FINAL REPORT

Environment Protection Authority South Australia

Stage 1 Environmental Assessment

Melrose Park EPA Assessment Area

21 May 2021

60610-137125 RP01 (Rev0)
JBS&G

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Table of Contents

List of Tables (In Text)

List of Figures (In Appendices)

List of Summary Tables (In Appendices)

Appendices

Abbreviations

Term	Definition
API	American Petroleum Institute
ASC NEPM	National Environment Protection (Assessment of Site Contamination) Measure
ASTM	American Society for Testing and Materials
AT	Averaging Time
BoM	Bureau of Meteorology
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes
CA	Contaminant concentration in air
CEs	Chlorinated Ethenes
cm	Centimetres
COC	Chain of Custody
CRC CARE	Cooperative Research Centre for Contamination Assessment and Remediation of the Environment
CSM	Conceptual Site Model
DCE	Dichloroethene
DIT	Department for Infrastructure and Transport
DO	Dissolved Oxygen
DQIs	Data Quality Indicators
EC	Electrical Conductivity
ED	Exposure Duration
EF	Exposure Frequency
ET	Exposure Time
EPA	Environment Protection Authority South Australia
GC/MS	Gas Chromatography / Mass Spectrometry
HI	Hazard Index
HIL	Health Investigation Level
ILCR	Increased Lifetime Cancer Risk
inHg	Inches of Mercury
IP	Interface Probe
ITRC	Interstate Technology & Regulatory Council
JBS&G	JBS&G Australia Pty Ltd
J&E	Johnson and Ettinger
km	Kilometres
LDPE	Low Density Polyethylene
LOR	Limit of Reporting
m	Metres
mbgl	Metres Below Ground Level
ml	Millilitres
ml/min	Millilitres per minute
mm	Millimetres
mTOC	Metres Below Top of Casing
NAPL	Non-Aqueous Phase Liquid
NATA	National Association of Testing Authorities
NEPC	National Environmental Protection Council
PARCCS	Precision, Accuracy, Representativeness, Comparability and Completeness and Sensitivity
PCE	Tetrachloroethene
PID	Photoionisation Detector
ppm	Parts Per Million
QA/QC	Quality Assurance/Quality Control
RPD	Relative Percent Difference
RSLs	Regional Screening Levels
SHE	Standard Hydrogen Electrode
SVME	Soil Vapour Monitoring Event
TCA	Trichloroethane
TCE	Trichloroethene
TDS	Total Dissolved Solids
TRH	Total Recoverable Hydrocarbons
US EPA	United States Environmental Protection Agency

Term	Definition
VC	Vinyl Chloride
VIRA	Vapour Intrusion Risk Assessment
VOCs	Volatile Organic Compounds
µg/m^3	Micrograms per cubic metre
-	On tables is "not calculated", "no criteria" or "not applicable"

Executive Summary

JBS&G Australia Pty Ltd (JBS&G) was engaged by the Environment Protection Authority South Australia (EPA) to undertake the Stage 1 Environmental Assessment, a targeted soil vapour investigation in vicinity of existing groundwater well GW3034b and vapour intrusion risk assessment (VIRA) on the basis of these results, within the Melrose Park EPA Assessment Area, South Australia.

It is understood that in February 2021 the EPA was notified by the Department for Infrastructure and Transport (DIT) of groundwater contamination during routine investigations for the South Road upgrade. This testing reported elevated concentrations of metals and, of priority for the Stage 1 Environmental Assessment, chlorinated ethenes (CEs) at groundwater well GW3034b, including trichloroethene (TCE) at levels exceeding drinking water criteria. There were no other groundwater wells available in vicinity of GW3034b for testing. It is understood residents, workers and landowners in the Melrose Park EPA Assessment Area have been advised by EPA that groundwater should not be used for any purpose.

The objectives of the Stage 1 Environmental Assessment were as follows:

- Assess the nature and extent of CE soil vapour contamination in the vicinity of groundwater well GW3034b;
- Identify potential source sites of CE contamination (based on the soil vapour data collected as part of these works); and
- Assess the risk potentially posed by CE contamination to identified receptors in properties in close proximity of GW3034b via the inhalation pathway.

The works undertaken to address the above objectives included the following:

- Installation of five soil vapour probes at targeted locations in the vicinity of groundwater well GW3034b;
- Sampling of the five newly installed soil vapour probes with analysis for CEs;
- Sampling of existing groundwater well GW3034b with analysis for CEs;
- Drilling of one geotechnical bore with analysis for geotechnical parameters; and
- Complete a VIRA on the basis of the soil vapour and geotechnical data described above.

Based on the outcomes of the targeted soil vapour investigation in the vicinity of existing groundwater well GW3034b and VIRA, and subject to the limitations in **Section 11**, the following was concluded:

- Site contaminations exists within the Melrose Park EPA Assessment Area in accordance with the definition provided in the *Environment Protection Act 1993*;
- Elevated CE concentrations (namely TCE and 1,1-dichloroethene [1,1-DCE]) were reported above the adopted soil vapour Tier 1 screening levels at all five soil vapour probe locations. The lateral extent of the soil vapour plume is unknown, and hence it is unknown whether higher CE concentrations are present within the Melrose Park EPA Assessment Area than those which have been reported to date;
- It is not possible to identify potential source sites of contamination based on the data collected to date; and
- No unacceptable risks via the vapour inhalation pathway were identified for residents (slab on grade dwellings without basements and crawlspace), commercial / industrial workers (slab on grade buildings) and subsurface maintenance / construction workers in subsurface

maintenance trenches / excavations installed to a maximum depth of 1 metres below ground level (mbgl) in outdoor areas, noting this conclusion is based on the concentrations reported to date in the Melrose Park EPA Assessment Area and site specific geotechnical data from a single sample location.

The following data gaps were identified following completion of the targeted soil vapour investigation in vicinity of existing groundwater well GW3034b and VIRA:

- The potential source(s) of the CE impacts has/have not been identified, noting no site history investigation has been completed for the Melrose Park EPA Assessment Area to date;
- The extent of the groundwater TCE plume has not been delineated laterally or vertically;
- The extent of the soil vapour TCE plume has not been delineated laterally;
- Limited geotechnical information is available;
- No indoor air testing has been completed to date to validate modelling;
- No temporal data is available (groundwater, soil vapour and geotechnical); and
- The potential influences of preferential pathways are not understood, noting the source(s) of the CE impacts are required to be identified before this can be assessed.

1. Introduction

1.1 Overview

JBS&G Australia Pty Ltd (JBS&G) was engaged by the Environment Protection Authority South Australia (EPA) to undertake the Stage 1 Environmental Assessment, a targeted soil vapour investigation in the vicinity of existing groundwater well GW3034b and a vapour intrusion risk assessment (VIRA) on the basis of these results, within the Melrose Park EPA Assessment Area, South Australia. The location and extent of the Melrose Park EPA Assessment Area is shown in **Figure 1**.

It is understood that in February 2021 the EPA was notified by the Department for Infrastructure and Transport (DIT) of groundwater contamination during routine investigations for the South Road upgrade. This testing reported elevated concentrations of metals, and of priority for the Stage 1 Environmental Assessment, chlorinated ethenes (CEs) at groundwater well GW3034b, including trichloroethene (TCE) at levels exceeding drinking water criteria. There were no other groundwater wells available in the vicinity of GW3034b for testing. It is understood residents, workers and landowners in the Melrose Park EPA Assessment Area have been advised by EPA that groundwater should not be used for any purpose.

JBS&G was engaged by EPA to assess whether the reported groundwater contamination has the potential to result in elevated indoor air concentrations. This report presents the background, methodology, results of the targeted soil vapour investigation and VIRA.

1.2 Objective

The objectives of the Stage 1 Environmental Assessment were as follows:

- Assess the nature and extent of CE soil vapour contamination in the vicinity of groundwater well GW3034b;
- Identify potential source sites of CE contamination (based on the soil vapour data collected as part of these works); and
- Assess the risk potentially posed by CE contamination to identified receptors in properties in close proximity of GW3034b via the inhalation pathway.

2. Scope of Work

The following scope of work was undertaken in March 2021 in order to meet the objectives:

- Installation of five soil vapour probes (SVP01-SVP05) to a depth of 1.2 metres below ground level (mbgl) at targeted locations in the vicinity of groundwater well GW3034b;
- Drilling of one geotechnical bore (GB01) to a depth of 1.2 mbgl, with analysis of the sample from surface to 0.7 mbgl for geotechnical parameters;
- Sampling of the five newly installed soil vapour probes (SVP01-SVP05);
- Laboratory analysis of the soil vapour samples for the chemicals of interest (CEs);
- Sampling of existing groundwater well GW3034b;
- Laboratory analysis of the groundwater samples for the chemicals of interest (CEs);
- Comparison of the soil vapour and groundwater results against appropriate Tier 1 screening levels; and
- Complete a VIRA on the basis of the soil vapour and geotechnical data described above.

3. Methodology

3.1 Soil Vapour Probe Installation and Sampling

3.1.1 Guidelines

All soil vapour investigation works were undertaken in accordance with the methodologies outlined in the following guidance documents:

Australian Guidelines

- *National Environment Protection (Assessment of Site Contamination) Measure,* National Environment Protection Council, 1999 as amended 2013 (NEPC 2013); and
- *Technical Report No. 13 - Field Assessment of Gas*, Cooperative Research Centre for Contamination Assessment and Remediation of the Environment (CRC CARE), 2009 (CRC CARE 2009).

International Guidelines

- *Collecting and Interpreting Soil Gas Samples from the Vadose Zone, Publication Number 4741*, American Petroleum Institute (API), 2005 (API 2005);
- *Standard Practice for Active Soil Gas Sampling in the Vadose Zone for Vapor Intrusion Evaluations, American Society for Testing and Materials* (ASTM), 2008 (ASTM 2008); and
- *Vapor Intrusion Technical Guidance,* New Jersey Department of Environmental Protection (NJ DEP), 2018 (NY DEP 2018).

3.1.2 Soil Vapour Probe Installation

A total of five soil vapour probes (SVP01-SVP05) were installed to a depth of 1.2 mbgl on 26 March 2021. The following methodology was undertaken for the installation of the soil vapour probes:

- The locations of the soil vapour probes were marked and cleared by a professional underground service locator following review of dial before you dig plans;
- Downhole drilling equipment was decontaminated using phosphate free detergent, followed by rinsing with deionised water prior to the commencement of drilling at each investigation location to minimise the potential for cross contamination. A rinsate sample was collected on the day of soil vapour probe installation to validate decontamination techniques;
- All soil vapour probes were installed using a hand auger with a diameter of 75 mm. The soils encountered were logged in accordance with the ASC NEPM (NEPC 2013) by an experienced environmental scientist. Soil logs are included in **Appendix A**. Photographs of the soils encountered are included in **Appendix B**. Soil samples were collected from the top of each lithological layer encountered for field screening of volatile organic compounds (VOCs) using a photoionisation detector (PID). The PID was calibrated using isobutylene to 100 parts per million (ppm) prior to the commencement of works. The PID calibration records are included in **Appendix C**;
- Following the drilling and soil logging, soil vapour probes were installed in all boreholes as follows:
    - A stainless-steel vapour probe with ¼ inch Teflon tubing connected was lowered so that the tip of the probe was above the base of the borehole (i.e. at a depth of approximately 1.1 mbgl);
    - The bore annulus was backfilled with a clean washed sand pack to create a total sand pack interval of approximately 50 cm (i.e. from 0.7 mbgl to 1.2 mbgl);

- Approximately 5 cm of dry bentonite was placed above the sand pack;
- A slurry of cement powder, bentonite powder and water was used to backfill the borehole to a depth of approximately 0.2 mbgl; and
- The soil vapour probe was completed with a flush mounted gatic cover.

- Soil cuttings were transferred to a 205 L drum, with testing completed to enable offsite disposal. The drum was disposed offsite upon completion of the soil vapour probe installation program. Waste disposal documentation is included in **Appendix D**.

The locations of the soil vapour probes are shown in **Figure 2**.

The construction details of the soil vapour probes are summarised below in **Table 3.1**. Detailed soil vapour probe construction logs are included in **Appendix A**.

Table 3.1: Soil Vapour Probe Construction Summary (SVP01-SVP05)

Soil Vapour Probe ID	Date Installed	Total Depth of Borehole	Depth of Base of Probe	Sand Interval	Total Length of Teflon Tubing
		m			
SVP01	26-Mar-21	1.20	1.05	0.70 to 1.20	1.25
SVP02	26-Mar-21	1.20	1.05	0.70 to 1.20	1.25
SVP03	26-Mar-21	1.20	1.05	0.70 to 1.20	1.25
SVP04	26-Mar-21	1.20	1.05	0.70 to 1.20	1.25
SVP05	26-Mar-21	1.20	1.05	0.70 to 1.20	1.25

3.1.3 Soil Vapour Sampling

The five newly installed soil vapour probes (SVP01-SVP05) were sampled on 30 March 2021. The soil vapour samples were collected in specially prepared Summa canisters supplied by Eurofins MGT. The canisters were fitted with a calibrated regulator (flow controller) that when opened, allows air to be drawn in at a pre-set constant flow rate. The adopted flow rate for the investigation was 80 ml/min (approximate 10 minute sample time for the 1 L Summa canister).

The following soil vapour sampling methodology was undertaken:

- The gatic cover was removed from the soil vapour probe and a visual inspection of the Teflon tubing conducted in order to detect any damage to the tubing. No damage was observed to any of the soil vapour probes;
- The Summa canister pressure was measured using the laboratory supplied pressure gauge and the reading compared to the initial canister pressure recorded by the laboratory. All canisters used in the soil vapour monitoring event (SVME) had a starting pressure of -30 inHg, indicating no ingress of ambient air during transit to site;
- The Summa canister was then fitted with a flow controller, and the sampling train assembled. A shut in test was completed to ensure connections were adequate with no minor leaks. This was completed by closing off the soil vapour probe, and then using a syringe attached to a pressure gauge to create a vacuum. The vacuum was maintained with no loss of pressure for 30 seconds in all soil vapour probes;
- A pressure test was conducted to ensure a significant vacuum was not formed when purging soil vapour (i.e. ensure there was sufficient soil vapour present to sample) and ensure no water was present in the soil vapour probe. This was undertaken using a syringe attached to a pressure gauge to remove the approximate volume of the Teflon tubing of the soil vapour probe, while monitoring pressure – no vacuum was generated during this step for any of the soil vapour probes, nor was any water noted in the Teflon tubing;
- A leak test of the soil vapour probe was then undertaken using helium. A background measurement of helium in ambient air was first recorded, followed by a background

measurement of helium in the soil vapour probe. A shroud of volume 35 L was placed over the soil vapour probe and sampling train, and helium was pumped into the shroud at a rate of 15 L/min for five minutes. The helium detector was connected for the entire period and helium measurements recorded at 1 minute intervals for a total of five minutes. It is noted that the shroud was flush with ground level, with no significant gaps present between the shroud and ground. The helium concentration within the shroud was recorded following the leak testing of the soil vapour probe and sampling train. If there was greater than 10 % helium in the sampling line, then the soil vapour probe was deemed compromised and was not sampled – this did not occur for any of the soil vapour probes. The helium detector calibration certificate is included in **Appendix C**;

- Paper towel soaked with isopropanol (approximately 20 mL) was placed in a small jar, open at the top, inside the shroud along with the sampling train connected to the soil vapour probe. Soil vapour was then sampled, and the start sampling time was recorded. The following was completed during sampling:
    - A pressure gauge (connected as part of the sample train) was used to determine whether a vacuum developed in the soil vapour probe during sampling – this did not occur for any of the soil vapour probes; and
    - Measurement of VOCs within the shroud was completed using a PID throughout sampling, with the maximum and average PID value recorded.
- Once the pressure reading on the flow regulator was between approximately -5 inHg and -10 inHg, sampling was ceased and the canister valve closed tight to prevent sample loss. The end sampling time was recorded. The Summa canister pressure (post sampling) was measured using the laboratory supplied pressure gauge;
- Post sampling general gas readings (carbon dioxide, methane, oxygen, hydrogen sulphide, carbon monoxide and balance) were measured with a landfill gas meter (GA5000), firstly in ambient air and then in the soil vapour probe. PID measurements were also collected at this time. The soil vapour probe was purged with the GA5000 and PID until measurements stabilised (approximately 30 seconds);
- Duplicate samples were collected with a Summa canister prepared in the same way as detailed above, using a duplicate sampling bar (provided by the laboratory) to connect both Summa canisters (each with its own flow controller) to the soil vapour probe;
- A shroud sample was collected to assess the concentration of isopropanol within the shroud. The shroud sample was collected with a Summa canister prepared in the same way as detailed above. The Summa canister was placed inside the shroud, along with the primary sample Summa canister and sampling train. Sampling occurred for the same period as the primary soil vapour sample at that location, with the same rate on the flow controller to enable comparison between isopropanol concentrations within primary samples and the shroud sample; and
- Samples were transported in pelican boxes to the laboratory for selected chemical analysis under chain of custody (COC) documentation. The primary and duplicate soil vapour samples were analysed using gas chromatography / mass spectrometry (GC/MS) for the chemicals of interest (CEs including TCE, tetrachloroethene [PCE], cis-1,2-dichloroethene [cis-1,2-DCE], trans-1,2-dichloroethene [trans-1,2-DCE], 1,1-dichloroethene [1,1-DCE] and vinyl chloride [VC]) and isopropanol (for quality control [QC] purposes), while the shroud sample was analysed for isopropanol only.

Soil vapour probe locations are shown in **Figure 2**. The soil vapour field sampling sheets are included in **Appendix E**.

3.2 Geotechnical Soil Borehole Installation and Sampling

One geotechnical soil borehole (GB01) was installed to a depth of 1.2 mbgl on 26 March 2021. This geotechnical soil borehole was installed approximately 2 m south of soil vapour probe SVP02 and approximately 4 m south of groundwater well GW3034b, in an unsealed area adjacent to the footpath.

The following methodology was undertaken for the installation of the geotechnical borehole:

- The location of the geotechnical soil borehole was marked and cleared by a professional underground service locator following review of dial before you dig plans;
- The geotechnical soil borehole was installed by geoprobe techniques (direct push), with the undisturbed soil core (surface to 1.2 mbgl) retained in the geoprobe plastic sleeve (sealed with end caps) for geotechnical analysis. Due to the soil core collection methods logging was not possible, so the soils at GB01 have been assumed to be consistent with those observed during the installation of soil vapour probe SVP02 (approximately 2 m north of GB01), noting that the soil type reported by the laboratory at GB01 (brown clay from 0.6 mbgl to 0.7 mbgl) was consistent with the soil type reported at SVP02 at this depth (brown silty sandy clay). The borelog for GB01 is included in **Appendix A**;
- Soil cuttings from soil vapour probe SVP02 were used to reinstate the geotechnical soil borehole to prevent tripping hazards; and
- The geotechnical sample (soil core) was transported to the laboratory for geotechnical analysis immediately following completion of drilling. The geotechnical sample (soil core) from 0.6 mbgl to 0.7 mbgl was analysed for the following:
    - Bulk and dry density;
    - Void ratio;
    - Moisture content including degree of saturation;
    - Porosity; and
    - Specific gravity/soil particle density.

The geotechnical sample location is shown in **Figure 2**.

3.3 Groundwater Sampling

All groundwater investigation works were undertaken in accordance with the methodologies outlined in the following guidance documents and JBS&G standard operating procedures:

- The ASC NEPM (NEPC 2013);
- *Regulatory monitoring and testing - Groundwater sampling,* Environment Protection Authority South Australia, 2019 (EPA 2019a);
- *AS/NZS 5667.1: Water quality – Sampling, Part 1: Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples,* Australian / New Zealand Standards, 1998a (Australian / New Zealand Standards 1998a); and
- *AS/NZS 5667.11: Water quality – Sampling, Part 11: Guidance on sampling of groundwaters,* Australian / New Zealand Standard, 1998b (Australian / New Zealand Standards 1998b).

Existing groundwater well GW3034b was sampled on 30 March 2021 using low flow techniques. The following groundwater sampling methodology was undertaken:

- The Interface Probe (IP) and low flow pump were decontaminated using phosphate free detergent, followed by rinsing with deionised water prior to the commencement of

sampling. A rinsate sample was collected off the clean low flow pump to validate decontamination procedures;

- The groundwater well was gauged prior to sampling using an IP to measure the depth to water, depth to non-aqueous phase liquid (NAPL), if present, and total depth;
- The groundwater well was then sampled using low flow techniques, as follows:
  - Dedicated low-density polyethylene (LDPE) twin tubing was attached to the low flow pump. The low flow pump was lowered into the groundwater well so that the pump intake point was set in the approximate centre of the water column. The depth of the base of the pump (intake point) was recorded on the field sampling sheet;
  - The low flow pump was then used to purge the groundwater well at a rate to establish a stabilised pumping rate while minimising drawdown. A maximum drawdown of 100 mm was adopted for the investigation;
  - Following the establishment of the flow rate, water quality parameters (including dissolved oxygen [DO], redox potential, electrical conductivity [EC], temperature and pH) were measured to determine when purging was complete (i.e. when water quality parameters were considered stable in accordance with EPA [2019a]). Water quality parameters were recorded every 3 minutes along with the depth to water and time on the groundwater field sampling sheet. The presence or absence of visual and/or olfactory evidence of contamination, turbidity and colour were also noted on the field sampling sheet. The water quality meter was calibrated prior to sampling, with the calibration record provided in **Appendix C**; and
  - Following stabilisation of indictor parameters, a groundwater sample was collected in appropriately preserved sample bottles for the chemicals of interest (provided by the laboratory) using the same method employed throughout purging. Duplicate samples were also collected in this manner.
- Samples were transported in a chilled cool box to the laboratory for selected chemical analysis under COC documentation. The primary, duplicate and trip blank samples were analysed for the chemicals of interest (CEs including TCE, PCE, cis-1,2-DCE, trans-1,2-DCE, 1,1-DCE and VC), while the trip spike sample was analysed for total recoverable hydrocarbons (TRH) and benzene, toluene, ethyl benzene and xylenes (BTEX); and
- All purge water was transferred to a 50 L drum and disposed offsite upon completion of groundwater sampling. Waste disposal documentation is included in **Appendix D**.

The location of groundwater well GW3034b is shown in **Figure 2**. The groundwater field sampling sheet is included in **Appendix F**.

4. Adopted Tier 1 Screening Levels

4.1 Soil Vapour

4.1.1 Australian Screening Levels

Investigation levels presented within the ASC NEPM (NEPC 2013) were adopted in the first instance to assess soil vapour results.

The ASC NEPM (NEPC 2013) provides *Interim Soil Vapour Health Investigation Levels (HILs) for Volatile Organic Chlorinated Compounds* for selected volatile chlorinated compounds (PCE, TCE, cis-1,2-DCE, VC and 1,1,1-trichloroethane [1,1,1-TCA]) which are specific to various ASC NEPM (NEPC 2013) land use scenarios. The derivation of these HILs is simple though conservative and is based on acceptable indoor air concentrations (based on US EPA guidelines) with an attenuation factor of 0.1 applied to account for the attenuation factor between concentrations in soil gas immediately below the building foundation and indoor air concentrations.

ASC NEPM (NEPC 2013) land use scenario A / B (residential land use) and land use scenario D (commercial land use) have been adopted for assessing the potential risks to human health via the vapour inhalation pathway. The HILs are based on generally conservative assumptions for the estimated allowable exposure dependant on land use. An exceedance of a screening level does not indicate that there is an unacceptable risk to human health, but rather that further site-specific assessment is required to quantify the potential risk to human health in the selected land use scenario. Further site-specific assessment includes property specific sampling (indoor air and crawlspace) and/or vapour intrusion modelling.

It is noted that neither the ASC NEPM (NEPC 2013) nor the US EPA[1] (discussed further below) provide criteria for trans-1,2-DCE. In the absence of Tier 1 screening levels for trans-1,2-DCE, assessment against the Tier 1 screening level adopted for cis-1,2-DCE (that provided within the ASC NEPM [NEPC 2013]) has been undertaken. This is considered to be conservative, given the relative toxicity of trans-1,2-DCE compared to cis-1,2-DCE.

4.1.2 United States Environmental Protection Agency

The US EPA (2020) provides *Regional Screening Levels (RSLs)* for a large number of chemicals. In the absence of criteria in the ASC NEPM (NEPC 2013) for 1,1-DCE, the RSL for residential air has been adopted as the Tier 1 screening level for this chemical. The RSLs (US EPA 2020) provide a noncarcinogenic screening level for 1,1-DCE – a hazard index (HI) of 0.1 has been adopted for screening purposes in order to assess potential additive effects between chemicals.

The RSLs (US EPA 2020) are for ambient air rather than soil vapour. An attenuation factor has been applied to the ambient air guidelines using a soil vapour to indoor air attenuation factor of 0.1, as consistent with that adopted in the ASC NEPM (NEPC 2013) for the derivation of the HILs. The result of this is that the Tier 1 soil vapour screening level adopted for this assessment is 10 times greater than the RSL presented by the US EPA (2020) for ambient air.

4.2 Groundwater

4.2.1 Overview

The *Environment Protection (Water Quality) Policy 2015* (WQEPP 2015) identifies a range of protected beneficial uses of underground waters in South Australia. EPA[2] provides the following hierarchical order for the protected environmental values of groundwater:

[1] *Regional Screening Levels*, United States Environmental Protection Agency, November 2020 (US EPA 2020).

[2] *Guidelines for the assessment and remediation of site contamination,* Environment Protection Authority South Australia, November 2019 (EPA 2019b).

1. Drinking water
2. Recreation and aesthetics
3. Aquatic ecosystem (marine and freshwater)
4. Primary industries (agriculture [irrigation, general water uses and livestock] and aquaculture).

In addition, human health in non-use scenarios (i.e. exposure to volatile contaminants via vapour intrusion) is required to be considered where volatile chemicals are present.

4.2.2 Assessment of Relevant Protected Environmental Values of Groundwater

The risk-based approach for assessing groundwater contamination outlined in the ASC NEPM (NEPC 2013) and by EPA (2019b) is based on protection of relevant (i.e. current or realistic) environmental values of groundwater. The assessment of relevant environmental values of groundwater at any given site includes the following in accordance with EPA (2019b):

1. Assessment of environmental values of groundwater on the basis of total dissolved solids (TDS) – environmental values of groundwater which are assessed by this step include drinking water and primary industries (agriculture [irrigation, general water uses and livestock] and aquaculture). Recreation and aesthetics, and aquatic ecosystems (marine and freshwater) are not assessed on the basis of TDS. The TDS assessment is included in **Section 4.2.2.1**;
2. Identification and assessment of surface water bodies within a 2 km radius of the site – environmental values of groundwater which are assessed by this step include recreation and aesthetics, and aquatic ecosystems (marine and freshwater). Drinking water and primary industries (agriculture [irrigation, general water uses and livestock] and aquaculture) are not assessed on the basis of proximity to surface water bodies. The surface water body assessment is included in **Section 4.2.2.2**; and
3. Identification and assessment of registered bores within a 2 km radius of the site – environmental values of groundwater which are assessed by this step include drinking water, recreation and aesthetics, and primary industries (agriculture only [irrigation, general water uses and livestock]). The assessment of registered bores within a 2 km radius of the site is included in **Section 4.2.2.3.**

4.2.2.1 Assessment of Total Dissolved Solids at the Site

The WQEPP (2015) provides TDS ranges for the protected environmental values of groundwater. Where groundwater has TDS above the range for a particular protected environmental value, the groundwater quality is unlikely to support this particular protected environmental value of groundwater. However, environmental values of groundwater cannot be excluded on the basis of TDS alone.

A summary of the assessment of protected environmental values of groundwater based on TDS at the site is included below in **Table 4.1**. The TDS reported at GW3034b (the only groundwater well present at the site to date) has been adopted for screening purposes.

Table 4.1: Summary of Assessment of Protected Environmental Values of Groundwater Based on Total Dissolved Solids at the Site

Protected environmental value of groundwater	TDS range (WQEPP 2015)	Lowest TDS reported at the site	Relevant at the site based on TDS?
Drinking water	Below 1,200 mg/L	2,800 mg/L[#1]	Not relevant
Primary industries – irrigation and general water uses	Below 3,000 mg/L		Relevant
Primary industries – livestock	Below 13,000 mg/L		Relevant
Primary industries – aquaculture and human consumption of aquatic foods	Below 13,000 mg/L		Relevant
Notes: #1: TDS calculated from the electrical conductivity reported at GW3034b (5.039 mS/cm).			

4.2.2.2 Assessment of Surface Water Bodies within a 2 km Radius of the Melrose Park EPA Assessment Area

An assessment of surface water bodies within a 2 km radius of the Melrose Park EPA Assessment Area was undertaken in order to assess whether surface water bodies were present within this radius of the site, and if present, whether there was potential inter-connectivity with groundwater.

There were no surface water bodies identified within a 2 km radius of the Melrose Park EPA Assessment Area. It is noted Brown Hill Creek (2.9 km north-east), Sturt River (2.3 km south-west) and the Oaklands Wetlands (2.5 km west) are the closest surface water bodies to the Melrose Park EPA Assessment Area (shown in **Figure 3**).

Given no surface water bodies are present within a 2 km radius of the site, aquatic ecosystems (marine and freshwater) and aquaculture are not relevant protected environmental values of groundwater for the Melrose Park EPA Assessment Area.

4.2.2.3 Assessment of Registered Bores within a 2 km Radius of the Melrose Park EPA Assessment Area

A search of the WaterConnect[3] database was undertaken on 19 April 2021 in order to assess whether operational bores were present within a 2 km radius of the Melrose Park EPA Assessment Area, and if present, whether these bores were likely targeting the shallow aquifer and used for beneficial purposes.

The search identified a total of 1,231 registered bores within a 2 km radius of the Melrose Park EPA Assessment Area. The following registered bores within a 2 km radius of the site were then excluded:

- Bores with drillhole class of engineering;
- Bores which have been backfilled, abandoned, reported as dry and reported as not in use;
- Bores registered for environmental, drainage or investigation / observation / monitoring purposes;
- Bores with no listed purpose; and
- Bores installed within a deeper aquifer which has been assumed to be all bores reported to be installed in aquifers other than the Q1.

