Douglas Partners Pty Ltd
ABN 75 053 980 117
www.douglaspartners.com.au
96 Hermitage Road
West Ryde NSW 2114
PO Box 472
West Ryde NSW 1685

SJD NB Pty Ltd
Suite 902
65 Berry Street
North Sydney 2060

221953.00
12 March 2024
R.001.Rev1
ZW / NSA:jl

Attention: Alex Zhao

Email: alexzhao@sjdpg.com

Contamination Investigation
Pre-Purchase Due Diligence
57-69 Strathallen Avenue, Northbridge

1. Introduction

This report presents the results of a Contamination Investigation undertaken for Pre-Purchase Due Diligence purposes at 57-69 Strathallen Avenue, Northbridge, hereon referred to as the 'site' (as indicated on attached **Drawing 1**). The investigation was commissioned by SJD Property Group and undertaken in general accordance with Douglas Partners Pty Ltd's (DP's) proposal for 'Due Diligence Contamination Investigation' (DP reference: 221945.P.001.Rev0), dated 5 April 2023.

It is understood that the report will be used for pre-purchase due diligence purposes. At the time of undertaking this investigation, the proposed land use has yet been conceptualised, however it is anticipated that the potential use may comprise a mixed residential / commercial setting.

The objective of this investigation is to:

- Assess the potential for contamination at the site based on the available site history information and analytical results obtained from the intrusive component of the investigation.
- Provide comment on the need for further investigation and/or management with regard to the contamination risk for a potential mixed residential and commercial land use scenario.

This investigation was undertaken in conjunction with a geotechnical investigation[1].

This report must be read in conjunction with all appendices including the notes provided in at the end of this report.

The following key guidelines were consulted in the preparation of this report:

- NEPC *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM]* (NEPC, 2013); and
- NSW EPA *Guidelines for Consultants Reporting on Contaminated Land* (NSW EPA, 2020).

[1] DP report on 'Geotechnical Investigation, 57-69 Strathallen Avenue, Northbridge' DP reference: 221953.01.R.001.Rev0

2. Scope of Works

The scope of works for this investigation comprised:

Desktop Component:

- Review of geological, soil, acid sulfate soil and hydrogeological published information;
- Review of publicly available historical aerial photography for the site and immediate surrounds;
- Search of the NSW EPA land information records to determine the existence of statutory notices relating to the site or adjacent land under the Contaminated Land Management Act 1997; and
- Search for groundwater bores registered with the NSW Department of Primary Industries within a 500 m radius of the site.

Intrusive Investigation Component:

- A site walkover to identify potential areas of environmental concern (PAEC) and set out of proposed sampling locations;
- Undertook a Dial-Before-You-Dig search and services scan at the sample locations;
- With the assistance of a track mounted drill rig (GEO205), drilling of two boreholes (BH1 and BH2) to a target depth of 12 and 6 m below ground level (bgl), respectively;
- Collection of soil samples from each of the boreholes at regular depth intervals, changes in strata and where signs of contamination (odours or staining) were observed;
- Installation of two combined groundwater monitoring / ground gas wells (BH1/SV102 and BH2/SV103);
- Collected two groundwater samples using low flow pumps and the micro-purge technique;
- Installed two sub-slab soil vapour pins (SV101 and SV104);
- Purged and sampled two soil vapour pins and two combined groundwater/gas wells using a summa canister;
- Analysed selected soil samples at a NATA accredited laboratory for the following contaminants of potential concern (CoPC):
  - Dissolved heavy metals (As, Ca, Cr, Pb, Hg, Ni, Zn & Fe);
  - Total Recoverable Hydrocarbons (TRH);
  - Benzene, toluene, ethylbenzene and xylenes (BTEX);
  - Polycyclic Aromatic Hydrocarbons (PAH);
  - Total phenolics;
  - Polychlorinated biphenyls (PCB);
  - Organochlorine pesticides (OCP);
  - Organophosphorus pesticides (OPP); and
  - Asbestos (40 g soil sample).
- Analysed collected groundwater samples at a NATA accredited laboratory for metals, TRH, BTEX, VOC, phenols, OCP, OPP, PCB and PFAS;
- Analysed Summa canister samples for VOC and TRH using USEPA TO-15 techniques at a NATA accredited laboratory; and

- Analysed selected Quality Assurance and Quality Control (QA/QC) samples at NATA accredited laboratories.

Report

- Compiled this contamination investigation report outlining the works undertaken and findings of the investigation.

3. Site Information

Site Address	57-69 Strathallen Avenue, Northbridge
Legal Description	The site comprises the following: • Lots 5 and 6 Deposited Plan 7122; • Lots 4A and 4B Deposited Plan 305190; • Lot 1 Deposited Plan 172561; and • Lot 1 Deposited Plan 726736.
Approximate Site Area	0.24 ha
Local Council	City of Willoughby
Current Use	Hotel / Commercial Centre
Surrounding Uses	North – Commercial followed by Sailors Bay Road East – Residential South – Baringa Road followed by residential West – Strathallen Avenue followed by commercial / residential

4. Environmental Setting

Topography	Regional topography can be characterised by gently undulating crests and ridges of approximately between 80 to 90 m Australian Height Datum (AHD). The site is situated near a localised crest, local topography dips gently towards the south / south-west in the area to the south of Sailor Bay Road and north / north-east in the area to the north of Sailor Bay Road.
Soil Landscape	Reference to the Sydney 1:100,000 Soil Landscape Series Sheet indicates the site underlain by residual soils of the Lucas Heights soil Landscape. This is typically characterised by shallow to moderately deep yellow residual clays and sandy clays. The mapped geology is largely consistent with field observations during this investigation.

Geology	Reference to the Sydney 1:100,000 Geological Series Sheet indicates that the site is underlain by Triassic aged Hawkesbury Sandstone, generally comprising medium to coarse grained quartz sandstone with minor shale and laminite lenses.
Acid Sulfate Soils	Reference to the 1:25,000 Acid Sulfate Soils (ASS) Risk Mapping Data (1994-1998) indicates that the site is located in an area with low probability of ASS occurrence. Based on the site elevation (i.e., >80 m AHD), as well as the natural geology encountered during this investigation (i.e., residual soils over bedrock) suggests the environment is not conducive to formation of ASS. On this basis, further assessment of ASS within the site is not considered to be warranted.
Surface Water	Surface water (originating from stormwater) within the site is anticipated to be intercepted by the stormwater system that would discharge into Flat Rock Creek (closest waterbody, approximately 400 m to the south of the site) which flows into Middle Harbour, located approximately 1 km to the south-east of the site.
Groundwater	A search of the publicly available registered groundwater bore database indicated that there are a cluster of 10 registered groundwater monitoring bores at 75 Sailors Bay Rd, Northbridge (approximately 350 m west-northwest of the site). The monitoring wells are installed to a depth of between 4 to 8 m bgl, however no standing water levels are recorded. Based on the regional topography, groundwater is inferred to be flowing to the south-east, towards flat rock creek and the Sydney harbour.

5. Site History

5.1 Historical Aerial Photography

Several historical aerial photographs were obtained from public databases. Extracts of the aerial photographs are attached at the end of this report. A summary of key features observed for the site and surrounding land is presented in Table 1.

Table 1: Summary of Historical Aerial Photographs

Year	Site	Surrounding Land Use
1943	The site appears to be occupied by two lots. The northern lot appears to be largely vacant, an elongated structure is situated along the northern boundary. The southern Lot appears to be occupied by (what appears to be) the existing Northbridge hotel.	The surrounding land use appears to be sub-urban residential. A number of store fronts and shops appear to be situated along Sailor Bay Road to the north of the site.
1951	The site appears relatively unchanged compared to the 1943 aerial photograph.	No significant change is observed within the surrounding area.
1961	The site appears to have undergone significant redevelopment. The northern part of the Northbridge hotel appears to have been demolished. An 'L' shaped structure is constructed in its place (possibly service station or motor mechanic). The northern (previous vacant) portion of the site appears to be used as a carpark.	A number of homes to the west and north-west (along Strathallen Avenue) of the site appears to have been demolished and undergoing redevelopment.
1971	The 1971 aerial photograph is in poor resolution. Based on the building outlines, it is inferred that the site layout remains largely unchanged compared to the 1961 aerial photograph.	Developments to the west and northwest of the site appears to be completed. These appear to be purposed for commercial activities.
1986	The site appears to have undergone further redevelopment, the previously constructed 'L' shaped building appears to have been demolished. Two new structures have been constructed within the northern and western portion of the site.	Continued minor commercial developments along Strathallen Avenue.
2000	An additional minor structure and possible renovations / retrofitting appears to have been undertaken to the north and within the eastern section of the Northbridge Hotel. The site layout appears to be in its present-day condition.	The structures to the west of the site appear to have been demolished.
2011	The site appears relatively unchanged compared to the 2000 aerial photograph.	Continued minor commercial and/or residential developments to the north and west of the site.

5.2 Public Registers and Planning Records

A search of EPA Notices available under Section 58 and 60 of the Contaminated Lands Management Act and Licences listed under Section 308 of the Protection of the Environment Operations Act 1997 (POEO Act) was undertaken on 27 April 2023. The search indicated that there were no records of notices for the site or adjacent properties within a 500 m search radius.

6. Other Sources

A search of google listed businesses indicated a drycleaner is present onsite at 69 Strathallen Ave, Northbridge. Additionally, a number of restaurants are situated along Sailor Bays Road. It is anticipated that several grease traps associated with these restaurants are connected to the main sewer line which bisects the site.

6.1 Site History Integrity Assessment

The information used to establish the history of the site was sourced from reputable and reliable reference documents, many of which were official records held by Government departments / agencies. The databases maintained by various Government agencies potentially can contain high quality information, but some of these do not contain any data at all.

In particular, aerial photographs can provide high quality information that is generally independent of memory or documentation. They are only available at intervals of several years, so some gaps exist in the information from this source. The observed site features are open to different interpretations and can be affected by the time of day and / or year at which they were taken, as well as specific events, such as flooding. Care has been taken to consider different possible interpretations of aerial photographs and to consider them in conjunction with other lines of evidence.

6.2 Summary of Site History

Based on the available historical aerial photography, the site appears to have operated as commercial real estate since the earliest available photograph (1943). Between 1951 and 1986, the site appears to have accommodated a service station and / or motor mechanic. After 1986, the existing northern building was constructed. It is likely this structure may have operated as a dry cleaner since construction (between 1986 and 2000 to present day). The site layout appears to be in its present-day condition since circa 2000.

7. Site Walkover

A site walkover was undertaken by a DP environmental engineer on 21 April 2023. The general site topography was consistent with that described in Section 4. The site layout appeared to have remained unchanged from the latest aerial photograph. Access to the site was limited to the external areas and the dry cleaner. The following key features are considered pertinent to contamination issues at the site:

- With regard to the drycleaner located on 69 Strathallen Ave:
  - An inspection of the interior operations indicates the dry-cleaning machine and associated solvents are located in the back (eastern portion) of the building.
  - The building floor comprise a mixture of carpet and tiles. Darkened and corroded chemical staining was evident on the floor in the eastern portion of the building.
  - The dry-cleaning machine comprised a third-generation closed loop machine (which recaptures the drycleaning solvent). The volume of drycleaning solvent observed to be stored on-site amounted to less than 500 L.
  - Volatile organic compound (VOC) screening results in ambient air within the drycleaner registered between 7 to 30 ppm on the Photo Ionisation Detector (PID). This suggests that VOCs are present within the indoor air.
  - A sewer line runs parallel to the rear of the dry cleaner. A number of washing machines are present in the rear corridor adjacent to the sewer line. Chemical staining was observed on the carpet in this section suggesting the potential for spills or leaks in the area that could impact the sewer.
- With regard to the remaining accessible sections of the site:
  - The carpark area is paved with asphalt which appears to be in a good condition.
  - A grease trap was observed in the south-eastern corner of the car park (adjacent to the sewer line).
- An interview was conducted with the existing tenants, the following was communicated:
  - The site operated as a service station in the past.
  - The underground storage tanks may still present beneath the car park.
  - Restaurant operations along Sailors Bay Road, discharge large volumes of waste (oil and grease) directly into the sewer lines, causing blockages every 6 month or so.

8. Sampling and Analytical Rationale

Given the preliminary nature of the current investigation, a limited sampling programme was adopted to obtain preliminary information on the potential for widespread contamination at the site. The sampling program comprised a general screen of contamination risks within the site targeting primarily soil vapour and groundwater.

The existing dry cleaner was determined to be the principal source of contamination risk. On this basis, it is anticipated that potential contamination would travel along the sewer line (representing the preferential contaminant migration pathway). As such the sampling locations were positioned within accessible areas along the existing sewer line comprising:

- Sub-slab soil vapour Pins (SV101 and SV102): positioned within the eastern portion of the dry cleaner (near the sewer line) and down gradient at the south-eastern corner of the site to evaluate the risk of potential dry cleaning solvent migrating along the sewer line (as a worst case scenario).
- BH1 and BH2: positioned near the eastern boundary of the car park, and aim to obtain information on any potential impacts to the groundwater arising from the dry cleaner. Note that BH1 is intended to target the deeper groundwater, whilst BH2 is intended to target the shallow groundwater and evaluate the potential for stratification of contamination if any.
- SV102 and SV103: opportunistic soil vapour samples collected from BH1 and BH2. These samples are intended to provide data on soil vapour concentrations in the central portion of the site.

Opportunistic soil sampling was undertaken from BH1 and BH2 to provide preliminary information on the contamination status of soil in the central portion and in close proximity to the sewer alignment.

Samples were analysed for common contaminants of concern as well as contaminants of concern associated with dry cleaning operations (i.e., VOCs).

9. Assessment Criteria

Analytical results were assessed (as a Tier 1 assessment) against the Site Assessment Criteria (SAC) comprising primarily the investigation and screening levels of Schedule B1 of NEPC (2013). The SAC was derived based on an assumed future mixed commercial and high density residential land use scenario corresponding to:

- Land use category ‘B‘, residential with minimal opportunities for soil access includes dwellings with fully and permanently paved yard space such as high-rise buildings and flats; and
- Land use category ‘D‘, commercial / industrial such as shops, offices, factories and industrial sites.

The assessment criteria are included in the attached **Tables A1 to A4**. The following key guidelines were consulted for deriving the SAC:

- NEPC National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM] (NEPC, 2013).
- CRC CARE Health screening levels for petroleum hydrocarbons in soil and groundwater (CRC CARE, 2011).

- ANZG, '*Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2018*' (ANZG 2018). The screening criteria assumes a slightly / moderately disturbed marine water system, at a general protection level of protection of 95%.
- National Environment Protection Council, '*National Environment Protection Measure 1999, as amended*' (NEPC (2013)); and
- Heads of EPAs Australia and New Zealand, *'PFAS National Management Plan Version 2.0-January 2020'* (HEPA, 2020).

Where guideline values were not available, the laboratory reporting limit (LRL) is initially adopted as a screen. Where analytes were detected above LRL and appropriate Australian guidelines were not available, guidance is sought from the USEPA, *'Regional Screening Levels (RSLs), August 2020'* (USEPA, 2020) RSLs for tap water and maximum contaminant limit were applied to groundwater. RSLs for 'residential' and 'indoor worker' scenarios were applied to soil vapour as an initial screen.

Note that no attenuation factor was applied to the RSLs for soil vapour. The concentrations reported are therefore assessed as indoor air (as a conservative screen) to provide an indication of the risks associated with vapour intrusion given no preliminary design is available at the time of this investigation.

10. Field Work Results

10.1 Subsurface Conditions

Subsurface conditions encountered during the drilling of BH1 and BH2 are recorded in borehole logs attached. These should be read in conjunction with the accompanying standard notes defining classification methods and descriptive terms. The general subsurface conditions encountered during this investigation were as follows:

- **Asphaltic Concrete**: in boreholes BH1 and BH2, of approximately 50 mm in thickness.
- **Fill:** in all boreholes comprising a sandy gravel matrix of igneous (roadbase) and sandstone gravels, with clay nodules mixed-in to a depth of between 0.6 to 0.9 m bgl.
- **Natural (residual):** natural soils beneath the site comprise residual sandy clays to a depth of 1.38 m bgl.
- **Hawkesbury sandstone:** the bedrock beneath the site comprised Hawkesbury sandstone interbedded with siltstone lenses of the Mittagong formation.

A slight hydrocarbon odour was noted at approximately 1 m bgl in BH1. The use of rock coring techniques (i.e., hydraulic rotary drilling) prohibited further assessment of potential odours due to use of drilling fluid. Note that PID readings were not taken during the field investigation, however, given the preliminary nature of the investigation DP does not consider this minor noncompliance to have impacted the interpolation of the results.

10.2 Groundwater

Groundwater levels were gauged prior to development and prior to sampling. The measured water levels prior to sampling are summarised in Table 2 below.

Table 2: Summary of Groundwater Level Measurements on 3 January 2023

Well ID	Ground Level * m (AHD)	SWL m (bgl)	SWL m (AHD)
BH1	87.6	3.05	84.55
BH2	87.1	3.7	83.4

Notes:
*Surveyed by dGPS
AHD – Australian Height Datum
SWL – standing water level

The stabilised groundwater field parameters recorded prior to sampling are shown on the groundwater field sheets (attached) and summarised in Table 3 below.

Table 3: Summary of Stabilized Groundwater Field Parameters

Well / Sample ID	Temp. (°C)	DO (ppm)	pH	Redox (mV)
BH1	21.2	0.49	6.62	-75
BH2	21.4	3.12	8.23	31

The groundwater parameters indicate that groundwater is slightly alkaline, aerobic and slightly oxidising within the shallow groundwater. Anoxic, acidic and reducing conditions were recorded in the deeper groundwater.

A slight to moderate hydrocarbon odour was recorded during sampling of BH1. No light non-aqueous phase liquid (LNAPL) was observed whilst sampling.

11. Analytical Results

The laboratory analytical results are tabulated in the summary tables attached at the end of this report, this includes:

- Table A1: Summary of laboratory Analytical Results – Soils.
- Table A2: Summary of laboratory Analytical Results – Groundwater.
- Table A3: Summary of laboratory Analytical Results – Soil Vapour.
- Table A4: Summary of Waste Classification Results.

The data quality assurance and quality control (QA / QC) results are included in the laboratory certificates of analysis and included within the aforementioned summary tables. The QA / QC results have been reviewed and are considered acceptable for this assessment.

Laboratory certificates of analysis with associated chain of custody documentation are attached at the end of this report.

12. Discussion

The laboratory analytical results were screened against the adopted SAC. It should be noted that the screening levels are not a trigger for remediation, rather they provide an indication on the need for further assessment.

The soil, groundwater and soil vapour results from this investigation are discussed in the following subsections.

12.1 Soils

A limited number of soil samples were analysed for common contaminants of concern which are indicated on the attached **Table A1**. As soil vapour sampling and VOC analysis was undertaken as part of the investigation, the need for VOC analysis specifically in soil was not considered warranted.

The laboratory analytical results for soils were screened against the adopted SAC. The majority of results were below the SAC, with the exception of those highlighted in Table A1 (attached). In summary:

- No exceedances of health-based screening levels were detected.
- Heavy metals, namely copper, nickel and zinc exceeded Ecological investigation levels (EIL) for Urban Residential and Public Open Space in seven of the analysed samples.

  However, the EILs have not been adjusted for soil properties in absence of data on cationic exchange capacity of soils (this would likely raise the EILs). Given the largely commercial land use and noting that the area is covered by asphaltic hardstand, the ecological significance of the site is considered to be low. Accordingly, the recorded EIL exceedances are considered to pose a low ecological risk.
- Low concentrations of PAH (near LRL) were recorded but were below the adopted SAC.
- The concentration of phenols, OCP, OPP PCB in the analysed soil samples were below LRL. This indicates that that there is a low potential for these contaminants to be present within the car-park area.
- Asbestos was not detected by laboratory analysis in the analysed samples. However it should be noted that the samples analysed comprised 40 g subsamples for presence or absence of asbestos in soils. Given the nature of asbestos contamination (i.e., highly heterogenous), as well as the methodology for testing (i.e., small diameter boreholes) which are not ideal for characterisation of asbestos risk, it is considered that the potential for the presence of asbestos at the site cannot be completely ruled out.

Table A4 compares the soil analytical results against the waste classification guidelines to provide a preliminary indication of the likely waste classification of soils at the sampled locations. Based on the field observations and current, albeit limited analytical results, only lead exceeded the CT1 criteria. Toxicity characteristic leaching procedure (TCLP) analysis was not undertaken and would be required to confirm whether the soil would be classifiable as general solid waste (GSW) – non putrescible.

12.2 Groundwater

All laboratory analytical results were below the SAC, with the exception of those highlighted in **Table A2** (attached). In summary:

- Elevated concentrations of chlorinated VOCs, particularly Tetrachloroethene (PCE) and Cis-1,2-dichloroethene (cis-DCE) were detected in BH2 and exceeded adopted Marine default guideline value (DGV). The use of chlorinated VOCs are commonly associated with chemicals used in dry cleaning activities and indicates that the groundwater beneath the site has been impacted by historical and/or ongoing dry cleaning operations.
- Elevated TRH, particularly fractions 1 (F1) and 2 (F2) were recorded in all samples. Given that notable hydrocarbon odours were recorded during sampling, it is considered this may be attributed to both chlorinated VOCs and petroleum hydrocarbons.
- Dissolved copper, nickel and zinc exceeded the screening criteria assuming a slightly / moderately disturbed marine aquatic ecosystem. This is likely attributable to the regional groundwater quality, as elevated copper, nickel and zinc are commonly detected in groundwater in urbanised areas.
- Dissolved lead exceeded the adopted criteria in BH2. Based on the anecdotal evidence outlined in previous sections, it is considered that lead concentrations may be associated with the historical use of the site as a service station and/or mechanical workshop.
- All analysed PFAS concentrations were below or near LRL. It is noted that Perfluorooctanoic acid (PFOA) exceeded the 99% Level of species protection (LOP), however is below the 95% LOP. Given the proliferate use of PFAS, the detections are likely to be representative of background concentrations although additional investigations would be required to confirm this inference.
- All analysed PAH, OCP, OPP PCB were below LRL.

Overall, the analytical results suggest that groundwater beneath the site has been impacted by contaminants associated with historical on-site and potentially nearby off-site activities.

12.3 Soil Vapour

The laboratory analytical results for soil vapour samples were screened against the adopted SAC and summarised in **Table A3** (attached). The results indicated elevated concentrations of chlorinated VOCs in soil vapour, notable detections include:

- Vinyl Chloride (VC) with highest recorded concentration of 280 µg/m^3, exceeded both residential and commercial/industrial screening levels.
- Trans-1,2-dichloroethene (trans-DCE) with highest recorded concentration of 200 µg/m^3 exceeded the adopted USEPA RSL for indoor worker (i.e., corresponding to a commercial / Industrial land use scenario).
- Cis-DCE with highest recorded concentration of 3500 µg/m^3 exceeded the adopted USEPA RSL for indoor worker.
- Chloroform with highest recorded concentration of 420 µg/m^3 exceeded the adopted USEPA RSL for indoor worker.
- Trichloroethene (TCE) with highest recorded concentration of 4800 µg/m^3 exceeded the adopted NEPM criteria for residential and commercial land uses.

- PCE with highest recorded concentration of 37000 µg/m^3 exceeded the adopted NEPM criteria for residential and commercial land uses.

In addition to the above, it is noted that elevated concentrations of F1 and F2 TPH were reported (but within initial screening criteria). This indicates the potential for presence of petroleum hydrocarbons in soil vapour and further suggests the likelihood of gross petroleum hydrocarbon contamination from historical service station and/or motor garage operations within the site.

