	µg/m³	7	8	<2.2
m-& p-Xylene	µg/m³	20	30	<4.3
Styrene	µg/m³	<2.1	<2.1	<2.1
o-Xylene	µg/m³	10	31	<2.2
Bromoform	µg/m³	<5.2	<5.2	<5.2
1,1,2,2-Tetrachloroethane	µg/m³	<3.4	<3.4	<3.4
4-ethyl toluene	µg/m³	<2.5	10	<2.5
1,3,5-Trimethylbenzene	µg/m³	<2.5	58	<2.5
1,2,4-Trimethylbenzene	µg/m³	<2.5	10	<2.5
1,3-Dichlorobenzene	µg/m³	<3	<3	<3
Benzyl chloride	µg/m³	<2.6	<2.6	<2.6
1,4-Dichlorobenzene	µg/m³	4	5	<3
1,2-Dichlorobenzene	µg/m³	<3	<3	<3
1,2,4-Trichlorobenzene	µg/m³	<3.7	<3.7	<3.7
Naphthalene	µg/m³	<2.6	<2.6	<2.6
Hexachloro- 1,3-butadiene	µg/m³	<5.3	<5.3	<5.3
Surrogate-Bromochloromethane	% rec	125	129	129
Surrogate -1,4-Difluorobenzene	% rec	120	119	122
Surrogate-Chlorobenzene-D5	% rec	125	124	130

TPH Air/ Air Phase Hydrocarbon				
Our Reference		329532-1	329532-2	329532-3
Your Reference	UNITS	V1	V2	V3
Date Sampled		02/08/2023	02/08/2023	02/08/2023
Type of sample		Air	Air	Air
Air Kit Security No.		3509	3659	3282
Date prepared	-	04/08/2023	04/08/2023	04/08/2023
Date analysed	-	04/08/2023	04/08/2023	04/08/2023
TPH C_5 - C_8 Aliphatic	µg/m^3	1,400	110,000	540
TPH C_9 - C_{12} Aliphatic	µg/m^3	51	4,900	<50
TPH C_9 - C_{10} Aromatic	µg/m^3	<100	140	<100
TPH C_6 - C_{10} - BTEX (F1)	µg/m^3	690	120,000	<200
TPH >C_{10} - C_{12} - Naphthalene (F2)	µg/m^3	<40	1,600	<40

Permanent Gas analysis				
Our Reference		329532-1	329532-2	329532-3
Your Reference	UNITS	V1	V2	V3
Date Sampled		02/08/2023	02/08/2023	02/08/2023
Type of sample		Air	Air	Air
Air Kit Security No.		3509	3659	3282
Date prepared	-	04/08/2023	04/08/2023	04/08/2023
Date analysed	-	04/08/2023	04/08/2023	04/08/2023
Methane (CH_4)	%	<0.01	3.5	<0.01

Method ID	Methodology Summary
AT-003	Gases determined by GC-FID/TCD using methods ASTM 1945, 1946 and USEPA 3C.
AT-005	Measurement of Air-Phase Petroleum Hydrocarbons and Ozone Precursors by GC-MS.
TO15	USEPA TO15 - Analysis of VOC's in air using USEPA TO15 and in house method AT-002. Note, longer term stability of some oxygenated compounds is questionable where significant humidity is present.
USEPA 18	Measurement of Gaseous Organic Compound Emissions by Gas Chromatography using USEPA m18.