Following the above exclusions, a total of 116 bores remained, as follows:

- 107 bores were registered for domestic use;
- Six bores were registered for irrigation;

[3] https://www.waterconnect.sa.gov.au/Systems/GD/Pages/Default.aspx (accessed online 19 April 2021)

- Two bores were registered for recreational / environmental use; and
- One bore was registered for industrial use.

Of the above relevant bores, two bores (6628-13583 and 6628-15413) are present within the Melrose Park EPA Assessment Area. A summary of the key information for these bores is included below in **Table 4.2**.

Table 4.2: Summary of Key Information for Relevant Registered Bores within the Melrose Park EPA Assessment Area

Registered Bore ID	Installed Depth (mbgl)	Standing Water Level (mbgl)	Purpose	Status	TDS (mg/L)
6628-15413	7.5	6	Domestic	Operational	1,732
6628-13583	14.6	3	Domestic	Operational	2,318

The relevant registered bores are shown in **Figure 4**. Information from the WaterConnect database for the relevant registered bores is included in **Appendix G**.

4.2.2.4 Summary of Relevant Protected Environmental Values of Groundwater

Based on the TDS assessment, the assessment of surface water bodies within a 2 km radius of the Melrose Park EPA Assessment Area and the registered bore search within a 2 km radius of the Melrose Park EPA Assessment Area, the following environmental values of groundwater have been considered as relevant at the site:

- Drinking water;
- Recreation and aesthetics; and
- Irrigation.

4.2.3 Sources of Groundwater Tier 1 Screening Levels

Groundwater results were compared against the Tier 1 screening levels outlined in **Table 4.3** for the relevant protected environmental values of groundwater outlined in **Section 4.2.2.4**. It is noted the protected environmental values of groundwater are listed in hierarchical order.

Table 4.3: Adopted Tier 1 Screening Levels for Relevant Protected Environmental Values of Groundwater

Relevant Protected Environmental Values of Groundwater		Adopted Tier 1 Screening levels
Hierarchical Order	Description	Reference
1	Drinking water	• ADWG[#1] (NHMRC 2018) Health[#2] • ADWG[#1] (NHMRC 2018) Aesthetics
2	Recreation and aesthetics	• ADWG[#1] (NHMRC 2018) Health x10[#3] • ADWG[#1] (NHMRC 2018) Aesthetics
3	Irrigation	No available criteria for the chemicals of interest (CEs) – assessed via collection of soil vapour data
N/A	Vapour Inhalation	No available criteria for the chemicals of interest (CEs) – assessed via collection of soil vapour data

Notes:
#1: *Australian Drinking Water Guidelines 6, Version 3.5,* National Health and Medical Research Council, 2011 Updated August 2018 (NHMRC 2018).
#2: Tier 1 screening level for TCE adopted from *Trichloroethene in drinking-water, Background document for development of WHO Guidelines for drinking-water quality*, World Health Organisation, 2020 (WHO 2020).
#3: As per the *Guidelines for Managing Risks in Recreational Water,* National Health and Medical Research Council, 2008 (NHMRC 2008), a recreational exposure is assumed to be consumption of 100 ml/day to 200 ml/day and thus drinking water criteria (which assumes consumption of 2 L/day) can be adjusted to account for this difference in exposure by multiplication of drinking water criteria by a factor of 10.
#4: *Australian and New Zealand Guidelines for Fresh and Marine Water Quality,* Australian and New Zealand Environment and Conservation Council, 2000 (ANZECC 2000).

5. Data Quality Assessment

The data quality indicators (DQIs) are summarised in **Appendix H**. A detailed review of the quality assurance / quality control (QA/QC) measures implemented during the March 2021 works program to address the DQIs is also included in **Appendix H**.

Based on the results of the evaluation of the QA/QC data, it is considered that:

- The field and laboratory QA measures implemented provide an acceptable level of confidence that the data collected and reported is appropriately complete, comparable and representative; and
- The field and laboratory QC measures implemented provide an acceptable level of confidence that the data collected and reported is appropriately accurate and precise.

Therefore, the data collected during the March 2021 works program is reliable and suitable for the assessment of the condition of the site.

6. Results and Discussion

6.1 Soil Vapour

6.1.1 Rainfall Prior to Soil Vapour Sample Collection

Daily weather observation data from the Bureau of Meteorology (BoM) for March 2021 is included in **Appendix I**. The following was noted:

- Rainfall recorded within a 72 hour period of sampling (i.e. on 27, 28 and 29 March 2021) was 4.6 mm;
- An additional 0.4 mm was reported two days prior to that (i.e. on 25 March 2021); and
- There were ten days of no rainfall prior to that (i.e. from 15 to 24 March 2021, inclusive).

The ASC NEPM (NEPC 2013) states that sampling of soil vapour directly after significant rainfall events (defined as greater than 25 mm) should be avoided for soil vapour probes installed to depths shallower than 1.5 mbgl. Given the rainfall reported in the days immediately prior to sampling was well below 25 mm, the sampling timing is considered appropriate to assess soil vapour concentrations.

6.1.2 Soil Vapour Sampling Field Measurements – General Gases and PID

Measurements of general gases (carbon dioxide, methane, oxygen, hydrogen sulphide, carbon monoxide and balance) and VOCs (via a PID) were recorded as part of the sampling procedure. These measurements have been summarised in the **Summary Tables**. The following was noted:

- Methane, carbon monoxide and hydrogen sulphide were reported at negligible concentrations;
- Carbon dioxide was reported at elevated concentrations between 1.6 %v/v and 4.6 %v/v, consistent with expectations of soil vapour at a depth of 1.2 mbgl within predominately sealed areas;
- Oxygen was reported at reduced concentrations as compared to ambient air (approximately 21 %), ranging between 17 %v/v and 19.5 %v/v. The oxygen concentrations are consistent with expectations of soil vapour at depths of 1.2 mbgl within predominately sealed areas, and with the reported carbon dioxide concentrations – this indicates no significant leakage and/or short circuiting in the soil vapour probe;
- PID values ranged between 0.5 ppm at SVP04 to 2.7 ppm at SVP05. Field VOCs vs laboratory CEs are discussed in **Section 6.1.4**.

6.1.3 Soil Vapour Analytical Results – March 2021

The soil vapour laboratory certificates of analysis and COC documentation is included in **Appendix J**. Analytical results have also been tabulated and are included in the **Summary Tables**. The reported CE concentrations reported above the laboratory limit of reporting (LOR) are shown spatially in **Figure 5**.

TCE and 1,1-DCE were reported at concentrations above the adopted soil vapour Tier 1 screening levels – locations / concentrations exceeding the adopted soil vapour Tier 1 screening levels are summarised below in **Table 6.1**.

Table 6.1: Soil Vapour Concentrations Exceeding Adopted Tier 1 Screening Levels

Chemical	Soil Vapour Probe ID	Concentration µg/m³	Tier 1 Soil Vapour Screening Level Exceeded
TCE	SVP01	7,000	• Residential: 20 µg/m³ • Commercial / Industrial: 80 µg/m³
	SVP02	5,800#1	
	SVP03	8,100	
	SVP04	3,100	
	SVP05	14,000	
1,1-DCE	SVP01	540	• Residential: 210 µg/m³
	SVP02	400#1	
	SVP05	350	

Notes:
#1:Concentration reported in duplicate sample displayed as this concentration was higher than that reported in the primary sample.

6.1.4 Field Measurement of VOCs Vs Laboratory Reported CE Concentrations

The field measurements of VOCs collected via a PID were compared to the laboratory reported CE concentrations, as summarised in **Table 6.2**.

The laboratory reported CE concentrations aligned with the field measurement of VOCs.

Table 6.2: Field Measurement of VOCs Vs Laboratory Reported CE Concentrations

Soil Vapour Probe ID	PID (ppm)	Laboratory CEs (µg/m³)#1
SVP01	1.3	7,640
SVP02	0.9	6,236
SVP03	1.6	8,164
SVP04	0.5	3,151
SVP05	2.7	14,691
Notes: #1: The sum of all CEs reported above the LOR.		

6.2 Geotechnical

A geotechnical sample was collected from one location (GB01), with the core from 0.6 mbgl to 0.7 mbgl analysed for geotechnical parameters. Results of this analysis are included in the laboratory certificates of analysis in **Appendix K**, and are summarised below in **Table 6.3**. It is noted these results are similar to geotechnical sample results for the adjacent South-Eastern Edwardstown EPA Assessment Area[4].

Table 6.3: Summary of Geotechnical Parameter Results

Sample Location	Bulk Density (t/m³)	Moisture (%)	Dry Density (t/m³)	Void Ratio	Degree of Saturation (%)	Porosity
GB01	2.01	20.5	1.67	0.58	92.6	0.37

6.3 Groundwater

6.3.1 Groundwater Sampling Field Observations

The following observations were made during the sampling of GW3034b:

- Standing water level was reported at 3.372 m below top of casing (mTOC);
- NAPL was not observed;
- No visually obvious sheen or notable odour was observed;
- GW3034b reported a sustainable yield of approximately 180 ml/min; and

[4] Reported in *June 2020 Soil Vapour Monitoring Event and Update of Vapour Intrusion Risk Assessment, South-Eastern Edwardstown EPA Assessment Area,* JBS&G Australia Pty Ltd, 10 July 2020 (JBS&G 2020).

- Groundwater was observed to be of medium to high turbidity.

6.3.2 Groundwater Sampling Field Measurements – Water Quality Parameters

The following water quality parameters were reported at GW3034b:

- DO was low (0.45 ppm);
- Redox potential was reported to be 422 mV Standard Hydrogen Electrode (SHE), which is indicative of oxidising conditions;
- pH was neutral (7.11 pH units); and
- EC was 5,039 µS/cm and 9,720 µS/cm (approximately 2,800 mg/L TDS).

6.3.3 Groundwater Analytical Results – March 2021

The groundwater laboratory certificates of analysis and COC documentation is included in **Appendix L**. Analytical results have also been tabulated and are included in the **Summary Tables**. The reported CE concentrations reported above the LOR are shown spatially in **Figure 5**.

TCE and 1,1-DCE were reported at concentrations above the adopted groundwater Tier 1 screening levels – concentrations exceeding the adopted groundwater Tier 1 screening levels are summarised below in **Table 6.4**. Site contaminations exists within the Melrose Park EPA Assessment Area in accordance with the definition provided in the *Environment Protection Act 1993*.

Table 6.4: Groundwater Concentrations Exceeding Adopted Tier 1 Screening Levels at GW3034b

Chemical	Concentration µg/L	Tier 1 Groundwater Screening Level Exceeded
TCE	1,200	• Drinking Water (Health): 8 µg/L • Recreation / Aesthetics (Health): 80 µg/L
1,1-DCE	110	• Drinking Water (Health): 30 µg/L
Notes: #1:Concentration reported in duplicate sample displayed as this concentration was higher than that reported in the primary sample.		

6.3.4 Previous Groundwater Analytical Results at GW3034b

A comparison of the TCE and 1,1-DCE concentrations reported at GW3034b in the three monitoring events completed to date is included in **Table 6.5**, noting the other CEs analysed (PCE, cis-1,2-DCE, trans-1,2-DCE and VC) were reported below the LOR in all samples in all monitoring events.

The TCE and 1,1-DCE concentrations reported at GW3034b were consistent in the three monitoring events completed to date.

Table 6.5: Comparison of TCE Concentrations Reported at GW3034b in January 2021, February 2021 and March 2021

Sampling Date	TCE Concentration	1,1-DCE Concentration	Sampling Methodology
29-Jan-21	1,200 µg/L	110 µg/L	Hydrasleeve
26-Feb-21	1,200 µg/L	94 µg/L	Hydrasleeve
30-Mar-21	1,200 µg/L (1,400 µg/L in DUP01; 1,200 µg/L in SPLIT01)	110 µg/L (130 µg/L in DUP01; 93 µg/L in SPLIT01)	Low flow

7. Conceptual Site Model

The ASC NEPM (NEPC 2013) identifies a conceptual site model (CSM) as a representation of site related information regarding contamination sources, receptors and exposure pathways between those sources and receptors. The development of a CSM is an essential part of all site assessments.

The essential elements of a CSM (as outlined in the ASC NEPM [NEPC 2013]) include:

- Known and potential sources of contamination and contaminants of potential concern (COPCs);
- Potentially affected media (soil, sediment, groundwater, surface water, indoor or ambient air);
- Landuse and building design;
- Preferential pathways for vapour intrusion (where volatile chemicals are COPC);
- Human and ecological receptors; and
- Potential and complete exposure pathways.

The preliminary CSM is presented in **Table 7.1**.

Table 7.1: Preliminary Conceptual Site Model

Element of CSM	Discussion
Potential sources of contamination	At EPA's request, the investigation undertaken was targeted to one groundwater well (GW3034b) where elevated concentrations of CEs have been reported. No site history investigation has been undertaken to date to attempt to identify the potential source(s) of this contamination.
COPCs associated with the potential sources of contamination	At EPA's request, this investigation was limited to CEs.
Potentially affected media	• Soil • Groundwater • Soil vapour • Indoor air
Landuse and building design	The Melrose Park EPA Assessment Area is predominately used for commercial / industrial purposes, however, two properties potentially used for residential purposes were identified (shown in **Figure 6)**.
Geology	Limited intrusive investigations have been completed onsite to date, including the installation of five soil vapour probes to a depth of 1.2 mbgl and one groundwater well to a depth of 6.5 mbgl. Soils observed during the installation of the soil vapour probes and groundwater well included shallow surface fill consisting of sandy gravel / gravelly sand to a depth of approximately 0.1 mbgl to 0.3 mbgl, underlain by silty sandy clay at two locations to a depth of approximately 0.5 mbgl. Natural soils underlying the fill material consisted of silty sandy clay of medium to high plasticity. Based on a review of published geological survey information[5], the site is likely to be underlain by the Pooraka Formation which consists of pale red brown sandy clay with carbonate of the Loveday Soil.
Hydrogeology	Based on the one groundwater well (GW3034b) currently present within the Melrose Park EPA Assessment Area, groundwater in the upper Quaternary aquifer (Q1 Aquifer) is encountered approximately 3.5 mbgl. Electrical conductivity was reported to be 5.039 mS/cm, which equates to an approximate TDS of 2,800 mg/L.

[5] *Adelaide Map Sheet SI54-9 1:125,000 Geological Survey of South Australia – Map Series Edition 1,* Department of Mines, 1969 (DoM 1969).

Element of CSM	Discussion
	A search of the WaterConnect[6] database undertaken on 19 April 2021 identified two bores (6628-15413 and 6628-13583) installed in the Q1 aquifer within the Melrose Park EPA Assessment Area. The following was noted: • Both bores were registered for domestic use and listed as operational; • The bores were installed to depths of 7.5 mbgl and 14.6 mbgl, respectively; • The standing water level was 6 mbgl and 3 mbgl, respectively; and • The TDS was 1,732 mg/L and 2,318 mg/L, respectively. The Edwardstown Groundwater Prohibition Area (GPA) is present to the west (beyond South Road), north (beyond Marion Street) and north-west of the Melrose Park EPA Assessment Area (i.e. the Melrose Park EPA Assessment Area is outside of the current GPA). The purpose of the GPA is to prevent current and future landholders from accessing contaminated groundwater.
Preferential pathways for vapour intrusion	Detailed assessment of service trenches was beyond the scope of this investigation, noting that the source of the contamination is currently unknown. Notwithstanding, the following was noted: • There are a large number of services in footpaths and road verges within the Melrose Park EPA Assessment Area, and these service trenches, if filled with sand or gravels, have the potential to act as preferential pathways for vapour migration; • Significant fill has not been reported onsite during the investigations completed to date, however, investigations have been limited to footpaths. There is potential for more significant fill to be present on the various commercial / industrial properties within the Melrose Park EPA Assessment Area. If significant sandy / gravelly fill were present, this may have the potential to act as a preferential pathway for vapour migration; and • Natural soils are expected to consist of the Pooraka Formation, which may be associated with bands of significantly porous materials.
Human and ecological receptors	The following human receptors were identified under the current landuse: • Residents (adults and children); • Commercial / industrial workers; and • Sub-surface maintenance workers. The following ecological receptors were identified under the current landuse: • Native flora and fauna; • Introduced flora and fauna; • Transitory wildlife; and • Biota supporting ecological processes.
Potential exposure pathways	The following potential exposure pathways have been identified: • Dermal contact with soil; • Incidental ingestion of soil; • Inhalation of dust; • Consumption of fruit / vegetables / eggs grown in impacted soil; • Dermal contact with groundwater (noting all residents, workers and landowners of sites within the Melrose Park EPA Assessment Area have been advised that groundwater [bore water] is contaminated and should not be used for any purpose); • Incidental ingestion of groundwater (noting all residents, workers and landowners of sites within the Melrose Park EPA Assessment Area have been advised that groundwater [bore water] is contaminated and should not be used for any purpose); • Consumption of fruit / vegetables irrigated with groundwater (noting all residents, workers and landowners of sites within the Melrose Park EPA Assessment Area have been advised that groundwater [bore water] is contaminated and should not be used for any purpose); and • Inhalation of vapour.

[6] http://www.waterconnect.sa.gov.au/Systems/GD/Pages/Default.aspx (accessed online 19 April 2021).

8. Vapour Intrusion Risk Assessment

8.1 Potential Exposure Pathways Requiring Further Assessment

A number of potential exposure pathways were identified in the CSM (**Section 7**). Of these potential exposure pathways, further assessment has been undertaken for the inhalation pathway only, given to the following:

- There is no soil data available, and therefore it is not possible to assess the potential exposure pathways associated with soil (dermal contact with soil, incidental ingestion of soil, inhalation of dust, and consumption of fruit / vegetables / eggs grown in impacted soil); and
- All residents, workers and landowners of sites within the Melrose Park EPA Assessment Area have been advised that groundwater (bore water) is contaminated and should not be used for any purpose. To this end, potential exposure pathways associated with groundwater (dermal contact with groundwater, incidental ingestion of groundwater, and consumption of fruit / vegetables irrigated with groundwater) are not considered to be complete.

8.2 Overview of Inhalation Pathway Exposure Scenarios Requiring Further Assessment

The CSM (**Section 7**) identified the following human receptors:

- Residents (adults and children);
- Commercial / industrial workers; and
- Sub-surface maintenance workers.

As outlined in **Section 6.1.3**, TCE and cis-1,2-DCE were reported at concentrations exceeding the adopted soil vapour Tier 1 screening levels, as follows:

- TCE was reported at concentrations exceeding soil vapour Tier 1 screening levels for both residential and commercial / industrial landuse; and
- cis-1,2-DCE was reported at concentrations exceeding soil vapour Tier 1 screening levels for residential landuse.

Given the CEs were reported above the adopted soil vapour Tier 1 screening levels for both residential and commercial / industrial landuse, these scenarios require further assessment. In addition, there are no soil vapour Tier 1 screening levels for subsurface maintenance workers and hence this scenario also requires further assessment.

It is noted the risk assessment for residents and commercial/industrial workers is adequately protective of visitors to these sites.

8.3 Parameters Adopted in Modelling

8.3.1 Exposure Factors and Estimation of Inhalation Exposure

The adopted exposure factors for a resident are summarised below in **Table 8.1**.

Table 8.1: Exposure Parameters – Resident

Exposure Parameter	Units	Factor	Reference
Exposure Frequency (EF)	days/year	365	ASC NEPM (NEPC 2013)
Exposure Time (ET) – Indoors	hours	20	ASC NEPM (NEPC 2013)
Exposure Duration (ED)	years	35	ASC NEPM (NEPC 2013)
Averaging Time (AT) – non-Threshold	years	70	ASC NEPM (NEPC 2013)
Averaging Time (AT) – Threshold	years	35[#1]	ASC NEPM (NEPC 2013)
Notes: #1: Consistent with exposure duration.			

The adopted exposure factors for a commercial worker are summarised below in **Table 8.2**.

Table 8.2: Exposure Parameters – Commercial Worker

Exposure Parameter	Units	Factor	Reference
Exposure Frequency (EF)	days/year	240	ASC NEPM (NEPC 2013)
Exposure Time (ET) – Indoors	hours	8	ASC NEPM (NEPC 2013)
Exposure Duration (ED)	years	30	ASC NEPM (NEPC 2013)
Averaging Time (AT) – non-Threshold	years	70	ASC NEPM (NEPC 2013)
Averaging Time (AT) – Threshold	years	30[#1]	ASC NEPM (NEPC 2013)
Notes: #1: Consistent with exposure duration.			

The adopted exposure factors for a subsurface maintenance / construction (trench) worker are summarised below in **Table 8.3**.

Table 8.3: Exposure Parameters – Subsurface Maintenance / Construction (Trench) Worker

Exposure Parameter	Units	Factor	Reference
Exposure Frequency (EF)	days/year	20	CRCCARE 2011[#1]
Exposure Time (ET) – Indoors	hours	8	CRCCARE 2011[#1]
Exposure Duration (ED)	years	30	CRCCARE 2011[#1]
Averaging Time (AT) – non-Threshold	years	70	ASC NEPM (NEPC 2013)
Averaging Time (AT) – Threshold	years	30[#2]	ASC NEPM (NEPC 2013)
Notes: #1: The ASC NEPM (NEPC 2013) does not provide EF, ET and ED for this exposure scenario and hence parameters provided by CRCCARE (2011) have been adopted. #2: Consistent with exposure duration.			

Inhalation exposures have been estimated by the approach outlined by US EPA[7]. Equations are provided below for estimating exposure concentrations for assessing cancer risks and for calculating hazard index (HI) from chronic exposures:

EC = Adjustment factor*CA

Adjustment factor = (ET*EF*ED)/AT

Where:

EC – exposure concentration (µg/m^3);

CA – contaminant concentration in air (µg/m^3);

ET – exposure time (hours/day)

EF – exposure frequency (days/year)

ED – exposure duration (years)

AT – averaging time (hours),
= 70 years*365 days/year*24 hours/day, for non-threshold exposure

= ED in years*365 days/year*24 hours/day, for threshold exposure.

The adjustment factors for inhalation exposure, as calculated based on the above equations and exposure factors outlined above, are summarised below in **Table 8.4**.

[7] *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part F, Supplemental Guidance for Inhalation Risk Assessment),* United States Environment Protection Agency, January 2009 (US EPA 2009).

Table 8.4: Summary of Adjustment Factors and Formula for Calculation of Exposure Concentration for Inhalation Exposure

Receptor	Adjustment Factor – Cancer Risks (Non-Threshold Exposure)	Adjustment Factor – Hazard Index (Threshold Exposure)
Residential dwelling (slab on grade without basement)	0.42 * CA in dwelling	0.83 * CA in dwelling
Commercial building (slab on grade)	$9.4*10^{-2}$ * CA in building	0.22 * CA in building
Subsurface maintenance trench / excavation to 1 mbgl	$7.8*10^{-3}$ * CA in trench / excavation to 1 mbgl	$1.8*10^{-2}$ * CA in trench / excavation to 1 mbgl

8.3.2 Characterisation of Exposure Areas

Residential Dwellings

The residential dwelling type of slab on grade has been considered, consistent with the likely construction of the residential properties in closest proximity to the investigation locations assessed during the Stage 1 Environmental Assessment. As no inspections / interviews have been completed to confirm the construction of these properties, the crawlspace dwelling scenario has been assessed in **Section 8.7**. It is noted that it is not possible to assess the slab on grade with basement dwelling scenario from the available soil vapour data.

The adopted residential dwelling parameters for a slab on grade dwelling are summarised below in **Table 8.5**. Fate and transport to residential dwellings of slab on grade construction has included assessment of diffusive and advective vapour movement.

Table 8.5: Summary of Adopted Building Parameters – Residential Dwelling, Slab on Grade (Without Basement)

Parameter	Adopted Value	Reference
Enclosed floor length	15 m	CRCCARE (2011)[8]
Enclosed floor width	10 m	CRCCARE (2011)
Enclosed space height of upper floor(s)	2.4 m	CRCCARE (2011)
Foundation thickness	10 cm	CRCCARE (2011)
Ventilation / air exchanges (building)	0.6 h^{-1}	CRCCARE (2011)
Fraction of foundation present as cracks	0.001	CRCCARE (2011)
Porosity in foundation cracks	0.38	CRCCARE (2011)
Water content in foundation cracks	0.12	CRCCARE (2011)
Q_{soil}:$Q_{building}$	0.005	CRCCARE (2011)

Commercial Buildings

Commercial buildings have been characterised as slab on grade structures and basements have not been considered.

The adopted commercial building parameters are summarised below in **Table 8.6**. Fate and transport to commercial buildings of slab on grade construction has included assessment of diffusive and advective vapour movement.

[8] *CRC CARE Technical Report No.10: Health screening levels for petroleum hydrocarbons in soil and groundwater*, CRC for Contamination Assessment and Remediation of the Environment, September 2011 (CRCCARE 2011).

Table 8.6: Summary of Adopted Building Parameters – Commercial Building

Parameter	Adopted Value	Reference
Enclosed floor length	20 m	CRCCARE (2011)
Enclosed floor width	20 m	CRCCARE (2011)
Enclosed space height	3 m	CRCCARE (2011)
Foundation thickness	15 cm	CRCCARE (2011)
Ventilation / air exchanges (building)	0.83 h^{-1}	CRCCARE (2011)
Fraction of foundation present as cracks	0.001	CRCCARE (2011)
Porosity in foundation cracks	0.38	CRCCARE (2011)
Water content in foundation cracks	0.12	CRCCARE (2011)
Q_{soil}:$Q_{building}$	0.005	CRCCARE (2011)

Sub-Surface Maintenance Trenches / Excavations

The adopted parameters for subsurface maintenance trenches / excavations are summarised below in **Table 8.7**. It is noted subsurface maintenance trenches / excavations are assumed to occur outside of buildings.

Table 8.7: Summary of Adopted Building Parameters – Subsurface Maintenance Trench / Excavation

Parameter	Adopted Value	Reference
Enclosed floor length	10 m	CRCCARE (2011)
Enclosed floor width	1 m	CRCCARE (2011)
Enclosed space height	1 m	CRCCARE (2011)
Foundation thickness	0.001 (i.e. no foundation)	CRCCARE (2011)
Ventilation / air exchanges	87.5 h^{-1}	CRCCARE (2011)
Fraction of foundation present as cracks	1 (i.e. no foundation)	CRCCARE (2011)
Porosity in foundation cracks	1	CRCCARE (2011)
Water content in foundation cracks	0 (i.e. all air)	CRCCARE (2011)

8.3.3 Characterisation of Site Physical Parameters

Soils within the Melrose Park EPA Assessment Area were observed to include shallow surface fill consisting of sandy gravel / gravelly sand to a depth of approximately 0.1 mbgl to 0.3 mbgl, underlain by silty sandy clay at two locations to a depth of approximately 0.5 mbgl. Natural soils underlying the fill material consisted of silty sandy clay of medium to high plasticity. Clay was the predominant soil type reported in the surficial 1.2 m.

Geotechnical data is available for one location (GB01) – this data has been adopted for the site physical parameters (summarised in **Table 8.8**). It is noted published data for clayey soils have been adopted for comparison in the sensitivity analysis (**Section 8.7**).

Table 8.8: Summary of Adopted Site Physical Parameters

Parameter	Adopted Value	Reference
Total porosity	0.37	Site data (**Section 6.2**)
Water filled porosity	0.34[#1]	Site data (**Section 6.2**)
Air filled porosity	0.03[#1]	Site data (**Section 6.2**)
Bulk Density	2.01 t/m^3	Site data (**Section 6.2**)

Notes:

#1:Based on total porosity (0.37) and degree of saturation (92.6 %).

8.3.4 Characterisation of Chemicals of Interest

As outlined in **Section 8.1**, the chemicals exceeding the adopted soil vapour Tier 1 screening criteria and requiring further assessment are TCE and 1,1-DCE. The properties of the chemicals of interest (as per the Risk Assessment Information System[9]) are summarised in **Table 8.9**.

Table 8.9: Summary of the Properties of the Chemicals of Interest (RAIS 2021)

Chemical Properties	Henry's Law Constant at 25°C (-)	Diffusivity in Air (cm^2/s)	Diffusivity in Water (cm^2/s)	Water Solubility (mg/L)
TCE	0.403	$6.87x10^{-2}$	$1.02x10^{-5}$	1,280
1,1-DCE	0.107	$8.63x10^{-2}$	$1.10x10^{-5}$	2,420

Toxicity and background intake data for all chemicals requiring further assessment in the VIRA is summarised below in **Table 8.10.**

Table 8.10: Summary of Toxicity and Background Intakes for Chemicals of Interest

Chemical	Inhalation TRV		Background (% of TRV)	Source
	Unit Risk (Carcinogenic Endpoints) $(mg/m^3)^{-1}$	Inhalation Toxicity (Non-Carcinogenic Endpoints) (mg/m^3)		
TCE	0.004	0.002	10	ASC NEPM (NEPC 2013)
1,1-DCE	N/A[#1]	0.2	0[#2]	US EPA (2002)[#3]

Notes:
#1:Classified as 'inadequate information to assess the carcinogenic potential' – NEPC (2013) states it is appropriate that a threshold dose-response (i.e. non-carcinogenic) approach is adopted.
#2: As per the ASC NEPM (NEPC 2013) recommendation for cis-1,2-DCE.
#3: *Toxicological Review of 1,1-dichloroethylene, In Support of Summary Information on the Integrated Risk Information System,* US Environmental Protection Agency, June 2002 (US EPA 2002).

8.3.5 Source Data

Soil vapour data from SVP01-SVP05 has been adopted for the Tier 1 assessment of the resident and commercial / industrial worker exposure scenarios. Only chemicals exceeding the adopted soil vapour Tier 1 screening criteria for each exposure scenario have been included in the quantitative assessment of risk (i.e. TCE and cis-1,2-DCE for residential dwellings; TCE for commercial buildings). As there are no soil vapour Tier 1 screening criteria for the exposure of subsurface maintenance / construction (trench) workers via the inhalation pathway for the chemicals of interest, both TCE and cis-1,2-DCE have been assessed for this exposure scenario.

The adopted source data, including maximum reported concentration and depth from source to building foundation or subsurface maintenance trench / excavation, are summarised below in **Table 8.11**.