13. Preliminary Conceptual Site Model

Based on the results of the current investigation, the following key potential sources of contamination and associated CoPC have been identified:

- Fill: Associated with levelling, demolition of former buildings on the site.
  - CoPC include metals, total recoverable hydrocarbons (TRH), benzene, toluene, ethylbenzene, xylene (BTEX), polycyclic aromatic hydrocarbons (PAH), polychlorinated biphenyls (PCB), organochlorine pesticides (OCP), phenols and asbestos.
- Historical service station/motor garage onsite and associated potential USTs and associated pipework.
  - CoPC include lead, TRH, BTEX, PAH, and volatile organic compounds (VOC).
- Existing dry cleaner operations.
  - CoPC include Chlorinated VOCs.
- On-site and offsite restaurants and grease traps.
  - CoPC include Oil and Grease, TRH.

The following key potential pathways have been identified:

- Leaks / spills and incorrect disposal of dry cleaning solvents resulting in soil, groundwater soil vapour contamination presenting a vapour intrusion risk to receptors within the migratory pathway.
- Historic operations of service station and/or motor garage and associated leaks from USTs / bowsers impacting soils and groundwater presenting a vapour intrusion risk to receptors within the migratory pathway.

13.1 Comments

Based on the results of the current investigation, the following key contamination risks were identified:

1. **VOC contaminated groundwater**: in direct contact, or close proximity to the final / proposed landform (basement / slabs). This may result in effective restrictions on basement design / configuration i.e., drains, membranes / waterproofing, and tanked / drained configurations which may require on a site-specific risk assessment.
2. **Vapour Inhalation**: Initial testing indicates there is a vapour inhalation risk for a proposed commercial / industrial or residential site usage which will need to be assessed in further detail. Mitigation of this risk would likely require removal of the current source i.e., impacted soils beneath the site, and potentially treatment of impacted groundwater, and provision of vapour mitigation measures to the building.

3. **Contaminated groundwater:** Current testing has identified contamination exceeding screening criteria. It is currently unknown whether there is any phase separated hydrocarbons (light or dense) which may require remediation / treatment. Minor treatment (if required) could be undertaken as part of the groundwater treatment for dewatering purposes (refer point 4). More extensive treatment may require on-site treatment such as a pump and recirculate / treat prior to commencement of dewatering. Trace quantities of PFAS in groundwater may also further complicate any treatment system.
4. **Contaminated groundwater requiring dewatering during basement construction**: Treatment will be required to meet any disposal guidelines (e.g., trade waste agreement (sewer), or stormwater disposal). Identified chlorinated VOCs will require treatment beyond the capacity of simpler treatment systems. Any treatment / disposal will likely require ongoing monitoring for the duration of dewatering. Low (but above guidance levels) concentrations of PFAS in groundwater may also complicate any treatment system.
5. **Soils**: Unexpected finds, such as asbestos in soils (existing or as a result of demolition), or areas of potential elevated waste classifications (e.g., restricted waste). Primarily this may represent a cost risk for landfill disposal, but also may potentially limit any re-use of materials on-site.
6. **USTs**: Based off indirect evidence (i.e., presence of petroleum hydrocarbons in groundwater and soil vapour), site history and anecdotal evidence (discussion with site tenants), it is considered likely that decommissioned USTs may still be present beneath the carpark. If present, the USTs and surrounding soils would require remediation, as such, additional costs may be expected for any necessary decommissioning works including contractors and associated validation testing and reporting. Given the likely requirement for basement formation it is considered that this process could be undertaken during initial earthworks.

It is therefore considered that there is a high risk of contamination within the site. The site will therefore require further assessment to determine the extent and nature of the contamination, to better inform requirements for remediation, as well as the impacts and / or restrictions this may have on any proposed development. Any development application for a proposed development will therefore require a preliminary and detailed site investigation (full scope) and remediation action plan, as a minimum.

Furthermore, noting that exceedances of chlorinated solvents were detected in both groundwater and soil vapour, the potential for offsite migration and impacts of the contaminants cannot be ruled out. Further investigations are required to evaluate whether off-site migration of chlorinated VOCs is occurring. Based on the results of the further investigation, legal advice may need to obtained on whether the site needs to be reported to NSW EPA as a contaminated site under Section 60 of the Contaminated Land Management Act 1997.

14. Recommendations

Further intrusive testing and investigation is required to adequately characterise the potential contamination risks outlined above. Testing is recommended to include, *inter alia*:

- **Desktop searches** – conduct a SafeWork NSW search for dangerous goods to identify potential storage of dangerous goods (including underground or above ground storage tanks for the historic dry cleaner or other land uses). Historical title deed searches may provide greater certainty of land-usage, notably for period of operations of the on-stie dry cleaner, however it is considered that the current business directory search is otherwise adequate to identify the broader range of former land-uses at the site. Review of the site's Section 10.7 Planning Certificates may also identify any major contamination issues.
- **Soils** – intrusive assessment (in accordance with NSW EPA recommended sampling density) to provide adequate characterisation of any fill beneath the site for waste classification purposes, i.e., to inform preliminary classification as part of any basement construction, and to characterise any fill planned to remain on-site (and whether it is suitable to remain on-site);
- **Groundwater** – additional investigation and analysis to provide characterisation of groundwater contamination, such as on-site and off-site migration of contaminants. Assessment should include periodic monitoring of contaminant concentrations. This should also include a measurement of groundwater levels to inform dewatering planning, and for basement design.
- **Soil vapour** – additional investigation and analysis of soil vapour to characterise the risk associated with proposed development (i.e., a site specific risk assessment). More detailed assessment may allow for more specific site risk assessment considering factors such as sub-slab attenuation, distance to source and any specifics to the actual proposed landform, this may better characterise the possible risks for site usage.

Furthermore, noting that exceedances of chlorinated solvents were detected in both groundwater and soil vapour, the potential for off-site migration and impacts of the contaminants cannot be ruled out. Further investigations are required to evaluate whether off-site migration of chlorinated VOCs is occurring. Based on the results of the further investigation, legal advice may need to be obtained on whether the site needs to be reported to NSW EPA as a contaminated site under Section 60 of the Contaminated Land Management Act 1997.

15. References

CRC CARE. (2011). *Health screening levels for petroleum hydrocarbons in soil and groundwater.* Parts 1 to 3, Technical Report No. 10: Cooperative Research Centre for Contamination Assessment and Remediation of the Environment.

NEPC. (2013). *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM].* Australian Government Publishing Services Canberra: National Environment Protection Council.

NSW EPA. (2020). *Guidelines for Consultants Reporting on Contaminated Land.* Contaminated Land Guidelines: NSW Environment Protection Authority.

16. Limitations

Douglas Partners (DP) has prepared this report for this project at 57-69 Strathallen Avenue, Northbridge in accordance with DP's proposal dated 5 April 2023. The work was carried out under DP's Conditions of Engagement. This report is provided for the exclusive use of SJD NB Pty Ltd for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of DP, does so entirely at its own risk and without recourse to DP for any loss or damage. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

The results provided in the report are indicative of the sub-surface conditions on the site only at the specific sampling and / or testing locations, and then only to the depths investigated and at the time the work was carried out. Sub-surface conditions can change abruptly due to variable geological processes and also as a result of human influences. Such changes may occur after DP's field testing has been completed.

Asbestos has not been detected by observation or by laboratory analysis, either on the surface of the site, or in fill materials at the test locations sampled and analysed. Based off the site history and conceptual site model it is considered that possible presence of hazardous building materials (HBM), including asbestos may be within untested areas of the site.

DP's advice is based upon the conditions encountered during this investigation. The accuracy of the advice provided by DP in this report may be affected by undetected variations in ground conditions across the site between and beyond the sampling and/or testing locations. The advice may also be limited by budget constraints imposed by others or by site accessibility.
The assessment of atypical safety hazards arising from this advice is restricted to the (geotechnical / environmental / groundwater) components set out in this report and based on known project conditions and stated design advice and assumptions. While some recommendations for safe controls may be provided, detailed 'safety in design' assessment is outside the current scope of this report and requires additional project data and assessment.

This report must be read in conjunction with all of the attached and should be kept in its entirety without separation of individual pages or sections. DP cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion stated in this report.

This report, or sections from this report, should not be used as part of a specification for a project, without review and agreement by DP. This is because this report has been written as advice and opinion rather than instructions for construction.

Although the sampling plan adopted for this investigation is considered appropriate to achieve the stated project objectives, there are necessarily parts of the site that have not been sampled and analysed. This is either due to undetected variations in ground conditions or to budget constraints (as discussed above), or to parts of the site being inaccessible and not available for inspection/sampling. It is therefore considered possible that HBM, including asbestos, may be present in unobserved or untested parts of the site, between and beyond sampling locations, and hence no warranty can be given that asbestos is not present.

Please contact the undersigned if you have any questions on this matter.

Yours faithfully
Douglas Partners Pty Ltd

Zihan Wang
Environmental Engineer

Reviewed by

Nizam Ahamed
Senior Associate

Attachments:
About this Report
Drawing 1 – Site Locality and Test Location Plan
Historical Aerials
Site Photographs
Fieldwork and Sampling Methodology
Field Groundwater and Soil Vapour Sampling Records
Borehole Logs
Explanation Notes: Soil Descriptions, Symbols and Abbreviations
Summary Tables (A1-A4)
Laboratory Reports

Attachments

About this Report

About this Report

Douglas Partners

Introduction

These notes have been provided to amplify DP's report in regard to classification methods, field procedures and the comments section. Not all are necessarily relevant to all reports.

DP's reports are based on information gained from limited subsurface excavations and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretive rather than factual documents, limited to some extent by the scope of information on which they rely.

Copyright

This report is the property of Douglas Partners Pty Ltd. The report may only be used for the purpose for which it was commissioned and in accordance with the Conditions of Engagement for the commission supplied at the time of proposal. Unauthorised use of this report in any form whatsoever is prohibited.

Borehole and Test Pit Logs

The borehole and test pit logs presented in this report are an engineering and/or geological interpretation of the subsurface conditions, and their reliability will depend to some extent on frequency of sampling and the method of drilling or excavation. Ideally, continuous undisturbed sampling or core drilling will provide the most reliable assessment, but this is not always practicable or possible to justify on economic grounds. In any case the boreholes and test pits represent only a very small sample of the total subsurface profile.

Interpretation of the information and its application to design and construction should therefore take into account the spacing of boreholes or pits, the frequency of sampling, and the possibility of other than 'straight line' variations between the test locations.

Groundwater

Where groundwater levels are measured in boreholes there are several potential problems, namely:

- In low permeability soils groundwater may enter the hole very slowly or perhaps not at all during the time the hole is left open;
- A localised, perched water table may lead to an erroneous indication of the true water table;
- Water table levels will vary from time to time with seasons or recent weather changes. They may not be the same at the time of construction as are indicated in the report; and
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must first be washed out of the hole if water measurements are to be made.

More reliable measurements can be made by installing standpipes which are read at intervals over several days, or perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from a perched water table.

Reports

The report has been prepared by qualified personnel, is based on the information obtained from field and laboratory testing, and has been undertaken to current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal, the information and interpretation may not be relevant if the design proposal is changed. If this happens, DP will be pleased to review the report and the sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical and environmental aspects, and recommendations or suggestions for design and construction. However, DP cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions. The potential for this will depend partly on borehole or pit spacing and sampling frequency;
- Changes in policy or interpretations of policy by statutory authorities; or
- The actions of contractors responding to commercial pressures.

If these occur, DP will be pleased to assist with investigations or advice to resolve the matter.

About this Report

Site Anomalies

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, DP requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed rather than at some later stage, well after the event.

Information for Contractual Purposes

Where information obtained from this report is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. DP would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Site Inspection

The company will always be pleased to provide engineering inspection services for geotechnical and environmental aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site.

Drawing 1 – Site Locality and Test Location Plan

LOCALITY MAP

Notes:
1. Drawing projection GDA94 / MGA zone 56
2. Latest available aerial imagery sourced from metromap.com accessed 26/4/2023
3. Test locations shown are approximate only

Legend

- Site Boundary
- Lots
- Sewer

Test Locations

- Borehole / Monitoring Well
- Soil Vapour Pin

0 5 10 15 20 m

Douglas Partners
Geotechnics / Environment / Groundwater

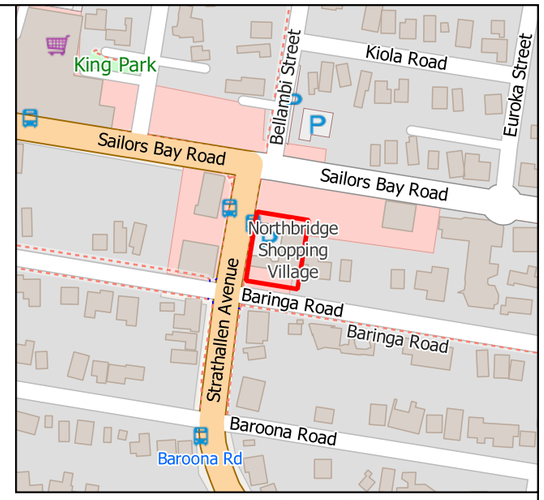
CLIENT:	SJD NB Pty Ltd		
OFFICE:	Sydney	DRAWN BY:	ZW
SCALE:	1:300 @ A3	DATE:	26/04/2023

TITLE: **Site Locality and Test Location Plan**
Preliminary Site Investigation
57-59 Strathallen Avenue, Northbridge

N

PROJECT No:	221953.01
DRAWING No:	1
REVISION:	1

Historical Aerials



LOCALITY MAP

Notes:
1. Drawing projection GDA94 / MGA zone 56
2. Imagery sourced from NSW Spatial Services (1943-1986) and metromap.com (2000-2011)

Legend

Site Boundary

0 25 50 75 100 m

Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT:	SJD NB Pty Ltd		
OFFICE:	Sydney	DRAWN BY:	ZW
SCALE:	1:1500 @ A3	DATE:	12.03.2024

TITLE: **1943 Historical Aerial Imagery**
Preliminary Site Investigation
57-59 Strathallen Avenue, Northbridge

N

PROJECT No:	221953.00
DRAWING No:	A
REVISION:	1

LOCALITY MAP

Notes:
1. Drawing projection GDA94 / MGA zone 56
2. Imagery sourced from NSW Spatial Services (1943-1986) and metromap.com (2000-2011)

Legend

Site Boundary

0 25 50 75 100 m

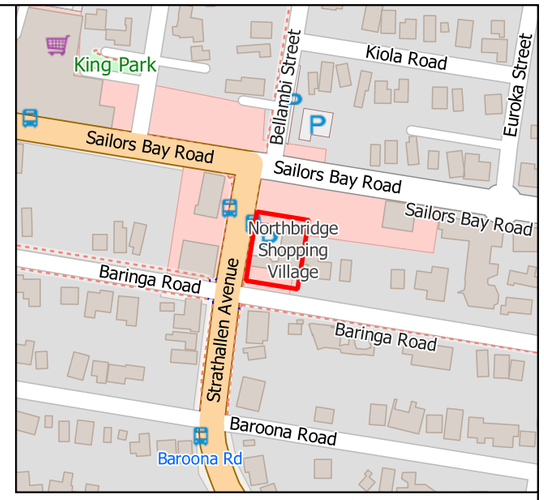
Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT:	SJD NB Pty Ltd		
OFFICE:	Sydney	DRAWN BY:	ZW
SCALE:	1:1500 @ A3	DATE:	12.03.2024

TITLE: **1951 Historical Aerial Imagery**
Preliminary Site Investigation
57-59 Strathallen Avenue, Northbridge

N

PROJECT No:	221953.00
DRAWING No:	B
REVISION:	1



LOCALITY MAP

Notes:
1. Drawing projection GDA94 / MGA zone 56
2. Imagery sourced from NSW Spatial Services (1943-1986) and metromap.com (2000-2011)

Legend

Site Boundary

0 25 50 75 100 m

Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT:	SJD NB Pty Ltd		
OFFICE:	Sydney	DRAWN BY:	ZW
SCALE:	1:1500 @ A3	DATE:	12.03.2024

TITLE: **1961 Historical Aerial Imagery**
Preliminary Site Investigation
57-59 Strathallen Avenue, Northbridge

N

PROJECT No:	221953.00
DRAWING No:	C
REVISION:	1

LOCALITY MAP

Notes:
1. Drawing projection GDA94 / MGA zone 56
2. Imagery sourced from NSW Spatial Services (1943-1986) and metromap.com (2000-2011)

Legend

Site Boundary

0 25 50 75 100 m

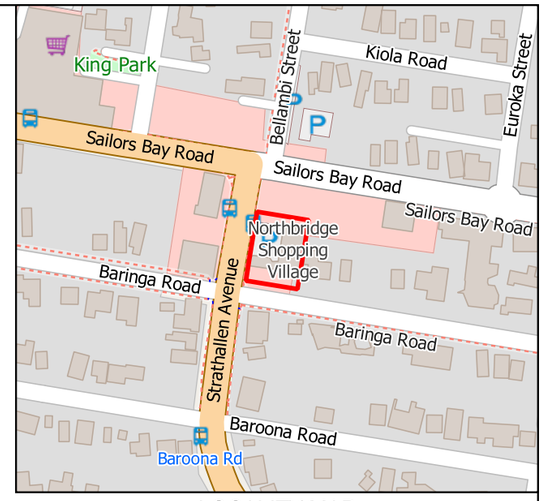
Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT:	SJD NB Pty Ltd		
OFFICE:	Sydney	DRAWN BY:	ZW
SCALE:	1:1500 @ A3	DATE:	12.03.2024

TITLE: **1971 Historical Aerial Imagery**
Preliminary Site Investigation
57-59 Strathallen Avenue, Northbridge

N

PROJECT No:	221953.00
DRAWING No:	D
REVISION:	1



LOCALITY MAP

Notes:
1. Drawing projection GDA94 / MGA zone 56
2. Imagery sourced from NSW Spatial Services (1943-1986) and metromap.com (2000-2011)

Legend

Site Boundary

0 25 50 75 100 m

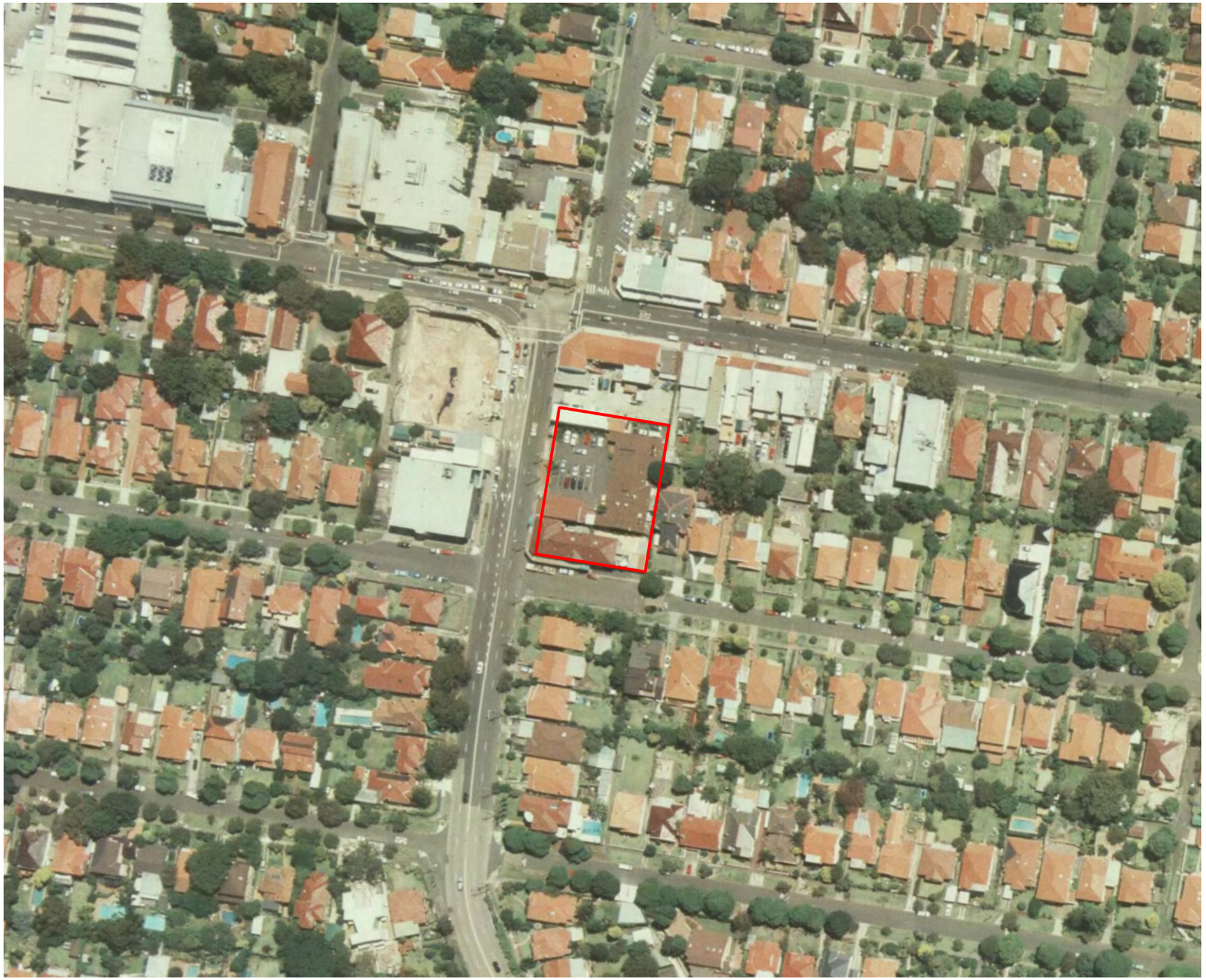
Douglas Partners
Geotechnics / Environment / Groundwater

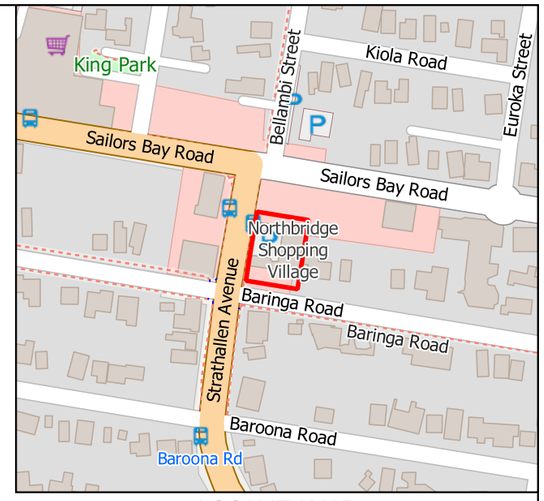
CLIENT:	SJD NB Pty Ltd		
OFFICE:	Sydney	DRAWN BY:	ZW
SCALE:	1:1500 @ A3	DATE:	12.03.2024

TITLE: **1986 Historical Aerial Imagery**
Preliminary Site Investigation
57-59 Strathallen Avenue, Northbridge

N

PROJECT No:	221953.00
DRAWING No:	E
REVISION:	1





LOCALITY MAP

Notes:
1. Drawing projection GDA94 / MGA zone 56
2. Imagery sourced from NSW Spatial Services (1943-1986) and metromap.com (2000-2011)

Legend

Site Boundary

0 25 50 75 100 m

Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT:	SJD NB Pty Ltd		
OFFICE:	Sydney	DRAWN BY:	ZW
SCALE:	1:1500 @ A3	DATE:	12.03.2024

TITLE: **2000 Historical Aerial Imagery**
Preliminary Site Investigation
57-59 Strathallen Avenue, Northbridge

N

PROJECT No:	221953.00
DRAWING No:	F
REVISION:	1

LOCALITY MAP

Notes:
1. Drawing projection GDA94 / MGA zone 56
2. Imagery sourced from NSW Spatial Services (1943-1986) and metromap.com (2000-2011)

Legend

Site Boundary

0 25 50 75 100 m

Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT:	SJD NB Pty Ltd		
OFFICE:	Sydney	DRAWN BY:	ZW
SCALE:	1:1500 @ A3	DATE:	12.03.2024

TITLE: **2011 Historical Aerial Imagery**
Preliminary Site Investigation
57-59 Strathallen Avenue, Northbridge

N

PROJECT No:	221953.00
DRAWING No:	G
REVISION:	1

Site Photographs

Photo 1: General Site condition, car park, facing north

Photo 2: General site condition, car park, facing south

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs**	PROJECT:	221953.00
	Pre-Purchase Due Diligence	PLATE No:	1
	57-69 Strathallen Avenue, Northbridge	REV:	1
	CLIENT: SJD NB Pty Ltd	DATE	28/04/2023

Photo 3: Car park area, grease trap

Photo 4: Interior of dry cleaner, storage of tetrachloroethene (PCE) containers

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs**	PROJECT:	221953.00
	Pre-Purchase Due Diligence	PLATE No:	2
	57-69 Strathallen Avenue, Northbridge	REV:	1
	CLIENT: SJD NB Pty Ltd	DATE	28/04/2023

Photo 5: Interior of dry cleaner, stained carpets, indicating potential spills and leaks

Photo 6: Rear of drycleaner, stormwater and sewer network (potential release point for PCE)

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs**	PROJECT:	221953.00
	Pre-Purchase Due Diligence	PLATE No:	3
	57-69 Strathallen Avenue, Northbridge	REV:	1
	CLIENT SJD NB Pty Ltd	DATE	28/04/2023

Photo 7: Strathallen Ave, facing north

Photo 8: Baringa Road and northbridge hotel, facing north

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs**	PROJECT:	221953.00
	Pre-Purchase Due Diligence	PLATE No:	4
	57-69 Strathallen Avenue, Northbridge	REV:	1
	CLIENT: SJD NB Pty Ltd	DATE	28/04/2023

Fieldwork and Sampling Methodology

Fieldwork and Sampling Methodology
57-69 Strathallen Avenue, Northbridge

1.0 Guidelines

The following key guidelines were consulted for the field work methodology:

- NEPC National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM] (NEPC, 2013).
- HEPA *PFAS National Environmental Management Plan (NEMP)* (HEPA, 2020).