QUALITY CONTROL: TO15 in Canisters/Bags						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Vacuum before Shipment	Hg"			[NT]	1	-30	-30	0	[NT]	[NT]
Vacuum before Analysis	Hg"			[NT]	1	-8	-8	0	[NT]	[NT]
Date prepared	-			04/08/2023	1	04/08/2023	04/08/2023		04/08/2023	[NT]
Date analysed	-			04/08/2023	1	04/08/2023	04/08/2023		04/08/2023	[NT]
Propylene	ppbv	0.5	TO15	<0.5	1	7.3	7.2	1	[NT]	[NT]
Dichlorodifluoromethane	ppbv	0.5	TO15	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
Chloromethane	ppbv	0.5	TO15	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
1,2-Dichlorotetrafluoroethane	ppbv	0.5	TO15	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
Vinyl chloride	ppbv	0.5	TO15	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
1,3-Butadiene	ppbv	0.5	TO15	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
Bromomethane	ppbv	0.5	TO15	<0.5	1	<1	<1	0	[NT]	[NT]
Chloroethane	ppbv	0.5	TO15	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
Ethanol	ppbv	5	TO15	<5	1	440	450	2	[NT]	[NT]
Acrolein	ppbv	5	TO15	<5	1	<5	<5	0	[NT]	[NT]
Trichlorofluoromethane (Freon 11)	ppbv	0.5	TO15	<0.5	1	1	1	0	[NT]	[NT]
Acetone	ppbv	5	TO15	<5	1	75	74	1	[NT]	[NT]
Isopropyl Alcohol	ppbv	5	TO15	<5	1	20	10	67	[NT]	[NT]
1,1-Dichloroethene	ppbv	0.5	TO15	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
1,1,2-Trichlorotrifluoroethane	ppbv	0.5	TO15	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
Methylene chloride (Dichloromethane)	ppbv	5	TO15	<5	1	<5	<5	0	[NT]	[NT]
Carbon Disulfide	ppbv	5	TO15	<5	1	<5	<5	0	[NT]	[NT]
trans-1,2-dichloroethene	ppbv	0.5	TO15	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
MTBE	ppbv	0.5	TO15	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
1,1- Dichloroethane	ppbv	0.5	TO15	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
Vinyl Acetate	ppbv	0.5	TO15	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
MEK	ppbv	5	TO15	<5	1	<5	<5	0	[NT]	[NT]
Hexane	ppbv	0.5	TO15	<0.5	1	38	38	0	104	[NT]
cis-1,2-Dichloroethene	ppbv	0.5	TO15	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
Ethyl Acetate	ppbv	0.5	TO15	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
Chloroform	ppbv	0.5	TO15	<0.5	1	0.9	0.9	0	[NT]	[NT]
Tetrahydrofuran	ppbv	0.5	TO15	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
1,1,1-Trichloroethane	ppbv	0.5	TO15	<0.5	1	2	2	0	[NT]	[NT]
1,2-Dichloroethane	ppbv	0.5	TO15	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
Benzene	ppbv	0.5	TO15	<0.5	1	2	2	0	110	[NT]
Carbon tetrachloride	ppbv	0.5	TO15	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
Cyclohexane	ppbv	0.5	TO15	<0.5	1	39	40	3	83	[NT]
Heptane	ppbv	0.5	TO15	<0.5	1	24	24	0	103	[NT]

QUALITY CONTROL: TO15 in Canisters/Bags					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Trichloroethene	ppbv	0.5	TO15	<0.5	1	0.8	0.8	0	[NT]	[NT]
1,2-Dichloropropane	ppbv	0.5	TO15	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
1,4-Dioxane	ppbv	0.5	TO15	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
Bromodichloromethane	ppbv	0.5	TO15	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
Methyl Methacrylate	ppbv	0.5	TO15	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
MIBK	ppbv	5	TO15	<5	1	<5	<5	0	[NT]	[NT]
cis-1,3-Dichloropropene	ppbv	0.5	TO15	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
trans-1,3-Dichloropropene	ppbv	0.5	TO15	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
Toluene	ppbv	0.5	TO15	<0.5	1	7.3	7.4	1	103	[NT]
1,1,2-Trichloroethane	ppbv	0.5	TO15	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
Methyl Butyl Ketone	ppbv	0.5	TO15	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
Dibromochloromethane	ppbv	0.5	TO15	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
Tetrachloroethene	ppbv	0.5	TO15	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
1,2-Dibromoethane	ppbv	0.5	TO15	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
Chlorobenzene	ppbv	0.5	TO15	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
Ethylbenzene	ppbv	0.5	TO15	<0.5	1	2	2	0	106	[NT]
m-& p-Xylene	ppbv	1	TO15	<1	1	5	5	0	103	[NT]
Styrene	ppbv	0.5	TO15	<0.5	1	<0.5	<0.5	0	112	[NT]
o-Xylene	ppbv	0.5	TO15	<0.5	1	3	3	0	101	[NT]
Bromoform	ppbv	0.5	TO15	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
1,1,2,2-Tetrachloroethane	ppbv	0.5	TO15	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
4-ethyl toluene	ppbv	0.5	TO15	<0.5	1	<0.5	<0.5	0	110	[NT]
1,3,5-Trimethylbenzene	ppbv	0.5	TO15	<0.5	1	<0.5	<0.5	0	103	[NT]
1,2,4-Trimethylbenzene	ppbv	0.5	TO15	<0.5	1	<0.5	<0.5	0	108	[NT]
1,3-Dichlorobenzene	ppbv	0.5	TO15	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
Benzyl chloride	ppbv	0.5	TO15	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
1,4-Dichlorobenzene	ppbv	0.5	TO15	<0.5	1	0.7	0.6	15	[NT]	[NT]
1,2-Dichlorobenzene	ppbv	0.5	TO15	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
1,2,4-Trichlorobenzene	ppbv	0.5	TO15	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
Naphthalene	ppbv	0.5	TO15	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
Hexachloro- 1,3-butadiene	ppbv	0.5	TO15	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
Surrogate-Bromochloromethane	% rec		TO15	96	1	125	125	0	116	[NT]
Surrogate -1,4-Difluorobenzene	% rec		TO15	91	1	120	121	1	115	[NT]
Surrogate-Chlorobenzene-D5	% rec		TO15	86	1	125	126	1	110	[NT]