Table 8.11: Summary of Adopted Source Data

Exposure Scenario	Adopted Concentration of Chemical of Interest ($\mu g/m^3$)	Rationale	Adopted Depth from Source to Building Foundation
Residential dwelling	• TCE: 14,000 $\mu g/m^3$ (SVP05) • cis-1,2-DCE: 540 $\mu g/m^3$ (SVP01)	Maximum TCE and cis-1,2-DCE concentrations reported to date in soil vapour	1 mbgl (depth from soil vapour probe to building foundation)
Commercial building	• TCE: 14,000 $\mu g/m^3$ (SVP05)	Maximum TCE concentration reported to date in soil vapour	1 mbgl (depth from soil vapour probe to building foundation)
Subsurface maintenance trench / excavation to 1 mbgl	• TCE: 14,000 $\mu g/m^3$ (SVP05) • cis-1,2-DCE: 540 $\mu g/m^3$ (SVP01)	Maximum TCE and cis-1,2-DCE concentrations reported to date in soil vapour	0.1 mbgl (depth from soil vapour probe to base of trench)

[9] https://rais.ornl.gov/cgi-bin/tools/TOX_search?select=chemspef (accessed online 16 April 2021).

8.3.6 Use of RISC Modelling Package

The *Johnson and Ettinger Model Spreadsheet Tool, Version 6.0,* US EPA, 2017 (US EPA 2017) has been utilised for the fate and transport modelling. The spreadsheet model uses J&E relationships in estimating transport of volatile constituents into human breathing zones. Exposure parameters, building and subsurface maintenance trench / excavation parameters, site physical parameters and chemical parameters have been updated as outlined in **Section 8.3.1** to **Section 8.3.5**.

8.4 Fate and Transport Modelling Outcomes – Calculation of Indoor Air Concentration

Modelling spreadsheets are included in **Appendix M**. The predicted indoor air concentrations for all exposure scenarios are summarised below in **Table 8.12**.

Table 8.12: Predicted Indoor Air Concentrations (µg/m^3)

Exposure Scenario	Predicted Indoor Air Concentration (µg/m^3)	
	TCE	1,1-DCE
Residential dwelling (slab on grade without basement)	$3.8*10^{-2}$	$1.10*10^{-3}$
Commercial building (slab on grade)	$2.3*10^{-2}$	N/A
Subsurface maintenance trench / excavation to 1 m bgl	$5.4*10^{-3}$	$1.60*10^{-4}$

8.5 Assessment of Risk

8.5.1 Adopted Criteria for the Assessment of Risk

As consistent with the ASC NEPM (NEPC 2013), the following criteria have been adopted:

- Carcinogens – an acceptable increased lifetime cancer risk (ILCR) of 1:100,000; and
- Non-carcinogens – an acceptable total HI of 1.

8.5.2 Risk Assessment Calculation

Risk assessment calculations have been completed based on the following:

- Estimate of inhalation exposures for each population (**Section 8.3.1**);
- Unit risk and reference concentrations for each chemical (**Section 8.3.4**); and
- Fate and transport modelling outcomes (**Section 8.4**).

ILCR and HI calculation spreadsheets are included in **Appendix N** and summarised below in **Table 8.13** (ILCR) and **Table 8.14** (HI).

The calculated ILCR and HI for all exposure scenarios assessed were below the adopted criteria.

Table 8.13: Summary of ILCR Calculations (Carcinogenic Endpoints)

Exposure Scenario	TCE	Acceptable ILCR
Residential dwelling (slab on grade without basement)	$6.4*10^{-8}$	**$1*10^{-5}$**
Commercial building (slab on grade)	$8.6*10^{-9}$	**$1*10^{-5}$**
Subsurface maintenance trench / excavation to 1 mbgl	$1.7*10^{-10}$	**$1*10^{-5}$**

Table 8.14: Summary of HI Calculations (Non-carcinogenic Endpoints)

Chemical	TCE	1,1-DCE	Total HI	Acceptable HI
Residential dwelling (slab on grade without basement)	$1.8*10^{-2}$	$4.6*10^{-6}$	$1.8*10^{-2}$	**1.0**
Commercial building (slab on grade)	$2.8*10^{-3}$	N/A	$2.8*10^{-3}$	**1.0**
Subsurface maintenance trench / excavation to 1 mbgl	$5.4*10^{-5}$	$1.4*10^{-8}$	$5.4*10^{-5}$	**1.0**

8.6 Comparison of Predicted TCE Indoor Air Concentrations within Residential Dwellings to TCE Response Ranges

8.6.1 Background

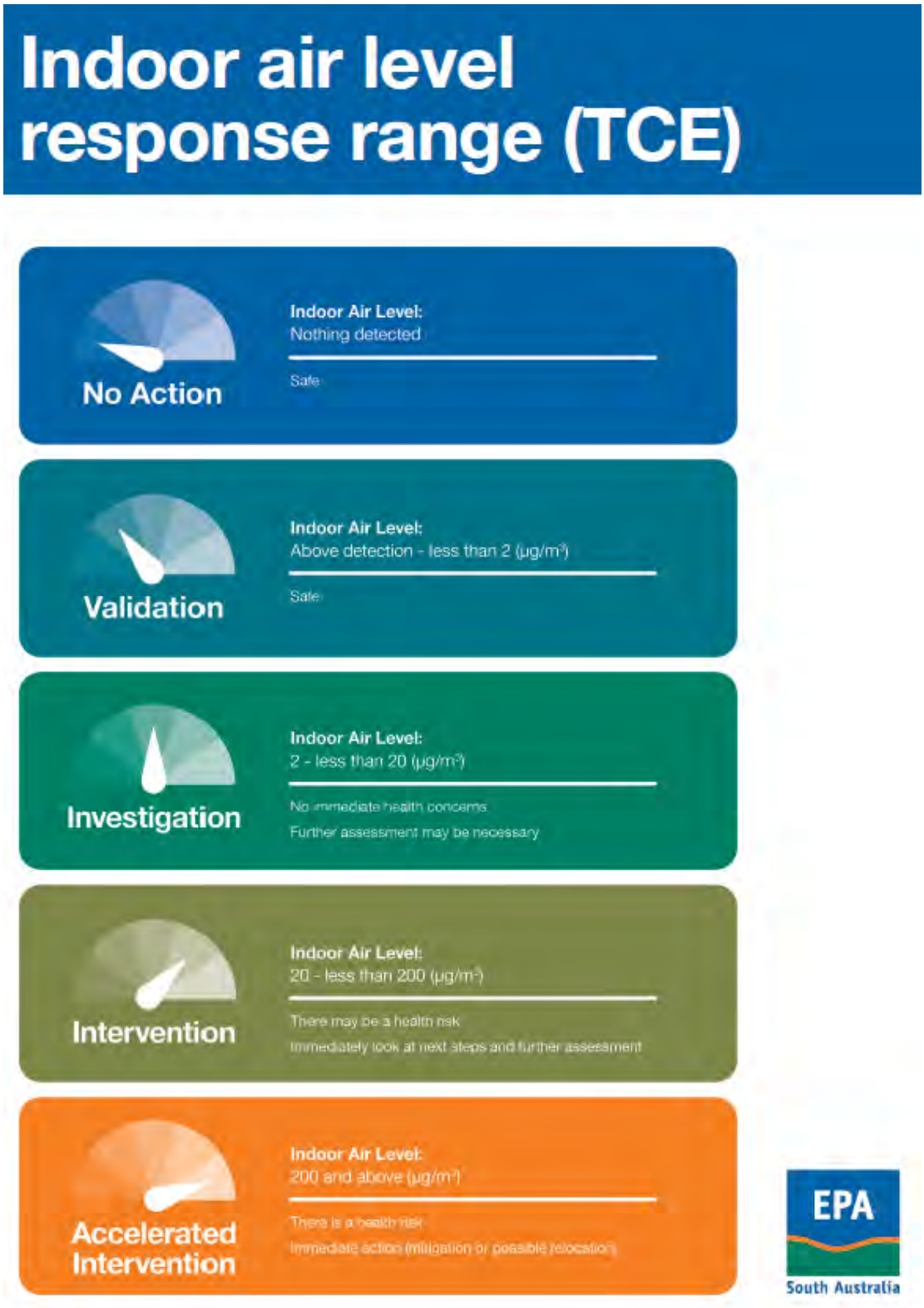
The predicted TCE indoor air concentrations in residential dwellings have also been compared to the Government of South Australia TCE Indoor Air Response Ranges[10]. These response ranges were developed for sensitive land uses for use in determining the level of risk and the response required for each TCE concentration range from no action (<LOR) through to accelerated intervention (>200 µg/m^3).

The TCE Indoor Air Response Ranges and actions are shown below in **Image 1**.

It is noted the Indoor Air Response Ranges are not available for 1,1-DCE only. Given TCE is the chemical driving the risk at the site, the absence of Indoor Air Response Ranges for 1,1-DCE will not impact on the conclusions of this VIRA.

[10] *TCE Indoor Air Response Ranges,* Government of South Australia, 2014 (Government of South Australia 2014).

Image 1 – TCE Indoor Air Response Ranges (Government of South Australia 2014)



8.6.2 Residential Predicted Indoor Air TCE Concentration with Corresponding TCE Indoor Air Response Range Classification

A summary of the predicted TCE concentration in indoor air along with the corresponding TCE Indoor Air Response Range classification is included in **Table 8.15**.

Table 8.15: Predicted TCE Indoor Air Concentration (µg/m³) in Residential Dwellings with Corresponding TCE Indoor Air Response Range Classification

Exposure Scenario	Predicted TCE Indoor Air Concentration (µg/m³)	TCE Indoor Air Response Range Classification
Residential dwelling (slab on grade without basement)	0.04	Validation

8.7 Uncertainty and Sensitivity Analysis

The major uncertainties and sensitivities associated with the VIRA are as follows:

- Levels of chemicals as estimated by the sampling program completed in March 2021 for the Melrose Park EPA Assessment Area;
- Characterisation of the site physical parameters;
- Exposure parameters to characterise the receptors;
- Building and trench parameters; and
- Use of modelling package.

8.7.1 Site Specific Alpha Assessment

The site-specific alpha value (steady state attenuation factor between soil vapour and indoor air) for TCE (i.e. the risk driving contaminant of concern) was $2.1*10^{-6}$ for the residential dwelling with slab on grade construction without basement exposure scenario. This alpha is lower (i.e. indicative of greater attenuation between soil vapour and indoor air) than the default range provided by US EPA for this exposure scenario with the reported soils. This lower alpha is due to the adoption of site-specific geotechnical data for the soil parameters, noting that an alpha within the default range provided by US EPA is calculated when adopting the generic soil parameters for clay provided by CRCCARE (2011). The adoption of the site-specific geotechnical data for the soil parameters is discussed further below in **Section 8.7.3**.

It should be noted that the most reliable site-specific assessments of alpha are considered to be derived through the comparison of indoor air data and soil vapour data for locations beneath or immediately adjacent to a building where indoor air data was collected, however, no indoor air data has been collected within the Melrose Park EPA Assessment Area to date.

8.7.2 Source Concentration Data

Soil vapour data utilised within the VIRA was obtained during investigations completed in March 2021 for the Melrose Park EPA Assessment Area. The maximum concentrations reported in soil vapour have been adopted in the model – this is considered most appropriate given the key exposure pathway of concern is to residents and a potential residential dwelling is located in close proximity to the soil vapour probe where the highest TCE concentration was reported.

As outlined in the CSM, the investigation undertaken was targeted to one groundwater well (GW3034b) where elevated concentrations of CEs have been reported and no site history investigation has been undertaken to date to attempt to identify the potential source(s) of this contamination. Therefore, there is potential that higher concentrations of CEs are present within the Melrose Park EPA Assessment Area. In addition, data is from one monitoring event only (i.e. no seasonal data is available).

8.7.3 Site Physical Parameter Data

Geotechnical data is available for one location (GB01) and this data has been adopted in the model as the site physical parameters. In order to assess the sensitivity of the model to the site-specific soil parameter data adopted, the CRC CARE (2011) parameters for clay have been adopted in additional modelling. The adoption of the above alternate physical parameters results in the prediction of significantly higher indoor air concentrations for all exposure scenarios (summarised below in **Table 8.16**). Based on these higher indoor air concentrations:

- The calculated HI exceeded the adopted criteria for the residential slab on grade without basement scenario, and resulted in an alternate TCE Indoor Air Reponses Range classification of 'Investigation'. The ILCR was below the adopted criteria; and
- The calculated HI and ILCR was below the adopted criteria for the commercial building and subsurface maintenance trench / excavation to 1 mbgl.

Table 8.16: Sensitivity Analysis – Predicted Indoor Air Concentrations with Alternate Physical Parameter Data (µg/m^3)

Exposure Scenario	Predicted Indoor Air TCE Concentration (µg/m^3)	
	Physical Parameters Adopted in VIRA (Site Specific Geotechnical Data)	Sensitivity Analysis Physical Parameters (Clayey Soil; CRCCARE 2011)
Residential dwelling (slab on grade without basement)	$3.8*10^{-2}$	2.3
Commercial building (slab on grade)	$2.3*10^{-2}$	1.4
Subsurface maintenance trench / excavation to 1 mbgl	$5.4*10^{-3}$	$3.4*10^{-2}$

8.7.4 Exposure Parameters to Characterise Receptors

As outlined in **Section 8.3.1**, the exposure factors adopted are consistent with those adopted in the ASC NEPM (NEPC 2013) for residents and commercial workers, and CRC CARE (2011) for subsurface maintenance/excavation workers. Acknowledging the potential to be at home / work for longer hours, the following exposures have been assessed:

- Residents: 365 days/year; 24 hours/day, 35 years;
- Commercial works: 288 days/year (6 days/week with 4 weeks leave), 10 hours/day, 30 years; and
- Subsurface maintenance / excavation worker: 48 days/year (6 days/week for 8 weeks), 10 hours/day, 30 years.

The above increased exposure does not alter the conclusions of the VIRA.

8.7.5 Residential Dwelling, Commercial Building and Excavation Parameters

As outlined in **Section 8.3.2**, the building and excavation parameters adopted are consistent with CRC CARE (2011). It is noted that by changing the floor area of a residential dwelling / commercial building (i.e. a 5 m by 5 m room) or the lateral extent of an excavation (i.e. 5 m length), the predicted indoor air concentrations are not altered.

As outlined in **Section 8.3.2**, the residential dwelling type of slab on grade has been considered, consistent with the likely construction of the residential properties in closest proximity to the investigation locations assessed during the Stage 1 Environmental Assessment. However, as no inspections / interviews have been completed to confirm the construction of these properties, the crawlspace dwelling scenario has also been assessed. Parameters adopted to assess this scenario are included in **Table 8.17**.

Table 8.17: Summary of Adopted Building Parameters – Residential Dwelling, Crawlspace

Parameter	Adopted Value	Reference
Enclosed floor length	15 m	CRCCARE (2011)[11]
Enclosed floor width	10 m	CRCCARE (2011)
Crawlspace height	0.5 m	Assumption (crawlspace height is not provided by the ASC NEPM [NEPC 2013] or CRCCARE [2011]).
Crawlspace to dwelling attenuation factor	1 (i.e. no attenuation)	US EPA (2015)#1
Foundation thickness	0 (i.e. no foundation)	CRCCARE (2011) – as provided for open space/recreational to simulate no concrete resistance
Ventilation / air exchanges (building)	0.6 h^{-1}	CRCCARE (2011) – as provided for a slab on grade dwelling. This is likely to be a conservative, however, has been adopted in the absence of site-specific measurement.
Fraction of foundation present as cracks	1	CRCCARE (2011) – as provided for open space/recreational to simulate no concrete resistance
Porosity in foundation cracks	0.38	CRCCARE (2011)
Water content in foundation cracks	0.12	CRCCARE (2011)
Q_{soil}:$Q_{building}$	0.005	CRCCARE (2011)
Notes: #1: The potential level of vapours in dwellings overlying a crawlspace has been estimated consistent with *OSWER Technical Guide for Assessing and Mitigating the Vapour Intrusion Pathway from Subsurface Vapour Sources to Indoor Air,* United States Environment Protection Agency, 2015 (US EPA 2015) which recommends that crawlspace vapours are assumed to be present at the same level in overlying residential dwellings. This is noted to be more conservative than the factor of 0.4 recommended to be adopted in *CRCCARE Technical Report 23: Petroleum Hydrocarbon Vapour Intrusion Assessment: Australian Guidance*, Cooperative Research Centre for Contamination and Remediation of the Environment, 2013 (CRCCARE 2013).		

The predicted TCE indoor air concentrations are summarised below in **Table 8.18**. Although a higher indoor air concentration is predicted for the crawlspace scenario, this concentration remains in the same TCE Indoor Air Reponses Range classification of 'Validation', and the calculated ILCR and HI were below the adopted criteria.

Table 8.18: Sensitivity Analysis – Predicted Indoor Air Concentrations for Slab on Grade Dwelling Vs Crawlspace Dwelling

Exposure Scenario	Predicted Indoor Air TCE Concentration (µg/m^3)	TCE Indoor Air Response Range Classification
Slab on Grade Dwelling	$3.8*10^{-2}$	Validation
Crawlspace Dwelling	0.18	Validation

8.7.6 Uncertainty and Sensitivity Analysis Conclusions

There are several factors which may have caused the risk and hazard estimates provided in VIRA to be underestimated, the most significant of which are as follows:

- The potential for higher concentrations to be present within the Melrose Park EPA Assessment Area, given the sampling completed to date was targeted to one existing groundwater well and there has been no site history assessment completed to date (and hence there is no understanding of the location of the source of the contamination); and
- The adoption of site-specific physical parameters from analysis of a single geotechnical sample from the site, noting a high degree of saturation was reported in this sample.

[11] *CRC CARE Technical Report No.10: Health screening levels for petroleum hydrocarbons in soil and groundwater*, CRC for Contamination Assessment and Remediation of the Environment, September 2011 (CRCCARE 2011).

The remaining factors did not have a significant effect on the risk and hazard estimates.

8.8 VIRA Conclusion

Based on the data collected to date, and subject to the limitations in **Section 11**, no unacceptable risks were identified for the following exposure scenarios:

- Residents (slab on grade without basement and crawlspace);
- Commercial / industrial workers (slab on grade); and
- Subsurface maintenance / construction workers in subsurface maintenance trenches / excavations installed to a maximum depth of 1 mbgl in outdoor areas.

It is noted other residential building types have not been assessed (slab on grade with basement), nor have commercial buildings with basements, or subsurface maintenance trenches / excavations to depths greater than 1 mbgl / subsurface maintenance trenches / excavations installed within buildings.

9. Conclusions

Based on the outcomes of the targeted soil vapour investigation in vicinity of existing groundwater well GW3034b and VIRA, and subject to the limitations in **Section 11**, the following was concluded:

- Site contaminations exists within the Melrose Park EPA Assessment Area in accordance with the definition provided in the *Environment Protection Act 1993*;
- Elevated CE concentrations (namely TCE and 1,1-DCE) were reported above the adopted soil vapour Tier 1 screening levels at all five soil vapour probe locations. The lateral extent of the soil vapour plume is unknown, and hence it is unknown whether higher CE concentrations are present within the Melrose Park EPA Assessment Area than those which have been reported to date;
- It is not possible to identify potential source sites of contamination based on the data collected to date; and
- No unacceptable risks via the vapour inhalation pathway were identified for residents (slab on grade dwellings without basements and crawlspace), commercial / industrial workers (slab on grade buildings) and subsurface maintenance / construction workers in subsurface maintenance trenches / excavations installed to a maximum depth of 1 mbgl in outdoor areas, noting this conclusion is based on the concentrations reported to date in the Melrose Park EPA Assessment Area and site specific geotechnical data from a single sample location.

10. Data Gap Analysis

The following data gaps were identified following completion of the targeted soil vapour investigation in vicinity of existing groundwater well GW3034b and VIRA:

- The potential source(s) of the CE impacts has not been identified, noting no site history investigation has been completed for the Melrose Park EPA Assessment Area to date;
- The extent of the groundwater TCE plume has not been delineated laterally or vertically;
- The extent of the soil vapour TCE plume has not been delineated laterally;
- Limited geotechnical information is available;
- No indoor air testing has been completed to date to validate modelling;
- No temporal data is available (groundwater, soil vapour and geotechnical); and
- The potential influences of preferential pathways are not understood, noting the source(s) of the CE impacts are required to be identified before this can be assessed.

11. Limitations

This report has been prepared for use by the client who has commissioned the works in accordance with the project brief only, and has been based in part on information obtained from the client and other parties.

The advice herein relates only to this project and all results conclusions and recommendations made should be reviewed by a competent person with experience in environmental investigations, before being used for any other purpose.

JBS&G accepts no liability for use or interpretation by any person or body other than the client who commissioned the works. This report should not be reproduced without prior approval by the client, or amended in any way without prior approval by JBS&G, and should not be relied upon by other parties, who should make their own enquires.

Sampling and chemical analysis of environmental media is based on appropriate guidance documents made and approved by the relevant regulatory authorities. Conclusions arising from the review and assessment of environmental data are based on the sampling and analysis considered appropriate based on the regulatory requirements.

Limited sampling and laboratory analyses were undertaken as part of the investigations undertaken, as described herein. Ground conditions between sampling locations and media may vary, and this should be considered when extrapolating between sampling points. Chemical analytes are based on the information detailed in the site history. Further chemicals or categories of chemicals may exist at the site, which were not identified in the site history and which may not be expected at the site.

Changes to the subsurface conditions may occur subsequent to the investigations described herein, through natural processes or through the intentional or accidental addition of contaminants. The conclusions and recommendations reached in this report are based on the information obtained at the time of the investigations.

This report does not provide a complete assessment of the environmental status of the site, and it is limited to the scope defined herein. Should information become available regarding conditions at the site including previously unknown sources of contamination, JBS&G reserves the right to review the report in the context of the additional information.

12. References

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World Health Organisation (2020) Trichloroethene in drinking-water, Background document for development of WHO Guidelines for drinking-water quality.

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https://rais.ornl.gov/cgi-bin/tools/TOX_search?select=chemspef (accessed online 16 April 2021)

Figures

Legend

- Site Location
- EPA Assessment Area

JBS&G

Job No: 60610	
Client: EPA SA	
Version: FINAL	Date: 21-May-2021
Drawn By: AS	Checked By: KL
Scale 1:20,000	

0 300 600

metres

Coord. Sys. GDA 1994 MGA Zone 54

Melrose Park EPA Assessment Area, Melrose Park, South Australia

SITE LOCATION PLAN

FIGURE 1

File Name: C:\Users\ASmith\OneDrive - JBS&G Australia\1. Arc Pro\EPA-Melrosepark\1_ArcGISPro_210412\60610_EPA.aprx; Name:60610_01_SiteLoc
Reference: ESRI Topographic Basemap - Accessed Imagery: 21/05/2021 & www.nearmap.com - Imagery Date: 12/06/2020

Legend

- EPA Assessment Area Boundary
- Groundwater Well Location
- Soil Vapour Probe Location
- Geotechnical Soil Location

JBS&G

Job No: 60610	
Client: EPA SA	
Version: FINAL	Date: 21-May-2021
Drawn By: AS	Checked By: KL
Scale 1:4,000	

0 50 100
metres

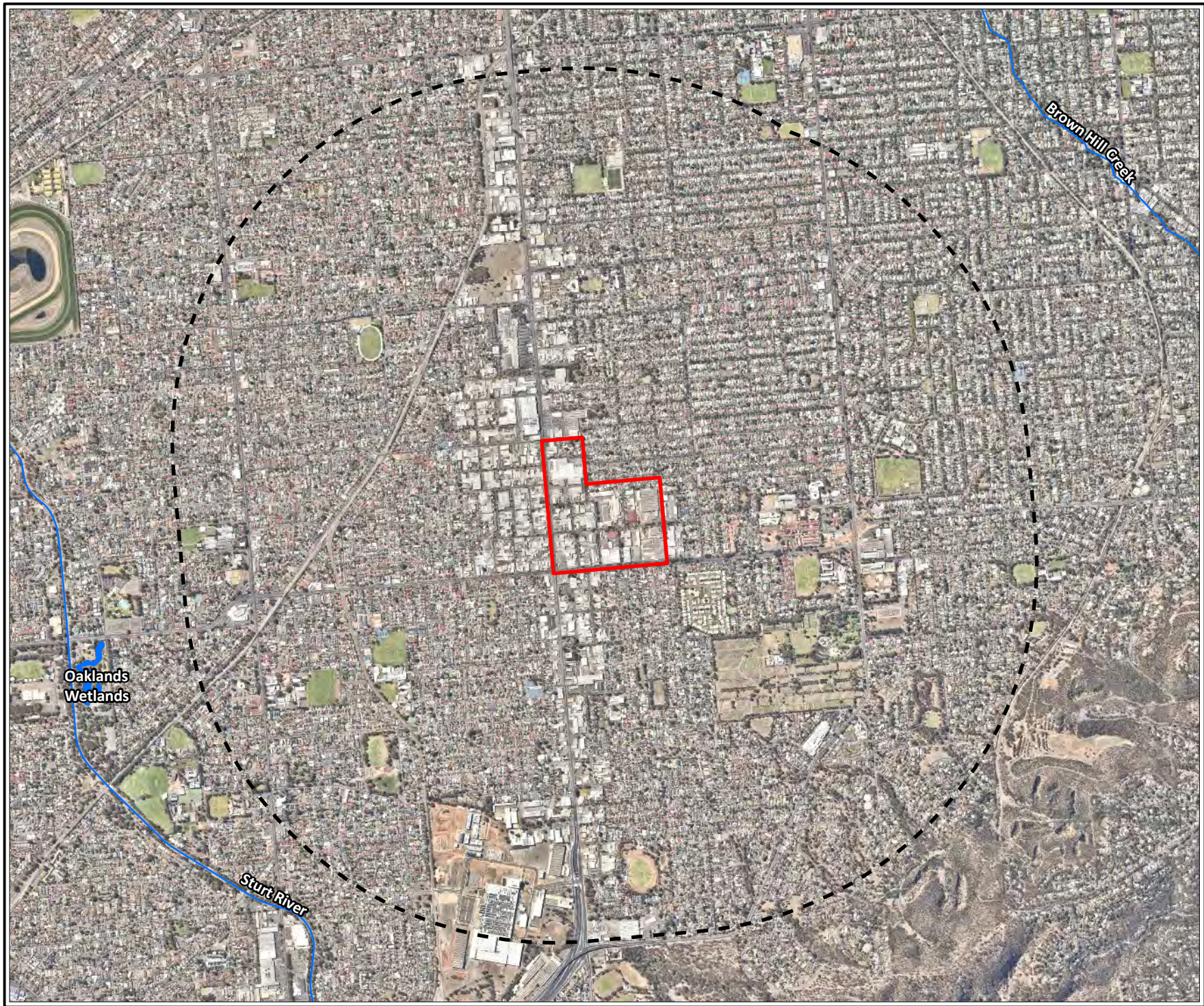
Coord. Sys. GDA 1994 MGA Zone 54

Melrose Park EPA Assessment Area, Melrose Park, South Australia

SOIL VAPOUR PROBE, GROUNDWATER WELL & GEOTECHNICAL SAMPLE LOCATIONS – MARCH 2021

FIGURE 2

File Name: C:\Users\ASmith\OneDrive - JBS&G Australia\1. Arc Pro\EPA-Melrosepark\1_ArcGISPro_210412\60610_EPA.aprx; Name:60610_02_Soil_SVP & GW Loc
Reference: www.nearmap.com - Imagery Date: 27/02/2021



Legend

- EPA Assessment Area
- 2km Radius from EPA Assessment Area
- Surface Water Body
- Surface Water Course

JBS&G

Job No: 60610

Client: EPA SA

Version: FINAL	Date: 21-May-2021
Drawn By: AS	Checked By: KL

Scale 1:28,000

0 500 1,000

metres

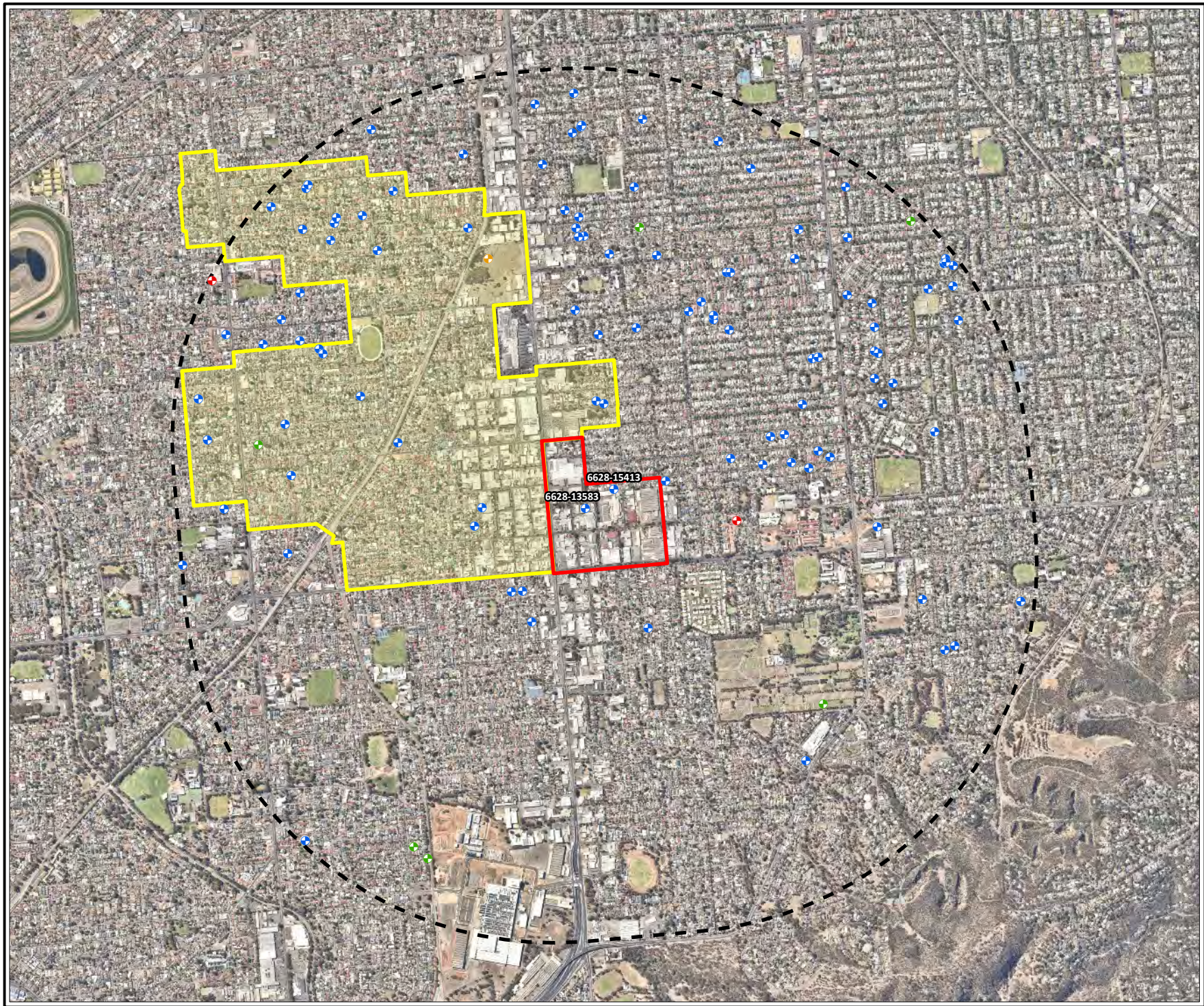
Coord. Sys. GDA 1994 MGA Zone 54

Melrose Park EPA Assessment Area, Melrose Park, South Australia

SURFACE WATER BODIES WITHIN A 2 KM RADIUS OF THE MELROSE PARK EPA ASSESSMENT AREA

FIGURE 3

File Name: C:\Users\ASmith\OneDrive - JBS&G Australia\1. Arc Pro\EPA-Melrosepark\1_ArcGISPro_210412\60610_EPA.aprx; Name:60610_03_Surface_Water_Bodies_2km
Reference: www.nearmap.com - Imagery Date: 27/02/2021



Legend

- EPA Assessment Area
- 2km Radius from EPA Assessment Area
- Edwardstown GPA

Groundwater Well

- Domestic
- Industrial
- Irrigation
- Recreational/Environmental

JBS&G

Job No: 60610

Client: EPA SA

Version: FINAL	Date: 21-May-2021
Drawn By: AS	Checked By: KL

Scale 1:28,000

0 500 1,000

metres

Coord. Sys. GDA 1994 MGA Zone 54

Melrose Park EPA Assessment Area, Melrose Park, South Australia

RELEVANT REGISTERED BORES WITHIN A 2 KM RADIUS OF THE MELROSE PARK EPA ASSESSMENT AREA

FIGURE 4

File Name: C:\Users\ASmith\OneDrive - JBS&G Australia\1. Arc Pro\EPA-Melrosepark\1_ArcGISPro_210412\60610_EPA.aprx; Name:60610_04_Water_Connect_Bores 2km
Reference: www.nearmap.com - Imagery Date: 27/02/2021

SVP04	Concentration (µg/m³)
Analyte	
Trichloroethene	3,100
1,1-dichloroethene	< 5

SVP05	Concentration (µg/m³)
Analyte	
Trichloroethene	14,000
1,1-dichloroethene	350

SVP01	Concentration (µg/m³)
Analyte	
Trichloroethene	7,000
1,1-dichloroethene	540

SVP03	Concentration (µg/m³)
Analyte	
Trichloroethene	8,100
1,1-dichloroethene	25

SVP02	Concentration (µg/m³)
Analyte	
Trichloroethene	5,800 #1
1,1-dichloroethene	400 #1

GW3034B	Concentration (µg/L)
Analyte	
Trichloroethene	1,200
1,1-dichloroethene	110

Legend

- EPA Assessment Area Boundary
- Groundwater Well Location
- Soil Vapour Probe Location

Note: #1: Concentration reported in duplicate sample displayed as this concentration was higher than that reported in the primary sample.