2.0 Field Work Methodology

2.1 Groundwater Well Installation

Groundwater monitoring wells installed by DP were constructed using class 18 uPVC machine slotted screen and blank sections with screw threaded joints. The screened sections of each well were backfilled with a washed sand filter pack to approximately 0.3 to 0.5 m above the screened interval. Each well was completed with a hydrated bentonite plug to the near surface of at least 0.9 m thick. Each well was then finished with cast iron gatic cover at the surface.

Well construction details of the individual monitoring wells are included in the corresponding borehole logs attached.

2.2 Soil Vapour Port / Pin Installation

The two sub-slab pins (sample locations SV101and SV104) were installed by a DP environmental engineer and comprised the following steps:

- Drilling a 38 mm diameter pilot hole into the concrete slab to a depth of approximately 50 mm using a rotary hammer drill and masonry bit;
- Drilling a second hole with a 16 mm diameter to fully penetrate the slab and extending approximately 100 mm below the base of the slab;
- Inserting a pre-fabricated stainless-steel vapour pin with a silicon sleeve (with an outer diameter approximately 20 mm) into the drilled hole and then driving it into the slab using a hammer. The silicon sleeve holding the pin in place. No glues, cements or other binding products were applied to the installation; and
- Placing a plastic cap on the inlet to the pin and screwing a stainless-steel cap into place.

3.0 Sampling Methodology

3.1 Groundwater

Monitoring Well Development

The groundwater monitoring wells were developed on 18 April 2023 prior to the sampling. The purpose of well development was to remove as far as practical stagnant water and / or sediments hence to facilitate the connection of the well to the local groundwater regime.

The general groundwater development methodology undertaken during this investigation comprised for each well:

- Measurement of the water level and well depth using a water whistle;
- Examining the presence / absence of light non-aqueous phase liquid (LNAPL) in the monitoring well using a bailer. Note: no LNAPL was encountered;
- With the assistance of a super twister pump with HDPE tubing developing the well by removing approximately three well volumes or until the well was dry.
- Following development of each well, the super twister pump was decontaminated using a solution of Liquinox and demineralised water, followed by rinsing using demineralised water.

Groundwater Sampling

Groundwater samples were collected on 21 April 2023 using the low-flow micro-purge technique. The sampling comprised:

- Measurement of groundwater levels, monitoring well depth and presence / absence of free phase liquid prior to sampling using an interface metre. Note: no LNAPL or DNAPL was encountered;
- Using a peristatic pump with HDPE tubing, lowering of the sampling tube to a level estimated to be the desired sampling depth (generally the mid-point of the screened section of the well);
- Setting the pump at the lowest rate possible to minimise drawdown of the water column;
- Measuring field parameters (temperature, dissolved oxygen (DO), redox and pH) with a water quality meter by continuously passing the purged water through a flow cell. These are provided in the field sheets attached and summarised in Section 10.2;
- Following stabilisation of the field parameters, collection of samples in laboratory-prepared analyte specific bottles and vials whilst minimising headspace within the sample bottle and vials and capping immediately. It is noted that:
    - Sample bottles were filled directly from the pump outlet to minimise disturbance;
    - Samples were not filtered in the field (i.e., refrigerated and filtered via laboratory prior to analysis); and
    - Replicate samples were collected concurrently with the primary samples in separately and uniquely labelled groundwater bottles.
- Following sampling all HDPE tubing were replaced. The interface metre was rinsed using a solution of Liquinox and demineralized water, followed by rinsing of equipment in demineralised water.

The general groundwater sample handling and management procedures comprised:

- Collection of 10% replicate QA/QC samples;
- Labelling the sample containers with individual and unique identification details, including project number and sample location;
- Placing the sample containers into a cooled, insulated and sealed container for transport to the laboratory; and
- Use of chain of custody documentation.

3.2 Soil Vapour

Soil vapour ports / pins were left for a minimum of two hours to allow sample points to equilibrate to ambient conditions prior to sampling.

The soil vapour sampling was carried out in general accordance with DP's standard operating procedures. The general sampling and sample management procedures comprised:

- Connecting the sample tubing directly to the vapour port / pin outlet following removal of the HDPE plastic cap;
- Purging the soil vapour well prior to sampling by removing one volume of air/vapour from the port / pin (typically ~500 ml);
- Measuring general landfill gas parameters (including methane, oxygen, carbon dioxide, carbon monoxide and hydrogen sulphide) from the soil vapour port / pin on-site using a calibrated GA5000 landfill gas analyser;
- Introducing liquid isopropyl alcohol (IPA) into the sampling shroud to act as a tracer gas for leaks in the soil vapour well and / or the sampling train. All samples were analysed for IPA as part of the VOC (USEPA TO-15) analysis;
- Taking readings with a photoionisation detection instrument (PID) from the soil vapour port / pin prior to and following application of the IPA tracer gas. PID reading were also taken inside the shroud to provide a field indication of potential leaks;
- Performing a shut-in test (minimum 30 seconds) following assembly of the sampling apparatus at each location comprising:
    - Summa canister: Assembling the sample apparatus to the extent practical (i.e., connecting the Summa canister to the regulator), then opening the canister valve to apply the vacuum (of between -28 mm Hg" to -30 mm Hg") to the sampling train, while the regulator is still capped; and
    - Carbon back-up tube: Assembling the sample train (fittings to attach to vapour port / pin, carbon tube, vacuum gauge, rotameter and pump plus the associated tubing connecting the sample train) then clamping the sampling tube between the vapour port and carbon tube, activating the pump until a vacuum of -7 Kpa" is achieved and then the sampling train is clamped at the pump.

- Collection of the soil vapour sample comprising:
  - Collecting primary samples directly from the soil vapour port / pin into 1 L Summa canisters with a flow regulator (approximately 100 ml/min) set by the analytical laboratory. The Summa canisters were attached directly to the sample point with disposable tubing. The regulators were supplied by the analytical laboratory and were decontaminated by the laboratory prior to shipment. A negative pressure was retained in the canister at all times;
  - Collecting one replicate Summa canister samples for QC;
  - Collecting back-up samples directly onto carbon tubes using an SKC constant flow air-sampling pump, low flow adapter and rotameter to confirm the flow rate;
  - Collecting a shroud sample on a carbon tube to conduct analysis for IPA and hence determine the concentration of the tracer compound in the shroud; and
  - Labelling of the sample canisters and tubes and use of chain of custody documentation. Completed field sampling sheets and samples were transported to the laboratory in appropriately sealed containers.

3.3 Soil

Soil sampling was carried out in general accordance with DP's standard operating procedures. The general sampling and sample management procedures comprised:

- Collection of soil samples directly from solid flight auger returns;
- Transfer of contamination samples into laboratory-prepared glass jars with Teflon lined lids by hand, capping immediately and minimising headspace within the sample jar;
- Use of new disposable nitrile gloves for each sample point, thereby minimising potential for cross-contamination;
- Collection of 10% replicate contamination samples for QC purposes;
- Labelling of sample containers with individual and unique identification details, including project number, sample location and sample depth (where applicable);
- Placing samples into a cooled, insulated and sealed container for transport to the laboratory; and
- Use of chain of custody documentation.

It should be noted that PID screening was not conducted during this investigation.

Field Groundwater and Soil Vapour Sampling Records

Douglas Partners
Geotechnics / Environment / Groundwater

Groundwater (GW) Field Sheet

Project and Bore Installation Details						
Project Name / Site Location	57-69 Strathallen Avenue, Northbridge, DD				Project Number	221953.00
Well Construction Details	Well ID	BH2	Drilling Method	SFA	Hole Diameter (m)~	
	Well Depth (m bgl)		Screened (m bgl)		Stick Up (m)	
Survey Information	Easting		Northing	Refer to logs	Elevation RL	
GW Level During Drilling		m bgl				
Contaminants/Comments						

Well Development Details					
Date / Time / Weather Conditions	18/04/23, ~~11~~ 1:40 pm overcast			Purged By	SAF
Purge Method / Equipment	Twister + HDPE				
Product observed / Thickness	—	mm	Confirmed with Bailer?	(Yes)	No
GW Level (pre-purge)	3.5	m bgl	Observed Well Depth	6.05	m bgl
Height of Water Column (H)	0 2.55	m bgl	Estimated Bore Volume*	0 ~25	L
GW Level (post-purge)	5.7	m bgl	Total Volume Purged**	~15	L
Appearance/Comments	P. brown, no sheen, no odour				

Sampling Details					
Date / Time / Weather Conditions	21/04/23, 10:50 am, overcast			Sampled By	ZLO
Sampling Method / Equipment	Bladder pump				
WQM Model	TPS FLT90		WQM Calibration Date	20/4/23	
Product observed / Thickness	—	mm	Confirmed with Bailer?	(Yes)	No
GW Level (pre-micropurge)	3.7	m bgl	Observed Well Depth	6.1	m bgl
Height of Water Column	0 2.4	m bgl	Estimated Bore Volume*	0 ~8	L
GW Level (post sample)	4.8	m bgl	Total Volume of Micro-Purged	~2.5	L

Water Quality Parameters

Time (s)	Cumulative Volume (L)	Temp (°C)	DO (mg/L)#	EC (µS or mS/cm)	pH	Redox (mV)	Turbidity^
Stabilisation Target (3 readings)		0.2	+/- 10%	+/- 5%	+/- 0.1	+/- 10 mV	+/- 10%
0	0.5	21.3	3.59	—	8.15	37	—
30	1	21.5	3.41	—	8.15	36	—
60	1.5	21.4	3.33	—	8.18	34	—
90	2	21.4	3.12	—	8.22	32	—
120	2.5	21.4	3.12	—	8.23	31	—
Notes:	# Considered stabilised if three DO values are less than 0.5 mg/L			^ Considered stabilised if three Turbidity values are less than 5 NTU			

Sample Details						
Sampling Depth (rationale)	5.0	m bgl,	mid WC			
Sample Observations (e.g. colour, sediment, sheen, odour)	Pale brown, moderately silty, no sheen, no odour					
Sample ID						
QAQC Samples	Replicate		Triplicate		Other	
Sample Containers Quantity / Preservation / Filtration	Amber glass		Plastic		PFAS (no teflon)	
	Metals (F/UF) (HNO3)		Phenols/COD/NH3 (H2SO4)		Vials (HCl)	
	Ferrous/Ferric Iron (HCl)		Cyanides/Chromium (NaOH)		Other	
Comments						

*Estimated Well Volume = H * F	Std. Drilling Diameter (m)~	NMLC (0.075)	HQ (0.096)	PQ (0.1226)	SFA (0.125)	HFA (0.194)
**Purge Target: min. 3 well volumes	Factor (F):	2.8	3.7	5.2	5.4	11.1

Douglas Partners
Geotechnics / Environment / Groundwater

Groundwater (GW) Field Sheet

Project and Bore Installation Details

Project Name / Site Location	57-69 Strathallen Avenue, Northbridge, DD				Project Number	221953.00	
Well Construction Details	Well ID	BH1	Drilling Method	SFA	Hole Diameter (m)~		
	Well Depth (m bgl)		Screened (m bgl)		Stick Up (m)		
Survey Information	Easting		Northing	Refer to log	Elevation RL		
GW Level During Drilling		m bgl					
Contaminants/Comments							

Well Development Details

Date / Time / Weather Conditions	18/4/23, 12:40 pm, overcast			Purged By	SAF
Purge Method / Equipment	twister pump + HDPE				
Product observed / Thickness	—	mm	Confirmed with Bailer?	(Yes) No	
GW Level (pre-purge)	2.74	m bgl	Observed Well Depth	9.59	m bgl
Height of Water Column (H)	0 6.85	m bgl	Estimated Bore Volume*	0 ~15	L
GW Level (post-purge)	3.69	m bgl	Total Volume Purged**	~45	L
Appearance/Comments	P. grey moderately silty, no sheen, slight HC odour.				

Sampling Details

Date / Time / Weather Conditions	21/4/23, 10:00 am, Sunny			Sampled By	ZW
Sampling Method / Equipment	~~Bladder pump~~ Peristatic pump				
WQM Model	TPS FLT90		WQM Calibration Date	20/4	
Product observed / Thickness	—	mm	Confirmed with Bailer?	(Yes) No	
GW Level (pre-micropurge)	3.05	m bgl	Observed Well Depth	9.5	m bgl
Height of Water Column	0 6.45	m bgl	Estimated Bore Volume*	0 ~15	L
GW Level (post sample)	3.05	m bgl	Total Volume of Micro-Purged	~3	L

Water Quality Parameters

Time (s)	Cumulative Volume (L)	Temp (°C)	DO (mg/L)#	EC (µS or mS/cm)	pH	Redox (mV)	Turbidity^
Stabilisation Target (3 readings)		0.2	+/- 10%	+/- 5%	+/- 0.1	+/- 10 mV	+/- 10%
0	0.5	20.2	0.86	—	6.59	-70	—
30	1	21.3	0.82	—	6.60	-72	—
60	1.5	21.3	0.79	—	6.60	-73	—
90	2	21.2	0.54	—	6.61	-74	—
120	2.5	21.2	0.50	—	6.62	-74	—
150	3	21.2	0.49	—	6.62	-75	—
Notes:	# Considered stabilised if three DO values are less than 0.5 mg/L			^ Considered stabilised if three Turbidity values are less than 5 NTU			

Sample Details

Sampling Depth (rationale)	6.0	m bgl,	mid screen				
Sample Observations (e.g. colour, sediment, sheen, odour)	Pale grey, slightly silty, no sheen, moderate HC odour						
Sample ID							
QAQC Samples	Replicate	BD1/230422	Triplicate		Other		
Sample Containers Quantity / Preservation / Filtration	Amber glass		Plastic		PFAS (no teflon)		
	Metals (F/UF) (HNO3)		Phenols/COD/NH3 (H2SO4)		Vials (HCl)		
	Ferrous/Ferric Iron (HCl)		Cyanides/Chromium (NaOH)		Other		
Comments							

*Estimated Well Volume = H * F	Std. Drilling Diameter (m)~	NMLC (0.075)	HQ (0.096)	PQ (0.1226)	SFA (0.125)	HFA (0.194)
**Purge Target: min. 3 well volumes	Factor (F):	2.8	3.7	5.2	5.4	11.1

Soil Vapour Sampling Sheet

Douglas Partners
Geotechnics | Environment | Groundwater

Project and Bore Installation Details

Project Name:	Northbridge, QP
Project Number:	224953.00
Client	
Sample ID / Bore No.	SV101
Site Location:	
GPS Co-ord:	
Elevation (RL, m AHD)	
Installation Date:	
Well / Pin Construction Details	Subslab soil vapour pin
Weather	Humidity 77% Temperature 16° Barometric 1028
Canister Flow Controller	100 mL/min
Carbon / TD Tube Flow Controller	84.5 mL/min Type Rotameter, flow flow adaptor and vacuum gauge
Pump ID	11532213
Date/Time:	21/4 2W, 9:02 am
Sampled By:	

Purge Details / Field Readings

Pre Purge PID Reading			ppm			
Bulk Gas readings	Time (s)	Concentration (% v/v) CH_4	CO_2	O_2	H_2S (ppm)	CO (ppm)
	0	0.1	0.8	17.0	0	0
	15	0.1	1.1	14.5	0	0
	30	0.1	1.4	13.9	0	0
	45	0.1	2.0	13.7	0	0
	60	0.1	2.2	13.7	0	0
Purge Method	GA5000					
Post Purge PID Reading	11.5	ppm	Ambient VOC 7.5 ppm			
Approximate Volume Purged	~3	L				

Pre-Start QA Tests

Shut In Test				
	Canister		**Carbon Tube / TD Setup**	
Vacuum Applied	-30	in Hg	-2.6	kPa
Duration	1	min	1	min
Pass / Fail	pass		pass	
Leak Test	**PID in Sample Train**		**PID in Shroud**	
	14.1	ppm	196.3	ppm
Pass / Fail	pass			

Sampling Details - Primary

	Canister		**Carbon Tube / TD Tube**	
ID Number	2555		0171504751	
Regulator Number	505		N/A	
Start Time	0	min	0	min
Start Vacuum	-30	in Hg	-0.1	kPa
Stop Time	19	min	5	min
Stop Vacuum	-6	in Hg	-0.4	kPa
Approximate Sample Volume	~700	mL	~430	mL
	Note: recommended end vacuum of -7 in Hg (~75% full)		Note: recommended < 2.5 kPa induced vacuum (ASTM D7663)	

Sampling Details - Replicate

	Canister		**Carbon Tube / TD Tube**	
ID Number				
Regulator Number			N/A	
Start Time		min		min
Start Vacuum		in Hg		kPa
Stop Time		min		min
Stop Vacuum		in Hg		kPa
Approximate Sample Volume		mL		mL

Sampling Details - Shroud shroud 1

Carbon / TD Tube ID	0171504753		
Start Time	0	min	
Stop Time	1	min	
Sample Time	1	min	
Approximate Sample Volume	84.5	mL	

Comments / Observations:	Ambient PID ~ 7 - 80 ppm

Soil Vapour Sampling Sheet

Douglas Partners
Geotechnics | Environment | Groundwater

Project and Bore Installation Details

Project Name:	
Project Number:	221951.00
Client	
Sample ID / Bore No.	SV102 (BH1)
Site Location:	
GPS Co-ord:	
Elevation (RL, m AHD)	
Installation Date:	
Well / Pin Construction Details	Groundwater well with LFG cap. see log.
Weather	Humidity 59% Temperature 21° Barometric 1027
Canister Flow Controller	84.5 mL/min
Carbon / TD Tube Flow Controller	100 mL/min Type Rotameter, flow flow adaptor and vacuum gauge
Pump ID	11528213
Date/Time:	21/4 1:48 pm
Sampled By:	ZW

Purge Details / Field Readings

Pre Purge PID Reading			ppm			
Bulk Gas readings	Time (s)	Concentration (% v/v) CH_4	CO_2	O_2	H_2S (ppm)	CO (ppm)
	0	0.1	0.5	20.2	0	1
	30	0.2	0.5	19.7	0	1
	60	0.2	0.4	19.7	0	1
	90	0.2	0.4	19.7	0	1
	120	0.1	0.4	19.7	0	1
Purge Method	GAS000					
Post Purge PID Reading	5.3		ppm	HC odour.		
Approximate Volume Purged	~6		L			

Pre-Start QA Tests

Shut In Test				
	Canister		**Carbon Tube / TD Setup**	
Vacuum Applied	-~~30~~ ~~29~~ 70	in Hg	2.6	kPa
Duration	1	min	1	min
Pass / Fail	pass		pass	
Leak Test	**PID in Sample Train**		**PID in Shroud**	
	5.4	ppm	150.2	ppm
Pass / Fail	pass			

Sampling Details - Primary

	Canister		**Carbon Tube / TD Tube**	
ID Number	2263		0171504715	
Regulator Number	2085		N/A	
Start Time	0	min 1:40	0	min
Start Vacuum	-~~30~~ 29	in Hg	—	kPa
Stop Time	8	min	5	min
Stop Vacuum	-7	in Hg	—	kPa
Approximate Sample Volume	~700	mL	~430	mL
	Note: recommended end vacuum of -7 in Hg (~75% full)		Note: recommended < 2.5 kPa induced vacuum (ASTM D7663)	

Sampling Details - Replicate

	Canister		**Carbon Tube / TD Tube**	
ID Number				
Regulator Number			N/A	
Start Time		min		min
Start Vacuum		in Hg		kPa
Stop Time		min		min
Stop Vacuum		in Hg		kPa
Approximate Sample Volume		mL		mL

Sampling Details - Shroud

Carbon / TD Tube ID			
Start Time		min	
Stop Time		min	
Sample Time		min	
Approximate Sample Volume		mL	

Comments / Observations:	slight to moderate HC odour.