QUALITY CONTROL: TO15 in Canisters µg/m3						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Vacuum before Shipment	Hg"			[NT]	1	-30	-30	0	[NT]	[NT]
Vacuum before Analysis	Hg"			[NT]	1	-8	-8	0	[NT]	[NT]
Date prepared	-			04/08/2023	1	04/08/2023	04/08/2023		[NT]	[NT]
Date analysed	-			04/08/2023	1	04/08/2023	04/08/2023		[NT]	[NT]
Propylene	µg/m³	0.9	TO15	<0.9	1	13	12	8	[NT]	[NT]
Dichlorodifluoromethane	µg/m³	2.5	TO15	<2.5	1	<2.5	<2.5	0	[NT]	[NT]
Chloromethane	µg/m³	1.0	TO15	<1.0	1	<1.0	<1.0	0	[NT]	[NT]
1,2-Dichlorotetrafluoroethane	µg/m³	2.5	TO15	<2.5	1	<2.5	<2.5	0	[NT]	[NT]
Vinyl chloride	µg/m³	1.3	TO15	<1.3	1	<1.3	<1.3	0	[NT]	[NT]
1,3-Butadiene	µg/m³	1.1	TO15	<1.1	1	<1.1	<1.1	0	[NT]	[NT]
Bromomethane	µg/m³	1.9	TO15	<1.9	1	<4	<4	0	[NT]	[NT]
Chloroethane	µg/m³	1.3	TO15	<1.3	1	<1.3	<1.3	0	[NT]	[NT]
Ethanol	µg/m³	9	TO15	<9	1	830	840	1	[NT]	[NT]
Acrolein	µg/m³	11	TO15	<11	1	<11	<11	0	[NT]	[NT]
Trichlorofluoromethane (Freon 11)	µg/m³	2.8	TO15	<2.8	1	8	8	0	[NT]	[NT]
Acetone	µg/m³	11.9	TO15	<11.9	1	180	170	6	[NT]	[NT]
Isopropyl Alcohol	µg/m³	12	TO15	<12	1	40	40	0	[NT]	[NT]
1,1-Dichloroethene	µg/m³	2.0	TO15	<2.0	1	<2	<2	0	[NT]	[NT]
1,1,2-Trichlorotrifluoroethane	µg/m³	3.8	TO15	<3.8	1	<3.8	<3.8	0	[NT]	[NT]
Methylene chloride (Dichloromethane)	µg/m³	17	USEPA 18	<17	1	<17	<17	0	[NT]	[NT]
Carbon Disulfide	µg/m³	16	TO15	<16	1	<16	<16	0	[NT]	[NT]
trans-1,2-dichloroethene	µg/m³	2.0	TO15	<2.0	1	<2	<2	0	[NT]	[NT]
MTBE	µg/m³	1.8	TO15	<1.8	1	<1.8	<1.8	0	[NT]	[NT]
1,1- Dichloroethane	µg/m³	2.0	TO15	<2.0	1	<2	<2	0	[NT]	[NT]
Vinyl Acetate	µg/m³	1.8	TO15	<1.8	1	<1.8	<1.8	0	[NT]	[NT]
MEK	µg/m³	15	TO15	<15	1	<15	<15	0	[NT]	[NT]
Hexane	µg/m³	1.8	TO15	<1.8	1	130	130	0	[NT]	[NT]
cis-1,2-Dichloroethene	µg/m³	2.0	TO15	<2.0	1	<2	<2	0	[NT]	[NT]
Ethyl Acetate	µg/m³	1.8	TO15	<1.8	1	<1.8	<1.8	0	[NT]	[NT]
Chloroform	µg/m³	2.4	TO15	<2.4	1	5	5	0	[NT]	[NT]
Tetrahydrofuran	µg/m³	1.5	TO15	<1.5	1	<1.5	<1.5	0	[NT]	[NT]
1,1,1-Trichloroethane	µg/m³	2.7	TO15	<2.7	1	10	10	0	[NT]	[NT]
1,2-Dichloroethane	µg/m³	2.0	TO15	<2.0	1	<2	<2	0	[NT]	[NT]
Benzene	µg/m³	1.6	TO15	<1.6	1	5	5	0	[NT]	[NT]
Carbon tetrachloride	µg/m³	3.1	TO15	<3.1	1	<3.1	<3.1	0	[NT]	[NT]
Cyclohexane	µg/m³	1.7	TO15	<1.7	1	140	140	0	[NT]	[NT]
Heptane	µg/m³	2.0	TO15	<2.0	1	99	100	1	[NT]	[NT]