JBS&G

Job No: 60610

Client: EPA SA

Version: FINAL | Date: 21-May-2021

Drawn By: AS | Checked By: KL

Scale 1:4,000

0 50 100

metres

Coord. Sys. GDA 1994 MGA Zone 54

Melrose Park EPA Assessment Area, Melrose Park, South Australia

CHLORINATED ETHENE SOIL VAPOUR & GROUNDWATER CONCENTRATIONS – MARCH 2021

FIGURE 5

File Name: C:\Users\ASmith\OneDrive - JBS&G Australia\1. Arc Pro\EPA-Melrosepark\1_ArcGISPro_210412\60610_EPA.aprx; Name:60610_05_SVP & GW Conc
Reference: www.nearmap.com - Imagery Date: 27/02/2021

Legend

- EPA Assessment Area Boundary
- Potential Residential Landuse

JBS&G

Job No: 60610	
Client: EPA SA	
Version: FINAL	Date: 21-May-2021
Drawn By: AS	Checked By: KL
Scale 1:4,000	

0 50 100

metres

Coord. Sys. GDA 1994 MGA Zone 54

Melrose Park EPA Assessment Area, Melrose Park, South Australia

AREAS OF POTENTIAL RESIDENTIAL LANDUSE

FIGURE 6

File Name: C:\Users\ASmith\OneDrive - JBS&G Australia\1. Arc Pro\EPA-Melrosepark\1_ArcGISPro_210412\60610_EPA.aprx; Name:60610_06_Potential Residential Landuse
Reference: www.nearmap.com - Imagery Date: 27/02/2021

Summary Tables – Results

SUMMARY OF SOIL VAPOUR FIELD PARAMETERS: MARCH 2021
Project Number: 60610
Project Name: Melrose Park EPA Assessment Area

Soil Vapour Probe ID	Sampling Date	Start Sampling Time	End Sampling Time	Total Sampling Time	Post Sampling Pressure	Sampling Flow Rate	Volume Purged Prior to Sampling	CH_4	CO_2	O_2	Balance	H_2S	CO	PID
					-inHg	mL/min	mL	%v/v	%v/v	%v/v	%v/v	ppm	ppm	ppm
SVP01	30-Mar-21	9:05	9:15	10 minutes	-7.0	80.0	50.0	0.0	4.6	17.0	78.5	0.0	0.0	1.3
SVP02	30-Mar-21	10:17	10:26	9 minutes	-10.0	80.0	50.0	0.0	1.6	19.0	79.3	0.0	0.0	0.9
SVP03	30-Mar-21	9:45	9:56	11 minutes	-5.0	80.0	33.0	0.0	1.7	19.5	78.8	0.0	0.0	1.6
SVP04	30-Mar-21	7:40	7:51	11 minutes	-7.0	80.0	51.0	0.0	2.3	19.1	78.6	0.0	0.0	0.5
SVP05	30-Mar-21	8:26	8:36	10 minutes	-4.0	80.0	55.0	0.0	4.0	17.3	78.7	0.0	0.0	2.7

SOIL VAPOUR RESULTS: MARCH 2021
Project Number: 60610
Project Name: Melrose Park

	Tetrachloroethene	Trichloroethene	cis-1,2-dichloroethene	trans-1,2-dichloroethene	1,1-dichloroethene	Vinyl Chloride
	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3
EQL	3.4	2.7	5.0	5.0	5.0	3.0
NEPC (2013) ASC NEPM Interim HILs, Residential A/B - Soil Vapour	2,000	20	80	80[#2]		30
US EPA (2020) RSL for Indoor Air x10, Resident, HI=0.1[#1]					210[#3]	
NEPC (2013) ASC NEPM Interim HILs, Commercial / Industrial D - Soil Vapour	8,000	80	300	300[#2]		100
US EPA (2020) RSL for Indoor Air x10, Worker, HI=0.1[#1]					880[#3]	

Field ID	Sample Date	Lab Report Number					
SVP01	30-Mar-21	784189	100	7,000	< 5	< 5	540	< 3
SVP02	30-Mar-21	784189	36[#1]	5,800[#1]	< 6	< 6	400[#1]	< 4
SVP03	30-Mar-21	784189	39	8,100	< 5	< 5	25	< 3
SVP04	30-Mar-21	784189	51	3,100	< 5	< 5	< 5	< 3
SVP05	30-Mar-21	784189	320	14,000	21	< 4	350	< 3

Env Stds Comments

#1:Factor of 10 used to convert indoor air criteria provided by US EPA (2017) to soil vapour criteria (i.e. attenuation factor of 0.1 applied, consistant with the ASC NEPM [NEPC 2013]).

#2:ASC NEPM (NEPC 2013) HIL for cis-1,2-DCE adopted in the absence of criteria provided in the ASC NEPM (NEPC 2013) or by US EPA (2017) for trans-1,2-DCE.

#3:US EPA (2017) RSL for 1,1-DCE adopted in the absence of criteria provided in the ASC NEPM (NEPC 2013).

Data Comments

#1:Concentration reported in duplicate sample displayed as this concentration was higher than that reported in the primary sample.

SUMMARY OF GROUNDWATER FIELD PARAMETERS: MARCH 2021
Project Number: 60610
Project Name: Melrose Park EPA Assessment Area

Well ID	Date	LNAPL	SWL (30-Mar-21)	RL	RWL	Total Depth	Completion	Dissolved Oxygen	Conductivity	pH	Redox	Redox	Temperature	Sample Information	Sample Observations
		mTOC	mTOC	mAHD	mAHD	mTOC		ppm	mS/cm		mV	SHE	°C		
GW3034b	30-Mar-21	-	3.372	31.187	27.815	6.620	Gatic	0.45	5.039	7.11	223.0	422.0	23.3	Low flow methods: total of 3.8 L purged over 21 minutes (approx flow rate of 180 ml/min), drawdown of 30 mm	No odour, no sheen

GROUNDWATER RESULTS SUMMARY: MARCH 2021
Project Number: 60610
Project Name: Melrose Park

			Chlorinated Ethenes					
			Tetrachloroethene	Trichloroethene	cis-1,2-dichloroethene	trans-1,2-dichloroethene	1,1-dichloroethene	Vinyl Chloride
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL			1	1	1	1	1	1
1. Drinking Water - NHMRC (2011 updated 2018) ADWG: Health			50	#1 | 8 #2			30	0.3
1. Drinking Water - NHMRC (2011 updated 2018) ADWG: Aesthetics								
2. Recreation / Aesthetics - NHMRC (2011 updated 2018) ADWG: Health x10			500	#1 | 80 #2			300	3
2. Recreation / Aesthetics - NHMRC (2011 updated 2018) ADWG: Aesthetics								
3. Primary Industries - ANZECC (2000) Irrigation, long term								
3. Primary Industries - ANZECC (2000) Irrigation, short term								
Field ID	**Sample Date**	**Lab Report**						
GW3034B	30-Mar-21	784255	<25	1,200	<25	<25	110	<25

Env Stds Comments
#1:Insuffcient data to set a guideline value based on health considerations
#2:Adopted from *Trichloroethene in drinking-water, Background document for development of WHO Guidelines for drinking-water quality,* World Health Organisation, 2020 (WHO 2020)

Summary Tables – QA/QC

RINSATE RESULTS SUMMARY
Project Number: 60610
Project Name: Melrose Park

Lab Report Number	784279	784255
Field ID	RB01	RB02
Sample Date	26-Mar-21	30-Mar-21
Sample Type	Rinsate	Rinsate

Chem_Group	ChemName	Units	EQL		
BTEXN	Benzene	µg/L	1	<1	
	Toluene	µg/L	1	<1	
	Ethylbenzene	µg/L	1	<1	
	Xylene (o)	µg/L	1	<1	
	Xylene (m & p)	µg/L	2	<2	
	Xylene Total	µg/l	3	<3	
Chlorinated Alkanes	1,1,1,2-tetrachloroethane	µg/L	1	<1	
	1,1,1-trichloroethane	µg/L	1	<1	
	1,1,2,2-tetrachloroethane	µg/L	1	<1	
	1,1,2-trichloroethane	µg/L	1	<1	
	1,1-dichloroethane	µg/L	1	<1	
	1,2,3-trichloropropane	µg/L	1	<1	
	1,2-dichloroethane	µg/L	1	<1	
	1,2-dichloropropane	µg/L	1	<1	
	1,3-dichloropropane	µg/L	1	<1	
	Bromochloromethane	µg/L	1	<1	
	Carbon tetrachloride	µg/L	1	<1	
	Chloroethane	µg/L	1	<1	
	Chloromethane	µg/L	1	<1	
	Dichlorodifluoromethane	µg/L	1	<1	
	Dichloromethane	µg/l	1	<1	
	Trichlorofluoromethane	µg/L	1	<1	
Chlorinated Alkenes	1,1-dichloroethene	µg/L	1	<1	<1
	3-chloropropene	µg/l	1	<1	
	4-chlorotoluene	µg/L	1	<1	
	cis-1,2-dichloroethene	µg/L	1	<1	<1
	cis-1,3-dichloropropene	µg/L	1	<1	
	Tetrachloroethene	µg/L	1	<1	<1
	trans-1,2-dichloroethene	µg/L	1	<1	<1
	trans-1,3-dichloropropene	µg/L	1	<1	
	Trichloroethene	µg/L	1	<1	<1
	Vinyl Chloride	µg/L	1	<1	<1
Chlorinated Benzenes	1,2-Dichlorobenzene	µg/L	1	<1	
	1,3-dichlorobenzene	µg/L	1	<1	
	1,4-dichlorobenzene	µg/L	1	<1	
	Chlorobenzene	µg/L	1	<1	
MAH	1,2,4-trimethylbenzene	µg/L	1	<1	
	1,3,5-trimethylbenzene	µg/L	1	<1	
	Styrene	µg/L	1	<1	
	Total MAH	µg/l	3	<3	
	Bromobenzene	µg/L	1	<1	
	Isopropylbenzene	µg/L	1	<1	
Miscellaneous Hydrocarbons	1,2-dibromoethane	µg/L	1	<1	
	Bromomethane	µg/L	1	<1	
	Dibromomethane	µg/L	1	<1	
	Iodomethane	µg/l	1	<1	
	4-Methyl-2-pentanone	µg/l	1	<1	
	Methyl Ethyl Ketone	µg/l	1	<1	
Organic Sulfur Compounds	Carbon disulfide	µg/l	1	<1	
Solvents	Acetone	µg/l	1	<1	
Trihalomethanes	Dibromochloromethane	µg/L	1	<1	
	Chloroform	µg/L	1	<5	
	Tribromomethane	µg/L	1	<1	
	Bromodichloromethane	µg/L	1	<1	

HELIUM LEAK TEST RESULTS SUMMARY - MARCH 2021

Project Number: 60610

Project Name: Melrose Park EPA Assessment Area

Field ID	Sample Date	Background Helium (Ambient Air)	Background Helium (Within Soil Vapour Probe) - Prior to Addition of Helium	Maximum Helium Reported Over 5 Minutes of Additon of Helium	Helium Level Above Background	Shroud Helium Concentration	Percentage Helium in Sample	Leak Test Assessment
		ppm	ppm	ppm	ppm	ppm	%	-
SVP01	30-Mar-21	300	0	0	0	900,000	<0.01	Pass
SVP02	30-Mar-21	0	0	0	0	900,000	<0.01	Pass
SVP03	30-Mar-21	0	0	0	0	900,000	<0.01	Pass
SVP04	30-Mar-21	200	0	0	0	900,000	<0.01	Pass
SVP05	30-Mar-21	100	0	0	0	900,000	<0.01	Pass

ISOPROPANOL LEAK TEST RESULTS SUMMARY - MARCH 2021

Project Number: 60610

Project Name: Melrose Park EPA Assessment Area

	2-Propanol	Percentage Isopropanol in Sample	Leak Test Assessment
	µg/m3	%	-
EQL	1.2	-	-

Field ID	Sample Date	Laboratory	Lab Report Number			
SHROUD01	30-Mar-21	Eurofins MGT	784189	930,000	-	-
SVP01	30-Mar-21	Eurofins MGT	784189	< 127	<0.02	Pass
SVP02	30-Mar-21	Eurofins MGT	784189	220	0.02	Pass
SVP03	30-Mar-21	Eurofins MGT	784189	< 119	<0.02	Pass
SVP04	30-Mar-21	Eurofins MGT	784189	< 123	<0.02	Pass
SVP05	30-Mar-21	Eurofins MGT	784189	190	0.02	Pass
DUP01	30-Mar-21	Eurofins MGT	784189	<123	<0.02	Pass
DUP02	30-Mar-21	Envirolab	265789	280	0.03	Pass

SOIL VAPOUR SUMMA CANISTER SAMPLE PRESSURE SUMMARY
Project Number: 60610
Project Name: Melrose Park EPA Assessment Area

Sample ID	Sampling Date	Laboratory	Lab Report	Pressure at Laboratory	Pre Sampling Pressure	Post Sampling Pressure	Final Laboratory Receipt Pressure	Pressure Difference Between Laboratory and Pre-Sampling	Pressure Difference Between Post-Sampling and Final Laboratory	Total Pressure Difference	Leak Test Assessment
SVP01	30-Mar-21	Eurofins MGT	784189	-30.0	-30.0	-7.0	-7.2	0.0	0.0	0.0	Pass
SVP02	30-Mar-21	Eurofins MGT	784189	-30.0	-30.0	-10.0	-9.4	0.0	0.6	0.6	Pass
SVP03	30-Mar-21	Eurofins MGT	784189	-30.0	-30.0	-5.0	-5.7	0.0	0.0	0.0	Pass
SVP04	30-Mar-21	Eurofins MGT	784189	-30.0	-30.0	-7.0	-6.4	0.0	0.6	0.6	Pass
SVP05	30-Mar-21	Eurofins MGT	784189	-30.0	-30.0	-4.0	-2.9	0.0	1.1	1.1	Pass
DUP01	30-Mar-21	Eurofins MGT	784189	-30.0	-30.0	-6.0	-6.4	0.0	0.0	0.0	Pass
DUP02	30-Mar-21	Envirolab	265789	-30.0	-30.0	-7.0	-8.0	0.0	0.0	0.0	Pass
SHROUD01	30-Mar-21	Eurofins MGT	784189	-30.0	-30.0	-5.0	-3.4	0.0	1.6	1.6	Pass

SOIL VAPOUR RPD VALUE SUMMARY
Project Number: 60610
Project Name: Melrose Park

	Lab Report Number	784189	Intra-Lab Dup		784189	Inter-Lab Dup	
	Field ID	SVP02	DUP01	**RPD**	SVP03	DUP02	**RPD**
	Sample Date	30-Mar-21	30-Mar-21		30-Mar-21	30-Mar-21	
Chem_Group	**ChemName**	**Units**	**EQL**						
Chlorinated Alkenes	1,1-dichloroethene	µg/m3	2	330	400	19	25	22	13
	cis-1,2-dichloroethene	µg/m3	2	<6	<5	0	<5	<10	0
	Tetrachloroethene	µg/m3	3.4	29	36	22	39	30	26
	trans-1,2-dichloroethene	µg/m3	2	<6	<5	0	<5	<10	0
	Trichloroethene	µg/m3	2.7 : 1.6 (Interlab)	4800	5800	19	8100	7200	12
	Vinyl Chloride	µg/m3	1.3 : 0.8 (Interlab)	<4	<3	0	<3	<4	0
Organic Alcohols	2-Propanol	µg/m3	49 : 12 (Interlab)	**220**	**<123**	**57**	**<119**	**280**	**81**

*High RPDs are in bold (an acceptable RPD range of 0 % to 30 % has been adopted in accordance with the ASC NEPM [NEPC 2013]).
**Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory.

GROUNDWATER RPD VALUE SUMMARY
Project Number: 60610
Project Name: Melrose Park

Lab Report Number	784255	Intra-Lab Dup		25139	Inter-Lab Dup	
Field ID	GW3034B	DUP01	**RPD**	GW3034B	SPLIT01	**RPD**
Sample Date	30-Mar-21	30-Mar-21		30-Mar-21	30-Mar-21	

Chem_Group	**ChemName**	**Units**	**EQL**						
Chlorinated Alkenes	1,1-dichloroethene	µg/l	1	110	130	17	110	93	17
	cis-1,2-dichloroethene	µg/l	1	<25	<25	0	<25	<50	0
	Tetrachloroethene	µg/l	1	<25	<25	0	<25	<50	0
	trans-1,2-dichloroethene	µg/l	1	<25	<25	0	<25	<50	0
	Trichloroethene	µg/l	1	1200	1400	15	1200	1200	0
	Vinyl Chloride	µg/l	1 : 10 (Interlab)	<25	<25	0	<25	<500	0

*High RPDs are in bold (an acceptable RPD range of 0 % to 30 % has been adopted in accordance with the ASC NEPM [NEPC 2013]).
**Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory.

TRIP BLANK RESULTS SUMMARY
Project Number: 60610
Project Name: Melrose Park

Lab Report Number	784255
Field ID	TB01
Sample Date	30-Mar-21
Sample Type	Trip Blank

Chem_Group	ChemName	Units	EQL	
Chlorinated Alkenes	1,1-dichloroethene	µg/L	1	<1
	cis-1,2-dichloroethene	µg/L	1	<1
	Tetrachloroethene	µg/L	1	<1
	trans-1,2-dichloroethene	µg/L	1	<1
	Trichloroethene	µg/L	1	<1
	Vinyl Chloride	µg/L	1	<1

TRIP SPIKE RESULTS SUMMARY
Project Number: 60610
Project Name: Melrose Park

Lab Report Number	784255
Field ID	WSP7893
Sample Date	30-Mar-21
Sample Type	Trip Spike

Chem_Group	ChemName	Units	EQL	
BTEXN	Benzene	%	1	94
	Toluene	%	1	87
	Ethylbenzene	%	1	74
	Xylene (o)	%	1	70
	Xylene (m & p)	%	1	79
	Xylene Total	%	1	73
	Napthanlene	%	1	80
TRH	TRH C6-C10	%	1	73
	TRH C6-C9	%	1	74

Appendix A Soil Vapour Probe Soil Logs and Construction Details and Geotechnical Bore Soil Log

SOIL VAPOUR PROBE SVP01

PROJECT NUMBER 60610	**DRILLING COMPANY** JBS&G	**EASTING** 278,877
PROJECT NAME Melrose Park SVME & VIRA	**DRILLING DATE** 26-Mar-21	**NORTHING** 6,125,408
CLIENT SA EPA	**DRILL RIG** Hand Auger	**COORD SYS** GDA94_MGA_zone_54
ADDRESS Melrose Park, SA	**DRILLING METHOD** Hand Auger	**COORD SOURCE** Map Approximation
	DIAMETER 75 mm	**LOGGED BY** HF
COMPLETION Gatic	**CASING** Teflon Tubing - 6mm	**SCREEN INTERVAL** 0.85 - 1.05 m bgl

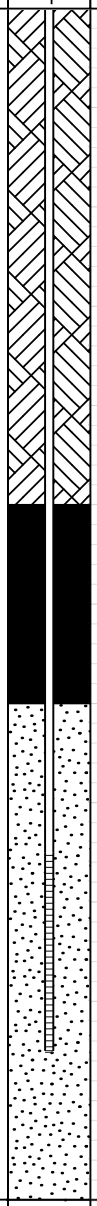
COMMENTS

Drilling Method	Well Details	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	PID	Additional Observations
HA		0.1		Fill	Fill - Sandy GRAVEL, grey-brown, fine to coarse, fine to coarse grained sand, with some silt fines	Dry		Gravel Cover
		0.2		CL-SC	Silty Sandy CLAY, brown, low plasticity, fine grained sand, with silt fines	Moist, dry of plastic limit	0	Very hard layer
		0.3						
		0.4		CL-SC	Silty Sandy CLAY, red-brown, medium plasticity, fine grained sand	Moist, dry of plastic limit	0	
		0.5						
		0.6						
		0.7						
		0.8		CH-MH	Silty CLAY, brown with pale brown mottling, medium to high plasticity, with some fine grained sand	Moist, dry of plastic limit		
		0.9						
		1						
		1.1					0	
		1.2			Termination Depth at:1.200 m.			
		1.3						
		1.4						

SOIL VAPOUR PROBE SVP02

PROJECT NUMBER 60610	**DRILLING COMPANY** JBS&G	**EASTING** 278,758
PROJECT NAME Melrose Park SVME & VIRA	**DRILLING DATE** 26-Mar-21	**NORTHING** 6,125,404
CLIENT SA EPA	**DRILL RIG** Hand Auger	**COORD SYS** GDA94_MGA_zone_54
ADDRESS Melrose Park, SA	**DRILLING METHOD** Hand Auger	**COORD SOURCE** Map Approximation
	DIAMETER 75 mm	**LOGGED BY** HF
COMPLETION Gatic	**CASING** Teflon Tubing - 6mm	**SCREEN INTERVAL** 0.85 - 1.05 m bgl

COMMENTS

Drilling Method	Well Details	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	PID	Additional Observations
HA		0.1		Fill	Fill - Sandy GRAVEL, grey, fine to coarse, fine to coarse grained sand	Dry		Gravel Cover
		0.2		Fill	Fill - Silty Gravelly SAND, cream-brown, fine to coarse grained sand, fine to coarse gravel, low plasticity silt	Dry		Road base layer
		0.3		CL-SC	Silty Sandy CLAY, brown, low plasticity, with fine grained sand	Moist, dry of plastic limit		
		0.4		CL-SC	Silty Sandy CLAY, red-brown, medium plasticity, fine grained sand	Moist, dry of plastic limit	0	
		0.5						
		0.6		CL-ML-SM	Sandy Silty CLAY, brown with cream mottling, medium plasticity, fine grained sand	Moist, dry of plastic limit	0	
		0.7						
		0.8						
		0.9		CH-MH	Silty CLAY, brown, medium to high plasticity	Moist, dry of plastic limit	0	
		1						
		1.1						
		1.2			Termination Depth at:1.200 m.			
		1.3						
		1.4						

SOIL VAPOUR PROBE SVP03

PROJECT NUMBER 60610	**DRILLING COMPANY** JBS&G	**EASTING** 278,744
PROJECT NAME Melrose Park SVME & VIRA	**DRILLING DATE** 26-Mar-21	**NORTHING** 6,125,422
CLIENT SA EPA	**DRILL RIG** Hand Auger	**COORD SYS** GDA94_MGA_zone_54
ADDRESS Melrose Park, SA	**DRILLING METHOD** Hand Auger	**COORD SOURCE** Map Approximation
	DIAMETER 75 mm	**LOGGED BY** HF
COMPLETION Gatic	**CASING** Teflon Tubing - 6mm	**SCREEN INTERVAL** 0.85 - 1.05 m bgl

COMMENTS

Drilling Method	Well Details	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	PID	Additional Observations
HA		0		Asphalt	Fill - Asphalt	Dry		
				Fill	Fill - Sandy GRAVEL, cream-brown, fine to coarse gravel and sand	Dry		Road base layer
		0.1		Fill	Fill - Silty Sandy CLAY, brown, low plasticity, with fine grained sand	Moist, dry of plastic limit	0	
		0.2						
		0.3						
		0.4		CL-ML-SM	Sandy Silty CLAY, red-brown, medium plasticity, fine grained sand	Moist, dry of plastic limit	0	
		0.5		CL-ML-SM	Sandy Silty CLAY, brown with cream mottling, medium plasticity, fine grained sand	Moist, dry of plastic limit	0	
		0.6						
		0.7						
		0.8						
		0.9		CH-MH	Silty CLAY, pale brown, medium to high plasticity	Moist, dry of plastic limit		
		1						
		1.1					0	
		1.2			Termination Depth at:1.200 m.			
		1.3						
		1.4						

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SOIL VAPOUR PROBE SVP04

PROJECT NUMBER 60610	**DRILLING COMPANY** JBS&G	**EASTING** 278,705
PROJECT NAME Melrose Park SVME & VIRA	**DRILLING DATE** 26-Mar-21	**NORTHING** 6,125,436
CLIENT SA EPA	**DRILL RIG** Hand Auger	**COORD SYS** GDA94_MGA_zone_54
ADDRESS Melrose Park, SA	**DRILLING METHOD** Hand Auger	**COORD SOURCE** Map Approximation
	DIAMETER 75 mm	**LOGGED BY** HF
COMPLETION Gatic	**CASING** Teflon Tubing - 6mm	**SCREEN INTERVAL** 0.85 - 1.05 m bgl

COMMENTS

Drilling Method	Well Details	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	PID	Additional Observations
HA		0.1		Fill	Fill - Sandy Silty GRAVEL, grey, fine to coarse gravel and sand, low plasticity fines	Dry		Gravel Cover
		0.2		Fill	Fill - Silty Sandy CLAY, brown, low plasticity, fine grained sand, with some fine to medium gravels	Moist, dry of plastic limit	0	
		0.3						
		0.4						
		0.5		CL-ML-SM	Sandy Silty CLAY, red-brown, medium plasticity, fine grained sand	Moist, dry of plastic limit	0	Roots present
		0.6		CL-ML-SM	Sandy Silty CLAY, brown with cream mottling, medium plasticity, fine grained sand	Moist, dry of plastic limit		
		0.7						
		0.8						
		0.9						
		1						
		1.1					0	
		1.2			Termination Depth at:1.200 m.			
		1.3						
		1.4						

SOIL VAPOUR PROBE SVP05

PROJECT NUMBER 60610	**DRILLING COMPANY** JBS&G	**EASTING** 278,782
PROJECT NAME Melrose Park SVME & VIRA	**DRILLING DATE** 26-Mar-21	**NORTHING** 6,125,444
CLIENT SA EPA	**DRILL RIG** Hand Auger	**COORD SYS** GDA94_MGA_zone_54
ADDRESS Melrose Park, SA	**DRILLING METHOD** Hand Auger	**COORD SOURCE** Map Approximation
	DIAMETER 75 mm	**LOGGED BY** HF
COMPLETION Gatic	**CASING** Teflon Tubing - 6mm	**SCREEN INTERVAL** 0.85 - 1.05 m bgl

COMMENTS

Drilling Method	Well Details	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	PID	Additional Observations
HA		0.1		Asphalt	Fill - Asphalt	Dry		
				Fill	Fill - Sandy GRAVEL, cream, fine to coarse gravel and sand, with silt fines	Dry		
		0.2		Fill	Fill - Silty Sandy CLAY, brown, low plasticity	Moist, dry of plastic limit		Roots present
		0.3						
		0.4		CL-SC	Silty Sandy CLAY, red-brown, medium plasticity, fine grained sand	Moist, dry of plastic limit	0	
		0.5						
		0.6		CL-SC	Silty Sandy CLAY, brown, medium plasticity, fine to medium grained sand	Moist, dry of plastic limit	0	
		0.7						
		0.8		CH-MH	Silty CLAY, brown with cream mottling, medium to high plasticity, with some fine grained sand	Moist, dry of plastic limit		
		0.9						
		1						
		1.1					0	
		1.2			Termination Depth at:1.200 m.			
		1.3						
		1.4						

SOIL BOREHOLE GB01

PROJECT NUMBER 60610
PROJECT NAME Melrose Park SVME & VIRA
CLIENT SA EPA
ADDRESS Melrose Park, SA

DRILLING COMPANY InDepth Drilling
DRILLING DATE 26-Mar-21
DRILL RIG Geoprobe
DRILLING METHOD Push Tube
DIAMETER 50 mm

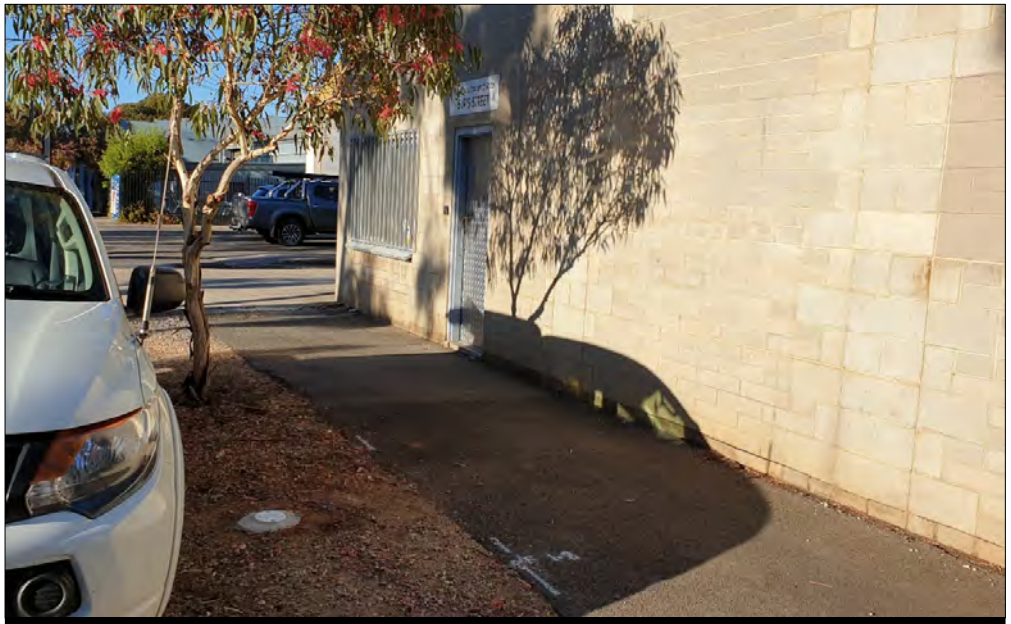
EASTING 278,758.43
NORTHING 6,125,402.63
COORD SYS GDA94_MGA_zone_54
COORD SOURCE Map Approximation
LOGGED BY HF

COMMENTS Soils encountered as SVP02 (approximately 2 m north of GB01) are displayed as the full soil core collected at GB01 was retained in the geoprobe plastic sleeve (sealed with end caps) and provided to the laboratory for geotechnical testing.