Soil Vapour Sampling Sheet

Douglas Partners
Geotechnics | Environment | Groundwater

Project and Bore Installation Details

Project Name:	
Project Number:	221953.00
Client	
Sample ID / Bore No.	SV103 (BH2)
Site Location:	
GPS Co-ord:	
Elevation (RL, m AHD)	
Installation Date:	
Well / Pin Construction Details	Groundwater well with LFG cap (see log)
Weather	Humidity 59% Temperature 21° Barometric 1027
Canister Flow Controller	100 mL/min
Carbon / TD Tube Flow Controller	84.7 mL/min Type Rotameter, flow flow adaptor and vacuum gauge
Pump ID	1172843
Date/Time:	21/4 2:15 pm
Sampled By:	ZO

Purge Details / Field Readings

Pre Purge PID Reading			ppm			
Bulk Gas readings	Time	Concentration (% v/v) CH_4	CO_2	O_2	H_2S (ppm)	CO (ppm)
	0	0.1	1.5	19.8	0	2
	30	0.1	1.5	19.5	0	3
	60	0.1	1.4	19.5	0	3
	90	0.1	1.3	19.6	0	3
	120	0.1	1.2	19.7	0	3
Purge Method						
Post Purge PID Reading	0.6	ppm				
Approximate Volume Purged	~ 63	L				

Pre-Start QA Tests

Shut In Test				
	Canister		**Carbon Tube / TD Setup**	
Vacuum Applied	-50	in Hg	2.6	kPa
Duration	1	min	1	min
Pass / Fail	pass		pass	
Leak Test	**PID in Sample Train**		**PID in Shroud**	
	2.0	ppm	191	ppm
Pass / Fail	pass			

Sampling Details - Primary

	Canister		**Carbon Tube / TD Tube**	
ID Number	3274		0171504714	
Regulator Number	1861		N/A	
Start Time	0	min	0	min
Start Vacuum	-30	in Hg		kPa
Stop Time	5	min	5	min
Stop Vacuum	-7	in Hg		kPa
Approximate Sample Volume	~710	mL	~430	mL
	Note: recommended end vacuum of -7 in Hg (~75% full)		Note: recommended < 2.5 kPa induced vacuum (ASTM D7663)	

Sampling Details - Replicate

	Canister		**Carbon Tube / TD Tube**	
ID Number				
Regulator Number			N/A	
Start Time		min		min
Start Vacuum		in Hg		kPa
Stop Time		min		min
Stop Vacuum		in Hg		kPa
Approximate Sample Volume		mL		mL

Sampling Details - Shroud

Carbon / TD Tube ID		
Start Time	min	
Stop Time	min	
Sample Time	min	
Approximate Sample Volume	mL	

Comments / Observations:	

Soil Vapour Sampling Sheet

Douglas Partners
Geotechnics | Environment | Groundwater

Project and Bore Installation Details

Project Name:	
Project Number:	221953.00
Client	
Sample ID / Bore No.	SV104
Site Location:	
GPS Co-ord:	
Elevation (RL, m AHD)	
Installation Date:	
Well / Pin Construction Details	Subslab Soil vapour pin
Weather	Humidity 61 % Temperature 20° Barometric 1027
Canister Flow Controller	mL/min
Carbon / TD Tube Flow Controller	N/A mL/min Type Rotameter, flow flow adaptor and vacuum gauge
Pump ID	N/A
Date/Time:	21/4/23, 3:00 pm overcast.
Sampled By:	ZW

Purge Details / Field Readings

Pre Purge PID Reading		ppm	

Bulk Gas readings	Time	Concentration (% v/v) CH_4	CO_2	O_2	H_2S (ppm)	CO (ppm)
	0	0.1	0.2	17.9	0	0
	15	0.1	0.2	19.9	0	0
	30	0.1	0.2	17.9	0	0
	45	0.1	0.2	19.9	0	0
	60	0.1	0.3	19.9	0	0

Purge Method			
Post Purge PID Reading	0.2	ppm	
Approximate Volume Purged	~3	L	

Pre-Start QA Tests

Shut In Test

	Canister		Carbon Tube / TD Setup	
Vacuum Applied	-30	in Hg		kPa
Duration	1	min		min
Pass / Fail	pass			

Leak Test

	PID in Sample Train		PID in Shroud	
	1.1	ppm	217	ppm
Pass / Fail	pass			

Sampling Details - Primary

	Canister		Carbon Tube / TD Tube	
ID Number	3273			
Regulator Number	1876		N/A	
Start Time	↓	min		min
Start Vacuum	-29	in Hg		kPa
Stop Time	~10	min		min
Stop Vacuum	-7	in Hg		kPa
Approximate Sample Volume	~700	mL		mL
	Note: recommended end vacuum of -7 in Hg (~75% full)		Note: recommended < 2.5 kPa induced vacuum (ASTM D7663)	

Sampling Details - Replicate RD1/230421

	Canister		Carbon Tube / TD Tube	
ID Number	5117			
Regulator Number	2078		N/A	
Start Time	0	min		min
Start Vacuum	-30	in Hg		kPa
Stop Time	~10	min		min
Stop Vacuum	-7	in Hg		kPa
Approximate Sample Volume	~700	mL		mL

Sampling Details - Shroud

Carbon / TD Tube ID			
Start Time		min	
Stop Time		min	
Sample Time		min	
Approximate Sample Volume		mL	

Comments / Observations:	

Borehole Logs

BOREHOLE LOG

CLIENT: SJD NB Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 57-69 Strathallen Avenue, Northbridge

SURFACE LEVEL: 87.6 AHD
EASTING: 334419
NORTHING: 6257320
DIP/AZIMUTH: 90°/--

BORE No: BH1
PROJECT No: 221953.01
DATE: 14/4/2023
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
87	0.05	ASPHALTIC CONCRETE							Gatic cover Concrete 0-0.2m
		FILL/Sandy Gravelly CLAY: low to medium plasticity, orange-brown and grey, fine sand, fine to coarse igneous (roadbase) gravel, trace sandstone and ironstone gravel, w~PL		E	0.3 0.5		No odour		
	0.6			E/S	0.7		Slight hydrocarbon odour		
	1	Sandy CLAY CI-CH: medium to high plasticity, pale grey mottled red-brown, fine to medium grained sand, w~PL, extremely weathered sandstone			1.0				Bentonite 0.2-2.0m
	1.38	At 1.0m: slight hydrocarbon odour			1.38				
86		SANDSTONE: medium to coarse grained, pale grey, orange and red-brown, low strength, highly weathered with extremely weathered band, slightly fractured, Hawkesbury Sandstone			1.67		PL(A) = 0.3		
	2			C					
85					2.51		PL(A) = 0.2		
	3								
					3.19				
84					3.45		PL(A) = 0.1		Blank pipe 0.1-4.0m
	3.66	SILSTONE: dark grey and grey, with approximately 40% interbedded fine grained sandstone, very low to low strength, highly weathered, fractured, Hawkesbury Sandstone							
	4								
	4.1	SANDSTONE: fine to coarse grained, red-brown, pale grey and pale grey-brown, medium strength, highly weathered, very thinly bedded, slightly fractured to unbroken, Hawkesbury Sandstone							
83		From 4.67 m, slightly weathered		C	4.57		PL(A) = 0.9		
	5								
					5.34		PL(A) = 0.8		
82									Gravel 2.0-9.5m
	6								
					6.15				
81					6.33		PL(A) = 1		
	7								Machine slotted PVC screen 3.5.0-9.5m
80				C	7.51		PL(A) = 0.9		
	8	Below 8.0 m: high strength							
79					8.7		PL(A) = 1.5		
	9								
					9.12				
78				C	9.65		PL(A) = 1.6		End cap
	10.0								

RIG: GEO205 **DRILLER:** Ground Test **LOGGED:** RAS **CASING:** HW to 1.3 m

TYPE OF BORING: Solid flight Auger to 1.38 m, NMLC coring to 12.15 m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Loss of drilling water return below 4.4 m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: SJD NB Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 57-69 Strathallen Avenue, Northbridge

SURFACE LEVEL: 87.6 AHD
EASTING: 334419
NORTHING: 6257320
DIP/AZIMUTH: 90°/--

BORE No: BH1
PROJECT No: 221953.01
DATE: 14/4/2023
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
77	11	SANDSTONE: fine to coarse grained, red-brown, pale grey and pale grey-brown, high strength, slightly weathered, very thinly bedded, slightly fractured to unbroken, Hawkesbury Sandstone		C	10.72		PL(A) = 1.5		Backfill with bentonite 9.5-12.15m
76	12				11.27		PL(A) = 1.8		
	12.15	Bore discontinued at 12.15m Target depth reached			12.15				
75	13								
74	14								
73	15								
72	16								
71	17								
70	18								
69	19								
68									

RIG: GEO205 **DRILLER:** Ground Test **LOGGED:** RAS **CASING:** HW to 1.3 m

TYPE OF BORING: Solid flight Auger to 1.38 m, NMLC coring to 12.15 m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Loss of drilling water return below 4.4 m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: SJD NB Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 57-69 Strathallen Avenue, Northbridge

SURFACE LEVEL: 87.1 AHD
EASTING: 334417
NORTHING: 6257301
DIP/AZIMUTH: 90°/--

BORE No: BH2
PROJECT No: 221953.01
DATE: 14/4/2023
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
87	0.05	ASPHALTIC CONCRETE							Gatic cover Concrete 0-0.2m
		FILL/Gravelly SAND: fine to medium, orange-brown and grey, fine to coarse igneous (roadbase) gravel, with clay nodules mixed in, trace sandstone and ironstone gravel, w~PL		E*	0.3 0.5		No odour		
	0.5			E	0.6 0.8		No odour		
86	0.9	FILL/Silty SAND: fine to medium, grey, trace igneous and sandstone gravel, apparently well compacted, moist			1.0				Backfill with spoil 0.2-1.8m
		SANDSTONE: medium to coarse grained, yellow-brown and red-brown, apparently very low to medium strength, distinctly weathered, Hawkesbury Sandstone		E	1.3		No odour		
85	2								Blank pipe 0.1-3.0m Bentonite 1.8-2.3m
84	3								
83	4								Gravel 2.3-6.0m Machine slotted PVC screen 3.0-6.0m
82	5								
81	6.0	Bore discontinued at 6.0m Target depth reached							End cap
80	7								
79	8								
78	9								

RIG: GEO205 **DRILLER:** Ground Test **LOGGED:** SP **CASING:** Uncased

TYPE OF BORING: Solid flight Auger to 6.0m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: *Replicate sample BH0D1 taken from 0.3 - 0.5m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

Explanation Notes: Soil Descriptions, Symbols and Abbreviations

Description and Classification Methods

The methods of description and classification of soils and rocks used in this report are generally based on Australian Standard AS1726:2017, Geotechnical Site Investigations. In general, the descriptions include strength or density, colour, structure, soil or rock type and inclusions.

Soil Types

Soil types are described according to the predominant particle size, qualified by the grading of other particles present:

Type	Particle size (mm)
Boulder	>200
Cobble	63 - 200
Gravel	2.36 - 63
Sand	0.075 - 2.36
Silt	0.002 - 0.075
Clay	<0.002

The sand and gravel sizes can be further subdivided as follows:

Type	Particle size (mm)
Coarse gravel	19 - 63
Medium gravel	6.7 - 19
Fine gravel	2.36 – 6.7
Coarse sand	0.6 - 2.36
Medium sand	0.21 - 0.6
Fine sand	0.075 - 0.21

Definitions of grading terms used are:

- Well graded - a good representation of all particle sizes
- Poorly graded - an excess or deficiency of particular sizes within the specified range
- Uniformly graded - an excess of a particular particle size
- Gap graded - a deficiency of a particular particle size with the range

The proportions of secondary constituents of soils are described as follows:

In fine grained soils (>35% fines)

Term	Proportion of sand or gravel	Example
And	Specify	Clay (60%) and Sand (40%)
Adjective	>30%	Sandy Clay
With	15 – 30%	Clay with sand
Trace	0 - 15%	Clay with trace sand

In coarse grained soils (>65% coarse)
- with clays or silts

Term	Proportion of fines	Example
And	Specify	Sand (70%) and Clay (30%)
Adjective	>12%	Clayey Sand
With	5 - 12%	Sand with clay
Trace	0 - 5%	Sand with trace clay

In coarse grained soils (>65% coarse)
- with coarser fraction

Term	Proportion of coarser fraction	Example
And	Specify	Sand (60%) and Gravel (40%)
Adjective	>30%	Gravelly Sand
With	15 - 30%	Sand with gravel
Trace	0 - 15%	Sand with trace gravel

The presence of cobbles and boulders shall be specifically noted by beginning the description with ‘Mix of Soil and Cobbles/Boulders’ with the word order indicating the dominant first and the proportion of cobbles and boulders described together.

Soil Descriptions

Cohesive Soils

Cohesive soils, such as clays, are classified on the basis of undrained shear strength. The strength may be measured by laboratory testing, or estimated by field tests or engineering examination. The strength terms are defined as follows:

Description	Abbreviation	Undrained shear strength (kPa)
Very soft	VS	<12
Soft	S	12 - 25
Firm	F	25 - 50
Stiff	St	50 - 100
Very stiff	VSt	100 - 200
Hard	H	>200
Friable	Fr	-

Cohesionless Soils

Cohesionless soils, such as clean sands, are classified on the basis of relative density, generally from the results of standard penetration tests (SPT), cone penetration tests (CPT) or dynamic penetrometers (PSP). The relative density terms are given below:

Relative Density	Abbreviation	Density Index (%)
Very loose	VL	<15
Loose	L	15-35
Medium dense	MD	35-65
Dense	D	65-85
Very dense	VD	>85

Soil Origin

It is often difficult to accurately determine the origin of a soil. Soils can generally be classified as:

- Residual soil - derived from in-situ weathering of the underlying rock;
- Extremely weathered material – formed from in-situ weathering of geological formations. Has soil strength but retains the structure or fabric of the parent rock;
- Alluvial soil – deposited by streams and rivers;
- Estuarine soil – deposited in coastal estuaries;
- Marine soil – deposited in a marine environment;
- Lacustrine soil – deposited in freshwater lakes;
- Aeolian soil – carried and deposited by wind;
- Colluvial soil – soil and rock debris transported down slopes by gravity;
- Topsoil – mantle of surface soil, often with high levels of organic material.
- Fill – any material which has been moved by man.

Moisture Condition – Coarse Grained Soils

For coarse grained soils the moisture condition should be described by appearance and feel using the following terms:

- Dry (D) Non-cohesive and free-running.
- Moist (M) Soil feels cool, darkened in colour.
  Soil tends to stick together.
  Sand forms weak ball but breaks easily.
- Wet (W) Soil feels cool, darkened in colour.
  Soil tends to stick together, free water forms when handling.

Moisture Condition – Fine Grained Soils

For fine grained soils the assessment of moisture content is relative to their plastic limit or liquid limit, as follows:

- ‘Moist, dry of plastic limit’ or ‘w <PL’ (i.e. hard and friable or powdery).
- ‘Moist, near plastic limit’ or ‘w ≈ PL (i.e. soil can be moulded at moisture content approximately equal to the plastic limit).
- ‘Moist, wet of plastic limit’ or ‘w >PL’ (i.e. soils usually weakened and free water forms on the hands when handling).
- ‘Wet’ or ‘w ≈LL’ (i.e. near the liquid limit).
- ‘Wet’ or ‘w >LL’ (i.e. wet of the liquid limit).

Rock Strength

Rock strength is defined by the Unconfined Compressive Strength and it refers to the strength of the rock substance and not the strength of the overall rock mass, which may be considerably weaker due to defects.

The Point Load Strength Index $Is_{(50)}$ is commonly used to provide an estimate of the rock strength and site specific correlations should be developed to allow UCS values to be determined. The point load strength test procedure is described by Australian Standard AS4133.4.1-2007. The terms used to describe rock strength are as follows:

Strength Term	Abbreviation	Unconfined Compressive Strength MPa	Point Load Index * $Is_{(50)}$ MPa
Very low	VL	0.6 - 2	0.03 - 0.1
Low	L	2 - 6	0.1 - 0.3
Medium	M	6 - 20	0.3 - 1.0
High	H	20 - 60	1 - 3
Very high	VH	60 - 200	3 - 10
Extremely high	EH	>200	>10

* Assumes a ratio of 20:1 for UCS to $Is_{(50)}$. It should be noted that the UCS to $Is_{(50)}$ ratio varies significantly for different rock types and specific ratios should be determined for each site.

Degree of Weathering

The degree of weathering of rock is classified as follows:

Term	Abbreviation	Description
Residual Soil	RS	Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are no longer visible, but the soil has not been significantly transported.
Extremely weathered	XW	Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are still visible
Highly weathered	HW	The whole of the rock material is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable. Rock strength is significantly changed by weathering. Some primary minerals have weathered to clay minerals. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores.
Moderately weathered	MW	The whole of the rock material is discoloured , usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable, but shows little or no change of strength from fresh rock.
Slightly weathered	SW	Rock is partially discoloured with staining or bleaching along joints but shows little or no change of strength from fresh rock.
Fresh	FR	No signs of decomposition or staining.
Note: If HW and MW cannot be differentiated use DW (see below)		
Distinctly weathered	DW	Rock strength usually changed by weathering. The rock may be highly discoloured, usually by iron staining. Porosity may be increased by leaching or may be decreased due to deposition of weathered products in pores.

Rock Descriptions

Degree of Fracturing

The following classification applies to the spacing of natural fractures in diamond drill cores. It includes bedding plane partings, joints and other defects, but excludes drilling breaks.

Term	Description
Fragmented	Fragments of <20 mm
Highly Fractured	Core lengths of 20-40 mm with occasional fragments
Fractured	Core lengths of 30-100 mm with occasional shorter and longer sections
Slightly Fractured	Core lengths of 300 mm or longer with occasional sections of 100-300 mm
Unbroken	Core contains very few fractures

Rock Quality Designation

The quality of the cored rock can be measured using the Rock Quality Designation (RQD) index, defined as:

$$\text{RQD \%} = \frac{\text{cumulative length of 'sound' core sections} \geq \text{100 mm long}}{\text{total drilled length of section being assessed}}$$

where 'sound' rock is assessed to be rock of low strength or stronger. The RQD applies only to natural fractures. If the core is broken by drilling or handling (i.e. drilling breaks) then the broken pieces are fitted back together and are not included in the calculation of RQD.

Stratification Spacing

For sedimentary rocks the following terms may be used to describe the spacing of bedding partings:

Term	Separation of Stratification Planes
Thinly laminated	< 6 mm
Laminated	6 mm to 20 mm
Very thinly bedded	20 mm to 60 mm
Thinly bedded	60 mm to 0.2 m
Medium bedded	0.2 m to 0.6 m
Thickly bedded	0.6 m to 2 m
Very thickly bedded	> 2 m

Symbols & Abbreviations

Douglas Partners

Introduction

These notes summarise abbreviations commonly used on borehole logs and test pit reports.

Drilling or Excavation Methods

C	Core drilling
R	Rotary drilling
SFA	Spiral flight augers
NMLC	Diamond core - 52 mm dia
NQ	Diamond core - 47 mm dia
HQ	Diamond core - 63 mm dia
PQ	Diamond core - 81 mm dia

Water

▷	Water seep
▽	Water level

Sampling and Testing

A	Auger sample
B	Bulk sample
D	Disturbed sample
E	Environmental sample
U_{50}	Undisturbed tube sample (50mm)
W	Water sample
pp	Pocket penetrometer (kPa)
PID	Photo ionisation detector
PL	Point load strength Is(50) MPa
S	Standard Penetration Test
V	Shear vane (kPa)

Description of Defects in Rock

The abbreviated descriptions of the defects should be in the following order: Depth, Type, Orientation, Coating, Shape, Roughness and Other. Drilling and handling breaks are not usually included on the logs.

Defect Type

B	Bedding plane
Cs	Clay seam
Cv	Cleavage
Cz	Crushed zone
Ds	Decomposed seam
F	Fault
J	Joint
Lam	Lamination
Pt	Parting
Sz	Sheared Zone
V	Vein

Orientation

The inclination of defects is always measured from the perpendicular to the core axis.

h	horizontal
v	vertical
sh	sub-horizontal
sv	sub-vertical

Coating or Infilling Term

cln	clean
co	coating
he	healed
inf	infilled
stn	stained
ti	tight
vn	veneer

Coating Descriptor

ca	calcite
cbs	carbonaceous
cly	clay
fe	iron oxide
mn	manganese
slt	silty

Shape

cu	curved
ir	irregular
pl	planar
st	stepped
un	undulating

Roughness

po	polished
ro	rough
sl	slickensided
sm	smooth
vr	very rough

Other

fg	fragmented
bnd	band
qtz	quartz

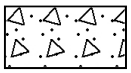
Symbols & Abbreviations

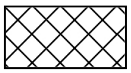
Graphic Symbols for Soil and Rock

General

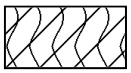

Asphalt

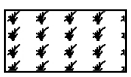

Road base

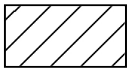

Concrete

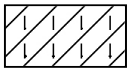

Filling

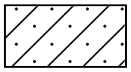
Soils


Topsoil

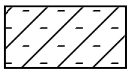

Peat

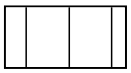

Clay

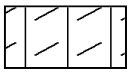

Silty clay

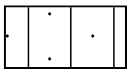

Sandy clay

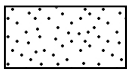

Gravelly clay

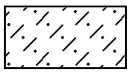

Shaly clay

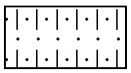

Silt


Clayey silt


Sandy silt

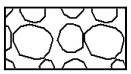

Sand

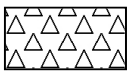

Clayey sand


Silty sand


Gravel

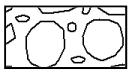

Sandy gravel


Cobbles, boulders

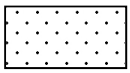

Talus

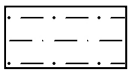
Sedimentary Rocks

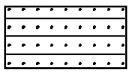

Boulder conglomerate

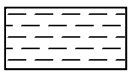

Conglomerate


Conglomeratic sandstone

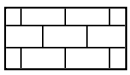

Sandstone


Siltstone

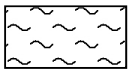

Laminite

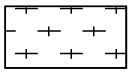

Mudstone, claystone, shale

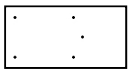

Coal


Limestone

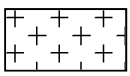
Metamorphic Rocks

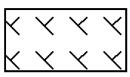

Slate, phyllite, schist

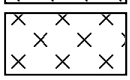

Gneiss

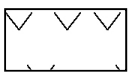

Quartzite

Igneous Rocks


Granite


Dolerite, basalt, andesite


Dacite, epidote


Tuff, breccia


Porphyry

Summary Tables (A1-A4)

Douglas Partners
Geotechnics / Environment / Groundwater

Table A1: Summary of Laboratory Analytical Results - Soils

			Metals								TRH					BTEX				PAH				Phenol	OCP	OPP	PCB	Asbestos	
			Arsenic	Cadmium	Total Chromium	Copper	Lead	Mercury (inorganic)	Nickel	Zinc	F1 ((C6-C10)-BTEX)	F2 (>C10-C16 less Naphthalene)	F3 (>C16-C34)	F4 (>C34-C40)	Total +ve TRH (>C10-C40)	Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene [b]	Benzo(a)pyrene (BaP)	Benzo(a)pyrene TEQ	Total PAHs	Phenol	All analysed OCPs	All analysed OPPs	All analysed PCBs	Asbestos ID in soil >0.1g/kg	Trace Analysis
Laboratory Reporting Limit (LRL)			4	0.4	1	1	1	0.1	1	1	25	50	100	100	50	0.2	0.5	1	1	0.1	0.05	0.5	0.05	5	-	-	-	-	-
HSL-A/B (Vapour Intrusion, Sand 0-1m)			-	-	-	-	-	-	-	-	45	110	-	-	-	0.5	160	55	40	3	-	-	-	-	-	-	-	-	-
HSL-A/B (Vapour Intrusion, Sand 0-1m)			-	-	-	-	-	-	-	-	260	-	-	-	-	3	-	-	230	-	-	-	-	-	-	-	-	-	-
HIL/HSL-B (with Direct Contact)			500	150	500	30 000	1200	120	1200	60 000	5600	4200	5800	8100	-	140	21 000	5900	12 000	2200	-	4	-	-	-	-	-	-	-
HIL/HSL-D (with Direct Contact)			3000	900	3600	240 000	1500	730	6000	400 000	26 000	20 000	27 000	38 000	-	430	99 000	27 000	81 000	11 000	-	40	-	-	-	-	-	AD	AD
EIL / ESL (A-B-C)			100	-	410	20	1100	-	5	75	180	120	300	2800	-	50	85	70	105	170	0.7	-	-	-	180[c]	-	-	-	-
Sample ID	Depth (m)	Sample Date	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	-	-
BH01	0.3-0.6	14/04/2023	<4	<0.4	**12**	**24**	**33**	<0.1	**37**	**70**	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	<1	**0.06**	<0.5	**0.06**	-	-	-	-	NAD	NAD
BH01	0.7-1	14/04/2023	**11**	<0.4	**16**	**7**	**21**	<0.1	**2**	**70**	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	<1	**0.06**	<0.5	**0.06**	<5	<LRL	<LRL	<LRL	NAD	NAD
BH02	0.3-0.5	14/04/2023	<4	<0.4	**11**	**23**	**150**	<0.1	**7**	**91**	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	<1	**0.2**	<0.5	**2.6**	-	-	-	-	NAD	NAD
BH0D1	0.3-0.5	14/04/2023	<4	<0.4	**11**	**27**	**160**	<0.1	**6**	**95**	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	<1	**0.2**	<0.5	**1.5**	-	-	-	-	NAD	NAD
BH02	0.6-0.8	14/04/2023	<4	<0.4	**7**	**13**	**22**	<0.1	**3**	**30**	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	<1	<0.05	<0.5	**0.3**	<5	<LRL	<LRL	<LRL	NAD	NAD

Highlighted cells indicate laboratory values above adopted SAC
Red cells indicates that asbestos has been detected by laboratory analysis, refer to the lab report
Bold = Lab detections - = Not tested or No HIL/HSL/EIL/ESL (as applicable) or Not applicable NL = Non limiting AD = Asbestos detected NAD = No Asbestos detected
HIL = Health investigation level HSL = Health screening level (excluding DC) EIL = Ecological investigation level ESL = Ecological screening level ML = Management Limit DC = Direct Contact HSL
Notes:

a QA/QC replicate of sample listed directly below the primary sample
b Reported naphthalene laboratory result obtained from BTEXN suite
c EIL criteria applies to DDT only
d HIL for pentachlorophenol used as a screening HIL for total phenols
Where unspecified, LRL is adopted as an initial screen