QUALITY CONTROL: TO15 in Canisters µg/m3						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Trichloroethene	µg/m³	2.7	TO15	<2.7	1	4	4	0	[NT]	[NT]
1,2-Dichloropropane	µg/m³	2.3	TO15	<2.3	1	<2.3	<2.3	0	[NT]	[NT]
1,4-Dioxane	µg/m³	1.8	TO15	<1.8	1	<1.8	<1.8	0	[NT]	[NT]
Bromodichloromethane	µg/m³	3.4	TO15	<3.4	1	<3.4	<3.4	0	[NT]	[NT]
Methyl Methacrylate	µg/m³	2.0	TO15	<2.0	1	<2	<2	0	[NT]	[NT]
MIBK	µg/m³	20	TO15	<20	1	<20	<20	0	[NT]	[NT]
cis-1,3-Dichloropropene	µg/m³	2.3	TO15	<2.3	1	<2.3	<2.3	0	[NT]	[NT]
trans-1,3-Dichloropropene	µg/m³	2.3	TO15	<2.3	1	<2.3	<2.3	0	[NT]	[NT]
Toluene	µg/m³	1.9	TO15	<1.9	1	27	28	4	[NT]	[NT]
1,1,2-Trichloroethane	µg/m³	2.7	TO15	<2.7	1	<2.7	<2.7	0	[NT]	[NT]
Methyl Butyl Ketone	µg/m³	2.0	TO15	<2.0	1	<2	<2	0	[NT]	[NT]
Dibromochloromethane	µg/m³	1.6	TO15	<1.6	1	<1.6	<1.6	0	[NT]	[NT]
Tetrachloroethene	µg/m³	3.4	TO15	<3.4	1	<3.4	<3.4	0	[NT]	[NT]
1,2-Dibromoethane	µg/m³	3.8	TO15	<3.8	1	<3.8	<3.8	0	[NT]	[NT]
Chlorobenzene	µg/m³	2.3	TO15	<2.3	1	<2.3	<2.3	0	[NT]	[NT]
Ethylbenzene	µg/m³	2.2	TO15	<2.2	1	7	7	0	[NT]	[NT]
m-& p-Xylene	µg/m³	4.3	TO15	<4.3	1	20	20	0	[NT]	[NT]
Styrene	µg/m³	2.1	TO15	<2.1	1	<2.1	<2.1	0	[NT]	[NT]
o-Xylene	µg/m³	2.2	TO15	<2.2	1	10	10	0	[NT]	[NT]
Bromoform	µg/m³	5.2	TO15	<5.2	1	<5.2	<5.2	0	[NT]	[NT]
1,1,2,2-Tetrachloroethane	µg/m³	3.4	TO15	<3.4	1	<3.4	<3.4	0	[NT]	[NT]
4-ethyl toluene	µg/m³	2.5	TO15	<2.5	1	<2.5	<2.5	0	[NT]	[NT]
1,3,5-Trimethylbenzene	µg/m³	2.5	TO15	<2.5	1	<2.5	<2.5	0	[NT]	[NT]
1,2,4-Trimethylbenzene	µg/m³	2.5	TO15	<2.5	1	<2.5	<2.5	0	[NT]	[NT]
1,3-Dichlorobenzene	µg/m³	3.0	TO15	<3.0	1	<3	<3	0	[NT]	[NT]
Benzyl chloride	µg/m³	2.6	TO15	<2.6	1	<2.6	<2.6	0	[NT]	[NT]
1,4-Dichlorobenzene	µg/m³	3.0	TO15	<3.0	1	4	4	0	[NT]	[NT]
1,2-Dichlorobenzene	µg/m³	3.0	TO15	<3.0	1	<3	<3	0	[NT]	[NT]
1,2,4-Trichlorobenzene	µg/m³	3.7	TO15	<3.7	1	<3.7	<3.7	0	[NT]	[NT]
Naphthalene	µg/m³	2.6	TO15	<2.6	1	<2.6	<2.6	0	[NT]	[NT]
Hexachloro- 1,3-butadiene	µg/m³	5.3	TO15	<5.3	1	<5.3	<5.3	0	[NT]	[NT]
Surrogate-Bromochloromethane	% rec		TO15	96	1	125	125	0	[NT]	[NT]
Surrogate -1,4-Difluorobenzene	% rec		TO15	91	1	120	121	1	[NT]	[NT]
Surrogate-Chlorobenzene-D5	% rec		TO15	86	1	125	126	1	[NT]	[NT]