Drilling Method	Water (m bgl)	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	PID	Additional Observations
PT		0.1		Fill	Fill - Sandy GRAVEL, grey, fine to coarse, fine to coarse grained sand	Dry		Gravel Cover
		0.2		Fill	Fill - Silty Gravelly SAND, cream-brown, fine to coarse grained sand, fine to coarse gravel, low plasticity silt	Dry		Road base layer
		0.3		CL-SC	Silty Sandy CLAY, brown, low plasticity, with fine grained sand	Moist, dry of plastic limit		
		0.4		CL-SC	Silty Sandy CLAY, red-brown, medium plasticity, fine grained sand		0	
		0.5						
		0.6		CL-ML-SM	Sandy Silty CLAY, brown with cream mottling, medium plasticity, fine grained sand	Moist, dry of plastic limit	0	
		0.7						
		0.8						
		0.9		CH-MH	Silty CLAY, brown, medium to high plasticity	Moist, dry of plastic limit	0	
		1						
		1.1						
		1.2			Termination Depth at: 1.2 m.			
		1.3						
		1.4						

Appendix B Photographs

SVP01 SOIL CORE

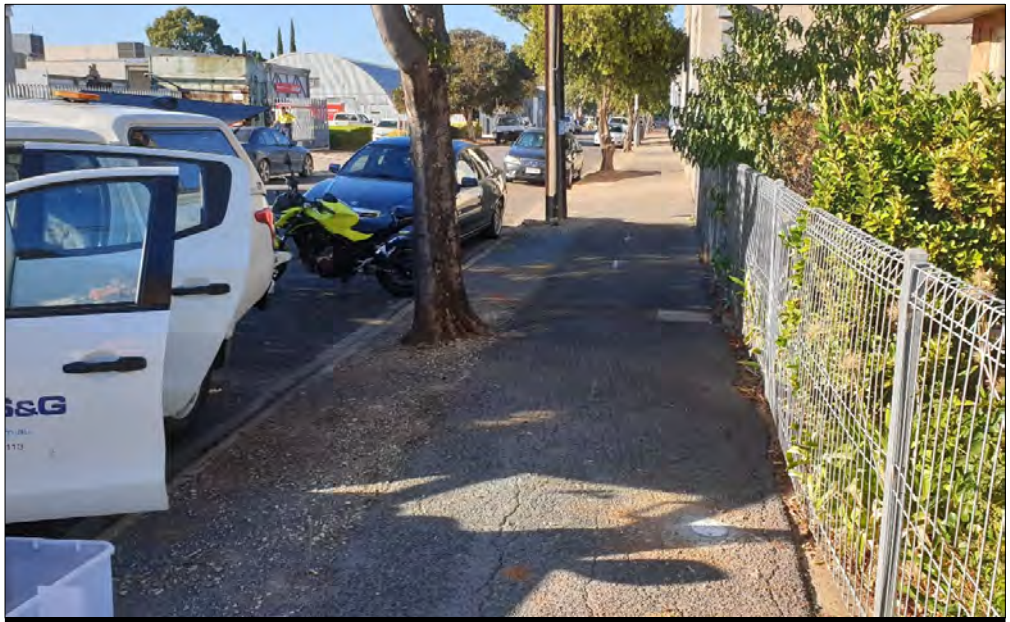


SVP01 LOCATION (IRIS STREET)

SVP02 SOIL CORE

SVP02 AND GW3034B LOCATION (ROSE STREET)

SVP03 SOIL CORE

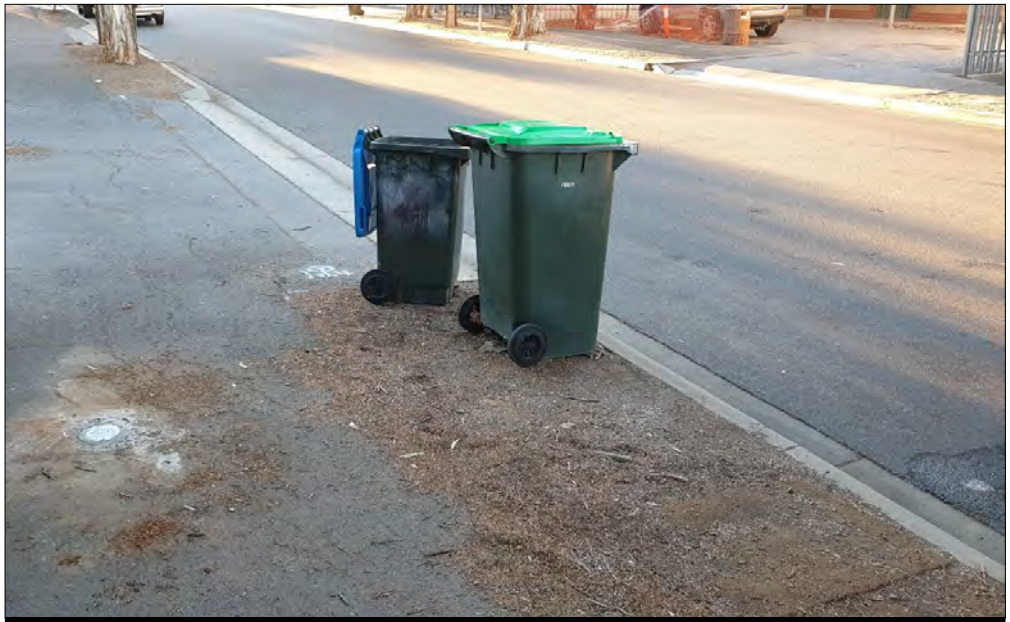


SVP03 LOCATION (CORNER OF ROSE STREET AND FERRY AVENUE)

SVP04 SOIL CORE

SVP04 LOCATION (FERRY AVENUE)

SVP05 SOIL CORE



SVP05 LOCATION (FERRY AVENUE)

Appendix C Calibration Certificates

Multi Parameter Water Meter

Instrument YSI Quatro Pro Plus
Serial No. 18L102027

airmet
Air-Met Scientific Pty Ltd
1300 137 067

Item	Test	Pass	Comments
Battery	Charge Condition	✓	
	Fuses	✓	
	Capacity	✓	
Switch/keypad	Operation	✓	
Display	Intensity	✓	
	Operation (segments)	✓	
Grill Filter	Condition	✓	
	Seal	✓	
PCB	Condition	✓	
Connectors	Condition	✓	
Sensor	1. pH	✓	
	2. mV	✓	
	3. EC	✓	
	4. D.O	✓	
	5. Temp	✓	
Alarms	Beeper		
	Settings		
Software	Version		
Data logger	Operation		
Download	Operation		
Other tests:			

Certificate of Calibration

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

Sensor	Serial no	Standard Solutions	Certified	Solution Bottle Number	Instrument Reading
1. pH 7.00		pH 7.00		330737	pH 7.02
2. pH 4.00		pH 4.00		330734	pH 4.00
3. mV		237.6mV		333083/329762	229.2 mV
4. EC		2760uS		329027	2760uS
6. D.O		0%		123302	0%
7. Temp		21.1°C		Multimeter	22.0 C

Calibrated by: Andrew Boyd

Calibration date: 26-Mar-21

Next calibration due: 26-Sep-21

Gas Calibration Certificate

Instrument GA5000
Serial No. G505863
Sensors CH4, CO2, O2, CO, H2S

airmet
Air-Met Scientific Pty Ltd
1300 137 067

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

Certificate of Calibration

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

Diffusion mode Aspirated mode

Sensor	Serial no	Calibration gas and concentration	Certified	Gas bottle No	Instrument Reading
O2		20.9% Vol O2		Fresh Air	20.9% O2
CH4		60% CH4	NIST	BC327756	60.1% CH4
CO2		40% CO2	NIST	BC327756	40% CO2
CO		100ppm CO	NIST	BC332280	100ppm CO
H2S		25ppm H2S	NIST	BC332280	25ppm H2S

Calibrated by: **Andrew Boyd**

Calibration date: **26/03/2021**

Next calibration due: **22/09/2021**

CALIBRATION RECORD

Project Number		Site/Client			
Equipment ID	WQM	TPS 90FLT T504541 ☐	YSI-1 17B100728 ☐	YSI-2 17C102196 ☐	Hire ☐
	PID	Tiger T-109753 ☑	MiniRae 2000 110-011979 ☐	Hire ☐	

Water Quality Meter

	Calibration standard	Pre-calibration value	Calibrated value	Calibration standard	Pre-calibration value	Calibrated value
Temperature (°C)	Compare against mercury thermometer					
Dissolved Oxygen (%)	100% saturation			Zero (0%)		
pH	pH 7.00			pH 4.00		
Conductivity (EC - mS/cm)	2.76 mS/cm			12.88 mS/cm		
Redox (ORP - mV)	229mV Zobell's sol^{n}			Temp for Zobell value		

Electrodes cleaned gently with dishwashing detergent on cotton tip ☐

Battery check (TPS min 7.2V, YSI >50%) ☐ Spare batteries in YSI case (2x "C" size) ☐

Photoionisation Detector

Calibration standard	Pre-calibration value	Calibrated value	Calibration standard	Pre-calibration value	Calibrated value
Zero in air	0	0	100ppm Isobutylene	2350	100

Lot/Cyl number: 238836/BC-83025

Expiry: 5/20/23

Battery check ☐

Action required

CHECKED BY: A Varney DATE: 29/3/21

SIGNED:

Acceptable Meter Tolerance (calibration not required)

pH	*± 0.1 pH unit*
Conductivity	*±2%*
Redox (ORP)	*±10%*
Temperature	*± 0.5°C*
Dissolved Oxygen Zero	*±0.1ppm*
Dissolved Oxygen Saturation	±0.5%

* Calibration solution traceability information is available upon request.

Temperature, C	Zobell Solution Value, mV vs. Ag/AgCl (4 M KCl)
-5	267.0
0	260.5
5	254.0
10	247.5
15	241.0
20	234.5
25	228.0
30	221.5
35	215.0
40	208.5
45	202.0
50	195.5

CALIBRATION RECORD

Project Number	60610	Site/Client	MELROSE PARK		
Equipment ID	WQM	TPS 90FLT T504541 ☐	YSI-1 17B100728 ☐	YSI-2 17C102196 ☐	Hire ☐
	PID	Tiger T-109753 ☑	MiniRae 2000 110-011979 ☐	Hire ☐	

Water Quality Meter

	Calibration standard	Pre-calibration value	Calibrated value	Calibration standard	Pre-calibration value	Calibrated value
Temperature (°C)	Compare against mercury thermometer					
Dissolved Oxygen (%)	100% saturation			Zero (0%)		
pH	pH 7.00			pH 4.00		
Conductivity (EC - mS/cm)	2.76 mS/cm			12.88 mS/cm		
Redox (ORP - mV)	229mV Zobell's sol^{n}			Temp for Zobell value		

Electrodes cleaned gently with dishwashing detergent on cotton tip ☐

Battery check (TPS min 7.2V, YSI >50%) ☐

Spare batteries in YSI case (2x "C" size) ☐

Photoionisation Detector

Calibration standard	Pre-calibration value	Calibrated value	Calibration standard	Pre-calibration value	Calibrated value
Zero in air	0.0	0.0	100ppm Isobutylene	120.0	101.2

Lot/Cyl number: 238836 / BE83025

Expiry: 5/2023

Battery check ☑

Action required N/A

CHECKED BY: H. FRANKLIN DATE: 25/03/2021

SIGNED:

Acceptable Meter Tolerance (calibration not required)

pH	*± 0.1 pH unit*
Conductivity	*±2%*
Redox (ORP)	*±10%*
Temperature	*± 0.5°C*
Dissolved Oxygen Zero	*±0.1ppm*
Dissolved Oxygen Saturation	±0.5%

* Calibration solution traceability information is available upon request.

Temperature, C	Zobell Solution Value, mV vs. Ag/AgCl (4 M KCl)
-5	267.0
0	260.5
5	254.0
10	247.5
15	241.0
20	234.5
25	228.0
30	221.5
35	215.0
40	208.5
45	202.0
50	195.5

Appendix D Waste Disposal Documentation

EPA *WasteTracker 000*

TRANSPORT CERTIFICATE - No. 5T00501136

South Australia

Created by : Kelly Bras **CA no:** 5C00036291 **Status:** Created **CA start date:** 20-Apr-2021 **CA end date:** 19-Apr-2022

PART 1 (this part to be completed by consignor at pickup)

CONSIGNOR

VARIOUS - PRODUCER
VARIOUS LOCATIONS SA
VARIOUS, SA 5000

Role: Producer
ABN/ACN:
ANZSIC #: 2919
Licence #: N/A

Contact: ENVIRONMENT PROTECTION A
Phone: (08) 8204 2000
Fax: N/A
Emergency: (08) 8204 2000
Email: N/A

Pickup details: As above

WASTE

See attachment for details of additional wastes transported under this TC

LAH 8151

Waste code: J120 - Waste oil/water, hydrocarbons/water mixtures or emulsions
Description: Oil/hydrocarbon mixed with water nos
Form: Liquid
Proposed treatment: Chemical/Physical treatment
Contaminants: N/A

This section is not administered by EPA - contact SafeWork SA 1300 365 255 www.safeworksa.sa.gov.au)

Dangerous goods class: 2 x Bags 1 x 5L **Subsidiary risk class:** **UN no.:**
Packaging type: **Packing group no:** **No. package:** 3

Waste amount at pickup: ... <100kg - (Required)
Waste amount at arrival: ..... Processing treatment: Chem / Phys

PICKUP

I declare that to the best of my knowledge and belief the above information is true and correct.
Name and Position (block letters) ..... LAURA JOHNSTON, JBS&G
Signature ..... Date 23/4/2021

PART 2 - TRANSPORTER (this part to be completed by the transporter at pickup)

UNLICENSED TRANSPORTER OF OWN WASTE
540 CHURCHILL ROAD
VARIOUS, SA 5000

Licence #: n/a
Vehicle reg:
Transport type: Road
Transit State: SA

Contact: ENVIRONMENT PROTECTION A
Phone: (08) 8204 2000
Fax: N/A
Email: N/A

I declare that to the best of my knowledge and belief the above information is true and correct.
Name and Position (block letters) ..... LAURA JOHNSTON, JBS&G
Signature ..... Date 23/4/2021

PART 3 - RECEIVING FACILITY (this part to be completed by the receiving facility)

VEOLIA - 2897 - KILBURN
540 CHURCHILL ROAD
' BURN, SA 5084

Licence #: 2897
Facility ref #: N/A

Contact: KELLY BRAS
Phone: (08) 8343 9608
Fax:
Email: kelly.bras@veolia.com

Arrival date: 23/4/21 **Waste amount at arrival:** N/A >100kg **Did paper TC accompany load?** Yes

ACCEPT / REJECT THE WASTE

☑ The receiving facility accepted the waste - Date accepted: 23/4/21 Date Processed: 23/4/21
☐ The receiving facility rejected the waste (complete section below)
Reason for rejection: .....
Rejected waste sent to - Name: .....
Address: .....

I declare that to the best of my knowledge and belief the above information is true and correct - complete if accepted or rejected:
Name and Position (block letters) ..... N. Kapsaitis Laboratory Manager
Signature ..... Date 23/4/21

NOTE (including any discrepancies)

JBS&G

If any of the information in Parts 1 and 2 is not correct and it is not practical at the time to change the information in *WasteTracker* and print a new version of the certificate, the consignor or transporter must write and initial any corrections on the certificate. The receiving facility must ensure these corrections are entered into *WasteTracker* as soon as practicable afterwards.

27 A 21.

Appendix E Soil Vapour Field Sampling Sheets

SOIL VAPOUR SAMPLING SHEET
SUMMA CANISTER

Soil Vapour Probe ID	SVP 01
Installation type	Soil Vapour Bore

JBS&G

Date:	30 / 03 / 2021	Address:	Iris Street
Client:	EPA SA	Time onsite: 7:15am	Time offsite: 12:30pm
Project Name:	Melrose Park	Temperature and Weather:	16°C Sunny
Project No:	60610	Field Staff:	AS

1a - Calculate Maximum Sampling volume (mL)

Borehole inner diameter (cm)	7.5	Length of sand pack (cm)	50	Sand Porosity	0.4

Maximum sampling volume (mL) = ∏ x (sand pack radius)^2 x (Lengh of sand pack) x Porosity — Indicative Maximum Sampling Volume(mL)= 883.125

1b - Calculate Maximum Sampling Time (mins)

Regulator Flow Rate (mL/min)	80	Maximum Sampling Volume (mL)	883.125	Maximum Sampling Time (minutes) =	11.0

2 -Canister pressure VG-02 (valve C open) (in. Hg) = include in section 6.0

4.0 - Calculate Soil Vapour Probe Deadspace Volume (Purge Volume)

Tubing volume (mL) = ∏r2 (tubing radius) x tubing length (cm)			Total deadspace volume (mL) = implant vol + tubing vol #1+#2+#3
Tubing #1 inner diameter (cm)	0.475	Length of tubing # 1 (cm) 140	Tubing #1 volume (mL) = 24.78
Tubing #2 inner diameter (cm)	0.475	Length of tubing # 2 (cm) 20	Tubing #2 volume (mL) = 3.5
Tubing #3 inner diameter (cm)	0.475	Length of tubing # 3 (cm) 20	Tubing #3 volume (mL) = 3.5
Implant Volume (mL) = 16			Total deadspace volume (mL) = 47.78

*1/4 inch tubing from SGS has ID of 0.3175cm, 1/4 tubing from Thermo has ID of 0.475cm; 1/4 inch tubing ∏r2 (tubing radius) is 0.079cm2 for SGS and 0.177cm2 for Thermo

5.1 - Shut-in test Record vacuum in VG-01 over 30 sec (kPa)

Start (kPa)	End (kPa) After 30 sec	Notes	16.93 kPa	100 in.H_2O	30 in.Hg
-10	-10		5 in.Hg	24.9 kPa	101.59kPa

5.2 - Vacuum test

Syringe volume during vacuum test (mL) = 38 (A)	Vaccum generated during test (Y/N) N	VG-01 maximum (kPa) = 0	Water observed (Y/N) N

Time (secs)=	1	2	3	4	5				
Pressure (kPA)=	0	0	0	0	0				

5.3 - Helium Leak Test

He Detector Model:	GASCHECK	Flow Rate of He Detector:	2 mL/min
Background (ambient) check:	3×10^2 ppm	Time start helium in: 9:58	He supply flowrate (L/min) = 10
Background (soil bore) check:	0×10^2 ppm	Voume purged during soil bore background check (mL) =	2 (B)
Helium concentration in shroud:	9×10^5 ppm	Helium detector purge Volume (mL) =	10 (C)
Time Start Purging with He detector (leak test): 8:59	Time Stop Purging with He detector (leak test): 9:04	Purge time (min):	5

Minutes after start purging =	1min	2min	3min	4min	5min	Leak test passed (Y/N)
He conc sampling train (ppm)	0×10^2	0×10^2	0×10^2	0×10^2	0×10^2	Y

Purge volumes

Volume purged during vacuum test (mL) = 38 (A)	Volume purged during He test (mL) = 12 (B) + (C)	Total Purge (mL) = 50 (A) + (B) + (C)

5.4 - Isopropanol Leak Test

Isopropanol volume applied (mL): 20	PID Average in shroud (ppm): 26.8	PID Peak in shroud (ppm): 41

6.0 - Summa Canister Sampling

Summa Canister ID:	10104	Flow controller ID:	000193	Flow controller rate (mL/min):	80
Duplicate Sample ID:		Flow controller ID:		Flow controller rate (mL/min):	

	Pressure prior to sampling (inch of Hg):	Time start Sampling	Pressure end of sampling (inch of Hg):	Time stop Sampling
Canister (Primary Sample):	-30	9:05am	-7	9:15am
Canister (Duplicate Sample):				

VG-01 pressure (P) checks Time: 9:08 P (kPa): 0 Time: 9:10 P (kPa): 0 Time: 9:12 P (kPa): 0 Time: P (kPa):

6.f-g - General Gases

Time (min)	CH_4 (%)	CO_2 (%)	O_2 (%)	BAL (%)	H2S (ppm)	CO (ppm)	Baro Pressure	VG-01 (kPa)	PID (ppm)
Soil Gas - Post 2min	0.0	4.6	17.0	78.5	0	0		0	0.3
Ambient Air 2min	0.0	0.0	21.1	78.8	0	1	1022		0.2

Notes:

SOIL VAPOUR SAMPLING SHEET
SUMMA CANISTER

Soil Vapour Probe ID	SVP 02
Installation type	Soil Vapour Bore

JBS&G

Date:	30 / 03 / 2021	Address:	Rose Street
Client:	EPA SA	Time onsite: 7:15am	Time offsite: 12:30pm
Project Name:	Melrose Park	Temperature and Weather:	18°C Sunny
Project No:	60610	Field Staff:	AS

1a - Calculate Maximum Sampling volume (mL)

Borehole inner diameter (cm)	7.5	Length of sand pack (cm)	50	Sand Porosity	0.4
Maximum sampling volume (mL) = ∏ x (sand pack radius)^2 x (Lengh of sand pack) x Porosity				Indicative Maximum Sampling Volume(mL)=	883.125

1b - Calculate Maximum Sampling Time (mins)

Regulator Flow Rate (mL/min)	80	Maximum Sampling Volume (mL)	883.125	Maximum Sampling Time (minutes) =	11.0

2 -Canister pressure VG-02 (valve C open) (in. Hg) = include in section 6.0

4.0 - Calculate Soil Vapour Probe Deadspace Volume (Purge Volume)

Tubing volume (mL) = ∏r2 (tubing radius) x tubing length (cm)			Total deadspace volume (mL) = implant vol + tubing vol #1+#2+#3
Tubing #1 inner diameter (cm)	0.475	Length of tubing # 1 (cm) 140	Tubing #1 volume (mL) = 24.78
Tubing #2 inner diameter (cm)	0.475	Length of tubing # 2 (cm) 20	Tubing #2 volume (mL) = 3.5
Tubing #3 inner diameter (cm)	0.475	Length of tubing # 3 (cm) 20	Tubing #3 volume (mL) = 3.5
Implant Volume (mL) = 16			Total deadspace volume (mL) = 47.78

*1/4 inch tubing from SGS has ID of 0.3175cm, 1/4 tubing from Thermo has ID of 0.475cm; 1/4 inch tubing ∏r2 (tubing radius) is 0.079cm2 for SGS and 0.177cm2 for Thermo

5.1 - Shut-in test Record vacuum in VG-01 over 30 sec (kPa)

Start (kPa)	End (kPa) After 30 sec	Notes	16.93 kPa	100 in.H_2O	30 in.Hg
-10	-10		5 in.Hg	24.9 kPa	101.59kPa

5.2 - Vacuum test

Syringe volume during vacuum test (mL) = 38 (A)	Vaccum generated during test (Y/N) N	VG-01 maximum (kPa) = 0	Water observed (Y/N) N

Time (secs)=	1	2	3	4	5				
Pressure (kPA)=	0	0	0	0	0				

5.3 - Helium Leak Test

He Detector Model:	GASCHECK	Flow Rate of He Detector:	2 mL/min
Background (ambient) check:	0×10^2 ppm	Time start helium in: 10:12	He supply flowrate (L/min) = 10
Background (soil bore) check:	0×10^2 ppm	Voume purged during soil bore background check (mL) =	2 (B)
Helium concentration in shroud:	9×10^5 ppm	Helium detector purge Volume (mL) =	10 (C)
Time Start Purging with He detector (leak test): 10:11	Time Stop Purging with He detector (leak test): 10:17	Purge time (min):	6

Minutes after start purging =	1min	2min	3min	4min	5min	Leak test passed (Y/N)
He conc sampling train (ppm)	0×10^2	0×10^2	0×10^2	0×10	0×10^2	Y

Purge volumes

Volume purged during vacuum test (mL) = 38 (A)	Volume purged during He test (mL) = 12 (B) + (C)	Total Purge (mL) = 50 (A) + (B) + (C)

5.4 - Isopropanol Leak Test

Isopropanol volume applied (mL): 20	PID Average in shroud (ppm): 19.1	PID Peak in shroud (ppm): 22.3

6.0 - Summa Canister Sampling

SVP02 Summa Canister ID:	1L0044	Flow controller ID:	000088	Flow controller rate (mL/min):	80
DUP01 Duplicate Sample ID:	1L0078	Flow controller ID:	000202	Flow controller rate (mL/min):	80

	Pressure prior to sampling (inch of Hg):	Time start Sampling	Pressure end of sampling (inch of Hg):	Time stop Sampling
SVP02 Canister (Primary Sample):	-30	10:17am	-10	10:26
DUP01 Canister (Duplicate Sample):	-30	10:17am	-6	10:26

VG-01 pressure (P) checks Time: 10:20 P (kPa): 0 Time: 10:23 P (kPa): 0 Time: 10:25 P (kPa): 0 Time: P (kPa):

6.f-g - General Gases

Time (min)	CH_4 (%)	CO_2 (%)	O_2 (%)	BAL (%)	H2S (ppm)	CO (ppm)	Baro Pressure	VG-01 (kPa)	PID (ppm)
Soil Gas - Post	0.0	1.6	19.0	79.3	0	0		0	0.9
Ambient Air	0.0	0.0	20.8	79.2	0	1	1023		0.0

Notes:
DUP01

SOIL VAPOUR SAMPLING SHEET
SUMMA CANISTER

Soil Vapour Probe ID: SVP03
Installation type: Soil Vapour Bore

JBS&G

Date:	30 / 03 / 2021	Address:	Rose Street
Client:	EPA SA	Time onsite: 7:15	Time offsite: 12:30pm
Project Name:	Melrose Park	Temperature and Weather:	18°C Sunny
Project No:	60610	Field Staff:	AS

1a - Calculate Maximum Sampling volume (mL)

Borehole inner diameter (cm)	7.5	Length of sand pack (cm)	50	Sand Porosity	0.4
Maximum sampling volume (mL) = ∏ x (sand pack radius)^2 x (Lengh of sand pack) x Porosity				Indicative Maximum Sampling Volume(mL)=	883.125

1b - Calculate Maximum Sampling Time (mins)

Regulator Flow Rate (mL/min)	80	Maximum Sampling Volume (mL)	883.125	Maximum Sampling Time (minutes) =	11.0

2 -Canister pressure VG-02 (valve C open) (in. Hg) = include in section 6.0

4.0 - Calculate Soil Vapour Probe Deadspace Volume (Purge Volume)

Tubing volume (mL) = ∏r2 (tubing radius) x tubing length (cm)			Total deadspace volume (mL) = implant vol + tubing vol #1+#2+#3
Tubing #1 inner diameter (cm) 0.475	Length of tubing # 1 (cm) 140		Tubing #1 volume (mL) = 24.78
Tubing #2 inner diameter (cm) 0.475	Length of tubing # 2 (cm) 20		Tubing #2 volume (mL) = 3.5
Tubing #3 inner diameter (cm) 0.475	Length of tubing # 3 (cm) 20		Tubing #3 volume (mL) = 3.5
Implant Volume (mL) = 16			Total deadspace volume (mL) = 47.78

*1/4 inch tubing from SGS has ID of 0.3175cm, 1/4 tubing from Thermo has ID of 0.475cm; 1/4 inch tubing ∏r2 (tubing radius) is 0.079cm2 for SGS and 0.177cm2 for Thermo

5.1 - Shut-in test Record vacuum in VG-01 over 30 sec (kPa)

Start (kPa)	End (kPa) After 30 sec	Notes	16.93 kPa	100 in.H_2O	30 in.Hg
-10	-10		5 in.Hg	24.9 kPa	101.59kPa