Site Assessment Criteria (SAC):
SAC based on generic land use thresholds for Residential B with garden/accessible soil
Where appropriate, HIL/HSL were adjusted for pH and CEC using NEPM toolbox
Refer to the SAC section of report for information of SAC sources and rationale. Summary information as follows:

HIL/HSL	HIL/HSL-B and D (NEPC, 2013)
HSL (vapour intrusion)	HSL-A/B (NEPC, 2013)
ESL	Urban Residential and Public Open Space (NEPC, 2013)

Douglas Partners
Geotechnics / Environment / Groundwater

Table A2: Summary of Laboratory Analytical Results - Groundwater

			Metals - Dissolved								TRH					BTEXN					VOC											All analysed PAH	All analysed OCP	All analysed OPP	All Analysed PCB	Total Phenolics (as Phenol)	PFAS		
			Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	vTPH C6 - C10 lessBTEX (F1)	TRH >C10 - C16less Naphthalene (F2)	TRH >C16-C34 (F3)	TRH >C34-C40 (F4)	Total +ve TRH (>C10-C40)	Benzene	Toluene	Ethylbenzene	Total +ve Xylenes	Naphthalene	Vinyl Chloride	1,1-Dichloroethene	Trans-1,2-dichloroethene	Cis-1,2-dichloroethene	Chloroform	Cyclohexane	Benzene	Trichloroethene	Tetrachloroethene	All other analysed VOCs						Perfluorohexanesulfonic acid - PFHxS	Perfluorooctanesulfonic acid PFOS	Perfluorooctanoic acid PFOA
Laboratory Reporting Limit (LRL)			4	0.4	1	1	1	0.1	1	1	10	50	100	100	50	1	1	1	3	1	10	1	1	1	1	1	1	1	1	LRL	-	-	-	-	0.05	0.01	0.01	0.01
ANZG (2018) Marinewater DGV 95% LOP			13[a]	5.5	4.4	1.3	4.4	0.1	7	8						500	180			50	100	700			370		500	330	70										
Groundwater HSL-A&B for Vapour Intrusion NEPC (2013)											1000	1000				800																						
Groundwater HSL-D for Vapour Intrusion NEPC (2013)											6000					5000																						
USEPA RSLs, MCL and Tapwater																							100	70		13000												
Interim Marinewater DGV 99 % LOP HEPA (2020)																																					19	0.00023
Interim Marinewater DGV 95 % LOP HEPA (2020)																																					220	0.13
Sample ID	Depth (m bgl)	Sample Date	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	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
BH1	6	21/04/2023	<1	<0.1	<1	<1	<1	<0.05	**1**	**11**	**160**	**150**	<100	<100	**150**	**25**	<1	<1	<3	**2**	**14**	<1	<1	**10**	**19**	**5**	**25**	<1	<1	<LRL	<LRL	<LRL	<LRL	<LRL	<0.1	<0.05	**0.01**	**0.07**	**0.01**
BD1/230421	-	21/04/2023	<1	<0.1	<1	<1	<1	<0.05	**1**	**8**	**140**	**120**	<100	<100	**120**	**24**	<1	<1	<3	**1**	-	-	-	-	-	-	-	-	-	-	<LRL	-	-	-	-	-	-	-
BH2	5	21/04/2023	<1	**0.1**	<1	**18**	**15**	<0.05	**7**	**76**	**1300**	<50	<100	<100	<50	<1	<1	<1	<3	<1	**13**	**1**	**2**	**470**	<1	<1	<1	**220**	**320**	<LRL	<LRL	<LRL	<LRL	<LRL	<0.1	<0.05	**0.03**	**0.02**	**0.04**

Notes:

a Freshwater DGV 95% LOP adopted in absence of Marinewater DGV

* QA/QC replicate of sample listed directly below the primary sample

PQL Practical quantitation limit

\- No criterion / not defined / not tested / not applicable

Shaded cell is exceedance of guideline value

Where one or more guideline value is exceeded, the cell is shaded to the colour of the highest guideline value exceeded

ANZG (2018) Australian and New Zealand Guidelines for Fresh and Marine Water Quality, 95% level of protection of species for Marine aquatic ecosystems [NB: 99% level of protection adopted for bioaccumulative chemicals]

NPEC (2013) Groundwater Health Screening Levels for Vapour Intrusion

HEPA (2018) PFAS National Environmental Management Plan, 99% level of protection for Marine water aquatic ecosystems

Douglas Partners
Geotechnics | Environment | Groundwater

Table A3: Summary of Laboratory Analytical Results – Soil Vapour

			QAQC		VOC																							TPH				
			Isopropyl Alcohol	Isopropyl Alcohol	Propylene	Vinyl chloride	Ethanol	Acetone	1,1-Dichloroethene (DCE)	trans-1,2-dichloroethene (Trans-DCE)	methyl ethyl ketone (MEK)	Hexane	cis-1,2-Dichloroethene (Cis-DCE)	Chloroform	Benzene	Cyclohexane	Heptane	Trichloroethene (TCE)	Toluene	Tetrachloroethene (PCE)	Ethylbenzene	m-& p-Xylene	o-Xylene	Styrene	4-ethyl toluene	1,3,5-Trimethylbenzene	1,2,4-Trimethylbenzene	All Other Analysed VOCs	TPH C5 - C8 Aliphatic^	TPH C9 - C12 Aliphatic^	TPH C9 - C10 Aromatic^	TPH C6 - C10 - BTEX (F1)^	TPH >C10 - C12 - Naphthalene (F2)^
Laboratory Reporting Limit (LRL)[a]			-	11.9	0.9	1.3	9	2.8	2.0	2.0	15	1.8	2.0	2.4	1.6	1.7	2.0	2.7	1.9	3.4	2.2	4.3	2.1	2.2	2.5	2.5	2.5	-	200	50	100	200	40
NEPC (2013) IHIL Residential A&B for Chlorinated VOC; Soil Vapour HSL for Vapour Intrusion, Sand 0-1 m						30							80		1000			20	1 300 000	2000	330 000	220 000									180 000	130 000
NEPC (2013) IHIL Comm/Ind D for Chlorinated VOC; Soil Vapour HSL for Vapour Intrusion, Sand 0-1 m						100							300		4000			80	4 800 000	8000	1 300 000	840 000									680 000	500 000
USEPA RSLs Residentail, Air THQ=1.0, TR 10-5					3130				209	41.7	5210	140		1.22		6260	417							1040			62.6						
USEPA RSLs Indoor worker, Air THQ=1.0, TR 10-5					13100				876	175	21900	613		5.33		26300	1750							4380			263						
Sample ID	Sample Date	Comments	µg/tube	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3
SV101	21/04/2023	Sub-slab soil vapour pin	-	**140**	**5**	<6.5	<45	<59.5	**20**	**200**	<75	<9	**3500**	**34**	<8	<8.5	<10	**4800**	<9.5	**37000**	<11	<21.5	<11	<10.5	<12.5	<12.5	<12.5	<LRL	**32000**	<250	<500	**30000**	<200
SV102	21/04/2023	Ground gas well	-	**1100**	**18**	**160**	<9	**80**	<2	<2	<15	**180**	**23**	**150**	**99**	**370**	**41**	**8**	**10**	**200**	**24**	**20**	**23**	**2**	**3**	**7**	**3**	<LRL	**6200**	<50	<100	**4300**	<40
SV103	21/04/2023	Ground gas well	-	**99000**	<90	**280**	<900	<1190	<200	<200	<1500	<180	**460**	<240	<160	<170	<200	**570**	<190	**1600**	<220	<430	<220	<210	<250	<250	<250	<LRL	**37000**	<5000	<10000	<20000	<4000
SV104	21/04/2023	Sub-slab soil vapour pin	-	**20**	**14**	<1.3	**50**	**340**	<2	<2	**25**	**20**	<2	**420**	**2**	<1.7	<2	<2.7	**8**	**20**	<2.2	<4.3	<2.2	<2.1	<2.5	<2.5	**3**	<LRL	**350**	<50	<100	<200	<40
BD1/230421*	21/04/2023	QAQC sample	-	**30**	**14**	<1.3	**50**	**340**	<2	<2	**20**	**6**	<2	**420**	<1.6	<1.7	<2	<2.7	**3**	**20**	<2.2	<4.3	<2.2	<2.1	<2.5	<2.5	<2.5	<LRL	-	-	-	-	-
SHROUD-1	21/04/2023	Carbon tube QAQC sample	1500	**17750000**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes:

*	QA/QC replicate of sample listed directly below the primary sample
~	Isopropyl alcohol used as QA analyte and hence detections have not been considered from a site suitability perspective
^	All total petroleum hydrocarbons (TPH) assessed against the NEPC (2013) criteria
LRL	Laboratory Reporting Limit
a	LRL may differ due to laboratory dilution during analysis and/or analytical suit tested
-	No criterion / not defined / not tested / not applicable
	Shaded cell is an exceedance of the guideline value
	Where one or more guideline value is exceeded, the cell is shaded to the colour of the highest guideline value exceeded
	NEPC (2013) Table 1A(2) Residential A&B Soil Vapour Interim Health Investigation Levels for Chlorinated Hydrocarbons
	NEPC (2013) Table 1A(5) Residential A&B soil vapour HSL for vapour intrusion, SAND 0-1 m
	USEPA Regional Screening Level (RSL) for Residential, Air THQ=1.0, TR 10-5
	NEPC (2013) Table 1A(2) commercial/industrial D Soil Vapour Interim Health Investigation Levels for Chlorinated Hydrocarbons
	NEPC (2013) Table 1A(5) coomercial/industrial D soil vapour HSL for vapour intrusion, SAND 0-1 m
	USEPA Regional Screening Level (RSL) for Residential, Air THQ=1.0, TR 10-5
	USEPA Regional Screening Level for commercial/industrial landuse, Air THQ=1.0, TR 10-5

USEPA RSL Inputs

Value	Variable
26	EDres (exposure duration) years
0.00001	TR (target risk) unitless
1	THQ (target hazard quotient) unitless
70	LT (lifetime) years
350	EFres (exposure frequency) days/year
2	ED0-2 (mutagenic exposure duration first phase) years
4	ED2-6 (mutagenic exposure duration second phase) years
10	ED6-16 (mutagenic exposure duration third phase) years
10	ED16-26 (mutagenic exposure duration fourth phase) years
350	EF0-2 (mutagenic exposure frequency first phase) days/year
350	EF2-6 (mutagenic exposure frequency second phase) days/year
350	EF6-16 (mutagenic exposure frequency third phase) days/year
350	EF16-26 (mutagenic exposure frequency fourth phase) days/year

USEPA RSL Inputs

Value	Variable
24	ETres (exposure time) hours/day
24	ET0-2 (mutagenic exposure time first phase) hours/day
24	ET2-6 (mutagenic exposure time second phase) hours/day
24	ET6-16 (mutagenic exposure time third phase) hours/day
24	ET16-26 (mutagenic exposure time fourth phase) hours/day

Douglas Partners
Geotechnics / Environment / Groundwater

Table A4 : Summary of Waste Classification Results

			Metals						TRH		BTEX				PAH		Phenol	OCP		OPP	PCB	Asbestos		
			Arsenic	Cadmium	Total Chromium	Lead	Mercury (inorganic)	Nickel	TRH C6 - C9	TRH C10-C36	Benzene	Toluene	Ethylbenzene	Total Xylenes	Benzo(a)pyrene (BaP)	Total PAHs	Phenol	Total Endosulfan	Total Analysed OCP	Total Analysed OPP	Total PCB	Asbestos ID in soil >0.1g/kg	Trace Analysis	Total Asbestos
		PQL	4	0.4	1	1	0.1	1	25	50	0.2	0.5	1	1	0.05	0.05	5	0.1	0.1	0.1	0.1			
Sample ID	Depth	Sample Date	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	-	-	-
BH01	0.3 - 0.6 m	14/04/23	<4	<0.4	**12**	**33**	<0.1	**37**	<25	<50	<0.2	<0.5	<1	<1	**0.06**	**0.06**	-	-	-	-	-	NAD	NAD	NAD
BH01	0.7 - 1 m	14/04/23	**11**	<0.4	**16**	**21**	<0.1	**2**	<25	<50	<0.2	<0.5	<1	<1	**0.06**	**0.06**	<5	<0.1	<0.1	<0.1	<0.1	NAD	NAD	NAD
BH02	0.3 - 0.5 m	14/04/23	<4	<0.4	**11**	**150**	<0.1	**7**	<25	<50	<0.2	<0.5	<1	<1	**0.2**	**2.6**	-	-	-	-	-	NAD	NAD	NAD
BH0D1*	0.3-0.5	14/04/23	<4	<0.4	**11**	**160**	<0.1	**6**	<25	<50	<0.2	<0.5	<1	<1	**0.2**	**1.5**	-	-	-	-	-	NAD	NAD	NAD
BH02	0.6 - 0.8 m	14/04/23	<4	<0.4	**7**	**22**	<0.1	**3**	<25	<50	<0.2	<0.5	<1	<1	<0.05	**0.3**	<5	<0.1	<0.1	<0.1	<0.1	NAD	NAD	NAD
Waste Classification Criteria [f]																								
CT1			100	20	100	100	4	40	-	10000	10	288	600	1000	0.8	200	288	60	<50	4	<50	-	-	-
SCC1			500	100	1900	1500	50	1050	-	10000	18	518	1080	1800	10	200	518	108	<50	7.5	<50	-	-	-
TCLP1			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CT2			400	80	400	400	16	160	-	40000	40	1152	2400	4000	3.2	800	1152	240	<50	16	<50	-	-	-
SCC2			2000	400	7600	6000	200	4200	-	40000	72	2073	4320	7200	23	800	2073	432	<50	30	<50	-	-	-
TCLP2			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

CT1 exceedance TCLP1 and/or SCC1 exceedance CT2 exceedance TCLP2 and/or SCC2 exceedance Asbestos detection

- = Not tested, No criteria or Not applicable AD = Asbestos detected NAD = No Asbestos detected

Notes:

a QA/QC replicate of sample listed directly below the primary sample

b Total chromium used as initial screen for chromium(VI).

c Total recoverable hydrocarbons (TRH) used as an initial screen for total petroleum hydrocarbons (TPH)

d Criteria for scheduled chemicals used as an initial screen

e Criteria for Chlorpyrifos used as initial screen

f All criteria are in the same units as the reported results

* Replicate sample collected at BH02/0.3-0.5

PQL Practical quantitation limit

CT1 NSW EPA, 2014, Waste Classification Guidelines Part 1; Classifying Waste, Maximum values of specific contaminant concentration (SCC) for classification without TCLP: General solid waste

SCC1 NSW EPA, 2014, Waste Classification Guidelines Part 1; Classifying Waste, Maximum values for leachable concentration (TCLP) and specific contaminant concentration (SCC) when used together: General solid waste

TCLP1 NSW EPA, 2014, Waste Classification Guidelines Part 1; Classifying Waste, Maximum values for leachable concentration (TCLP) and specific contaminant concentration (SCC) when used together: General solid waste

CT2 NSW EPA, 2014, Waste Classification Guidelines Part 1; Classifying Waste, Maximum values of specific contaminant concentration (SCC) for classification without TCLP: Restricted solid waste

SCC2 NSW EPA, 2014, Waste Classification Guidelines Part 1; Classifying Waste, Maximum values for leachable concentration (TCLP) and specific contaminant concentration (SCC) when used together: Restricted solid waste

TCLP2 NSW EPA, 2014, Waste Classification Guidelines Part 1; Classifying Waste, Maximum values for leachable concentration (TCLP) and specific contaminant concentration (SCC) when used together: Restricted solid waste

Laboratory Reports

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

CERTIFICATE OF ANALYSIS 321010

Client Details

Client	Douglas Partners Pty Ltd
Attention	Joel James-Hall
Address	96 Hermitage Rd, West Ryde, NSW, 2114

Sample Details

Your Reference	**221953.00 Northbridge**
Number of Samples	5 Soil
Date samples received	17/04/2023
Date completed instructions received	17/04/2023

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	24/04/2023
Date of Issue	24/04/2023

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 ***

Asbestos Approved By
Analysed by Asbestos Approved Analyst: Lucy Zhu
Authorised by Asbestos Approved Signatory: Lucy Zhu

Results Approved By
Diego Bigolin, Inorganics Supervisor
Dragana Tomas, Senior Chemist
Kyle Gavrily, Senior Chemist
Liam Timmins, Organics Supervisor
Loren Bardwell, Development Chemist
Lucy Zhu, Asbestos Supervisor

Authorised By

Nancy Zhang, Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		321010-1	321010-2	321010-3	321010-4	321010-5
Your Reference	UNITS	BH01	BH01	BH02	BH02	BH0D1
Depth		0.3-0.6	0.7-1	0.3-0.5	0.6-0.8	-
Date Sampled		14/04/2023	14/04/2023	14/04/2023	14/04/2023	14/04/2023
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	18/04/2023	18/04/2023	18/04/2023	18/04/2023	18/04/2023
Date analysed	-	19/04/2023	19/04/2023	19/04/2023	19/04/2023	19/04/2023
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
Naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	99	98	103	100	100

svTRH (C10-C40) in Soil						
Our Reference		321010-1	321010-2	321010-3	321010-4	321010-5
Your Reference	UNITS	BH01	BH01	BH02	BH02	BH0D1
Depth		0.3-0.6	0.7-1	0.3-0.5	0.6-0.8	-
Date Sampled		14/04/2023	14/04/2023	14/04/2023	14/04/2023	14/04/2023
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	18/04/2023	18/04/2023	18/04/2023	18/04/2023	18/04/2023
Date analysed	-	21/04/2023	21/04/2023	21/04/2023	21/04/2023	21/04/2023
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (C10-C36)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	71	87	79	81	82

PAHs in Soil						
Our Reference		321010-1	321010-2	321010-3	321010-4	321010-5
Your Reference	UNITS	BH01	BH01	BH02	BH02	BH0D1
Depth		0.3-0.6	0.7-1	0.3-0.5	0.6-0.8	-
Date Sampled		14/04/2023	14/04/2023	14/04/2023	14/04/2023	14/04/2023
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	18/04/2023	18/04/2023	18/04/2023	18/04/2023	18/04/2023
Date analysed	-	20/04/2023	20/04/2023	20/04/2023	21/04/2023	21/04/2023
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	0.3	<0.1	0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	0.5	0.1	0.3
Pyrene	mg/kg	<0.1	<0.1	0.4	0.1	0.3
Benzo(a)anthracene	mg/kg	<0.1	<0.1	0.2	<0.1	0.1
Chrysene	mg/kg	<0.1	<0.1	0.2	<0.1	0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	0.4	<0.2	0.3
Benzo(a)pyrene	mg/kg	0.06	0.06	0.2	<0.05	0.2
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	0.2	<0.1	0.1
Total +ve PAH's	mg/kg	0.06	0.06	2.6	0.3	1.5
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	104	104	98	116	112

Organochlorine Pesticides in soil			
Our Reference		321010-2	321010-4
Your Reference	UNITS	BH01	BH02
Depth		0.7-1	0.6-0.8
Date Sampled		14/04/2023	14/04/2023
Type of sample		Soil	Soil
Date extracted	-	18/04/2023	18/04/2023
Date analysed	-	20/04/2023	21/04/2023
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	<0.1
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
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1
Surrogate TCMX	%	109	100

Organophosphorus Pesticides in Soil			
Our Reference		321010-2	321010-4
Your Reference	UNITS	BH01	BH02
Depth		0.7-1	0.6-0.8
Date Sampled		14/04/2023	14/04/2023
Type of sample		Soil	Soil
Date extracted	-	18/04/2023	18/04/2023
Date analysed	-	20/04/2023	21/04/2023
Dichlorvos	mg/kg	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1
Chlorpyriphos-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
Parathion	mg/kg	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1
Surrogate TCMX	%	109	100

PCBs in Soil			
Our Reference		321010-2	321010-4
Your Reference	UNITS	BH01	BH02
Depth		0.7-1	0.6-0.8
Date Sampled		14/04/2023	14/04/2023
Type of sample		Soil	Soil
Date extracted	-	18/04/2023	18/04/2023
Date analysed	-	20/04/2023	21/04/2023
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	%	109	100

Acid Extractable metals in soil						
Our Reference		321010-1	321010-2	321010-3	321010-4	321010-5
Your Reference	UNITS	BH01	BH01	BH02	BH02	BH0D1
Depth		0.3-0.6	0.7-1	0.3-0.5	0.6-0.8	-
Date Sampled		14/04/2023	14/04/2023	14/04/2023	14/04/2023	14/04/2023
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	18/04/2023	18/04/2023	18/04/2023	18/04/2023	18/04/2023
Date analysed	-	19/04/2023	19/04/2023	19/04/2023	19/04/2023	19/04/2023
Arsenic	mg/kg	<4	11	<4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	12	16	11	7	11
Copper	mg/kg	24	7	23	13	27
Lead	mg/kg	33	21	150	22	160
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	37	2	7	3	6
Zinc	mg/kg	70	70	91	30	95

Misc Soil - Inorg			
Our Reference		321010-2	321010-4
Your Reference	UNITS	BH01	BH02
Depth		0.7-1	0.6-0.8
Date Sampled		14/04/2023	14/04/2023
Type of sample		Soil	Soil
Date prepared	-	18/04/2023	18/04/2023
Date analysed	-	18/04/2023	18/04/2023
Total Phenolics (as Phenol)	mg/kg	<5	<5

Moisture						
Our Reference		321010-1	321010-2	321010-3	321010-4	321010-5
Your Reference	UNITS	BH01	BH01	BH02	BH02	BH0D1
Depth		0.3-0.6	0.7-1	0.3-0.5	0.6-0.8	-
Date Sampled		14/04/2023	14/04/2023	14/04/2023	14/04/2023	14/04/2023
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	18/04/2023	18/04/2023	18/04/2023	18/04/2023	18/04/2023
Date analysed	-	19/04/2023	19/04/2023	19/04/2023	19/04/2023	19/04/2023
Moisture	%	6.9	11	9.7	11	9.8

Asbestos ID - soils						
Our Reference		321010-1	321010-2	321010-3	321010-4	321010-5
Your Reference	UNITS	BH01	BH01	BH02	BH02	BH0D1
Depth		0.3-0.6	0.7-1	0.3-0.5	0.6-0.8	-
Date Sampled		14/04/2023	14/04/2023	14/04/2023	14/04/2023	14/04/2023
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	18/04/2023	18/04/2023	18/04/2023	18/04/2023	18/04/2023
Sample mass tested	g	Approx. 60g	Approx. 90g	Approx. 65g	Approx. 55g	Approx. 70g
Sample Description	-	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Asbestos comments	-	NO	NO	NO	NO	NO
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected

Method ID	Methodology Summary
ASB-001	Asbestos ID - Qualitative identification of asbestos in bulk samples using Polarised Light Microscopy and Dispersion Staining Techniques including Synthetic Mineral Fibre and Organic Fibre as per Australian Standard 4964-2004.
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Inorg-031	Total Phenolics by segmented flow analyser (in line distillation with colourimetric finish). Solids are extracted in a caustic media prior to analysis.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
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	Determination of VOCs sampled onto coconut shell charcoal sorbent tubes, that can be desorbed using carbon disulphide, and analysed by GC-MS.
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.

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	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.