QUALITY CONTROL: TPH Air/ Air Phase Hydrocarbon						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			04/08/2023	1	04/08/2023	04/08/2023		04/08/2023	[NT]
Date analysed	-			04/08/2023	1	04/08/2023	04/08/2023		04/08/2023	[NT]
TPH C_5 - C_8 Aliphatic	µg/m^3	200	AT-005	<200	1	1400	1400	0	98	[NT]
TPH C_9 - C_{12} Aliphatic	µg/m^3	50	AT-005	<50	1	51	54	6	[NT]	[NT]
TPH C_9 - C_{10} Aromatic	µg/m^3	100	AT-005	<100	1	<100	<100	0	100	[NT]
TPH C_6 - C_{10} - BTEX (F1)	µg/m^3	200	TO15	<200	1	690	610	12	98	[NT]
TPH >C_{10} - C_{12} - Naphthalene (F2)	µg/m^3	40	TO15	<40	1	<40	<40	0	98	[NT]

QUALITY CONTROL: Permanent Gas analysis						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			04/08/2023	1	04/08/2023	04/08/2023		04/08/2023	[NT]
Date analysed	-			04/08/2023	1	04/08/2023	04/08/2023		04/08/2023	[NT]
Methane (CH_4)	%	0.01	AT-003	<0.01	1	<0.01	<0.01	0	86	[NT]

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.

The recommended maximums for analytes in urine are taken from “2018 TLVs and BEIs”, as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.

Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Where matrix spike recoveries fall below the lower limit of the acceptance criteria (e.g. for non-labile or standard Organics <60%), positive result(s) in the parent sample will subsequently have a higher than typical estimated uncertainty (MU estimates supplied on request) and in these circumstances the sample result is likely biased significantly low.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.

Report Comments

TO15
PQL has been raised for Bromomethane due to interference from analytes (other than those being tested) in sample #1 and #2.

PQL has been raised for Chloromethane due to interference from analytes (other than those being tested) in sample #3.