5.2 - Vacuum test

Syringe volume during vacuum test (mL) = 38 (A) | Vaccum generated during test (Y/N) N | VG-01 maximum (kPa) = 0 | Water observed (Y/N) N

Time (secs)=	1	2	3	4	5				
Pressure (kPA)=	0	0	0	0	0				

5.3 - Helium Leak Test

He Detector Model: GASCHECK		Flow Rate of He Detector:	2 mL/min
Background (ambient) check: 0×10^2 ppm		Time start helium in: 9:40	He supply flowrate (L/min) = 10
Background (soil bore) check: 0×10^2 ppm		Voume purged during soil bore background check (mL) =	2 (B)
Helium concentration in shroud: ppm		Helium detector purge Volume (mL) =	10 (C)
Time Start Purging with He detector (leak test): 9:39	Time Stop Purging with He detector (leak test): 9:44	Purge time (min):	6

Minutes after start purging =	1min	2min	3min	4min	5min	Leak test passed (Y/N)
He conc sampling train (ppm)	0×10^2	0×10^2	0×10^2	0×10^2	0×10^2	Y

Purge volumes

Volume purged during vacuum test (mL) = 38 (A)	Volume purged during He test (mL) = 12 (B) + (C)	Total Purge (mL) = 50 (A) + (B) + (C)

5.4 - Isopropanol Leak Test

Isopropanol volume applied (mL): 20	PID Average in shroud (ppm): 21.1	PID Peak in shroud (ppm): 33.0

6.0 - Summa Canister Sampling

SVP03 Summa Canister ID: 1L0083 | Flow controller ID: 000315 | Flow controller rate (mL/min): 80

DUP02 Duplicate Sample ID: 1L0132 | Flow controller ID: 000075 | Flow controller rate (mL/min): 80

	Pressure prior to sampling (inch of Hg):	Time start Sampling	Pressure end of sampling (inch of Hg):	Time stop Sampling
SVP03 Canister (Primary Sample):	-30	9:45am	-5	9:56am
DUP02 Canister (Duplicate Sample):	-30	9:45am	-7	9:56am

VG-01 pressure (P) checks Time: 9:47 P (kPa): 0 Time: 9:50 P (kPa): 0 Time: 9:53 P (kPa): 0 Time: P (kPa):

6.f-g - General Gases

Time (min)	CH_4 (%)	CO_2 (%)	O_2 (%)	BAL (%)	H2S (ppm)	CO (ppm)	Baro Pressure	VG-01 (kPa)	PID (ppm)
Soil Gas - Post	0.0	1.7	19.5	78.8	0	0			0.6
Ambient Air	0.0	0.0	20.7	79.2	0	1	1023		0.0

Notes:
DUP02

SOIL VAPOUR SAMPLING SHEET
SUMMA CANISTER

Soil Vapour Probe ID	SVP 04
Installation type	Soil Vapour Bore

JBS&G

Date:	30 / 03 / 2021	Address:	Ferry Ave
Client:	EPA SA	Time onsite: 7:15am	Time offsite: 12:30pm
Project Name:	Melrose Park	Temperature and Weather:	14°C and Sunny
Project No:	60610	Field Staff:	AS

1a - Calculate Maximum Sampling volume (mL)

Borehole inner diameter (cm)	7.5	Length of sand pack (cm)	50	Sand Porosity	0.4
Maximum sampling volume (mL) = ∏ x (sand pack radius)^2 x (Lengh of sand pack) x Porosity				Indicative Maximum Sampling Volume(mL)=	883.125

1b - Calculate Maximum Sampling Time (mins)

Regulator Flow Rate (mL/min)	80	Maximum Sampling Volume (mL)	883.125	Maximum Sampling Time (minutes) =	11.0

2 -Canister pressure VG-02 (valve C open) (in. Hg) = include in section 6.0

4.0 - Calculate Soil Vapour Probe Deadspace Volume (Purge Volume)

Tubing volume (mL) = ∏r2 (tubing radius) x tubing length (cm)			Total deadspace volume (mL) = implant vol + tubing vol #1+#2+#3
Tubing #1 inner diameter (cm) 0.475	Length of tubing # 1 (cm) 140		Tubing #1 volume (mL) = 24.78
Tubing #2 inner diameter (cm) 0.475	Length of tubing # 2 (cm) 20		Tubing #2 volume (mL) = 3.5
Tubing #3 inner diameter (cm) 0.475	Length of tubing # 3 (cm) 20		Tubing #3 volume (mL) = 3.5
Implant Volume (mL) = 16			Total deadspace volume (mL) = 47.78

*1/4 inch tubing from SGS has ID of 0.3175cm, 1/4 tubing from Thermo has ID of 0.475cm; 1/4 inch tubing ∏r2 (tubing radius) is 0.079cm2 for SGS and 0.177cm2 for Thermo

5.1 - Shut-in test Record vacuum in VG-01 over 30 sec (kPa)

Start (kPa)	End (kPa) After 30 sec	Notes	16.93 kPa	100 in.H_2O	30 in.Hg
-10	-10		5 in.Hg	24.9 kPa	101.59kPa

5.2 - Vacuum test

Syringe volume during vacuum test (mL) = 30 (A)			Vaccum generated during test (Y/N) Y		VG-01 maximum (kPa) = 0		Water observed (Y/N) N		
Time (secs)=	1	2	3	4	5				
Pressure (kPA)=	0	0	0	0	0				

5.3 - Helium Leak Test

He Detector Model: GASCHECK				Flow Rate of He Detector: 2 mL/min		
Background (ambient) check: 2x10^2 ppm				Time start helium in: 7:34	He supply flowrate (L/min) = 10	
Background (soil bore) check: 0x10^2 ppm				Voume purged during soil bore background check (mL) = 2 (B)		
Helium concentration in shroud: 9x10^5 ppm				Helium detector purge Volume (mL) = (C)		
Time Start Purging with He detector (leak test):		Time Stop Purging with He detector (leak test):			Purge time (min): 5min	
Minutes after start purging =	1min	2min	3min	4min	5min	Leak test passed (Y/N)
He conc sampling train (ppm)	0x10^2	0x10^2	0x10^2	0x10^2	0x10^2	

Purge volumes

Volume purged during vacuum test (mL) = 30 (A)	Volume purged during He test (mL) = 12 (B) + (C)	Total Purge (mL) = 48 (A) + (B) + (C)

5.4 - Isopropanol Leak Test

Isopropanol volume applied (mL): 20	PID Average in shroud (ppm): 29.5	PID Peak in shroud (ppm): 51

6.0 - Summa Canister Sampling

Summa Canister ID: IL0087		Flow controller ID: 1709		Flow controller rate (mL/min):	80
Duplicate Sample ID:		Flow controller ID:		Flow controller rate (mL/min):	

	Pressure prior to sampling (inch of Hg):	Time start Sampling	Pressure end of sampling (inch of Hg):	Time stop Sampling
Canister (Primary Sample):	-30	7:40am	-7	7:51am
Canister (Duplicate Sample):				

VG-01 pressure (P) checks Time: 7:43 P (kPa): 0 Time: 7:45 P (kPa): 0 Time: 7:48 P (kPa): 0 Time: P (kPa):

6.f-g - General Gases

	Time (min)	CH_4 (%)	CO_2 (%)	O_2 (%)	BAL (%)	H2S (ppm)	CO (ppm)	Baro Pressure	VG-01 (kPa)	PID (ppm)
Soil Gas - Post	2min	0.0	2.3	19.1	78.6	0	0		0	0.5
Ambient Air	2min	0.0	0.0	21.1	78.8	0	2	1022		0.0

Notes:

SOIL VAPOUR SAMPLING SHEET
SUMMA CANISTER

Soil Vapour Probe ID: SVP05
Installation type: Soil Vapour Bore

JBS&G

Date:	30 / 03 / 2021	Address:	Ferry Ave
Client:	EPA SA	Time onsite: 7:15am	Time offsite: 12:30pm
Project Name:	Melrose Park	Temperature and Weather:	16°C and Sunny
Project No:	60610	Field Staff:	AS

1a - Calculate Maximum Sampling volume (mL)

Borehole inner diameter (cm)	7.5	Length of sand pack (cm)	50	Sand Porosity	0.4
Maximum sampling volume (mL) = ∏ x (sand pack radius)^2 x (Lengh of sand pack) x Porosity				Indicative Maximum Sampling Volume(mL)=	883.125

1b - Calculate Maximum Sampling Time (mins)

Regulator Flow Rate (mL/min)	80	Maximum Sampling Volume (mL)	883.125	Maximum Sampling Time (minutes) =	11.0

2 -Canister pressure VG-02 (valve C open) (in. Hg) = include in section 6.0

4.0 - Calculate Soil Vapour Probe Deadspace Volume (Purge Volume)

Tubing volume (mL) = ∏r2 (tubing radius) x tubing length (cm)			Total deadspace volume (mL) = implant vol + tubing vol #1+#2+#3
Tubing #1 inner diameter (cm) 0.475	Length of tubing # 1 (cm) 140		Tubing #1 volume (mL) = 24.78
Tubing #2 inner diameter (cm) 0.475	Length of tubing # 2 (cm) 20		Tubing #2 volume (mL) = 3.5
Tubing #3 inner diameter (cm) 0.475	Length of tubing # 3 (cm) 20		Tubing #3 volume (mL) = 3.5
Implant Volume (mL) = 16			Total deadspace volume (mL) = 47.78

*1/4 inch tubing from SGS has ID of 0.3175cm, 1/4 tubing from Thermo has ID of 0.475cm; 1/4 inch tubing ∏r2 (tubing radius) is 0.079cm2 for SGS and 0.177cm2 for Thermo

5.1 - Shut-in test Record vacuum in VG-01 over 30 sec (kPa)

Start (kPa)	End (kPa) After 30 sec	Notes	16.93 kPa	100 in.H_2O	30 in.Hg
-10	-10		5 in.Hg	24.9 kPa	101.59kPa

5.2 - Vacuum test

Syringe volume during vacuum test (mL) = 38 (A)			Vaccum generated during test (Y/N) N		VG-01 maximum (kPa) = 0		Water observed (Y/N) N	
Time (secs)=	1	2	3	4	5			
Pressure (kPA)=	0	0	0	0	0			

5.3 - Helium Leak Test

He Detector Model: GASCHECK		Flow Rate of He Detector:	2 mL/min
Background (ambient) check:	1×10^2 ppm	Time start helium in: 8:10	He supply flowrate (L/min) = 10
Background (soil bore) check:	0×10^2 ppm	Voume purged during soil bore background check (mL) =	2 (B)
Helium concentration in shroud:	9×10^5 ppm	Helium detector purge Volume (mL) =	10 (C)
Time Start Purging with He detector (leak test): 8:19	Time Stop Purging with He detector (leak test): 8:25	Purge time (min):	6

Minutes after start purging =	1min	2min	3min	4min	5min	Leak test passed (Y/N)
He conc sampling train (ppm)	0 $\times 10^2$	0 $\times 10^2$	0 $\times 10^2$	0 $\times 10^2$	0 $\times 10^2$	Y

Purge volumes

Volume purged during vacuum test (mL) = 38 (A)	Volume purged during He test (mL) = 12 (B) + (C)	Total Purge (mL) = 50 (A) + (B) + (C)

5.4 - Isopropanol Leak Test

Isopropanol volume applied (mL): 20	PID Average in shroud (ppm): 34.3	PID Peak in shroud (ppm): 55.

6.0 - Summa Canister Sampling

Summa Canister ID:	1L0162	Flow controller ID:	~~1882~~ 000159	Flow controller rate (mL/min):	80
Duplicate Sample ID:	1L0107	Flow controller ID:	000147	Flow controller rate (mL/min):	80

SMRA001	Pressure prior to sampling (inch of Hg):	Time start Sampling	Pressure end of sampling (inch of Hg):	Time stop Sampling
Canister (Primary Sample):	-30	8:26 am	-4	8:36
Canister (Duplicate Sample):	-30	8:26 am	-5	8:36

VG-01 pressure (P) checks Time: 8:28 P (kPa): 0 Time: 8:31 P (kPa): 0 Time: 9:34 P (kPa): 0 Time: P (kPa):

6.f-g - General Gases

Time (min)	CH_4 (%)	CO_2 (%)	O_2 (%)	BAL (%)	H2S (ppm)	CO (ppm)	Baro Pressure	VG-01 (kPa)	PID (ppm)
Soil Gas - Post	0.0	4.0	17.3	78.7	0	0		0	2.7
Ambient Air	0.0	0.0	21.1	78.8	0	1	1022		0.0

Notes:

Appendix F Groundwater Field Sampling Sheet

GROUNDWATER FIELD PARAMETERS

JBS&G

Project Number:	60610	WELL ID	GW3034
Client:	CPB SA	Purging date:	30/3/2021
Site Location:	Melrose Park	Sampling date:	30/3/2021
Field Sampler(s):	AS	Stick up (m):	—
Casing Diameter (mm):	50mm / 100mm / 150mm	Depth to NAPL (mBTOC):	—
Well completion:	Gatic / Standpipe	Depth to SWL (mBTOC):	3.372
Cap type:	Envirocap / PVC End cap	NAPL thickness (m):	—
Well condition:	Comprimised / Good	Well Depth (mBTOC):	6.62
Sampling method:	Purge / Low Flow: Pump submersion depth (mBTOC): 5.11	Water Column Depth (m)	3.248
		Sampling SWL (mBTOC):	3.580

Volume Purged	Dissolved Oxygen	Electrical Conductivity	pH	Redox Potential	Temperature	Comments	Time
L	% ☐ ppm ☑	S/cm @25°C	pH units	mV	°C	SWL for low flow (mBTOC)	
1	6.35	4665	7.24	257.1	23.0	3.580	11:23
1.4	0.08	4949	7.17	235.5	23.7	3.580	11:26
1.8	0.15	4990	7.16	233.0	23.2	3.580	11:29
2.2	0.24	4954	7.14	228.0	22.7	3.580	11:32
2.6	0.36	4985	7.13	226.8	23.3	3.580	11:35
3.0	0.43	5029	7.12	224.7	23.3	3.55	11:38
3.4	0.44	5031	7.12	224.0	23.3	3.55	11:41
Acceptable Variation	+/-10%	+/-5%	+/- 0.1pH unit	+/- 10mV	+/- 0.1 °C	Field results acceptable:	YES / NO
LOW FLOW: Max. flow rate = 0.5 L/min - Max. drawdown = 0.1 m - Well stable when 3 consecutive readings (either 3min apart or 1L apart)							
PURGE: Min. sampling volume is 4 casing volumes or dry twice - 1 casing volume (50mm wells) = 2 L/m - 1 casing volume (100mm wells) = 8 L/m							
3.8	0.45	5039	7.11	223.0	23.3	3.55	11:44

Turbidity	High / Medium / Low	Hydrocarbon sheen?	YES / NO
Colour:	Orange brown	Odour:	None

		Container	No.	Preservative
Primary sample ID:	GW3034			
Duplicate sample ID:	DUP01	40mL Vial	2	HCl / other
Triplicate sample ID:	SLC1701	200/500mL Glass		none / H_2SO_4
Rinse blank after?	YES / NO ID: RB01	500mL Plastic		none / other
Samples filtered for metals?	YES / NO	80mL Plastic		H_2SO_4 / none / other
Filter Method:	~~0.45um sterileup filter~~ N/A	80mL Plastic		HNO_3 / none / other
Water Quality Meter:	YSI (hire)	80mL Plastic		NaOH / none/ other
Dipper / Interface probe:	IP (hire)			
Pump:	Microperge (hire)			

Notes: PID 4.3 Max steady @ 4.2ppm 2mins

Pump is 0.44m long CPM1 54/6 @ 50psi

Trip Spike = WSP7893 DI = MO806

Trip Blank = TB01 Grabes 11/5/21

Appendix G Groundwater Bore Database Search Results (WaterConnect 2021)

Unit_No	Drillhole Class	Aquifer	Original Drill		Maximum Drill		Last Open		Permit No.	Cased To	Casing Diameter	Purpose	Lastest Status		
			Depth	Date	Depth	Date	Depth	Date					Status	Date	DTW
6627-7341	Water Well	Qpah	32	1/05/1985	32	1/05/1985	32	1/05/1985	16750	25	150	Domestic	Operational		1.8
6627-8914	Water Well	Qpah	18	20/06/1994	18	20/06/1994	18	20/06/1994	31941	18	100	Domestic			
6628-12475	Water Well	Qpah	7.3		7.3			24/06/1983	11523	7.3	95	Domestic	Operational		2.4
6628-12530	Water Well	Qpah	13.7	13/10/1983	13.7	13/10/1983	13.7	13/10/1983	13114	13.7	95	Domestic	Operational		2.1
6628-12609	Water Well	Qpah	25	14/12/1983	25	14/12/1983	24.9	14/12/1983	13724	24.9	100	Domestic	Operational		3.4
6628-13083	Water Well	Qpah	14.5	22/10/1984	14.5	22/10/1984	14.5	22/10/1984	15399	14.5	95	Domestic	Operational		4
6628-13118	Water Well	Qpah	6	5/01/1984	6	5/01/1984	6	5/01/1984	15860			Domestic	Operational		2.13
6628-13289	Water Well	Qpah	11	16/11/1984	11	16/11/1984	11	16/11/1984	15359	11	95	Domestic	Operational		3.7
6628-13455	Water Well	Qpah	62.5	20/11/1984	62.5	20/11/1984	62.5	20/11/1984	93921	54	75	Domestic	Operational		
6628-13525	Water Well	Qpah	20	19/11/1985	20	19/11/1985	20	19/11/1985	17644	20	100	Domestic	Operational		4
6628-13583	Water Well	Qpah	14.6	16/01/1986	14.6	16/01/1986	14.6	16/01/1986	17852	14.6	95	Domestic	Operational		3
6628-14058	Water Well	Qpah	13.5	15/09/1990	13.5	15/09/1990	13.5	15/09/1990	24641	13.5	100	Domestic	Operational		7
6628-14234	Water Well	Qpah	15	2/05/1988	15	2/05/1988	15	2/05/1988	20952	15	95	Domestic	Operational		10.3
6628-14286	Water Well	Qpah	17	26/09/1988	17	26/09/1988	17	26/09/1988	21668	17	100	Domestic	Operational		12.5
6628-14305	Water Well	Qpah	18.8	24/10/1988	18.8	24/10/1988	18.8	24/10/1988	21681	18.8	100	Domestic	Operational		9.1
6628-14334	Water Well	Qpah	15.2	25/10/1988	15.2	25/10/1988	15.2	25/10/1988	22179	15.2	100	Domestic	Operational		9.1
6628-14401	Water Well	Qpah	20.7	22/04/1989	20.7	22/04/1989	20.7	22/04/1989	22565	20.7	100	Domestic	Operational		9.5
6628-15229	Water Well	Qpah	13.5	18/03/1990	13.5	18/03/1990	13.5	18/03/1990	23537	10	50	Domestic	Operational		3
6628-15317	Water Well	Qpah	15	4/07/1990	15	4/07/1990	15	4/07/1990	24458	15	100	Domestic	Operational		5.2
6628-15413	Water Well	Qpah	7.5	26/12/1990	7.5	26/12/1990	7.5	26/12/1990	25003	7.5	152	Domestic	Operational		6
6628-15414	Water Well	Qpah	19	15/12/1990	19	15/12/1990	19	15/12/1990	24977	19	100	Domestic	Operational		3
6628-15424	Water Well	Qpah	15.5	7/01/1991	15.5	7/01/1991	15.5	7/01/1991	24959	15.5	100	Domestic	Operational		9.5
6628-15560	Water Well	Qpah	5	1/02/1991	5	1/02/1991	5	1/02/1991	25381	5	102	Domestic	Operational		4
6628-15599	Water Well	Qpah	23.4	1/08/1991	23.4	1/08/1991	23.4	1/08/1991	25987	23.4	100	Domestic	Operational		17
6628-15638	Water Well	Qa+Qpah	11.8	27/09/1991	11.8	27/09/1991	11.8	27/09/1991	26158	11.8	100	Domestic	Operational		5.3
6628-15732	Water Well	Qpah	15	23/11/1991	15	23/11/1991	15	23/11/1991	26393	15	100	Domestic	Operational		7.5
6628-15833	Water Well	Qpah	18	12/12/1991	18	12/12/1991	18	12/12/1991	26594	18	95	Domestic	Operational		5
6628-15835	Water Well	Qpah	18	12/12/1991	18	12/12/1991	18	12/12/1991	26593	18	95	Domestic	Operational		4.5
6628-15923	Water Well	Qpah	18	28/02/1992	23	15/07/1992		15/07/1992	27126	23	100	Domestic	Operational		0
6628-15925	Water Well	Qpah	25.5	23/12/1991	25.5	23/12/1991	25.5	23/12/1991	26727	25.5	100	Domestic	Operational		14.1
6628-15953	Water Well	Qpah	17.3	24/12/1991	17.3	24/12/1991	17.3	24/12/1991	26680	17.3	100	Domestic	Operational		5.7
6628-16009	Water Well	Qpah	29.2	14/03/1992	29.2	14/03/1992	29.2	14/03/1992	26697	23	100	Domestic	Operational		16.2
6628-16245	Water Well	Qpah			24	12/02/1993		12/02/1993	28924	24	100	Domestic			15.6
6628-16246	Water Well	Qpah			18	8/02/1993		8/02/1993	28932	18	100	Domestic			5
6628-16248	Water Well	Qpah	6.6	5/01/1993	6.6	5/01/1993	6.6	5/01/1993	27320	4.25		Domestic			
6628-16379	Water Well	Qpah	21	3/11/1992	21	3/11/1992	21	3/11/1992	28481	21	100	Domestic			
6628-16382	Water Well	Qpah	18	10/12/1992	18	10/12/1992	18	10/12/1992	27926	18	100	Domestic			
6628-16390	Water Well	Qpah	14	24/04/1993	14	24/04/1993	14	24/04/1993	29472	14	100	Domestic			4
6628-16680	Water Well	Qpah	15	21/12/1993	15	21/12/1993	15	21/12/1993	30740	15	100	Domestic			2.6
6628-16726	Water Well	Qpah	25	26/10/1994	25	26/10/1994	25	26/10/1994	32645	25	100	Domestic			
6628-16744	Water Well	Qpah	21	7/09/1994	21	7/09/1994	21	7/09/1994	32315	21	100	Domestic			5
6628-16745	Water Well	Qpah	18	6/09/1994	18	6/09/1994	18	6/09/1994	32402	18	100	Domestic			
6628-16829	Water Well	Qpah	24	9/12/1994	24	9/12/1994	24	9/12/1994	32859	24	100	Domestic			
6628-16925	Water Well	Qpah	22.5	24/11/1994	22.5	24/11/1994	22.5	24/11/1994	32812	22.5	100	Domestic			
6628-16943	Water Well	Qpah	24	27/01/1995	24	27/01/1995	24	27/01/1995	33256	24	100	Domestic			
6628-16957	Water Well	Qpah	18	7/02/1995	18	7/02/1995	18	7/02/1995	33618	18	100	Domestic			
6628-16959	Water Well	Qpah	16.5	20/02/1995	16.5	20/02/1995	16.5	20/02/1995	33832	16.5		Domestic			
6628-16971	Water Well	Qpah	16.5	20/01/1995	16.5	20/01/1995	16.5	20/01/1995	33654	16.5	100	Domestic			
6628-17086	Water Well	Qpah	25	14/02/1995	25	14/02/1995	25	14/02/1995	32930	25	100	Domestic			
6628-17361	Water Well	Qpah	26	27/06/1995	26	27/06/1995	26	27/06/1995	34656	26	100	Domestic			
6628-17486	Water Well	Qpah	24	30/08/1995	24	30/08/1995	24	30/08/1995	35487	24	94	Domestic			
6628-17515	Water Well	Qpah	30	11/12/1995	30	11/12/1995	30	11/12/1995	36258	30	100	Domestic			11.9
6628-17520	Water Well	Qpah	22.3	20/12/1995	22.3	20/12/1995	22.3	20/12/1995	36365	22.3	100	Domestic			
6628-17541	Water Well	Qpah	27	4/01/1996	27	4/01/1996	27	4/01/1996	36638	27	100	Domestic			

Unit_No	Water Level			Salinity			pH		Yield		MGT Easting	MGA Northing	Hundred	Plan	Parcel	Title
	SWL	RSWL	Date	TDS	EC	Date	pH	Date	Yield	Date						
6627-7341	1.8	68.48	1/05/1985	1759	3170	1/05/1985	7.8	1/05/1985	3.75	1/05/1985	280021.34	6124045.7	ADELAIDE	F13435	A52	CT 5833 294
6627-8914				2704	4840	1/07/1994	6.7	1/07/1994			277312.3	6123614.81	ADELAIDE	D8184	A4	CT 5593 955
6628-12475	2.4	19.49	24/06/1983	2058	3700	24/05/1983	7.4	24/05/1983			277610.41	6126020.73	ADELAIDE	F11438	A226	CT 5617 289
6628-12530	2.1	86.9	13/10/1983	661	1200	13/10/1983	7.1	13/10/1983	1.2	13/10/1983	281184.29	6124910.71	ADELAIDE	D3026	A36	CT 5702 838
6628-12609	3.4	15.37	14/12/1983	1390	2510	14/12/1983	8.39	14/12/1983	0.7	14/12/1983	277283.37	6126577.72	ADELAIDE	D86686	A2	CT 6085 74
6628-13083	4	27.87	22/10/1984	1194	2160	22/10/1984	7.8	22/10/1984	1.5	22/10/1984	278772.33	6126486.77	ADELAIDE	S667		
6628-13118	2.13	16.66	5/01/1984	1960	3527	14/01/1985					277316.37	6127145.72	ADELAIDE	D7300	A6	CT 5302 533
6628-13289	3.7	28.91	16/11/1984	1446	2610	16/11/1984	8.6	16/11/1984	1.5	16/11/1984	278886.36	6125992.72	ADELAIDE	D3417	A189	CT 5482 357
6628-13455				2001	3600	6/09/1985	7.2	6/09/1985	0.2		281185.3	6124910.73	ADELAIDE	D3026	A36	CT 5702 838
6628-13525	4	15.9	5/12/1985	1378	2490	19/11/1985	7.9	19/11/1985	0.75	19/11/1985	277479.36	6126984.76	ADELAIDE	S544		
6628-13583	3	29.14	24/02/1986	2318	4160	16/01/1986	7.3	16/01/1986	1.25	16/01/1986	278827.42	6125413.78	ADELAIDE	D3280	A33	CT 5147 43
6628-14058	7	33	2/10/1990	1256	2271	2/10/1990	7.4	15/09/1990	1.2	15/09/1990	279521.36	6126433.77	ADELAIDE	F12136	A117	CT 5411 907
6628-14234	10.3	34.01	13/07/1988	1311	2370	13/07/1988	7.8	2/05/1988	1	2/05/1988	279905.33	6125812.71	ADELAIDE	D746	A180	CT 5705 927
6628-14286	12.5	34.3	19/10/1988	1068	1933	26/10/1988	7.9	26/10/1988	0.8	26/09/1988	280056.3	6126222.7	ADELAIDE	D3210	A333	CT 5749 803
6628-14305	9.1	34.28	30/11/1988	1289	2330	30/11/1988	7.5	24/10/1988	1.2	24/10/1988	279829.37	6125799.88	ADELAIDE	D746	A175	CT 5541 631
6628-14334	9.1	34.28	6/02/1989	1390	2509	6/02/1989	7.2	6/02/1989	1.2	25/10/1988	279829.37	6125799.88	ADELAIDE	D746	A175	CT 5541 631
6628-14401	9.5	35.56	8/05/1989	1074	1943	8/05/1989	7.9	22/04/1989	1.75	22/04/1989	279960.32	6126762.7	ADELAIDE	D1739	A22	CT 5551 267
6628-15229	3	18.17	27/03/1990	1418	2560	27/03/1990	7.45	18/03/1990	0.6	18/03/1990	277620.41	6126996.75	ADELAIDE	S4027		
6628-15317	5.2	25.8	6/07/1990	1205	2181	6/07/1990	7.9	4/06/1990	1.2	4/07/1990	278716.31	6127025.74	ADELAIDE	D2144	A53	CT 5591 290
6628-15413	6	27.44	8/01/1991	1732	3120	8/01/1991	7.6	26/12/1990			278981.37	6125517.75	ADELAIDE	D3528	A510	CT 5374 10
6628-15414	3	15.06	17/12/1990	10659	18128	17/12/1990	7.35	16/12/1990	0.1	15/12/1990	277083.38	6126301.78	ADELAIDE	D4209	A347	CT 5709 918
6628-15424	9.5	30.5	7/01/1991	1525	2751	7/01/1991	7.8	7/01/1991	1	7/01/1991	279613.35	6125681.67	ADELAIDE	D746	A260	CT 5672 98
6628-15560	4	21.28	1/02/1991	1278	2311						278167.42	6127329.63	ADELAIDE	D2614	A19	CT 5130 708
6628-15599	17	39.86	22/08/1991	1238	2239	20/12/2010	6	1/08/1991	1	1/08/1991	280817.34	6126614.74	ADELAIDE	D2855	A127	CT 5743 887
6628-15638	5.3	31.12	27/09/1991	1184	2142	27/09/1991	7	27/09/1991	1	27/09/1991	279214.34	6126783.74	ADELAIDE	D5634	A77	CT 5643 202
6628-15732	7.5	32	23/11/1991	1178	2131	23/11/1991	7.1	23/11/1991			279454.28	6126532.71	ADELAIDE	D122980	A781	CT 6234 109
6628-15833	5	26.91	21/01/1992	1121	2029	21/01/1992	7.2	12/12/1991	0.8	12/12/1991	278820.3	6126885.74	ADELAIDE	D4646	A4	CT 5409 290
6628-15835	4.5	27.09	21/01/1992	1027	1860	21/01/1992	7.4	12/12/1991	1	12/12/1991	278790.32	6126882.68	ADELAIDE	D4646	A2	CT 5663 457
6628-15923	0	57.25	28/02/1992								280818.37	6126727.76	ADELAIDE	D2855	A629	CT 5637 121
6628-15925	14.1	36.36	3/03/1992	1200	2171	3/03/1992	7.1	23/12/1991	0.75	23/12/1991	280379.29	6126523.73	ADELAIDE	D2955	A246	CT 5127 249
6628-15953	5.7	35.27	24/12/1991	1027	1860	24/12/1991	7.2	24/12/1991	1	24/12/1991	279606.34	6126379.77	ADELAIDE	F12136	A130	CT 5499 38
6628-16009	16.2	32.5	9/04/1992	909	1647	9/04/1992	7.7	14/03/1992	1	14/03/1992	280244.3	6126567.65	ADELAIDE	D2955	A205	CT 5678 356
6628-16245	15.6	35.69	23/02/1993	517	940	23/02/1993	7.3	23/02/1993			280437.25	6125979.59	ADELAIDE	D3450	A848	CT 5377 710
6628-16246	5	29.37	23/02/1993	1300	2350	23/02/1993	7.1	23/02/1993			279092.34	6127154.73	ADELAIDE	D4394	A9	CT 5571 305
6628-16248				1064	1925						278595.34	6127274.65	ADELAIDE	D4394	A73	CT 5697 789
6628-16379				1581	2851	24/11/1992	7.1	24/11/1992			280087.41	6125724.75	ADELAIDE	F34100	A109	CT 5144 20
6628-16382				1183	2142	6/01/1993	7.4	6/01/1993			280827.3	6124669.71	ADELAIDE	D3715	A108	CT 5635 322
6628-16390	4	18.15									277702.44	6126809.94	ADELAIDE	F11099	A71	CT 5398 157
6628-16680	2.6	16.29	21/12/1993	1856	3340	9/06/1994	7.1	9/06/1994	0.76	21/12/1993	277327.32	6127164.86	ADELAIDE	D821	A180	CT 5638 385
6628-16726				938	1700	10/11/1994	7.2	10/11/1994	1.5	26/10/1994	279982.36	6126924.73	ADELAIDE	D3845	A264	CT 5729 857
6628-16744	5	11.48	7/09/1994	3396	6050	7/09/1994	6.6	7/09/1994			276882.47	6126354.81	ADELAIDE	F10581	A538	CT 5211 698
6628-16745				1066	1930	6/09/1994	6.6	6/09/1994			279592.37	6126689.55	ADELAIDE	D84153	A701	CT 6059 606
6628-16829				961	1740	9/12/1994	6.6	9/12/1994			280777.46	6126764.85	ADELAIDE	D2855	A17	CT 5227 465
6628-16925				1266	2290	24/11/1994	7.4	24/11/1994			279137.31	6127519.66	ADELAIDE	F10242	A42	CT 5397 576
6628-16943				1049	1900	27/01/1995	7	27/01/1995			280492.24	6126089.69	ADELAIDE	D3176	A504	CT 5757 6
6628-16957				4182	7410	7/02/1995	7	7/02/1995			276872.34	6125409.86	ADELAIDE	D2289	A157	CT 5740 170
6628-16959				3407	6070	20/02/1995	7.1	20/02/1995			277202.38	6125869.58	ADELAIDE	F11643	A82	CT 5824 556
6628-16971				1497	2701	20/01/1995	6.9	20/01/1995			279262.52	6125559.63	ADELAIDE	D3528	A495	CT 5329 484
6628-17086				1043	1890	14/02/1995	7.2	14/02/1995	0.4	14/02/1995	280392.43	6126114.81	ADELAIDE	D3450	A841	CT 5273 602
6628-17361				5574	9790	27/06/1995	7.1	27/06/1995			279167.61	6124764.61	ADELAIDE	F12973	A21	CT 5809 177
6628-17486				750	1360	30/08/1995	7	30/08/1995	0.5	30/08/1995	280152.47	6125689.69	ADELAIDE	D746	A300	CT 5721 36
6628-17515	11.9	42.85	11/12/1995	1088	1970	11/12/1995	7.6	11/12/1995	0.5	11/12/1995	280682.4	6126599.73	ADELAIDE	D2955	A260	CT 5181 386
6628-17520				1390	2510	20/12/1995	7.6	20/12/1995	1	20/12/1995	279942.55	6125659.66	ADELAIDE	D746	A313	CT 5519 987
6628-17541				1094	1980	4/01/1996	6.9	4/01/1996	1	4/01/1996	280247.57	6126879.63	ADELAIDE	D2121	A7	CT 5088 397