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-13	[NT]
Date extracted	-			18/04/2023	[NT]	[NT]	[NT]	[NT]	18/04/2023	[NT]
Date analysed	-			19/04/2023	[NT]	[NT]	[NT]	[NT]	19/04/2023	[NT]
TRH C_6 - C_9	mg/kg	25	Org-023	<25	[NT]	[NT]	[NT]	[NT]	117	[NT]
TRH C_6 - C_{10}	mg/kg	25	Org-023	<25	[NT]	[NT]	[NT]	[NT]	117	[NT]
Benzene	mg/kg	0.2	Org-023	<0.2	[NT]	[NT]	[NT]	[NT]	113	[NT]
Toluene	mg/kg	0.5	Org-023	<0.5	[NT]	[NT]	[NT]	[NT]	123	[NT]
Ethylbenzene	mg/kg	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	116	[NT]
m+p-xylene	mg/kg	2	Org-023	<2	[NT]	[NT]	[NT]	[NT]	117	[NT]
o-Xylene	mg/kg	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	129	[NT]
Naphthalene	mg/kg	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-023	105	[NT]	[NT]	[NT]	[NT]	105	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-13	[NT]
Date extracted	-			18/04/2023	[NT]	[NT]	[NT]	[NT]	18/04/2023	[NT]
Date analysed	-			20/04/2023	[NT]	[NT]	[NT]	[NT]	20/04/2023	[NT]
TRH C_{10} - C_{14}	mg/kg	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	118	[NT]
TRH C_{15} - C_{28}	mg/kg	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	92	[NT]
TRH C_{29} - C_{36}	mg/kg	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	86	[NT]
TRH >C_{10} -C_{16}	mg/kg	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	118	[NT]
TRH >C_{16} -C_{34}	mg/kg	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	92	[NT]
TRH >C_{34} -C_{40}	mg/kg	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	86	[NT]
Surrogate o-Terphenyl	%		Org-020	86	[NT]	[NT]	[NT]	[NT]	83	[NT]

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-13	[NT]
Date extracted	-			18/04/2023	[NT]	[NT]	[NT]	[NT]	18/04/2023	[NT]
Date analysed	-			21/04/2023	[NT]	[NT]	[NT]	[NT]	21/04/2023	[NT]
Naphthalene	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	120	[NT]
Acenaphthylene	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	113	[NT]
Fluorene	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	109	[NT]
Phenanthrene	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	94	[NT]
Anthracene	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	129	[NT]
Pyrene	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	131	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	123	[NT]
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	118	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-022/025	111	[NT]	[NT]	[NT]	[NT]	106	[NT]

QUALITY CONTROL: Organochlorine Pesticides in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-13	[NT]
Date extracted	-			18/04/2023	[NT]	[NT]	[NT]	[NT]	18/04/2023	[NT]
Date analysed	-			21/04/2023	[NT]	[NT]	[NT]	[NT]	21/04/2023	[NT]
alpha-BHC	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	124	[NT]
HCB	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	118	[NT]
gamma-BHC	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Heptachlor	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	123	[NT]
delta-BHC	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	138	[NT]
Heptachlor Epoxide	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	126	[NT]
gamma-Chlordane	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	123	[NT]
Dieldrin	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	123	[NT]
Endrin	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	127	[NT]
Endosulfan II	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDD	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	121	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	137	[NT]
Methoxychlor	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	103	[NT]	[NT]	[NT]	[NT]	107	[NT]

QUALITY CONTROL: Organophosphorus Pesticides in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-13	[NT]
Date extracted	-			18/04/2023	[NT]	[NT]	[NT]	[NT]	18/04/2023	[NT]
Date analysed	-			21/04/2023	[NT]	[NT]	[NT]	[NT]	21/04/2023	[NT]
Dichlorvos	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	133	[NT]
Dimethoate	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chlorpyriphos-methyl	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Ronnel	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	136	[NT]
Fenitrothion	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	116	[NT]
Malathion	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	130	[NT]
Chlorpyriphos	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	132	[NT]
Parathion	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	134	[NT]
Bromophos-ethyl	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Ethion	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	119	[NT]
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	103	[NT]	[NT]	[NT]	[NT]	107	[NT]

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-13	[NT]
Date extracted	-			18/04/2023	[NT]	[NT]	[NT]	[NT]	18/04/2023	[NT]
Date analysed	-			21/04/2023	[NT]	[NT]	[NT]	[NT]	21/04/2023	[NT]
Aroclor 1016	mg/kg	0.1	Org-021	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-021	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-021	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-021	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-021	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-021	<0.1	[NT]	[NT]	[NT]	[NT]	105	[NT]
Aroclor 1260	mg/kg	0.1	Org-021	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate TCMX	%		Org-021	103	[NT]	[NT]	[NT]	[NT]	107	[NT]

QUALITY CONTROL: Acid Extractable metals in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-13	[NT]
Date prepared	-			18/04/2023	[NT]	[NT]	[NT]	[NT]	18/04/2023	[NT]
Date analysed	-			19/04/2023	[NT]	[NT]	[NT]	[NT]	19/04/2023	[NT]
Arsenic	mg/kg	4	Metals-020	<4	[NT]	[NT]	[NT]	[NT]	102	[NT]
Cadmium	mg/kg	0.4	Metals-020	<0.4	[NT]	[NT]	[NT]	[NT]	103	[NT]
Chromium	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	88	[NT]
Copper	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	84	[NT]
Lead	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	93	[NT]
Mercury	mg/kg	0.1	Metals-021	<0.1	[NT]	[NT]	[NT]	[NT]	100	[NT]
Nickel	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	105	[NT]
Zinc	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	91	[NT]

QUALITY CONTROL: Misc Soil - Inorg					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			18/04/2023	[NT]	[NT]	[NT]	[NT]	18/04/2023	[NT]
Date analysed	-			18/04/2023	[NT]	[NT]	[NT]	[NT]	18/04/2023	[NT]
Total Phenolics (as Phenol)	mg/kg	5	Inorg-031	<5	[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.

Report Comments

Asbestos: A portion of the supplied sample was sub-sampled for asbestos according to ASB-001 asbestos subsampling procedure. We cannot guarantee that this sub-sample is indicative of the entire sample. Envirolab/MPL recommends supplying 40-60g or 500ml of sample in its own container.
Note: Samples 321010-1-5 were sub-sampled from bags provided by the client.

Douglas Partners
Geotechnics / Environment / Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

Project No:	221953.00	**Suburb:**	Northbridge	**To:**	Envirolab Services
Project Manager:	Joel James Hall	**Order Number:**		**Sampler:**	setareh
					12 Ashley St, Chatswood NSW 2067
Email:	setareh.pourkazemi@douglaspartners.com.au /joel.james-hall@douglaspartners.com.au			**Attn:**	Sample Receipt
Turnaround time:	☑ Standard ☐ 72 hour ☐ 48 hour ☐ 24 hour ☐ Same day				(02)99106200 samplereceipt@envirolab.com.a
Prior Storage:	☑ Fridge ☐ Freezer ☐ Esky ☐ Shelf	**Do samples contain 'potential' HBM?**	☐ No ☐ Yes	(If YES, then handle, transport and store in accordance with FPM HAZID)	

Lab ID	Sample ID: Location / Other ID	Depth From	Depth To	Date Sampled	Sample Type: S - soil W - water M - Material	Container Type: G - glass P - plastic	Analytes: Combo 8a	Combo 3a	Combo 3								Notes/ Preservation/ Additional Requirements
1	BH01	0.3	0.6	14.04.23	S	G/P		x									
2	BH01	0.7	1	14.04.23	S	G/P	x										
3	BH02	0.3	0.5	14.04.23	S	G/P		x									
4	BH02	0.6	0.8	14.04.23	S	G/P	x										
5	BH0D1			14.04.23	S	G/P		x	x								

ENVIROLAB GROUP
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200

Job No: 321010

Date Received: 17/04/23
Time Received: 1520
Received By: AH
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

Metals to analyse:		**LAB RECEIPT**	
Number of samples in container:	**Transported to laboratory by:**	**Lab Ref. No:**	
Send results to:	Douglas Partners Pty Ltd	**Received by:**	Christine
Address:	**Phone:**	**Date & Time:**	17/04/23 1520
Relinquished by:	**Date:** **Signed:**	**Signed:**	

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

CERTIFICATE OF ANALYSIS 321586

Client Details

Client	Douglas Partners Pty Ltd
Attention	Zihan Wang
Address	96 Hermitage Rd, West Ryde, NSW, 2114

Sample Details

Your Reference	**221953.00 Northbridge**
Number of Samples	3 Water
Date samples received	24/04/2023
Date completed instructions received	24/04/2023

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

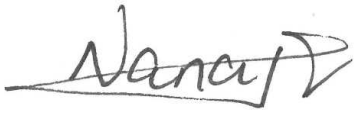
Date results requested by	27/04/2023
Date of Issue	27/04/2023

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
Diego Bigolin, Inorganics Supervisor
Hannah Nguyen, Metals Supervisor
Kyle Gavrily, Senior Chemist

Authorised By



Nancy Zhang, Laboratory Manager

VOCs in water			
Our Reference		321586-1	321586-2
Your Reference	UNITS	BH1	BH2
Depth		6	5
Date Sampled		21/04/2023	21/04/2023
Type of sample		Water	Water
Date extracted	-	24/04/2023	24/04/2023
Date analysed	-	25/04/2023	25/04/2023
Dichlorodifluoromethane	µg/L	<10	<10
Chloromethane	µg/L	<10	<10
Vinyl Chloride	µg/L	14	13
Bromomethane	µg/L	<10	<10
Chloroethane	µg/L	<10	<10
Trichlorofluoromethane	µg/L	<10	<10
1,1-Dichloroethene	µg/L	<1	1
Trans-1,2-dichloroethene	µg/L	<1	2
1,1-dichloroethane	µg/L	<1	<1
Cis-1,2-dichloroethene	µg/L	10	470
Bromochloromethane	µg/L	<1	<1
Chloroform	µg/L	19	<1
2,2-dichloropropane	µg/L	<1	<1
1,2-dichloroethane	µg/L	<1	<1
1,1,1-trichloroethane	µg/L	<1	<1
1,1-dichloropropene	µg/L	<1	<1
Cyclohexane	µg/L	5	<1
Carbon tetrachloride	µg/L	<1	<1
Benzene	µg/L	25	<1
Dibromomethane	µg/L	<1	<1
1,2-dichloropropane	µg/L	<1	<1
Trichloroethene	µg/L	<1	220
Bromodichloromethane	µg/L	<1	<1
trans-1,3-dichloropropene	µg/L	<1	<1
cis-1,3-dichloropropene	µg/L	<1	<1
1,1,2-trichloroethane	µg/L	<1	<1
Toluene	µg/L	<1	<1
1,3-dichloropropane	µg/L	<1	<1
Dibromochloromethane	µg/L	<1	<1
1,2-dibromoethane	µg/L	<1	<1
Tetrachloroethene	µg/L	<1	320
1,1,1,2-tetrachloroethane	µg/L	<1	<1
Chlorobenzene	µg/L	<1	<1

VOCs in water			
Our Reference		321586-1	321586-2
Your Reference	UNITS	BH1	BH2
Depth		6	5
Date Sampled		21/04/2023	21/04/2023
Type of sample		Water	Water
Ethylbenzene	µg/L	<1	<1
Bromoform	µg/L	<1	<1
m+p-xylene	µg/L	<2	<2
Styrene	µg/L	<1	<1
1,1,2,2-tetrachloroethane	µg/L	<1	<1
o-xylene	µg/L	<1	<1
1,2,3-trichloropropane	µg/L	<1	<1
Isopropylbenzene	µg/L	<1	<1
Bromobenzene	µg/L	<1	<1
n-propyl benzene	µg/L	<1	<1
2-chlorotoluene	µg/L	<1	<1
4-chlorotoluene	µg/L	<1	<1
1,3,5-trimethyl benzene	µg/L	<1	<1
Tert-butyl benzene	µg/L	<1	<1
1,2,4-trimethyl benzene	µg/L	<1	<1
1,3-dichlorobenzene	µg/L	<1	<1
Sec-butyl benzene	µg/L	<1	<1
1,4-dichlorobenzene	µg/L	<1	<1
4-isopropyl toluene	µg/L	<1	<1
1,2-dichlorobenzene	µg/L	<1	<1
n-butyl benzene	µg/L	<1	<1
1,2-dibromo-3-chloropropane	µg/L	<1	<1
1,2,4-trichlorobenzene	µg/L	<1	<1
Hexachlorobutadiene	µg/L	<1	<1
1,2,3-trichlorobenzene	µg/L	<1	<1
Surrogate Dibromofluoromethane	%	105	100
Surrogate toluene-d8	%	102	100
Surrogate 4-BFB	%	102	103

vTRH(C6-C10)/BTEXN in Water				
Our Reference		321586-1	321586-2	321586-3
Your Reference	UNITS	BH1	BH2	BD1/230421
Depth		6	5	-
Date Sampled		21/04/2023	21/04/2023	21/04/2023
Type of sample		Water	Water	Water
Date extracted	-	24/04/2023	24/04/2023	24/04/2023
Date analysed	-	25/04/2023	25/04/2023	25/04/2023
TRH C_6 - C_9	µg/L	160	1,300	140
TRH C_6 - C_{10}	µg/L	180	1,300	160
TRH C_6 - C_{10} less BTEX (F1)	µg/L	160	1,300	140
Benzene	µg/L	25	<1	24
Toluene	µg/L	<1	<1	<1
Ethylbenzene	µg/L	<1	<1	<1
m+p-xylene	µg/L	<2	<2	<2
o-xylene	µg/L	<1	<1	<1
Naphthalene	µg/L	2	<1	1
Surrogate Dibromofluoromethane	%	105	100	104
Surrogate toluene-d8	%	102	100	102
Surrogate 4-BFB	%	102	103	101

svTRH (C10-C40) in Water				
Our Reference		321586-1	321586-2	321586-3
Your Reference	UNITS	BH1	BH2	BD1/230421
Depth		6	5	-
Date Sampled		21/04/2023	21/04/2023	21/04/2023
Type of sample		Water	Water	Water
Date extracted	-	26/04/2023	26/04/2023	26/04/2023
Date analysed	-	27/04/2023	27/04/2023	27/04/2023
TRH C_{10} - C_{14}	µg/L	160	<50	130
TRH C_{15} - C_{28}	µg/L	<100	<100	<100
TRH C_{29} - C_{36}	µg/L	<100	<100	<100
Total +ve TRH (C10-C36)	µg/L	160	<50	130
TRH >C_{10} - C_{16}	µg/L	150	<50	120
TRH >C_{10} - C_{16} less Naphthalene (F2)	µg/L	150	<50	120
TRH >C_{16} - C_{34}	µg/L	<100	<100	<100
TRH >C_{34} - C_{40}	µg/L	<100	<100	<100
Total +ve TRH (>C10-C40)	µg/L	150	<50	120
Surrogate o-Terphenyl	%	87	89	78

PAHs in Water				
Our Reference		321586-1	321586-2	321586-3
Your Reference	UNITS	BH1	BH2	BD1/230421
Depth		6	5	-
Date Sampled		21/04/2023	21/04/2023	21/04/2023
Type of sample		Water	Water	Water
Date extracted	-	26/04/2023	26/04/2023	26/04/2023
Date analysed	-	26/04/2023	26/04/2023	26/04/2023
Naphthalene	µg/L	<0.2	<0.2	<0.2
Acenaphthylene	µg/L	<0.1	<0.1	<0.1
Acenaphthene	µg/L	<0.1	<0.1	<0.1
Fluorene	µg/L	<0.1	<0.1	<0.1
Phenanthrene	µg/L	<0.1	<0.1	<0.1
Anthracene	µg/L	<0.1	<0.1	<0.1
Fluoranthene	µg/L	<0.1	<0.1	<0.1
Pyrene	µg/L	<0.1	<0.1	<0.1
Benzo(a)anthracene	µg/L	<0.1	<0.1	<0.1
Chrysene	µg/L	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	µg/L	<0.2	<0.2	<0.2
Benzo(a)pyrene	µg/L	<0.1	<0.1	<0.1
Indeno(1,2,3-c,d)pyrene	µg/L	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	µg/L	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	µg/L	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQ	µg/L	<0.5	<0.5	<0.5
Total +ve PAH's	µg/L	<0.1	<0.1	<0.1
Surrogate p-Terphenyl-d14	%	108	104	104

Organochlorine Pesticides in Water			
Our Reference		321586-1	321586-2
Your Reference	UNITS	BH1	BH2
Depth		6	5
Date Sampled		21/04/2023	21/04/2023
Type of sample		Water	Water
Date extracted	-	26/04/2023	26/04/2023
Date analysed	-	26/04/2023	26/04/2023
alpha-BHC	µg/L	<0.2	<0.2
HCB	µg/L	<0.2	<0.2
beta-BHC	µg/L	<0.2	<0.2
gamma-BHC	µg/L	<0.2	<0.2
Heptachlor	µg/L	<0.2	<0.2
delta-BHC	µg/L	<0.2	<0.2
Aldrin	µg/L	<0.2	<0.2
Heptachlor Epoxide	µg/L	<0.2	<0.2
gamma-Chlordane	µg/L	<0.2	<0.2
alpha-Chlordane	µg/L	<0.2	<0.2
Endosulfan I	µg/L	<0.2	<0.2
pp-DDE	µg/L	<0.2	<0.2
Dieldrin	µg/L	<0.2	<0.2
Endrin	µg/L	<0.2	<0.2
Endosulfan II	µg/L	<0.2	<0.2
pp-DDD	µg/L	<0.2	<0.2
Endrin Aldehyde	µg/L	<0.2	<0.2
pp-DDT	µg/L	<0.2	<0.2
Endosulfan Sulphate	µg/L	<0.2	<0.2
Methoxychlor	µg/L	<0.2	<0.2
Surrogate TCMX	%	101	99

OP Pesticides in Water			
Our Reference		321586-1	321586-2
Your Reference	UNITS	BH1	BH2
Depth		6	5
Date Sampled		21/04/2023	21/04/2023
Type of sample		Water	Water
Date extracted	-	26/04/2023	26/04/2023
Date analysed	-	26/04/2023	26/04/2023
Dichlorvos	µg/L	<0.2	<0.2
Dimethoate	µg/L	<0.2	<0.2
Diazinon	µg/L	<0.2	<0.2
Chlorpyriphos-methyl	µg/L	<0.2	<0.2
Ronnel	µg/L	<0.2	<0.2
Fenitrothion	µg/L	<0.2	<0.2
Malathion	µg/L	<0.2	<0.2
Chlorpyriphos	µg/L	<0.2	<0.2
Parathion	µg/L	<0.2	<0.2
Bromophos ethyl	µg/L	<0.2	<0.2
Ethion	µg/L	<0.2	<0.2
Azinphos-methyl (Guthion)	µg/L	<0.2	<0.2
Surrogate TCMX	%	101	99

PCBs in Water			
Our Reference		321586-1	321586-2
Your Reference	UNITS	BH1	BH2
Depth		6	5
Date Sampled		21/04/2023	21/04/2023
Type of sample		Water	Water
Date extracted	-	26/04/2023	26/04/2023
Date analysed	-	26/04/2023	26/04/2023
Aroclor 1016	µg/L	<2	<2
Aroclor 1221	µg/L	<2	<2
Aroclor 1232	µg/L	<2	<2
Aroclor 1242	µg/L	<2	<2
Aroclor 1248	µg/L	<2	<2
Aroclor 1254	µg/L	<2	<2
Aroclor 1260	µg/L	<2	<2
Surrogate TCMX	%	101	99

Total Phenolics in Water			
Our Reference		321586-1	321586-2
Your Reference	UNITS	BH1	BH2
Depth		6	5
Date Sampled		21/04/2023	21/04/2023
Type of sample		Water	Water
Date extracted	-	24/04/2023	24/04/2023
Date analysed	-	24/04/2023	24/04/2023
Total Phenolics (as Phenol)	mg/L	<0.05	<0.05

HM in water - dissolved				
Our Reference		321586-1	321586-2	321586-3
Your Reference	UNITS	BH1	BH2	BD1/230421
Depth		6	5	-
Date Sampled		21/04/2023	21/04/2023	21/04/2023
Type of sample		Water	Water	Water
Date prepared	-	26/04/2023	26/04/2023	26/04/2023
Date analysed	-	26/04/2023	26/04/2023	26/04/2023
Arsenic-Dissolved	µg/L	<1	<1	<1
Cadmium-Dissolved	µg/L	<0.1	0.1	<0.1
Chromium-Dissolved	µg/L	<1	<1	<1
Copper-Dissolved	µg/L	<1	18	<1
Lead-Dissolved	µg/L	<1	15	<1
Mercury-Dissolved	µg/L	<0.05	<0.05	<0.05
Nickel-Dissolved	µg/L	1	7	1
Zinc-Dissolved	µg/L	11	76	8

PFAS in Waters Short			
Our Reference		321586-1	321586-2
Your Reference	UNITS	BH1	BH2
Depth		6	5
Date Sampled		21/04/2023	21/04/2023
Type of sample		Water	Water
Date prepared	-	24/04/2023	24/04/2023
Date analysed	-	24/04/2023	24/04/2023
Perfluorohexanesulfonic acid - PFHxS	µg/L	0.01	0.03
Perfluorooctanesulfonic acid PFOS	µg/L	0.07	0.02
Perfluorooctanoic acid PFOA	µg/L	0.01	0.04
6:2 FTS	µg/L	<0.01	<0.01
8:2 FTS	µg/L	<0.02	<0.02
Surrogate $^{13}C_8$ *PFOS*	%	94	99
Surrogate $^{13}C_2$ *PFOA*	%	76	78
Extracted ISTD $^{18}O_2$ *PFHxS*	%	75	80
Extracted ISTD $^{13}C_4$ *PFOS*	%	117	118
Extracted ISTD $^{13}C_4$ *PFOA*	%	120	121
Extracted ISTD $^{13}C_2$ *6:2FTS*	%	128	114
Extracted ISTD $^{13}C_2$ *8:2FTS*	%	142	134
Total Positive PFHxS & PFOS	µg/L	0.08	0.06
Total Positive PFOA & PFOS	µg/L	0.08	0.06
Total Positive PFAS	µg/L	0.09	0.09

Method ID	Methodology Summary
Inorg-031	Total Phenolics by segmented flow analyser (in line distillation with colourimetric finish). Solids are extracted in a caustic media prior to analysis.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Metals-022	Determination of various metals by ICP-MS.
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-021	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
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. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013.
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. 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-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: VOCs in water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W5	[NT]
Date extracted	-			24/04/2023	[NT]	[NT]	[NT]	[NT]	24/04/2023	[NT]
Date analysed	-			25/04/2023	[NT]	[NT]	[NT]	[NT]	25/04/2023	[NT]
Dichlorodifluoromethane	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chloromethane	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Vinyl Chloride	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Bromomethane	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chloroethane	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Trichlorofluoromethane	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,1-Dichloroethene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Trans-1,2-dichloroethene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,1-dichloroethane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	82	[NT]
Cis-1,2-dichloroethene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Bromochloromethane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chloroform	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	84	[NT]
2,2-dichloropropane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2-dichloroethane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	83	[NT]
1,1,1-trichloroethane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	83	[NT]
1,1-dichloropropene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Cyclohexane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Carbon tetrachloride	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibromomethane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2-dichloropropane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Trichloroethene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	81	[NT]
Bromodichloromethane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	82	[NT]
trans-1,3-dichloropropene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
cis-1,3-dichloropropene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,1,2-trichloroethane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Toluene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,3-dichloropropane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibromochloromethane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	80	[NT]
1,2-dibromoethane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Tetrachloroethene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	83	[NT]
1,1,1,2-tetrachloroethane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chlorobenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Ethylbenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Bromoform	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
m+p-xylene	µg/L	2	Org-023	<2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Styrene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,1,2,2-tetrachloroethane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]

QUALITY CONTROL: VOCs in water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W5	[NT]
o-xylene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2,3-trichloropropane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Isopropylbenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Bromobenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
n-propyl benzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
2-chlorotoluene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
4-chlorotoluene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,3,5-trimethyl benzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Tert-butyl benzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2,4-trimethyl benzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,3-dichlorobenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Sec-butyl benzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,4-dichlorobenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
4-isopropyl toluene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2-dichlorobenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
n-butyl benzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2-dibromo-3-chloropropane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2,4-trichlorobenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Hexachlorobutadiene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2,3-trichlorobenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-023	104	[NT]	[NT]	[NT]	[NT]	101	[NT]
Surrogate toluene-d8	%		Org-023	101	[NT]	[NT]	[NT]	[NT]	101	[NT]
Surrogate 4-BFB	%		Org-023	101	[NT]	[NT]	[NT]	[NT]	99	[NT]