Unit_No	Drillhole Class	Aquifer	Original Drill		Maximum Drill		Last Open		Permit No.	Cased To	Casing Diameter	Purpose	Lastest Status		
			Depth	Date	Depth	Date	Depth	Date					Status	Date	DTW
6628-17542	Water Well	Qpah	16	8/01/1996	16	8/01/1996	16	8/01/1996	36637	16	100	Domestic			
6628-17551	Water Well	Qpah	14.2	18/12/1995	14.2	18/12/1995	14.2	18/12/1995	36475	14.2	100	Domestic			5.2
6628-17628	Water Well	Qpah	24	7/12/1995	24	7/12/1995	24	7/12/1995	36445	24	94	Domestic			
6628-17655	Water Well	Qpah	18	4/02/1996	18	4/02/1996	18	4/02/1996	36515	18	100	Domestic			
6628-17658	Water Well	Qpah	13.5	15/01/1996	13.5	15/01/1996	13.5	15/01/1996	36651	13.5	100	Domestic			
6628-17815	Water Well	Qpah	23	1/04/1996	23	1/04/1996	23	1/04/1996	37059	23	100	Domestic			
6628-17843	Water Well	Qpah	17	28/02/1996	17	28/02/1996	17	28/02/1996	36939	17	100	Domestic			
6628-17846	Water Well	Qpah	18	29/02/1996	18	29/02/1996	18	29/02/1996	37174	18	100	Domestic			
6628-17860	Water Well	Qpah	16	11/04/1996	16	11/04/1996	16	11/04/1996	37429	16	100	Domestic			3.6
6628-17954	Water Well	Qpah	18	16/08/1996	18	16/08/1996	18	16/08/1996	38377	18	100	Domestic			
6628-17955	Water Well	Qpah	12	14/08/1996	12	14/08/1996	12	14/08/1996	38017	12	100	Domestic			2.4
6628-18117	Water Well	Qpah	30	11/12/1996	30	11/12/1996	30	11/12/1996	39040	30	94	Domestic			9
6628-18123	Water Well	Qpah	30	13/11/1996	30	13/11/1996	30	13/11/1996	39010	11	94	Domestic			11
6628-18151	Water Well	Qpah	25	17/05/1996	25	17/05/1996	25	17/05/1996	35891	25	100	Domestic			15.8
6628-18185	Water Well	Qpah	30	17/05/1996	30	17/05/1996	30	17/05/1996	37222	30	94	Domestic			
6628-18232	Water Well	Qpah	18	5/12/1996	18	5/12/1996	18	5/12/1996	39224	18	100	Domestic			7.5
6628-18247	Water Well	Qpah	21	21/02/1997	21	21/02/1997	21	21/02/1997	39109	21	94	Domestic			8
6628-18316	Water Well	Qpah	8	1/09/1996	8	1/09/1996	8	1/09/1996	37178	8	102	Domestic			3.2
6628-18370	Water Well	Qpah	15	20/01/1997	15	20/01/1997	15	20/01/1997	39383	15	102	Domestic			3
6628-18371	Water Well	Qpah	11.8	4/05/1997	11.8	4/05/1997	11.8	4/05/1997	40404	12	102	Domestic			6
6628-18490	Water Well	Qpah	24	14/02/1997	24	14/02/1997	24	14/02/1997	38600	24	100	Domestic	Operational	14/02/1997	15
6628-18542	Water Well	Qpah	19	17/05/1997	19	17/05/1997	19	17/05/1997	39382	17.5	100	Domestic			12
6628-18543	Water Well	Qpah	24	9/02/1997	24	9/02/1997	24	9/02/1997	39066	24	100	Domestic			11
6628-18585	Water Well	Qpah	36	14/11/1995	36	14/11/1995	35.5	14/11/1995	34372	35.5	100	Domestic			15
6628-18724	Water Well	Qpah	22.5	23/10/1997	22.5	23/10/1997	22.5	23/10/1997	42753	22.5	100	Domestic			14.4
6628-18725	Water Well	Qpah	10	9/03/1997	10	9/03/1997	10	9/03/1997	42879		152	Domestic			4
6628-18770	Water Well	Qpah	29	20/11/1997	29	20/11/1997	29	20/11/1997	41534	29	94	Domestic			6
6628-18828	Water Well	Qpah	21	29/01/1998	21	29/01/1998	21	29/01/1998	43709	21	100	Domestic			6
6628-18856	Water Well	Qpah	27	19/02/1998	27	19/02/1998	27	19/02/1998	44166	27	100	Domestic			18
6628-18868	Water Well	Qpah	24	18/02/1998	24	18/02/1998	24	18/02/1998	44118	24	100	Domestic			12
6628-19369	Water Well	Qpah	22	12/01/1999	22	12/01/1999	22	12/01/1999	47402	22	100	Domestic			9
6628-19414	Water Well	Qpah	18	19/02/1999	18	19/02/1999	18	19/02/1999	47960	18	100	Domestic			4.8
6628-19454	Water Well	Qpah	24	25/02/1999	24	25/02/1999	24	25/02/1999	47779	24	96	Domestic			15
6628-19462	Water Well	Qpah	16.5	29/03/1999	16.5	29/03/1999	16.5	29/03/1999	48505	16.5	100	Domestic			6
6628-19496	Water Well	Qpah	30	4/04/1999	30	4/04/1999	30	4/04/1999	48274	30	94	Domestic			10
6628-19497	Water Well	Qpah	30	16/05/1999	30	16/05/1999	30	16/05/1999	48580	30	94	Domestic			9
6628-20468	Water Well	Qpah	19.5	18/12/2000	19.5	18/12/2000	19.5	18/12/2000	54179	18.5	100	Domestic			8
6628-20514	Water Well	Qpah	28.5	14/02/2001	28.5	14/02/2001	28.5	14/02/2001	54609	28.5	100	Domestic			17
6628-20516	Water Well	Qpah	16	6/03/2001	16	6/03/2001	16	6/03/2001	54803	16	100	Domestic			3
6628-20585	Water Well	Qpah	16	3/11/2000	16	3/11/2000	16	3/11/2000	52319	16	100	Domestic			4.2
6628-20658	Water Well	Qpah	25.5	28/07/2001	25.5	28/07/2001	25.5	28/07/2001	55952	25.5	100	Domestic			9
6628-20719	Water Well	Qpah	16	9/11/2001	16	9/11/2001	16	9/11/2001	56478	16	105	Domestic			3
6628-20918	Water Well	Qpah(Q1)	29	7/06/2000	29	7/06/2000	29	7/06/2000	50186	29	24	Domestic			18
6628-21040	Water Well	Qpah	30	11/11/2001	30	11/11/2001	30	11/11/2001	56256	11	94	Domestic			11
6628-21218	Water Well	Qpah	30	8/11/2002	30	8/11/2002	30	8/11/2002	58838	9	94	Domestic			9
6628-21333	Water Well	Qpah	10	26/05/2003	10	26/05/2003	10	26/05/2003	62016	10	100	Domestic			3
6628-21560	Water Well	Qpah	7.5	12/11/2003	7.5	12/11/2003	7.5	12/11/2003	63728	5	100	Domestic			4
6628-21563	Water Well	Qpah	14	8/09/2003	14	8/09/2003	14	8/09/2003	62688	10	100	Domestic			4
6628-21576	Water Well	Qpah	30	11/12/2003	30	11/12/2003	30	11/12/2003	63925	24	100	Domestic			4
6628-21577	Water Well	Qpah	31	26/11/2003	31	26/11/2003	31	26/11/2003	63613	28	100	Domestic			17
6628-21611	Water Well	Qpah	27	22/01/2004	27	22/01/2004	25	22/01/2004	64208	19	100	Domestic			18
6628-21871	Water Well	Qpah	28	19/07/2004	28	19/07/2004	28	19/07/2004	66154	24.5	100	Domestic			10
6628-22530	Water Well	Qpah			5.2		5.2		41823		90	Domestic			4.8
6628-13427	Water Well	Qpah	39.6	9/08/1984	39.6	9/08/1984	39.6	9/08/1984	14510	12	150	Industrial	Operational		6

Unit_No	Water Level			Salinity			pH		Yield		MGT Easting	MGA Northing	Hundred	Plan	Parcel	Title
	SWL	RSWL	Date	TDS	EC	Date	pH	Date	Yield	Date						
6628-17542				1154	2090	8/01/1996	7.1	8/01/1996			279102.47	6126389.77	ADELAIDE	D5114	A4	CT 5684 985
6628-17551	5.2	15.01	18/12/1995	5794	10150	18/12/1995	7.35	18/12/1995	0.75	18/12/1995	277387.43	6126274.69	ADELAIDE	D2860	A71	CT 5488 673
6628-17628				683	1240	7/12/1995	7.2	7/12/1995	0.5	7/12/1995	278807.41	6127484.8	ADELAIDE	D6436	A11	CT 5267 381
6628-17655				3167	5650	4/02/1996	7.4	4/02/1996			276782.51	6125784.72	ADELAIDE	D2289	A30	CT 5744 849
6628-17658				4222	7480	15/01/1996	6.9	15/01/1996	1	15/01/1996	278227.59	6125314.63	ADELAIDE	D3703	A170	CT 5641 55
6628-17815				1496	2700	1/04/1996	6.8	1/04/1996	1	1/04/1996	279787.5	6125649.7	ADELAIDE	F11730	A16	CT 5366 75
6628-17843				1468	2650	19/02/1996	7.5	19/02/1996	0.4	28/02/1996	277812.57	6125769.82	ADELAIDE	F11723	A27	CT 5269 251
6628-17846				1066	1930	29/02/1996	7.3	29/02/1996	0.32	29/02/1996	279612.37	6126689.81	ADELAIDE	D1739	A141	CT 5722 915
6628-17860	3.6	15.13	11/04/1996	1423	2570	11/04/1996	7	11/04/1996			277297.46	6126924.93	ADELAIDE	F10794	A430	CT 5239 527
6628-17954				1591	2870	16/08/1996	7.4	16/08/1996	1	16/08/1996	278802.51	6127479.8	ADELAIDE	D6436	A11	CT 5267 381
6628-17955	2.4	15.01	14/08/1996	2103	3780	14/08/1996	7.6	14/08/1996			277127.52	6127044.65	ADELAIDE	D821	A111	CT 5666 74
6628-18117	9	13.37	11/12/1996	2960	5290	11/12/1996	7.4	11/12/1996	0.5	11/12/1996	277787.55	6127129.8	ADELAIDE	D2773	A44	CT 5709 665
6628-18123	11	38.15	13/11/1996	6774	11800	16/11/1996			0.5	11/11/1996	280407.32	6125314.68	ADELAIDE	D3438	A119	CT 5714 263
6628-18151	15.8	35.12	17/05/1996	1244	2250	17/05/1996	6.3	17/05/1996	0.32	17/05/1996	280392.54	6126394.74	ADELAIDE	D3176	A358	CT 5743 305
6628-18185									0.5	17/05/1996	280652.31	6124919.78	ADELAIDE	D5513	A52	CT 5511 18
6628-18232	7.5	23.86	5/12/1996	1072	1940	5/12/1996					278777.48	6126929.77	ADELAIDE	D4412	A8	CT 5694 951
6628-18247	8	30.46	21/02/1997	1116	2020	21/02/1997			0.5	21/02/1997	279387.33	6126479.58	ADELAIDE	F12136	A107	CT 5201 468
6628-18316	3.2	22.88	1/09/1996								278192.41	6126929.76	ADELAIDE	D3553	A90	CT 5742 970
6628-18370	3	18.24	20/01/1997								277217.47	6125169.78	ADELAIDE	F12140	A90	CT 5265 841
6628-18371	6	12.78	4/05/1997	4431	7840	4/05/1997					276647.53	6125104.77	ADELAIDE	D4764	A45	CT 5675 524
6628-18490	15	14.67	14/02/1997	5749	10070	14/02/1997					278487.47	6124964.76	ADELAIDE	D3034	A56	CT 5710 995
6628-18542	12	35.25	17/05/1997	1099	1990	17/05/1997			0.25	17/05/1997	280087.47	6126229.67	ADELAIDE	D3210	A338	CT 5106 958
6628-18543	11	18.3	9/02/1997								278427.49	6124959.75	ADELAIDE	C21934		
6628-18585	15	36.5	14/11/1995						1.2	14/11/1995	280412.44	6126254.71	ADELAIDE	D3176	A352	CT 5239 444
6628-18724	14.4	31.81	23/10/1997	1239	2240	23/10/1997					280002.45	6125974.77	ADELAIDE	D746	A12	CT 5278 795
6628-18725	4	14.58	9/03/1997	2978	5320	31/10/1997			0.5	31/10/1997	277182.54	6126434.74	ADELAIDE	D4344	A385	CT 5698 367
6628-18770	6	13.48	20/11/1997	3591	6390	20/11/1997			0.5	20/11/1997	277282.55	6126319.75	ADELAIDE	F11102	A9	CT 5806 495
6628-18828	6	27.04	29/01/1998	1367	2470	29/01/1998			0.5	29/01/1998	278927.51	6125979.73	ADELAIDE	D3417	A191	CT 5669 233
6628-18856	18	39.07	19/02/1998	1066	1930	19/02/1998					280847.45	6126429.78	ADELAIDE	D2855	A134	CT 5270 220
6628-18868	12	21.01	18/02/1998	1088	1970	20/02/1998			0.35	18/02/1998	278897.4	6126354.72	ADELAIDE	D67342	A2	CT 5943 332
6628-19369	9	11.43	12/01/1999	15249	25300	10/02/1999			0.1	12/01/1999	277407.5	6126249.76	ADELAIDE	D2860	A70	CT 5377 806
6628-19414	4.8	25.24	19/02/1999	1490	2690	19/02/1999			0.4	19/02/1999	278757.5	6127444.74	ADELAIDE	F9518	A82	CT 5086 975
6628-19454	15	58.84	25/02/1999						0.2	25/02/1999	280772.46	6124644.75	ADELAIDE	D48586	A9	CT 5627 138
6628-19462	6	25.59	29/03/1999	1255	2270	29/03/1999			1	29/03/1999	278792.47	6126989.74	ADELAIDE	D2144	A101	CT 5326 512
6628-19496	10	29.45	4/04/1999	899	1630	4/04/1999			0.5	4/04/1999	279547.43	6127399.72	ADELAIDE	D5438	A10	CT 5658 356
6628-19497	9	35.53	16/05/1999	1625	2930	16/05/1999			0.5	16/05/1999	280037.45	6125629.76	ADELAIDE	D746	A385	CT 5653 967
6628-20468	8	22.08	18/12/2000	1328	2400	18/12/2000			0.7	18/12/2000	278764.71	6127659.47	ADELAIDE	D2992	A31	CT 5724 977
6628-20514	17	37.51	14/02/2001	1177	2130	14/02/2001			0.5	14/02/2001	280718.72	6125826.54	ADELAIDE	D3171	A784	CT 5749 432
6628-20516	3	28.44	6/03/2001	5167	9100	6/03/2001			0.6	6/03/2001	278537.78	6124796.49	ADELAIDE	D3034	A38	CT 5467 420
6628-20585	4.2	12.8	3/11/2000	3322	5920	3/11/2000			1.5	3/11/2000	276733.75	6126003.52	ADELAIDE	D3102	A346	CT 5707 843
6628-20658	9	30.98	28/07/2001	865	1570	28/07/2001			1	27/07/2001	279521.76	6126458.53	ADELAIDE	F12136	A117	CT 5411 907
6628-20719	3	18.54	9/11/2001	1850	3330	9/11/2001			0.4	9/11/2001	277668.73	6127465.55	ADELAIDE	F9174	A112	CT 5695 848
6628-20918	18	2.12	7/06/2000	4182	7410	24/02/2005	7.5	24/02/2005	0.3	7/06/2000	277235.76	6125591.24	ADELAIDE	D2236	A170	CT 5118 640
6628-21040	11	37.3	11/11/2001	1804	3250	10/11/2001					280235.84	6127153.94	ADELAIDE			
6628-21218	9	32.69	8/11/2002	722	1310	8/11/2002			0.5	8/11/2002	279723.47	6127252.8	ADELAIDE	D2114	A133	CT 5182 601
6628-21333	3	16.9	26/05/2003	1362	2460	26/05/2003			1.51	26/05/2003	277468.25	6126956.96	ADELAIDE	F10794	A408	CT 5206 454
6628-21560	4	23.48	12/11/2003	3868	6870	12/11/2003			1.88	12/11/2003	278268.41	6125416.29	ADELAIDE	D3703	A156	CT 5252 70
6628-21563	4	29.71	8/09/2003	1166	2110	8/09/2003			0.44	8/09/2003	278957.8	6126791.51	ADELAIDE	D4646	A43	CT 5296 530
6628-21576	4	15.91	11/12/2003	1468	2650	12/12/2003			1	11/12/2003	277448.61	6126863.58	ADELAIDE	D4336	A243	CT 5646 612
6628-21577	17	39.65	26/11/2003	788	1430	26/11/2003			1	26/11/2003	280780.1	6126746.26	ADELAIDE	D2855	A17	CT 5227 465
6628-21611	18	38.43	22/01/2004	821	1490	22/01/2004			0.3	22/01/2004	280769.06	6126738.23	ADELAIDE	D2855	A16	CT 5611 288
6628-21871	10	41.24	19/07/2004	712	1293	13/08/2004			0.95	13/08/2004	280392.75	6126264.55	ADELAIDE	D3176	A557	CT 5108 861
6628-22530	4.8	23.53									278554.74	6127599.55	ADELAIDE	D3158	A35	CT 5325 352
6628-13427	6	21.51	9/08/1984	1681	3030	9/08/1984	8.1	9/08/1984	2.5		278301.3	6126764.7	ADELAIDE	F10796	A288	CT 5409 849

Unit_No	Drillhole Class	Aquifer	Original Drill		Maximum Drill		Last Open		Permit No.	Cased To	Casing Diameter	Purpose	Lastest Status		
			Depth	Date	Depth	Date	Depth	Date					Status	Date	DTW
6627-14193	Water Well	Qpah	7	13/01/2010	7	13/01/2010	7	13/01/2010	185111	4	50	Irrigation			6.2
6627-14197	Water Well	Qpah	7	19/01/2010	7	19/01/2010	7	19/01/2010	185114	4	50	Irrigation			6.2
6628-14285	Water Well	Qpah	8.2	15/10/1988	8.2	15/10/1988	8.2	15/10/1988	21846	8.2	100	Irrigation	Operational		3.3
6628-21844	Water Well	Qpah	30	27/08/2004	30	27/08/2004	30	27/08/2004	62982	24	105	Irrigation			12.5
6628-21877	Water Well	Qpah	70.2	22/10/2004	70.2	22/10/2004	70.2	22/10/2004	65237	48	125	Irrigation			-0.7
6628-8189	Water Well	Qpah	18	23/10/1976	18	23/10/1976	18	23/10/1976	511	18	100	Irrigation	Operational		6.6
6628-17522	Water Well	Qpah	7	2/01/1996	7	2/01/1996	7	2/01/1996	36565	6	102	Recreational/Environmental			
6628-18372	Water Well	Qpah	27.5	28/04/1997	27.5	28/04/1997	27.5	28/04/1997	40585	27.5	100	Recreational/Environmental			8.5

Unit_No	Water Level			Salinity			pH		Yield		MGT Easting	MGA Northing	Hundred	Plan	Parcel	Title
	SWL	RSWL	Date	TDS	EC	Date	pH	Date	Yield	Date						
6627-14193	6.2		13/01/2010								277975.22	6123514.89	ADELAIDE			
6627-14197	6.2		19/01/2010								277898.06	6123577.94	ADELAIDE			
6628-14285	3.3	15.62	19/10/1988	3351	5971	19/10/1988	7.7	15/10/1988	1.2	15/10/1988	277058.34	6125756.73	ADELAIDE	F11643	A95	CT 5669 981
6628-21844	12.5	40.98	27/08/2004	814	1476	28/08/2004			2	27/08/2004	280589.16	6126966.55	ADELAIDE	D2898	A4	CT 5165 206
6628-21877	-0.7	69.64	22/10/2004	1895	3410	7/12/2009			1	22/10/2004	280114.75	6124352.53	ADELAIDE	F13422	A48	CT 6109 684
6628-8189	6.6	29.4	23/10/1976	1138	2060	23/10/1976	7	23/10/1976	1	23/10/1976	279120.35	6126933.75	ADELAIDE	D4646	A21	CT 5148 342
6628-17522				683	1240	2/01/1996	7.8	2/01/1996			276807.68	6126644.68	ADELAIDE	C20522		
6628-18372	8.5	31.64	28/04/1997	2251	4040	28/04/1997			1.25	28/04/1997	279647.53	6125344.74	ADELAIDE	D6248	A30	CT 5643 752

Appendix H Data Quality Indicators and Quality Assurance / Quality Control Review

H1. Data Quality Indicators

Specific data quality indicator (DQI) limits were adopted in accordance with the ASC NEPM (NEPC 2013) and standard JBS&G procedures for field sampling and handling.

To assess the usability of the data prior to making decisions, the data was assessed against appropriate DQIs established in relation to precision, accuracy, representativeness, comparability and completeness and sensitivity (PARCCS parameters), as follows:

- **Precision** – measures the reproducibility of measurements under a given set of conditions. The precision of the laboratory data and sampling techniques is assessed by calculating the Relative Percent Difference (RPD) of duplicate samples;
- **Accuracy** – measures the bias in a measurement system. The accuracy of the laboratory data that are generated during this study is a measure of the closeness of the analytical results obtained by a method to the 'true' value. Accuracy is assessed by reference to the analytical results of laboratory control samples, laboratory spikes and analyses against reference standards;
- **Representativeness** – expresses the degree which sample data accurately and precisely represent a characteristic of a population or an environmental condition. Representativeness is achieved by collecting samples on a representative basis across the site, and by using an adequate number of sample locations to characterise the site to the required accuracy;
- **Comparability** – expresses the confidence with which one data set can be compared with another. This is achieved through maintaining a level of consistency in techniques used to collect samples, ensuring analysing laboratories use consistent analysis techniques and reporting methods;
- **Completeness** – is defined as the percentage of measurements made which are judged to be valid measurements. The completeness goal is set at there being sufficient valid data generated during the study; and
- **Sensitivity** – expresses the appropriateness of the chosen laboratory methods, including the limits of reporting.

The DQIs adopted as part of the assessment are summarised in **Table H.1**.

Table H.1: Summary of DQIs

Data Quality Indicators	Frequency & Data Quality Criteria
Precision	
Intra-laboratory Duplicate	• 1 in 20 samples per sample type. • RPD <30%.
Inter-laboratory Duplicate	• 1 in 20 samples per sample type. • RPD <30%.
Laboratory Internal Duplicates	• 1 in 20 samples. • RPD <30%.
Accuracy	
Laboratory method blanks	• 1 per laboratory batch. • All results <LOR.
Laboratory control samples	• 1 per laboratory batch. • Within laboratory prescribed recovery range.
Matrix spikes	• 1 per laboratory batch. • Within laboratory prescribed recovery range.
Representativeness	
Sampling appropriate media and analytes	• All sampling conducted in accordance with JBS&G procedures.
Rinsate samples (soil vapour installation and groundwater sampling)	• 1 per day of soil vapour probe installation. • 1 per day of groundwater sampling. • All results <LOR.
No potential ingress of ambient air into samples during transport (soil vapour sampling)	• No more than -5 inHg loss per sample during transit for Summa canister samples.
Leak test (soil vapour sampling)	• Shroud samples collected at 1 in 10. • All samples <10% tracer (helium or isopropanol).
No potential cross contamination (soil vapour sampling)	• Dedicated equipment used for collection of all samples.
Groundwater samples extracted and analysed within holding times	• All groundwater samples extracted and analysed within holding times (7 days).
Trip spike samples (groundwater sampling)	• 1 per batch of samples sent to the laboratory. • Recovery between 70 % and 130 %.
Trip blank samples (groundwater sampling)	• 1 per batch of samples sent to the laboratory. • All results <LOR.
Comparability	
Standard operating procedures for sample collection and handling	• All sampling conducted in accordance with JBS&G procedures.
Standard analytical methods used for all analyses	• Use of National Association of Testing Authorities (NATA) accredited laboratories. • Standard analytical methods (details on the laboratory certificates of analysis).
Consistent field conditions, sampling procedure and laboratory analysis	• All sampling completed on 30 March 2021. • Sampling completed using consistent operating procedures. • Laboratories NATA accredited for analysis.
Limits of reporting appropriate and consistent	Maximum soil vapour sample LORs as follows: • Tetrachloroethene: 10 µg/m^3; • Trichloroethene: 10 µg/m^3; • cis-1,2-dichloroethene: 10 µg/m^3; • trans-1,2-dichloroethene: 10 µg/m^3; • 1,1-dichloroethene: 10 µg/m^3; and • Vinyl chloride: 5 µg/m^3. Maximum groundwater sample LORs as follows: • Tetrachloroethene: 25 µg/L; • Trichloroethene: 5 µg/L; • cis-1,2-dichloroethene: 25 µg/L; • trans-1,2-dichloroethene: 25 µg/L; • 1,1-dichloroethene: 25 µg/L; and • Vinyl chloride: 1 µg/L.

Data Quality Indicators	Frequency & Data Quality Criteria
Completeness	
Sample description and Chain of Custody (COC) documentation completed and appropriate	• All COCs to be completed appropriately.
Satisfactory frequency and result for QC samples	• QC samples to be collected at frequencies as outlined above.
Sensitivity	
Analytical methods and limits of recovery appropriate for media and adopted assessment criteria	• Use of NATA accredited laboratories. • Maximum LORs as detailed above.

H2. Soil Vapour Quality Assurance / Quality Control Review

Table H.2 summarises the quality assurance (QA) and quality control (QC) activities undertaken to ensure integrity of the soil vapour data collected and conformance with the DQIs outlined in **Section H1**. Any departures from the DQIs are noted in **Table H.2**.