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W5	[NT]
Date extracted	-			24/04/2023	[NT]	[NT]	[NT]	[NT]	24/04/2023	[NT]
Date analysed	-			25/04/2023	[NT]	[NT]	[NT]	[NT]	25/04/2023	[NT]
TRH C_6 - C_9	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	83	[NT]
TRH C_6 - C_{10}	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	83	[NT]
Benzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	83	[NT]
Toluene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	83	[NT]
Ethylbenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	83	[NT]
m+p-xylene	µg/L	2	Org-023	<2	[NT]	[NT]	[NT]	[NT]	83	[NT]
o-xylene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	85	[NT]
Naphthalene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-023	104	[NT]	[NT]	[NT]	[NT]	101	[NT]
Surrogate toluene-d8	%		Org-023	101	[NT]	[NT]	[NT]	[NT]	101	[NT]
Surrogate 4-BFB	%		Org-023	101	[NT]	[NT]	[NT]	[NT]	99	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W3	[NT]
Date extracted	-			26/04/2023	1	26/04/2023	26/04/2023		26/04/2023	[NT]
Date analysed	-			27/04/2023	1	27/04/2023	27/04/2023		27/04/2023	[NT]
TRH C_{10} - C_{14}	µg/L	50	Org-020	<50	1	160	150	6	111	[NT]
TRH C_{15} - C_{28}	µg/L	100	Org-020	<100	1	<100	<100	0	120	[NT]
TRH C_{29} - C_{36}	µg/L	100	Org-020	<100	1	<100	<100	0	114	[NT]
TRH >C_{10} - C_{16}	µg/L	50	Org-020	<50	1	150	150	0	111	[NT]
TRH >C_{16} - C_{34}	µg/L	100	Org-020	<100	1	<100	<100	0	120	[NT]
TRH >C_{34} - C_{40}	µg/L	100	Org-020	<100	1	<100	<100	0	114	[NT]
Surrogate o-Terphenyl	%		Org-020	90	1	87	85	2	77	[NT]

QUALITY CONTROL: PAHs in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	321586-2
Date extracted	-			26/04/2023	1	26/04/2023	26/04/2023		26/04/2023	26/04/2023
Date analysed	-			26/04/2023	1	26/04/2023	26/04/2023		26/04/2023	26/04/2023
Naphthalene	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	74	77
Acenaphthylene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	82	85
Fluorene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	99	96
Phenanthrene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	88	93
Anthracene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	86	90
Pyrene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	94	101
Benzo(a)anthracene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Chrysene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	72	68
Benzo(b,j+k)fluoranthene	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	98	94
Indeno(1,2,3-c,d)pyrene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-022/025	100	1	108	106	2	93	100

QUALITY CONTROL: Organochlorine Pesticides in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	321586-2
Date extracted	-			26/04/2023	1	26/04/2023	26/04/2023		26/04/2023	26/04/2023
Date analysed	-			26/04/2023	1	26/04/2023	26/04/2023		26/04/2023	26/04/2023
alpha-BHC	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	83	87
HCB	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
beta-BHC	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	82	84
gamma-BHC	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Heptachlor	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	92	94
delta-BHC	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Aldrin	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	84	89
Heptachlor Epoxide	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	84	85
gamma-Chlordane	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
alpha-Chlordane	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Endosulfan I	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
pp-DDE	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	89	97
Dieldrin	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	91	101
Endrin	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	87	107
Endosulfan II	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
pp-DDD	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	93	100
Endrin Aldehyde	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
pp-DDT	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Endosulfan Sulphate	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	86	92
Methoxychlor	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	89	1	101	100	1	90	97

QUALITY CONTROL: OP Pesticides in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	321586-2
Date extracted	-			26/04/2023	1	26/04/2023	26/04/2023		26/04/2023	26/04/2023
Date analysed	-			26/04/2023	1	26/04/2023	26/04/2023		26/04/2023	26/04/2023
Dichlorvos	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	95	99
Dimethoate	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Diazinon	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Chlorpyriphos-methyl	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Ronnel	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	74	74
Fenitrothion	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	89	92
Malathion	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	97	103
Chlorpyriphos	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	90	94
Parathion	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	89	91
Bromophos ethyl	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Ethion	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	96	104
Azinphos-methyl (Guthion)	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	89	1	101	100	1	90	97

QUALITY CONTROL: PCBs in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	321586-2
Date extracted	-			26/04/2023	1	26/04/2023	26/04/2023		26/04/2023	26/04/2023
Date analysed	-			26/04/2023	1	26/04/2023	26/04/2023		26/04/2023	26/04/2023
Aroclor 1016	µg/L	2	Org-021	<2	1	<2	<2	0	[NT]	[NT]
Aroclor 1221	µg/L	2	Org-021	<2	1	<2	<2	0	[NT]	[NT]
Aroclor 1232	µg/L	2	Org-021	<2	1	<2	<2	0	[NT]	[NT]
Aroclor 1242	µg/L	2	Org-021	<2	1	<2	<2	0	[NT]	[NT]
Aroclor 1248	µg/L	2	Org-021	<2	1	<2	<2	0	[NT]	[NT]
Aroclor 1254	µg/L	2	Org-021	<2	1	<2	<2	0	125	131
Aroclor 1260	µg/L	2	Org-021	<2	1	<2	<2	0	[NT]	[NT]
Surrogate TCMX	%		Org-021	89	1	101	100	1	90	97

QUALITY CONTROL: Total Phenolics in Water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			24/04/2023	[NT]	[NT]	[NT]	[NT]	24/04/2023	[NT]
Date analysed	-			24/04/2023	[NT]	[NT]	[NT]	[NT]	24/04/2023	[NT]
Total Phenolics (as Phenol)	mg/L	0.05	Inorg-031	<0.05	[NT]	[NT]	[NT]	[NT]	98	[NT]

QUALITY CONTROL: HM in water - dissolved						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W3	[NT]
Date prepared	-			26/04/2023	1	26/04/2023	26/04/2023		26/04/2023	[NT]
Date analysed	-			26/04/2023	1	26/04/2023	26/04/2023		26/04/2023	[NT]
Arsenic-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	87	[NT]
Cadmium-Dissolved	µg/L	0.1	Metals-022	<0.1	1	<0.1	<0.1	0	93	[NT]
Chromium-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	96	[NT]
Copper-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	95	[NT]
Lead-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	92	[NT]
Mercury-Dissolved	µg/L	0.05	Metals-021	<0.05	1	<0.05	[NT]		88	[NT]
Nickel-Dissolved	µg/L	1	Metals-022	<1	1	1	1	0	96	[NT]
Zinc-Dissolved	µg/L	1	Metals-022	<1	1	11	10	10	97	[NT]

QUALITY CONTROL: PFAS in Waters Short						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	321586-2
Date prepared	-			24/04/2023	1	24/04/2023	24/04/2023		24/04/2023	24/04/2023
Date analysed	-			24/04/2023	1	24/04/2023	24/04/2023		24/04/2023	24/04/2023
Perfluorohexanesulfonic acid - PFHxS	µg/L	0.01	Org-029	<0.01	1	0.01	0.01	0	125	130
Perfluorooctanesulfonic acid PFOS	µg/L	0.01	Org-029	<0.01	1	0.07	0.06	15	102	99
Perfluorooctanoic acid PFOA	µg/L	0.01	Org-029	<0.01	1	0.01	0.02	67	98	94
6:2 FTS	µg/L	0.01	Org-029	<0.01	1	<0.01	<0.01	0	107	115
8:2 FTS	µg/L	0.02	Org-029	<0.02	1	<0.02	<0.02	0	116	110
Surrogate $^{13}C_8$ *PFOS*	%		Org-029	100	1	94	96	2	99	101
Surrogate $^{13}C_2$ *PFOA*	%		Org-029	85	1	76	76	0	90	76
Extracted ISTD $^{18}O_2$ *PFHxS*	%		Org-029	86	1	75	78	4	80	76
Extracted ISTD $^{13}C_4$ *PFOS*	%		Org-029	114	1	117	117	0	111	113
Extracted ISTD $^{13}C_4$ *PFOA*	%		Org-029	112	1	120	122	2	107	113
Extracted ISTD $^{13}C_2$ *6:2FTS*	%		Org-029	104	1	128	122	5	105	99
Extracted ISTD $^{13}C_2$ *8:2FTS*	%		Org-029	134	1	142	142	0	120	133

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

Dissolved Metals: no filtered, preserved sample was received, therefore the unpreserved sample was filtered through 0.45µm filter at the lab.
Note: there is a possibility some elements may be underestimated.

Douglas Partners
Geotechnics | Environment | Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

Project No:	221953.00	**Suburb:**	Northbridge	**To:**	Envirolab Services
Project Manager:	JJH	**Order Number:**		**Sampler:** ZW	12 Ashley St, Chatswood NSW 2067
Email:	Joel James-Hall; Zihan Wang			**Attn:**	Sample Receipt
Turnaround time:	☐ Standard ☐ 72 hour ☑ 48 hour ☐ 24 hour ☐ Same day				(02) 9910 6200 samplereceipt@envirolab.com.au
Prior Storage:	☑ Fridge ☐ Freezer ☐ Esky ☐ Shelf	**Do samples contain 'potential' HBM?**	☑ No ☐ Yes		(If YES, then handle, transport and store in accordance with FPM HAZID)

Lab ID	Sample ID: Location / Other ID	Sample ID: Sampling Depth	Date Sampled	Sample Type: S - soil W - water M - Material	Container Type: G - glass P - plastic	Analytes: Combo 8	PFAS (short)	VOC	Combo3								Notes/ Preservation/ Additional Requirements
1	BH1	6	21/04/23	W	G/P	×	×	×									PFAS PQL to 0.01 ug/L
2	BH2	5	21/04/23	W	G/P	×	×	×									
3	BD1/230421	-	21/04/23	W	G/P				×								

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

Job No: 321586
Date Received: 24/04/23
Time Received: 1130
Received By: SP
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

Metals to analyse:	8 Priority		
Number of samples in container:		**Transported to laboratory by:**	Courrier
Send results to:	Douglas Partners Pty Ltd		
Address:	DP West Ryde Office	**Phone:**	
Relinquished by:	ZW; 8:00 am	**Date:** 24/04/2023	**Signed:** ZW

LAB RECEIPT

Lab Ref. No:	
Received by:	ELS STD
Date & Time:	24/04/23, 1130
Signed:	

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

CERTIFICATE OF ANALYSIS 321610

Client Details

Client	Douglas Partners Pty Ltd
Attention	Joel Hall
Address	96 Hermitage Rd, West Ryde, NSW, 2114

Sample Details

Your Reference	**221953.00 Northbridge**
Number of Samples	6 Air
Date samples received	24/04/2023
Date completed instructions received	24/04/2023

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

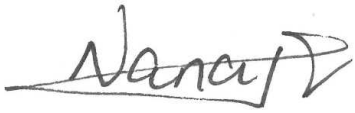
Date results requested by	27/04/2023
Date of Issue	27/04/2023

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
Amanda Chui, Air Toxics Team Leader
Kyle Gavrily, Senior Chemist

Authorised By



Nancy Zhang, Laboratory Manager

TO15 in Canisters/Bags						
Our Reference		321610-1	321610-2	321610-3	321610-4	321610-5
Your Reference	UNITS	SV101	SV102	SV103	SV104	BD1/230421
Date Sampled		21/04/2023	21/04/2023	21/04/2023	21/04/2023	21/04/2023
Type of sample		Air	Air	Air	Air	Air
Air Kit Security No.		2555	2263	3274	3273	3517
Vacuum before Shipment	Hg"	-30	-30	-30	-30	-30
Vacuum before Analysis	Hg"	-5	-8	-6	-6	-7
Date prepared	-	26/04/2023	26/04/2023	26/04/2023	26/04/2023	26/04/2023
Date analysed	-	26/04/2023	26/04/2023	26/04/2023	26/04/2023	26/04/2023
Propylene	ppbv	3	10	<50	8.4	8.2
Dichlorodifluoromethane	ppbv	<3	<0.5	<50	<0.5	<0.5
Chloromethane	ppbv	<3	<0.5	<50	<0.5	<0.5
1,2-Dichlorotetrafluoroethane	ppbv	<3	<0.5	<50	<0.5	<0.5
Vinyl chloride	ppbv	<3	64	110	<0.5	<0.5
1,3-Butadiene	ppbv	<3	<0.5	<50	<0.5	<0.5
Bromomethane	ppbv	<3	<0.5	<50	<0.5	<0.5
Chloroethane	ppbv	<3	<0.5	<50	<0.5	<0.5
Ethanol	ppbv	<30	<5	<500	20	30
Acrolein	ppbv	<30	<5	<500	<5	<5
Trichlorofluoromethane (Freon 11)	ppbv	<3	<0.5	<50	<0.5	<0.5
Acetone	ppbv	<30	30	<500	140	140
Isopropyl Alcohol	ppbv	56	460	40,000	9	10
1,1-Dichloroethene	ppbv	4	<0.5	<50	<0.5	<0.5
1,1,2-Trichlorotrifluoroethane	ppbv	<3	<0.5	<50	<0.5	<0.5
Methylene chloride (Dichloromethane)	ppbv	<30	<5	<500	<5	<5
Carbon Disulfide	ppbv	<30	<5	<500	<5	<5
trans-1,2-dichloroethene	ppbv	51	<0.5	<50	<0.5	<0.5
MTBE	ppbv	<3	<0.5	<50	<0.5	<0.5
1,1- Dichloroethane	ppbv	<3	<0.5	<50	<0.5	<0.5
Vinyl Acetate	ppbv	<3	<0.5	<50	<0.5	<0.5
MEK	ppbv	<30	<5	<500	8	7
Hexane	ppbv	<3	50	<50	5	2
cis-1,2-Dichloroethene	ppbv	890	5.9	120	<0.5	<0.5
Ethyl Acetate	ppbv	<3	<0.5	<50	<0.5	<0.5
Chloroform	ppbv	7.0	30	<50	86	87
Tetrahydrofuran	ppbv	<3	<0.5	<50	<0.5	<0.5
1,1,1-Trichloroethane	ppbv	<3	<0.5	<50	<0.5	<0.5
1,2-Dichloroethane	ppbv	<3	<0.5	<50	<0.5	<0.5
Benzene	ppbv	<3	31	<50	0.6	<0.5
Carbon tetrachloride	ppbv	<3	<0.5	<50	<0.5	<0.5

TO15 in Canisters/Bags						
Our Reference		321610-1	321610-2	321610-3	321610-4	321610-5
Your Reference	UNITS	SV101	SV102	SV103	SV104	BD1/230421
Date Sampled		21/04/2023	21/04/2023	21/04/2023	21/04/2023	21/04/2023
Type of sample		Air	Air	Air	Air	Air
Air Kit Security No.		2555	2263	3274	3273	3517
Cyclohexane	ppbv	<3	110	<50	<0.5	<0.5
Heptane	ppbv	<3	10	<50	<0.5	<0.5
Trichloroethene	ppbv	900	1	110	<0.5	<0.5
1,2-Dichloropropane	ppbv	<3	<0.5	<50	<0.5	<0.5
1,4-Dioxane	ppbv	<3	<0.5	<50	<0.5	<0.5
Bromodichloromethane	ppbv	<3	<0.5	<50	<0.5	<0.5
Methyl Methacrylate	ppbv	<3	<0.5	<50	<0.5	<0.5
MIBK	ppbv	<30	<5	<500	<5	<5
cis-1,3-Dichloropropene	ppbv	<3	<0.5	<50	<0.5	<0.5
trans-1,3-Dichloropropene	ppbv	<3	<0.5	<50	<0.5	<0.5
Toluene	ppbv	<3	3	<50	2	0.7
1,1,2-Trichloroethane	ppbv	<3	<0.5	<50	<0.5	<0.5
Methyl Butyl Ketone	ppbv	<3	<0.5	<50	<0.5	<0.5
Dibromochloromethane	ppbv	<3	<0.5	<50	<0.5	<0.5
Tetrachloroethene	ppbv	5,500	29	240	2	2
1,2-Dibromoethane	ppbv	<3	<0.5	<50	<0.5	<0.5
Chlorobenzene	ppbv	<3	<0.5	<50	<0.5	<0.5
Ethylbenzene	ppbv	<3	5.6	<50	<0.5	<0.5
m-& p-Xylene	ppbv	<5	4	<100	<1	<1
Styrene	ppbv	<3	0.5	<50	<0.5	<0.5
o-Xylene	ppbv	<3	5.2	<50	<0.5	<0.5
Bromoform	ppbv	<3	<0.5	<50	<0.5	<0.5
1,1,2,2-Tetrachloroethane	ppbv	<3	<0.5	<50	<0.5	<0.5
4-ethyl toluene	ppbv	<3	0.6	<50	<0.5	<0.5
1,3,5-Trimethylbenzene	ppbv	<3	1	<50	<0.5	<0.5
1,2,4-Trimethylbenzene	ppbv	<3	0.7	<50	0.5	<0.5
1,3-Dichlorobenzene	ppbv	<3	<0.5	<50	<0.5	<0.5
Benzyl chloride	ppbv	<3	<0.5	<50	<0.5	<0.5
1,4-Dichlorobenzene	ppbv	<3	<0.5	<50	<0.5	<0.5
1,2-Dichlorobenzene	ppbv	<3	<0.5	<50	<0.5	<0.5
1,2,4-Trichlorobenzene	ppbv	<3	<0.5	<50	<0.5	<0.5
Naphthalene	ppbv	<3	<0.5	<50	<0.5	<0.5
Hexachloro- 1,3-butadiene	ppbv	<3	<0.5	<50	<0.5	<0.5
Surrogate-Bromochloromethane	% rec	109	103	103	107	107
Surrogate -1,4-Difluorobenzene	% rec	104	103	106	104	104
Surrogate-Chlorobenzene-D5	% rec	104	103	105	104	103

TO15 in Canisters µg/m3						
Our Reference		321610-1	321610-2	321610-3	321610-4	321610-5
Your Reference	UNITS	SV101	SV102	SV103	SV104	BD1/230421
Date Sampled		21/04/2023	21/04/2023	21/04/2023	21/04/2023	21/04/2023
Type of sample		Air	Air	Air	Air	Air
Air Kit Security No.		2555	2263	3274	3273	3517
Vacuum before Shipment	Hg"	-30	-30	-30	-30	-30
Vacuum before Analysis	Hg"	-5	-8	-6	-6	-7
Date prepared	-	26/04/2023	26/04/2023	26/04/2023	26/04/2023	26/04/2023
Date analysed	-	26/04/2023	26/04/2023	26/04/2023	26/04/2023	26/04/2023
Propylene	µg/m³	5	18	<90	14	14
Dichlorodifluoromethane	µg/m³	<12.5	<2.5	<250	<2.5	<2.5
Chloromethane	µg/m³	<5	<1	<100	<1	<1
1,2-Dichlorotetrafluoroethane	µg/m³	<12.5	<2.5	<250	<2.5	<2.5
Vinyl chloride	µg/m³	<6.5	160	280	<1.3	<1.3
1,3-Butadiene	µg/m³	<5.5	<1.1	<110	<1.1	<1.1
Bromomethane	µg/m³	<9.5	<1.9	<190	<1.9	<1.9
Chloroethane	µg/m³	<6.5	<1.3	<130	<1.3	<1.3
Ethanol	µg/m³	<45	<9	<900	50	50
Acrolein	µg/m³	<55	<11	<1100	<11	<11
Trichlorofluoromethane (Freon 11)	µg/m³	<14	<2.8	<280	<2.8	<2.8
Acetone	µg/m³	<59.5	80	<1190	340	340
Isopropyl Alcohol	µg/m³	140	1,100	99,000	20	30
1,1-Dichloroethene	µg/m³	20	<2	<200	<2	<2
1,1,2-Trichlorotrifluoroethane	µg/m³	<19	<3.8	<380	<3.8	<3.8
Methylene chloride (Dichloromethane)	µg/m³	<85	<17	<1700	<17	<17
Carbon Disulfide	µg/m³	<80	<16	<1600	<16	<16
trans-1,2-dichloroethene	µg/m³	200	<2	<200	<2	<2
MTBE	µg/m³	<9	<1.8	<180	<1.8	<1.8
1,1- Dichloroethane	µg/m³	<10	<2	<200	<2	<2
Vinyl Acetate	µg/m³	<9	<1.8	<180	<1.8	<1.8
MEK	µg/m³	<75	<15	<1500	25	20
Hexane	µg/m³	<9	180	<180	20	6
cis-1,2-Dichloroethene	µg/m³	3,500	23	460	<2	<2
Ethyl Acetate	µg/m³	<9	<1.8	<180	<1.8	<1.8
Chloroform	µg/m³	34	150	<240	420	420
Tetrahydrofuran	µg/m³	<7.5	<1.5	<150	<1.5	<1.5
1,1,1-Trichloroethane	µg/m³	<13.5	<2.7	<270	<2.7	<2.7
1,2-Dichloroethane	µg/m³	<10	<2	<200	<2	<2
Benzene	µg/m³	<8	99	<160	2	<1.6
Carbon tetrachloride	µg/m³	<15.5	<3.1	<310	<3.1	<3.1

TO15 in Canisters µg/m3						
Our Reference		321610-1	321610-2	321610-3	321610-4	321610-5
Your Reference	UNITS	SV101	SV102	SV103	SV104	BD1/230421
Date Sampled		21/04/2023	21/04/2023	21/04/2023	21/04/2023	21/04/2023
Type of sample		Air	Air	Air	Air	Air
Air Kit Security No.		2555	2263	3274	3273	3517
Cyclohexane	µg/m³	<8.5	370	<170	<1.7	<1.7
Heptane	µg/m³	<10	41	<200	<2	<2
Trichloroethene	µg/m³	4,800	8	570	<2.7	<2.7
1,2-Dichloropropane	µg/m³	<11.5	<2.3	<230	<2.3	<2.3
1,4-Dioxane	µg/m³	<9	<1.8	<180	<1.8	<1.8
Bromodichloromethane	µg/m³	<17	<3.4	<340	<3.4	<3.4
Methyl Methacrylate	µg/m³	<10	<2	<200	<2	<2
MIBK	µg/m³	<100	<20	<2000	<20	<20
cis-1,3-Dichloropropene	µg/m³	<11.5	<2.3	<230	<2.3	<2.3
trans-1,3-Dichloropropene	µg/m³	<11.5	<2.3	<230	<2.3	<2.3
Toluene	µg/m³	<9.5	10	<190	8	3
1,1,2-Trichloroethane	µg/m³	<13.5	<2.7	<270	<2.7	<2.7
Methyl Butyl Ketone	µg/m³	<10	<2	<200	<2	<2
Dibromochloromethane	µg/m³	<8	<1.6	<160	<1.6	<1.6
Tetrachloroethene	µg/m³	37,000	200	1,600	20	20
1,2-Dibromoethane	µg/m³	<19	<3.8	<380	<3.8	<3.8
Chlorobenzene	µg/m³	<11.5	<2.3	<230	<2.3	<2.3
Ethylbenzene	µg/m³	<11	24	<220	<2.2	<2.2
m-& p-Xylene	µg/m³	<21.5	20	<430	<4.3	<4.3
Styrene	µg/m³	<10.5	2	<210	<2.1	<2.1
o-Xylene	µg/m³	<11	23	<220	<2.2	<2.2
Bromoform	µg/m³	<26	<5.2	<520	<5.2	<5.2
1,1,2,2-Tetrachloroethane	µg/m³	<17	<3.4	<340	<3.4	<3.4
4-ethyl toluene	µg/m³	<12.5	3	<250	<2.5	<2.5
1,3,5-Trimethylbenzene	µg/m³	<12.5	7	<250	<2.5	<2.5
1,2,4-Trimethylbenzene	µg/m³	<12.5	3	<250	3	<2.5
1,3-Dichlorobenzene	µg/m³	<15	<3	<300	<3	<3
Benzyl chloride	µg/m³	<13	<2.6	<260	<2.6	<2.6
1,4-Dichlorobenzene	µg/m³	<15	<3	<300	<3	<3
1,2-Dichlorobenzene	µg/m³	<15	<3	<300	<3	<3
1,2,4-Trichlorobenzene	µg/m³	<18.5	<3.7	<370	<3.7	<3.7
Naphthalene	µg/m³	<13	<2.6	<260	<2.6	<2.6
Hexachloro- 1,3-butadiene	µg/m³	<26.5	<5.3	<530	<5.3	<5.3
Surrogate-Bromochloromethane	% rec	109	103	103	107	107
Surrogate -1,4-Difluorobenzene	% rec	104	103	106	104	104
Surrogate-Chlorobenzene-D5	% rec	104	103	105	104	103

TPH Air/ Air Phase Hydrocarbon					
Our Reference		321610-1	321610-2	321610-3	321610-4
Your Reference	UNITS	SV101	SV102	SV103	SV104
Date Sampled		21/04/2023	21/04/2023	21/04/2023	21/04/2023
Type of sample		Air	Air	Air	Air
Air Kit Security No.		2555	2263	3274	3273
Date prepared	-	26/04/2023	26/04/2023	26/04/2023	26/04/2023
Date analysed	-	26/04/2023	26/04/2023	26/04/2023	26/04/2023
TPH C_5 - C_8 Aliphatic	µg/m^3	32,000	6,200	37,000	350
TPH C_9 - C_{12} Aliphatic	µg/m^3	<250	<50	<5000	<50
TPH C_9 - C_{10} Aromatic	µg/m^3	<500	<100	<10000	<100
TPH C_6 - C_{10} - BTEX (F1)	µg/m^3	30,000	4,300	<20000	<200
TPH >C_{10} - C_{12} - Naphthalene (F2)	µg/m^3	<200	<40	<4000	<40

VOC in Carbon tubes		
Our Reference		321610-6
Your Reference	UNITS	SHROUD-1
Date Sampled		21/04/2023
Type of sample		Air
Air Kit Security No.		171504753
Date extracted	-	26/04/2023
Date analysed	-	26/04/2023
Isopropyl Alcohol*	µg/tube	1,500
Surrogate Toluene-d8	%	84
Surrogate 4-Bromofluorobenzene	%	73

Method ID	Methodology Summary
AT-005	Measurement of Air-Phase Petroleum Hydrocarbons and Ozone Precursors by GC-MS.
ORG-022	Determination of volatile organic compounds in charcoal tubes/badges/sorbents using CS2 extraction, determined by GC/GC-MS. Desorption efficiencies are not applied to results. Note where µg/m^3 results are supplied for SKC badges, the factors used are for 575-001, if 575-001 data is unavailable for an analyte then use 575-002 then 575-003 (exposure time must be supplied). Otherwise a sampling rate may be used for a similar analyte on request. Analytes such as (where applicable) Iodomethane, Chloroprene, Nitrobenzene, Naphthalene and 1, 2, 3 // 1, 2, 4 Trichlorobenzenes are considered to be semi-quant analyses using CS2 desorption from charcoal tubes. The latter three compounds are better served by XAD-2 collection and analysis. Note - air volume measurements are not covered by Envirolab's NATA accreditation.
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]	2	-30	-30	0	[NT]	[NT]
Vacuum before Analysis	Hg"			[NT]	2	-8	-8	0	[NT]	[NT]
Date prepared	-			26/04/2023	2	26/04/2023	26/04/2023		26/04/2023	[NT]
Date analysed	-			26/04/2023	2	26/04/2023	26/04/2023		26/04/2023	[NT]
Propylene	ppbv	0.5	TO15	<0.5	2	10	10	0	116	[NT]
Dichlorodifluoromethane	ppbv	0.5	TO15	<0.5	2	<0.5	<0.5	0	[NT]	[NT]
Chloromethane	ppbv	0.5	TO15	<0.5	2	<0.5	<0.5	0	[NT]	[NT]
1,2-Dichlorotetrafluoroethane	ppbv	0.5	TO15	<0.5	2	<0.5	<0.5	0	[NT]	[NT]
Vinyl chloride	ppbv	0.5	TO15	<0.5	2	64	65	2	[NT]	[NT]
1,3-Butadiene	ppbv	0.5	TO15	<0.5	2	<0.5	<0.5	0	[NT]	[NT]
Bromomethane	ppbv	0.5	TO15	<0.5	2	<0.5	<0.5	0	[NT]	[NT]
Chloroethane	ppbv	0.5	TO15	<0.5	2	<0.5	<0.5	0	[NT]	[NT]
Ethanol	ppbv	5	TO15	<5	2	<5	<5	0	[NT]	[NT]
Acrolein	ppbv	5	TO15	<5	2	<5	<5	0	[NT]	[NT]
Trichlorofluoromethane (Freon 11)	ppbv	0.5	TO15	<0.5	2	<0.5	<0.5	0	[NT]	[NT]
Acetone	ppbv	5	TO15	<5	2	30	30	0	[NT]	[NT]
Isopropyl Alcohol	ppbv	5	TO15	<5	2	460	460	0	[NT]	[NT]
1,1-Dichloroethene	ppbv	0.5	TO15	<0.5	2	<0.5	<0.5	0	[NT]	[NT]
1,1,2-Trichlorotrifluoroethane	ppbv	0.5	TO15	<0.5	2	<0.5	<0.5	0	[NT]	[NT]
Methylene chloride (Dichloromethane)	ppbv	5	TO15	<5	2	<5	<5	0	[NT]	[NT]
Carbon Disulfide	ppbv	5	TO15	<5	2	<5	<5	0	[NT]	[NT]
trans-1,2-dichloroethene	ppbv	0.5	TO15	<0.5	2	<0.5	<0.5	0	[NT]	[NT]
MTBE	ppbv	0.5	TO15	<0.5	2	<0.5	<0.5	0	[NT]	[NT]
1,1- Dichloroethane	ppbv	0.5	TO15	<0.5	2	<0.5	<0.5	0	[NT]	[NT]
Vinyl Acetate	ppbv	0.5	TO15	<0.5	2	<0.5	<0.5	0	[NT]	[NT]
MEK	ppbv	5	TO15	<5	2	<5	<5	0	[NT]	[NT]
Hexane	ppbv	0.5	TO15	<0.5	2	50	51	2	98	[NT]
cis-1,2-Dichloroethene	ppbv	0.5	TO15	<0.5	2	5.9	6.0	2	[NT]	[NT]
Ethyl Acetate	ppbv	0.5	TO15	<0.5	2	<0.5	<0.5	0	[NT]	[NT]
Chloroform	ppbv	0.5	TO15	<0.5	2	30	30	0	[NT]	[NT]
Tetrahydrofuran	ppbv	0.5	TO15	<0.5	2	<0.5	<0.5	0	[NT]	[NT]
1,1,1-Trichloroethane	ppbv	0.5	TO15	<0.5	2	<0.5	<0.5	0	[NT]	[NT]
1,2-Dichloroethane	ppbv	0.5	TO15	<0.5	2	<0.5	<0.5	0	[NT]	[NT]
Benzene	ppbv	0.5	TO15	<0.5	2	31	32	3	95	[NT]
Carbon tetrachloride	ppbv	0.5	TO15	<0.5	2	<0.5	<0.5	0	[NT]	[NT]
Cyclohexane	ppbv	0.5	TO15	<0.5	2	110	110	0	95	[NT]
Heptane	ppbv	0.5	TO15	<0.5	2	10	9.8	2	101	[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	2	1	1	0	[NT]	[NT]
1,2-Dichloropropane	ppbv	0.5	TO15	<0.5	2	<0.5	<0.5	0	[NT]	[NT]
1,4-Dioxane	ppbv	0.5	TO15	<0.5	2	<0.5	<0.5	0	[NT]	[NT]
Bromodichloromethane	ppbv	0.5	TO15	<0.5	2	<0.5	<0.5	0	[NT]	[NT]
Methyl Methacrylate	ppbv	0.5	TO15	<0.5	2	<0.5	<0.5	0	[NT]	[NT]
MIBK	ppbv	5	TO15	<5	2	<5	<5	0	[NT]	[NT]
cis-1,3-Dichloropropene	ppbv	0.5	TO15	<0.5	2	<0.5	<0.5	0	[NT]	[NT]
trans-1,3-Dichloropropene	ppbv	0.5	TO15	<0.5	2	<0.5	<0.5	0	[NT]	[NT]
Toluene	ppbv	0.5	TO15	<0.5	2	3	3	0	101	[NT]
1,1,2-Trichloroethane	ppbv	0.5	TO15	<0.5	2	<0.5	<0.5	0	[NT]	[NT]
Methyl Butyl Ketone	ppbv	0.5	TO15	<0.5	2	<0.5	<0.5	0	[NT]	[NT]
Dibromochloromethane	ppbv	0.5	TO15	<0.5	2	<0.5	<0.5	0	[NT]	[NT]
Tetrachloroethene	ppbv	0.5	TO15	<0.5	2	29	30	3	[NT]	[NT]
1,2-Dibromoethane	ppbv	0.5	TO15	<0.5	2	<0.5	<0.5	0	[NT]	[NT]
Chlorobenzene	ppbv	0.5	TO15	<0.5	2	<0.5	<0.5	0	[NT]	[NT]
Ethylbenzene	ppbv	0.5	TO15	<0.5	2	5.6	5.5	2	99	[NT]
m-& p-Xylene	ppbv	1	TO15	<1	2	4	3	29	98	[NT]
Styrene	ppbv	0.5	TO15	<0.5	2	0.5	<0.5	0	94	[NT]
o-Xylene	ppbv	0.5	TO15	<0.5	2	5.2	5.1	2	98	[NT]
Bromoform	ppbv	0.5	TO15	<0.5	2	<0.5	<0.5	0	[NT]	[NT]
1,1,2,2-Tetrachloroethane	ppbv	0.5	TO15	<0.5	2	<0.5	<0.5	0	[NT]	[NT]
4-ethyl toluene	ppbv	0.5	TO15	<0.5	2	0.6	<0.5	18	98	[NT]
1,3,5-Trimethylbenzene	ppbv	0.5	TO15	<0.5	2	1	1	0	94	[NT]
1,2,4-Trimethylbenzene	ppbv	0.5	TO15	<0.5	2	0.7	0.6	15	94	[NT]
1,3-Dichlorobenzene	ppbv	0.5	TO15	<0.5	2	<0.5	<0.5	0	[NT]	[NT]
Benzyl chloride	ppbv	0.5	TO15	<0.5	2	<0.5	<0.5	0	[NT]	[NT]
1,4-Dichlorobenzene	ppbv	0.5	TO15	<0.5	2	<0.5	<0.5	0	[NT]	[NT]
1,2-Dichlorobenzene	ppbv	0.5	TO15	<0.5	2	<0.5	<0.5	0	[NT]	[NT]
1,2,4-Trichlorobenzene	ppbv	0.5	TO15	<0.5	2	<0.5	<0.5	0	[NT]	[NT]
Naphthalene	ppbv	0.5	TO15	<0.5	2	<0.5	<0.5	0	[NT]	[NT]
Hexachloro- 1,3-butadiene	ppbv	0.5	TO15	<0.5	2	<0.5	<0.5	0	[NT]	[NT]
Surrogate-Bromochloromethane	% rec		TO15	106	2	103	102	1	107	[NT]
Surrogate -1,4-Difluorobenzene	% rec		TO15	101	2	103	104	1	101	[NT]
Surrogate-Chlorobenzene-D5	% rec		TO15	101	2	103	105	2	103	[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]	2	-30	-30	0	[NT]	[NT]
Vacuum before Analysis	Hg"			[NT]	2	-8	-8	0	[NT]	[NT]
Date prepared	-			26/04/2023	2	26/04/2023	26/04/2023		[NT]	[NT]
Date analysed	-			26/04/2023	2	26/04/2023	26/04/2023		[NT]	[NT]
Propylene	µg/m³	0.9	TO15	<0.9	2	18	18	0	[NT]	[NT]
Dichlorodifluoromethane	µg/m³	2.5	TO15	<2.5	2	<2.5	<2.5	0	[NT]	[NT]
Chloromethane	µg/m³	1.0	TO15	<1.0	2	<1	<1	0	[NT]	[NT]
1,2-Dichlorotetrafluoroethane	µg/m³	2.5	TO15	<2.5	2	<2.5	<2.5	0	[NT]	[NT]
Vinyl chloride	µg/m³	1.3	TO15	<1.3	2	160	170	6	[NT]	[NT]
1,3-Butadiene	µg/m³	1.1	TO15	<1.1	2	<1.1	<1.1	0	[NT]	[NT]
Bromomethane	µg/m³	1.9	TO15	<1.9	2	<1.9	<1.9	0	[NT]	[NT]
Chloroethane	µg/m³	1.3	TO15	<1.3	2	<1.3	<1.3	0	[NT]	[NT]
Ethanol	µg/m³	9	TO15	<9	2	<9	<9	0	[NT]	[NT]
Acrolein	µg/m³	11	TO15	<11	2	<11	<11	0	[NT]	[NT]
Trichlorofluoromethane (Freon 11)	µg/m³	2.8	TO15	<2.8	2	<2.8	<2.8	0	[NT]	[NT]
Acetone	µg/m³	11.9	TO15	<11.9	2	80	80	0	[NT]	[NT]
Isopropyl Alcohol	µg/m³	12	TO15	<12	2	1100	1100	0	[NT]	[NT]
1,1-Dichloroethene	µg/m³	2.0	TO15	<2.0	2	<2	<2	0	[NT]	[NT]
1,1,2-Trichlorotrifluoroethane	µg/m³	3.8	TO15	<3.8	2	<3.8	<3.8	0	[NT]	[NT]
Methylene chloride (Dichloromethane)	µg/m³	17	USEPA 18	<17	2	<17	<17	0	[NT]	[NT]
Carbon Disulfide	µg/m³	16	TO15	<16	2	<16	<16	0	[NT]	[NT]
trans-1,2-dichloroethene	µg/m³	2.0	TO15	<2.0	2	<2	<2	0	[NT]	[NT]
MTBE	µg/m³	1.8	TO15	<1.8	2	<1.8	<1.8	0	[NT]	[NT]
1,1- Dichloroethane	µg/m³	2.0	TO15	<2.0	2	<2	<2	0	[NT]	[NT]
Vinyl Acetate	µg/m³	1.8	TO15	<1.8	2	<1.8	<1.8	0	[NT]	[NT]
MEK	µg/m³	15	TO15	<15	2	<15	<15	0	[NT]	[NT]
Hexane	µg/m³	1.8	TO15	<1.8	2	180	180	0	[NT]	[NT]
cis-1,2-Dichloroethene	µg/m³	2.0	TO15	<2.0	2	23	24	4	[NT]	[NT]
Ethyl Acetate	µg/m³	1.8	TO15	<1.8	2	<1.8	<1.8	0	[NT]	[NT]
Chloroform	µg/m³	2.4	TO15	<2.4	2	150	150	0	[NT]	[NT]
Tetrahydrofuran	µg/m³	1.5	TO15	<1.5	2	<1.5	<1.5	0	[NT]	[NT]
1,1,1-Trichloroethane	µg/m³	2.7	TO15	<2.7	2	<2.7	<2.7	0	[NT]	[NT]
1,2-Dichloroethane	µg/m³	2.0	TO15	<2.0	2	<2	<2	0	[NT]	[NT]
Benzene	µg/m³	1.6	TO15	<1.6	2	99	100	1	[NT]	[NT]
Carbon tetrachloride	µg/m³	3.1	TO15	<3.1	2	<3.1	<3.1	0	[NT]	[NT]
Cyclohexane	µg/m³	1.7	TO15	<1.7	2	370	370	0	[NT]	[NT]
Heptane	µg/m³	2.0	TO15	<2.0	2	41	40	2	[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	2	8	8	0	[NT]	[NT]
1,2-Dichloropropane	µg/m³	2.3	TO15	<2.3	2	<2.3	<2.3	0	[NT]	[NT]
1,4-Dioxane	µg/m³	1.8	TO15	<1.8	2	<1.8	<1.8	0	[NT]	[NT]
Bromodichloromethane	µg/m³	3.4	TO15	<3.4	2	<3.4	<3.4	0	[NT]	[NT]
Methyl Methacrylate	µg/m³	2.0	TO15	<2.0	2	<2	<2	0	[NT]	[NT]
MIBK	µg/m³	20	TO15	<20	2	<20	<20	0	[NT]	[NT]
cis-1,3-Dichloropropene	µg/m³	2.3	TO15	<2.3	2	<2.3	<2.3	0	[NT]	[NT]
trans-1,3-Dichloropropene	µg/m³	2.3	TO15	<2.3	2	<2.3	<2.3	0	[NT]	[NT]
Toluene	µg/m³	1.9	TO15	<1.9	2	10	10	0	[NT]	[NT]
1,1,2-Trichloroethane	µg/m³	2.7	TO15	<2.7	2	<2.7	<2.7	0	[NT]	[NT]
Methyl Butyl Ketone	µg/m³	2.0	TO15	<2.0	2	<2	<2	0	[NT]	[NT]
Dibromochloromethane	µg/m³	1.6	TO15	<1.6	2	<1.6	<1.6	0	[NT]	[NT]
Tetrachloroethene	µg/m³	3.4	TO15	<3.4	2	200	200	0	[NT]	[NT]
1,2-Dibromoethane	µg/m³	3.8	TO15	<3.8	2	<3.8	<3.8	0	[NT]	[NT]
Chlorobenzene	µg/m³	2.3	TO15	<2.3	2	<2.3	<2.3	0	[NT]	[NT]
Ethylbenzene	µg/m³	2.2	TO15	<2.2	2	24	24	0	[NT]	[NT]
m-& p-Xylene	µg/m³	4.3	TO15	<4.3	2	20	10	67	[NT]	[NT]
Styrene	µg/m³	2.1	TO15	<2.1	2	2	<2.1	5	[NT]	[NT]
o-Xylene	µg/m³	2.2	TO15	<2.2	2	23	22	4	[NT]	[NT]
Bromoform	µg/m³	5.2	TO15	<5.2	2	<5.2	<5.2	0	[NT]	[NT]
1,1,2,2-Tetrachloroethane	µg/m³	3.4	TO15	<3.4	2	<3.4	<3.4	0	[NT]	[NT]
4-ethyl toluene	µg/m³	2.5	TO15	<2.5	2	3	<2.5	18	[NT]	[NT]
1,3,5-Trimethylbenzene	µg/m³	2.5	TO15	<2.5	2	7	6	15	[NT]	[NT]
1,2,4-Trimethylbenzene	µg/m³	2.5	TO15	<2.5	2	3	3	0	[NT]	[NT]
1,3-Dichlorobenzene	µg/m³	3.0	TO15	<3.0	2	<3	<3	0	[NT]	[NT]
Benzyl chloride	µg/m³	2.6	TO15	<2.6	2	<2.6	<2.6	0	[NT]	[NT]
1,4-Dichlorobenzene	µg/m³	3.0	TO15	<3.0	2	<3	<3	0	[NT]	[NT]
1,2-Dichlorobenzene	µg/m³	3.0	TO15	<3.0	2	<3	<3	0	[NT]	[NT]
1,2,4-Trichlorobenzene	µg/m³	3.7	TO15	<3.7	2	<3.7	<3.7	0	[NT]	[NT]
Naphthalene	µg/m³	2.6	TO15	<2.6	2	<2.6	<2.6	0	[NT]	[NT]
Hexachloro- 1,3-butadiene	µg/m³	5.3	TO15	<5.3	2	<5.3	<5.3	0	[NT]	[NT]
Surrogate-Bromochloromethane	% rec		TO15	106	2	103	102	1	[NT]	[NT]
Surrogate -1,4-Difluorobenzene	% rec		TO15	101	2	103	104	1	[NT]	[NT]
Surrogate-Chlorobenzene-D5	% rec		TO15	101	2	103	105	2	[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	-			26/04/2023	2	26/04/2023	26/04/2023		26/04/2023	[NT]
Date analysed	-			26/04/2023	2	26/04/2023	26/04/2023		26/04/2023	[NT]
TPH C_5 - C_8 Aliphatic	µg/m^3	200	AT-005	<200	2	6200	6300	2	107	[NT]
TPH C_9 - C_{12} Aliphatic	µg/m^3	50	AT-005	<50	2	<50	<50	0	[NT]	[NT]
TPH C_9 - C_{10} Aromatic	µg/m^3	100	AT-005	<100	2	<100	<100	0	101	[NT]
TPH C_6 - C_{10} - BTEX (F1)	µg/m^3	200	TO15	<200	2	4300	4600	7	103	[NT]
TPH >C_{10} - C_{12} - Naphthalene (F2)	µg/m^3	40	TO15	<40	2	<40	<40	0	96	[NT]

QUALITY CONTROL: VOC in Carbon tubes						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			26/04/2023	[NT]	[NT]	[NT]	[NT]	26/04/2023	[NT]
Date analysed	-			26/04/2023	[NT]	[NT]	[NT]	[NT]	26/04/2023	[NT]
Isopropyl Alcohol*	µg/tube	5	ORG-022	<5	[NT]	[NT]	[NT]	[NT]	112	[NT]
Surrogate Toluene-d8	%		ORG-022	78	[NT]	[NT]	[NT]	[NT]	88	[NT]
Surrogate 4-Bromofluorobenzene	%		ORG-022	72	[NT]	[NT]	[NT]	[NT]	82	[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/TPH
PQL has been raised due to the high level of analytes present in sample #1 and #3.

Douglas Partners
Geotechnics | Environment | Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

Project No:	221953.00	**Suburb:** Northbridge	**To:** Envirolab Services
Project Name:	Northbridge, DD	**Order Number**	
Project Manager:	JJH	**Sampler:** ZW	**Attn:** Daniel Ford
Emails:	Joel James-Hall; Zihan Wang		**Phone:** 9910 6200
Date Required:	48 hour		**Email:** Dford@envirolab.com.au
Shelved		Do samples contain 'potential' HBM? Yes ☐ No ☐ (If YES, then handle, transport and store in accordance with FPM HAZID)	

	Sample ID	Lab ID	Date	Sample Type (S - suma canister C - Carbon tube)	Serial No.s: Canister / Tube ID	Serial No.s: Regulator ID	Analytes: VOC TO-15	Analytes: TRH - F1 & F2	Analytes: IPA	Analytes:	Sample Details: Start Vacuum	Sample Details: Stop Vaccum	Sample Details: Flow Rate	Sample Details: Time (min)	Sample Details: PID (ppm)	Sample Details:	Comments / Weather
1	SV101		21/04/24	S	2555	505	x	x	-		-30	-6	100	-	11.5		
2	SV102		21/04/24	S	2263	2085	x	x	-		-29	-7	100	-	5.3		
3	SV103		21/04/24	S	3274	1861	x	x	-		-30	-7	100	-	0.6		
4	SV104		21/04/24	S	3273	1876	x	x	-		-28	-7	100	-	0.2		
5	BD1/230421		21/04/24	S	3517	2078	x	-	-		-30	-7	100	-	-		
6	Shroud-1		21/04/24	C	171504753	-	-	-	x		-	-	84.5	1	-		

PQL = practical quantitation limit. If none given, default to Laboratory Method Detection Limit

Metals to Analyse: 8HM unless specified here:

Total number of samples in container: 6 **Relinquished by:** ZW Transported to laboratory by: Courrier

Send Results to: Douglas Partners Pty Ltd **Address:** **Phone:** **Fax:**

Signed: ZW; 8:15 am 24/4/23 **Received by:** **Date & Time:**

Lab Report/Reference No:

ENVIROLAB

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

Job No: 321610

Date Received: 24/04/2023
Time Received: 14.20 pm
Received By: JW
Temp: ~~Cool/Ambient~~
Cooling: ~~Ice/Icepack~~
Security: ~~Intact/Broken~~/None

NA