Table H.2: Soil Vapour QA/QC Program

QA/QC Item	Detail
QA	
Field Procedures	Field procedures were undertaken in accordance with the references in **Section 3.1.1.**
Decontamination of Equipment	The handauger was decontaminated prior to the commencement of drilling at each soil vapour probe location to minimise the potential for cross contamination. A rinsate sample was collected on the day of drilling in order to validate decontamination procedures. Dedicated soil vapour sampling equipment was used at each sampling location.
Laboratories used and NATA accreditation	Eurofins MGT (primary laboratory) and Envirolab (secondary laboratory for QC purposes) are NATA accredited for the analyses undertaken.
Sample Tracking	COC documentation was used for the transport of all samples to the laboratory and is included in **Appendix J** (along with the laboratory certificates of analysis).
Sample Preservation and Storage	Summa canisters were stored in laboratory supplied pelican cases and transported to the laboratory.
Data Transcription	Summary results tables are appended to this report, which were generated from laboratory supplied ESdat files, minimising the potential for transcription errors.
Laboratory Detection Limits	The LORs are presented in the soil vapour laboratory certificates of analysis (**Appendix J**) and included in the **Summary Tables**. The LORs outlined in the DQIs were achieved.
QC	
Rinsate Samples (Installation of Soil Vapour Probes)	One rinsate sample ('RB01') was collected on the day of groundwater well installation, as required by the DQIs. RB01 was collected by running deionised water over the clean hand auger head. This rinsate sampled was analysed for VOCs – all results were below the laboratory reporting limits, as required by the DQIs. The results of the rinsate sample are summarised in the **Summary Tables**, and are included in the laboratory certificates of analysis in **Appendix J**.
Certification of Summa Canisters	All Summa canisters were certified as clean by the primary laboratory (Eurofins MGT) prior to dispatch, noting the Summa canister analysed by Envirolab (the secondary laboratory) was a Eurofins MGT canister.
Integrity Testing – Helium Leak Test	All soil vapour probes passed the helium leak test, given the concentration reported in the soil vapour probe was below 10 % of that reported in the shroud, as required by the DQIs. This indicates adequate soil vapour probe construction / no significant damage. Helium leak test results are included in the **Summary Tables**.
Integrity Testing – Isopropanol Leak Test	One shroud sample (SHROUD01) was collected during the soil vapour monitoring event and analysed for isopropanol. An isopropanol concentration of 930,000 µg/m^3 was reported in the shroud sample. PID measurements taken within

QA/QC Item	Detail
	the shroud during sampling indicate similar concentrations of VOCs during sampling at each location, noting the shroud sample was collected at SVP05. The concentration of isopropanol within the soil vapour samples was compared to the acceptable concentration outlined in the DQIs (10 % of that reported in the shroud sample; 93,000 µg/m^3). All samples (both primary and QC samples) reported an isopropanol concentration below this acceptable concentration and hence passed the isopropanol leak test, indicating acceptable ingress of ambient air during sampling. Isopropanol leak test results are included in the **Summary Tables**.
Receipt Pressure of Samples	The pre-sampling pressure was -30 inHg for all canisters used in the SVME, indicating negligible loss of pressure between shipping from the laboratory to receipt for sampling. The post-sampling pressure was compared to the final laboratory receipt pressure, with total difference below -5 inHg for all Summa canisters, as required by the DQIs. The results indicate little loss of pressure and low potential for ambient air ingress during transit for all samples. Summa canister pressure is summarised in the **Summary Tables**.
Intra-Laboratory Duplicate Samples	One intra-laboratory duplicate sample pair was collected and analysed as part of the SVME for a total of five primary samples. This frequency is in accordance with the required frequency outlined in the DQIs. The following intra-laboratory duplicate sample was collected and analysed: • 'DUP01' was collected with primary sample 'SVP02'. The intra-laboratory duplicate sample pair was analysed for the chemicals of interest (CEs) and isopropanol. A total of seven RPD values were calculated – all RPD values were within the acceptable range (0 % to 30 %) outlined in the DQIs with the exception of isopropanol (57 %). The slightly elevated RPD reported for isopropanol is due to minor differences in the seal of the sample train for each sample, noting both samples passed the isopropanol leak test. The soil vapour intra-laboratory duplicate sample pair results and RPD values have been summarised in the **Summary Tables**. Laboratory certificates of analysis are included in **Appendix J**.
Inter-Laboratory Duplicate Samples	One inter-laboratory duplicate sample pair was collected and analysed as part of the SVME for a total of five primary samples. This frequency is in accordance with the required frequency outlined in the DQIs. The following inter-laboratory duplicate sample was collected and analysed: • 'DUP02' was collected with primary sample 'SVP03'. The inter-laboratory duplicate sample pair was analysed for the chemicals of interest (CEs) and isopropanol. A total of seven RPD values were calculated – all RPD values were within the acceptable range (0 % to 30%) outlined in the DQIs with the exception of isopropanol (57 %). The slightly elevated RPD reported for isopropanol is due to minor differences in the seal of the sample train for each sample, noting both samples passed the isopropanol leak test. The soil vapour inter-laboratory duplicate sample pair results and RPD values have been summarised in the **Summary Tables**. Laboratory certificates of analysis are included in **Appendix J**.
Laboratory Internal QC	Eurofins MGT (primary laboratory) and Envirolab (secondary laboratory for QC purposes) undertook internal QA procedures and internal QC testing, including laboratory blank samples (both laboratories), duplicate samples (Envirolab only) and spike samples (both laboratories). The following was noted: • Laboratory blank samples – All results were below the laboratory reporting limits. • Duplicate samples – The RPD values reported for all internal duplicate pairs within the acceptable range. • Spike samples – The recoveries from the laboratory control spike samples were within the specified range for each chemical.

H3. Groundwater Quality Assurance / Quality Control Review

Table H3.1 summarises the QA/QC activities undertaken to ensure integrity of the groundwater data collected. The results indicate conformance with the specific QA/QC procedures.

Table H3.1: Groundwater QA/QC Program

QA/QC Item	Detail
QA	
Field Procedures	Field procedures were undertaken in accordance with relevant guidelines outlined in **Section 3.3**.
Decontamination of Equipment	All sampling equipment (interface probe, low flow pump, water quality meter) was decontaminated prior to the start of groundwater sampling at GW3034b to minimise the potential for cross contamination. A rinsate sample was collected to validate decontamination procedures (rinsate samples are discussed further below). All low-density polyethylene (LDPE) tubing used for sampling of groundwater wells was dedicated to a specific well, noting this tubing was removed and disposed offsite on completion of groundwater sampling.
Laboratories used and NATA accreditation	Eurofins (primary laboratory) and Envirolab (secondary laboratory for QC purposes) are NATA accredited for the analyses undertaken.
Sample Tracking	COC documentation was used for the transport of all samples to the laboratory and is included in **Appendix L** (along with the laboratory certificates of analysis).
Sample Preservation and Storage	Samples were collected in laboratory supplied bottles with specific preservation for the contaminants of interest, and were kept in a chilled insulated box and transported to the laboratory.
Holding Times	Samples were analysed within specified holding times by both the primary and secondary laboratory.
Data Transcription	Summary results tables are attached to this report, which were generated from laboratory supplied ESdat files, minimising the potential for transcription errors.
Laboratory Limits of Reporting (LORs)	The LORs are presented in the groundwater laboratory certificates of analysis (**Appendix L**) and included in the **Summary Tables**. The LORs outlined in the DQIs were achieved with the exception of that for vinyl chloride, noting an elevated LOR was required due to the high concentrations of TCE reported. This is not considered to alter the outcomes of this investigation as the risk driver at the site is TCE. It is noted that vinyl chloride was reported below the LOR in soil vapour (the LOR outlined in the DQIs was achieved for soil vapour).
Rinsate Samples	One rinsate sample ('RB02') was collected on the day of groundwater sampling, as required by the DQIs. RB02 was collected by running deionised water through the clean low flow pump. This rinsate sampled was analysed for CEs – all results were below the laboratory reporting limits, as required by the DQIs. The results of the rinsate samples are summarised in the **Summary Tables**, and are included in the laboratory certificates of analysis in **Appendix L**.
Intra-laboratory Duplicate Samples	One intra-laboratory duplicate sample pair was collected and analysed as part of the groundwater sampling for a total of one primary samples. This frequency is in accordance with the required frequency outlined in the DQIs. The following intra-laboratory duplicate sample was collected and analysed: • 'DUP01' was collected with primary sample 'GW3034b'. The intra-laboratory duplicate sample pair was analysed for the chemicals of interest (CEs). A total of six RPD values were calculated – all RPD values were within the acceptable range (0 % to 30 %) outlined in the DQIs. The groundwater intra-laboratory duplicate sample pair results and RPD values have been summarised in the **Summary Tables**. Laboratory certificates of analysis are included in **Appendix L**.

QA/QC Item	Detail
Inter-laboratory Split Samples	One inter-laboratory split sample pair was collected and analysed as part of the groundwater sampling for a total of one primary samples. This frequency is in accordance with the required frequency outlined in the DQIs. The following inter-laboratory split sample was collected and analysed: • 'SPLIT01' was collected with primary sample 'GW3034b'. The inter-laboratory split sample pair was analysed for the chemicals of interest (CEs). A total of six RPD values were calculated – all RPD values were within the acceptable range (0 % to 30 %) outlined in the DQIs. The groundwater inter-laboratory split sample pair results and RPD values have been summarised in the **Summary Tables**. Laboratory certificates of analysis are included in **Appendix L**.
Transport Blank Sample	One trip blank sample ('TB01') was transported in the cool box to the laboratory along with the primary sample and other QC samples to ensure samples were not impacted during transport. The trip blank sample was analysed for CEs – all results were below the laboratory reporting limits, as required by the DQIs. The results of the trip blank sample are included summarised in the **Summary Tables** and included in the laboratory certificates of analysis in **Appendix L**.
Trip Spike Sample	One trip spike sample ('WSP7893'), pre-dosed with known concentrations of benzene, toluene, ethylbenzene, xylenes and naphthalene (BTEXN) and TRH C_6-C_{10}, was transported in the cool box to the laboratory along with the primary sample and other QC samples to assess the potential for loss of volatiles during transport. The trip spike sample was analysed for CEs – the recovery required by the DQIs was achieved for all chemicals analysed. It should be noted that dosing and analysis for BTEXN and TRH was completed in lieu of CEs due to laboratory protocols. The results of the trip spike sample are included summarised in the **Summary Tables** and included in the laboratory certificates of analysis in **Appendix L**.
Laboratory Internal QC	Eurofins (primary laboratory) and Envirolab (secondary laboratory for QC purposes) undertook internal QA procedures and internal QC testing including laboratory blank sample analysis and laboratory spike sample analysis. The following was noted: • Laboratory blank samples: All results were below the laboratory reporting limits. • Spike samples: The recoveries from the laboratory control spike samples were within the specified range for each contaminant.

Appendix I Bureau of Meteorology Daily Weather Observations – March 2021

Adelaide Airport, South Australia
March 2021 Daily Weather Observations

Observations are made about 1 km east of the coast.

Australian Government
Bureau of Meteorology

Date	Day	Temps		Rain	Evap	Sun	Max wind gust			9am						3pm					
		Min	Max				Dirn	Spd	Time	Temp	RH	Cld	Dirn	Spd	MSLP	Temp	RH	Cld	Dirn	Spd	MSLP
		°C	°C	mm	mm	hours		km/h	local	°C	%	eighths		km/h	hPa	°C	%	eighths		km/h	hPa
1	Mo	13.6	25.7	0	7.0	11.4	SSE	50	12:50	18.8	58	7	ESE	13	1016.1	25.4	34	5	SSE	24	1015.0
2	Tu	13.0	25.1	0	12.6	8.1	ESE	44	02:26	15.5	44	7	ESE	15	1020.0	23.2	23	7	E	11	1016.7
3	We	12.9	25.9	0	6.6	12.3	SE	41	18:52	16.3	45	1	W	7	1020.3	24.8	25	1	SE	22	1018.7
4	Th	10.3	24.2	0	7.6	12.0	SW	44	16:34	16.4	52	1		Calm	1020.4	21.9	49	0	WSW	26	1017.7
5	Fr	11.9	26.4	0	6.8	12.0	SW	48	15:25	18.6	65	1	W	4	1017.0	22.9	60	1	SW	35	1014.4
6	Sa	11.1	25.9	0	6.8	9.9	SE	37	23:58	17.0	51	6	NNW	6	1013.8	22.8	46	6	SSW	22	1011.3
7	Su	17.0	25.9	0	6.4	1.3	W	31	14:18	21.2	53	6		Calm	1008.8	23.7	57	7	W	15	1007.9
8	Mo	16.4	26.1	0.6	3.2	11.3	S	41	19:14	19.1	64	3	SE	24	1012.8	26.0	34	1	SSE	24	1012.1
9	Tu	13.6	26.6	0	8.0	11.9	SE	39	16:08	17.6	59	1	ESE	19	1018.5	22.7	55	1	WSW	28	1017.2
10	We	14.8	26.0	0	7.0	3.6	SE	33	23:46	19.4	53	7	SE	7	1018.5	21.6	60	7	SW	17	1016.8
11	Th	14.4	24.5	3.2	3.0	10.3	SW	33	16:41	19.6	68	7		Calm	1017.5	23.3	57	2	WSW	24	1015.8
12	Fr	13.8	31.7	0	5.8	11.7	NNW	35	11:40	20.1	60	1		Calm	1015.0	31.3	26	1	NW	19	1011.6
13	Sa	18.3	20.3	1.6	5.6	5.0	SW	54	15:29	18.3	86	8	SSW	33	1014.0	19.6	49	5	SW	33	1017.3
14	Su	9.1	20.5	7.0	6.6	11.5	SW	43	16:35	14.7	59	1	SSE	11	1025.3	19.1	39	1	SW	30	1024.4
15	Mo	10.2	20.0	0	5.4	6.0	W	30	11:39	16.3	69	3	NNE	7	1026.9	19.3	69	7	WSW	15	1025.3
16	Tu	14.8	23.4	0	3.4	2.1	SW	28	14:42	18.8	71	7	ESE	13	1024.9	22.8	58	7	WSW	19	1022.0
17	We	12.7	24.5	0	3.4	11.3	SE	39	22:46	19.2	69	0	NNW	4	1021.6	23.2	64	1	WSW	28	1018.9
18	Th	18.2	29.6	0	6.6	11.3	SE	43	17:10	22.7	57	1		Calm	1022.0	24.5	63	2	SSW	19	1020.5
19	Fr	17.2	32.0	0	8.6	11.2	SE	50	18:35	24.7	42	2	E	15	1023.8	30.1	27	6	E	28	1020.4
20	Sa	19.4	32.5	0	9.4	11.0	E	52	14:16	25.7	42	1	NE	15	1022.0	31.9	22	4	ENE	33	1018.1
21	Su	19.1	29.4	0	11.4	10.7	SSW	39	16:46	24.7	41	1	NNE	19	1018.2	26.4	48	4	SSW	24	1015.6
22	Mo	15.9	26.7	0	8.4	11.2	SSW	35	15:44	21.5	61	2		Calm	1014.1	24.7	53	2	SW	24	1010.9
23	Tu	14.2	22.6	0	6.4	11.2	WSW	37	13:31	19.2	61	1	SW	7	1009.6	21.4	64	1	SW	30	1008.0
24	We	17.7	22.2	0	5.6	6.7	WSW	46	21:17	18.9	69	8	SW	26	1009.1	20.9	59	3	WSW	30	1009.0
25	Th	17.2	21.6	0.4	7.6	9.6	SW	39	02:02	18.1	61	3	SW	28	1012.2	20.9	50	4	SW	24	1012.5
26	Fr	12.7	22.5	0	4.0	1.8	WSW	31	21:59	16.0	68	7	NE	15	1012.9	20.8	55	6	NW	20	1010.6
27	Sa	15.9	20.8	2.8	3.4	7.2	W	39	02:14	18.3	60	5	SW	17	1015.0	19.7	52	3	SW	22	1015.6
28	Su	12.7	20.8	1.8	3.4	10.4	WSW	33	13:21	15.9	73	1	N	11	1021.6	19.7	61	3	SW	24	1020.9
29	Mo	11.0	22.5	0	5.0	10.9	SW	31	15:53	16.5	74	1		Calm	1025.6	21.5	57	1	SW	22	1024.2
30	Tu	12.0	24.0	0	6.6	10.4	SW	31	17:00	18.2	71	1		Calm	1026.6	21.9	61	7	SW	17	1024.7
31	We	12.2	24.8	0	3.6	10.9	SSW	28	14:49	19.3	59	1	ESE	7	1024.7	23.6	54	0	SW	20	1022.1
Statistics for March 2021																					
	Mean	14.3	25.0		6.3	9.2				18.9	60	3		10	1018.3	23.3	49	3		23	1016.7
	Lowest	9.1	20.0		3.0	1.3				14.7	41	0		Calm	1008.8	19.1	22	0	E	11	1007.9
	Highest	19.4	32.5	7.0	12.6	12.3	SW	54		25.7	86	8	SSW	33	1026.9	31.9	69	7	SW	35	1025.3
	Total			17.4	195.2	286.2															

Observations were drawn from Adelaide Airport {station 023034}

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

IDCJDW5001.202103 Prepared at 13:02 UTC on 14 Apr 2021

Appendix J Soil Vapour Laboratory Certificates of Analysis and Chain of Custody Documentation

JBS & G Australia (SA) P/L
100 Hutt St
Adelaide
SA 5000

NATA Accredited
Accreditation Number 1261
Site Number 20794

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

Attention: **Kate Lough**

Report **784189-TO**
Project name MELROSE PARK
Project ID 60610
Received Date Mar 30, 2021

Client Sample ID			**SVP01**	**SVP02**	**SVP03**	**SVP04**
Sample Matrix			**1L Summa Canister**	**1L Summa Canister**	**1L Summa Canister**	**1L Summa Canister**
Eurofins Sample No.			**T21-Ma56852**	**T21-Ma56853**	**T21-Ma56854**	**T21-Ma56855**
Date Sampled			**Mar 30, 2021**	**Mar 30, 2021**	**Mar 30, 2021**	**Mar 30, 2021**
Receipt Vac./Pressure (inHg)			**7.2**	**9.4**	**5.7**	**6.4**
Final Pressure (psi)			**15**	**15**	**15**	**15**
Test/Reference	LOR	Unit				
Dilution Factor	0.1		2.6	2.8	2.4	2.5
US EPA Compendium Methods TO-14a/TO-15						
1.1-Dichloroethene	2	ug/m3	540	330	25	< 5
cis-1.2-Dichloroethene	2	ug/m3	< 5	< 6	< 5	< 5
Isopropanol	49	ug/m3	< 127	220	< 119	< 123
Tetrachloroethene	3.4	ug/m3	100	29	39	51
trans-1.2-Dichloroethene	2	ug/m3	< 5	< 6	< 5	< 5
Trichloroethene	2.7	ug/m3	7000	4800	8100	3100
Vinyl Chloride	1.3	ug/m3	< 3	< 4	< 3	< 3

Client Sample ID			**SVP05**	**DUP01**	**SHROUD01**
Sample Matrix			**1L Summa Canister**	**1L Summa Canister**	**1L Summa Canister**
Eurofins Sample No.			**T21-Ma56856**	**T21-Ma56857**	**T21-Ma56859**
Date Sampled			**Mar 30, 2021**	**Mar 30, 2021**	**Mar 30, 2021**
Receipt Vac./Pressure (inHg)			**2.9**	**6.4**	**3.4**
Final Pressure (psi)			**15**	**15**	**15**
Test/Reference	LOR	Unit			
Dilution Factor	0.1		2.2	2.5	530
US EPA Compendium Methods TO-14a/TO-15					
1.1-Dichloroethene	2	ug/m3	350	400	-
cis-1.2-Dichloroethene	2	ug/m3	21	< 5	-
Isopropanol	49	ug/m3	190	< 123	930000
Tetrachloroethene	3.4	ug/m3	320	36	-
trans-1.2-Dichloroethene	2	ug/m3	< 4	< 5	-
Trichloroethene	2.7	ug/m3	14000	5800	-
Vinyl Chloride	1.3	ug/m3	< 3	< 3	-

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

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

Description	Testing Site	Extracted	Holding Time
US EPA Compendium Methods TO-14a/TO-15	BrisbaneAir	Mar 31, 2021	30 Days

- Method: SOP #6 Analysis of Volatile Organic Compounds in Summa Polished Canisters EPA Method TO-15 And Modified EPA Method TO-14A

eurofins | Environment Testing

ABN: 50 005 085 521 web: www.eurofins.com.au email: EnviroSales@eurofins.com

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Site # 1254 & 14271

Sydney
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NATA # 1261 Site # 18217

Brisbane
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NATA # 1261 Site # 20794

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NATA # 1261
Site # 23736

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Rolleston, Christchurch 7675
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IANZ # 1290

Company Name: JBS & G Australia (SA) P/L
Address: 100 Hutt St
Adelaide
SA 5000

Project Name: MELROSE PARK
Project ID: 60610

Order No.:
Report #: 784189
Phone: 08 8431 7113
Fax: 08 8431 7115

Received: Mar 30, 2021 12:00 AM
Due: Apr 8, 2021
Priority: 5 Day
Contact Name: Kate Lough

Eurofins Analytical Services Manager : Michael Cassidy

Sample Detail						1.1-Dichloroethene	CANCELLED	cis-1.2-Dichloroethene	Dilution Factor	Final Pressure (psi)	Isopropanol	Receipt Vac./Pressure (in Hg)	Tetrachloroethene	trans-1.2-Dichloroethene	Trichloroethene	Vinyl Chloride
Melbourne Laboratory - NATA Site # 1254 & 14271																
Sydney Laboratory - NATA Site # 18217																
Brisbane Laboratory - NATA Site # 20794																
Perth Laboratory - NATA Site # 23736																
Mayfield Laboratory																
External Laboratory																
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**											
1	SVP01	Mar 30, 2021	9:05AM	1L Summa Canister	T21-Ma56852	X		X	X	X	X	X	X	X	X	X
2	SVP02	Mar 30, 2021	10:17AM	1L Summa Canister	T21-Ma56853	X		X	X	X	X	X	X	X	X	X
3	SVP03	Mar 30, 2021	9:45AM	1L Summa Canister	T21-Ma56854	X		X	X	X	X	X	X	X	X	X
4	SVP04	Mar 30, 2021	7:40AM	1L Summa Canister	T21-Ma56855	X		X	X	X	X	X	X	X	X	X
5	SVP05	Mar 30, 2021	8:26AM	1L Summa Canister	T21-Ma56856	X		X	X	X	X	X	X	X	X	X
6	DUP01	Mar 30, 2021		1L Summa	T21-Ma56857	X		X	X	X	X	X	X	X	X	X

eurofins | Environment Testing

ABN: 50 005 085 521 web: www.eurofins.com.au email: EnviroSales@eurofins.com

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43 Detroit Drive
Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

Company Name: JBS & G Australia (SA) P/L
Address: 100 Hutt St
Adelaide
SA 5000

Project Name: MELROSE PARK
Project ID: 60610

Order No.:
Report #: 784189
Phone: 08 8431 7113
Fax: 08 8431 7115

Received: Mar 30, 2021 12:00 AM
Due: Apr 8, 2021
Priority: 5 Day
Contact Name: Kate Lough

Eurofins Analytical Services Manager : Michael Cassidy

Sample Detail						1.1-Dichloroethene	CANCELLED	cis-1.2-Dichloroethene	Dilution Factor	Final Pressure (psi)	Isopropanol	Receipt Vac./Pressure (in Hg)	Tetrachloroethene	trans-1.2-Dichloroethene	Trichloroethene	Vinyl Chloride
Melbourne Laboratory - NATA Site # 1254 & 14271																
Sydney Laboratory - NATA Site # 18217																
Brisbane Laboratory - NATA Site # 20794																
Perth Laboratory - NATA Site # 23736																
Mayfield Laboratory																
External Laboratory																
				Canister												
7	DUP02	Mar 30, 2021		1L Summa Canister	T21-Ma56858		X									
8	SHROUD01	Mar 30, 2021		1L Summa Canister	T21-Ma56859				X	X	X	X				
Test Counts						6	1	6	7	7	7	7	6	6	6	6

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. Dilutions are performed on samples due to the presence of high level target species or the presence of high level non-target species.
3. Results are uncorrected for surrogate recoveries.
4. All QC limit exceedances and affected sample results are noted by flags. Each qualifying flag is defined below in section entitled 'Definition of Data Qualifying Flags' and additionally on individual sample results (where relevant).
5. "100% certification" is defined as evaluating the sampling system with humid zero air/N2 and humid calibration gases that pass through all active components of the sampling system. The system is "100% certified" if no significant additions or deletions (less than 0.2 ppbv each of target compounds) have occurred when challenged with the test gas stream.
6. The conversion equation from ppbv to g/m3 uses a temperature of 25 °C and an ambient sea level atmospheric pressure of 1 atmosphere (101.325 kPa) is assumed.
7. All canister samples are only analysed once temperature equilibrium with the laboratory has been achieved.
8. Safe Sampling Volume (SSV) - calculated by taking two-thirds of the breakthrough volume (direct method) and Appendix 1 of Method T0-17.
9. Samples were analysed on an 'as received' basis.
10. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
11. This report replaces any interim results previously issued.

Definition of Data Qualifying Flags

Qualifiers may have been used on the data analysis sheets and indicates as follows:

A01 Compound present in laboratory blank greater than reporting limit (background subtraction not performed).

A02 Estimated value.

A03 Exceeds instrument calibration range.

A04 Saturated peak.

A05 Exceeds quality control limits.

A06 Compound analysed for but not detected above the Limit of Reporting (LOR). See data page for project specific U-flag definition.

A07 Non-detected compound associated with low bias in the CCV.

A08 The identification is based on presumptive evidence.

A09 SSV has been exceeded for this compound. It is likely that this compound has been underestimated.

A10 LORs cited do not take into account sample dilution due to canister pressurisation.

A11 Naphthalene elutes outside the >C10-C12 range on the system used for sample analysis. As a result, >C10-C12 TRH value is equivalent to the modified F2 value.

Holding Times

Under conditions of normal usage for sampling ambient air, most Volatile Organic Compounds (VOCs) can be recovered from canisters near their original concentrations after storage times of up to thirty days. For thermal desorption tubes (TDT) samples should be refrigerated at <4°C in a clean environment during storage and analysed within 30 days of sample collection (within one week for limonene, carene, bis-chloromethyl ether and labile sulfur or nitrogen containing volatiles).

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

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

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

Units

ppbv: parts per billion by volume

ug/m3: micrograms per cubic metre

kPa: kilopascal

psig: pounds per square inch gauge

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
US EPA Compendium Methods TO-14a/TO-15							
1.1-Dichloroethene	ug/m3	< 2			2	Pass	
cis-1.2-Dichloroethene	ug/m3	< 2			2	Pass	
Isopropanol	ug/m3	< 49			49	Pass	
Tetrachloroethene	ug/m3	< 3.4			3.4	Pass	
trans-1.2-Dichloroethene	ug/m3	< 2			2	Pass	
Trichloroethene	ug/m3	< 2.7			2.7	Pass	
Vinyl Chloride	ug/m3	< 1.3			1.3	Pass	
LCS - % Recovery							
US EPA Compendium Methods TO-14a/TO-15							
1.1-Dichloroethene	%	115			70-130	Pass	
cis-1.2-Dichloroethene	%	115			70-130	Pass	
Isopropanol	%	73			70-130	Pass	
Tetrachloroethene	%	108			70-130	Pass	
trans-1.2-Dichloroethene	%	115			70-130	Pass	
Trichloroethene	%	100			70-130	Pass	
Vinyl Chloride	%	111			70-130	Pass	

Comments

Sample Integrity

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

Authorised by:

Emily Daos	Analytical Services Manager
Laurence Hearn	Senior Analyst-Air (QLD)

Glenn Jackson
General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

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

CHAIN OF CUSTODY DOCUMENTATION

JBS&G

CLIENT: EPA	LABORATORY: Eurofins	LABORATORY BATCH NO.: 764189	
PROJECT: Melrose Park	COC Reference #: COC_60610_2_SVP	SAMPLERS: AS	
SEND REPORT TO: JBS&G	SEND INVOICE TO: JBS&G	PHONE: 08 8431 7113 FAX: 08 8431 7115	
DATA NEEDED BY: 5 day t/a	REPORT NEEDED BY: 5 day t/a	REPORT FORMAT: HARD:YES FAX: NO E-MAIL: YES	
PROJECT ID: 60610	QUOTE #:		
RELINQUISHED BY:		RECEIVED BY	METHOD OF SHIPMENT: Overnight
NAME : Ashley Smith	DATE: 30/3/21	NAME : Ben Sutton DATE: 31/03/2021	CONSIGNMENT NOTE NO.
OF: JBS&G	TIME: PM	OF: Eurofins TIME: 10:30 AM	
NAME :	DATE:	NAME : DATE:	TRANSPORT CO. NAME.
OF:	TIME:	OF: TIME:	
P.O. NO.:	COMMENTS/SPECIAL HANDLING/STORAGE OR DIPOSAL:	ANALYSIS REQUIRED	
FOR LAB USE ONLY COOLER SEAL Yes ..... No ..... Broken ..... Intact ..... COOLER TEMP: deg.C	Please forward results to: labresults@jbsg.com.au, kdough@jbsg.com.au		*Container Type and Preservative Codes: P = Neutral Plastic; N = Nitric Acid Preserved; C = Sodium Hydroxide Preserved; J = Solvent Washed Acid Rinced Jar; S = Solvent Washed Acid Rinced Glass Bottle; VC = Hydrochloric Acid Preserved Vial; VS = Sulfuric Acid Preserved Vial; BS = Sulfuric Acid Preserved Glass Bottle; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; O = Other.

SAMPLE DATA									Chlorinated Ethenes**	Isopropanol											'NOTES
JBS&G SAMPLE ID	LAB ID	PID	MATRIX	DATE	COLLECTION TIME		CANISTER PRESSURE														
					TIME ON	TIME OFF	PRE-SAMPLING	POST-SAMPLING													
SVP01	1L0104	1.3	SV	30/03/2021	9:05	9:15	-30	-7	X	X											
SVP02	1L0044	0.9	SV	30/03/2021	10:17	10:26	-30	-10	X	X											**Chlorinated ethenes includes:
SVP03	1L0083	1.6	SV	30/03/2021	9:45	9:56	-30	-5	X	X											Tetrachloroethene
SVP04	1L0087	0.5	SV	30/03/2021	7:40	7:51	-30	-7	X	X											Trichloroethene
SVP05	1L0162	2.7	SV	30/03/2021	8:26	8:36	-30	-4	X	X											cis-1,2-dichloroethene
DUP01	1L0078		SV	30/03/2021	~10 min sampling time		-30	-7	X	X											trans-1,2-dichloroethene
DUP02	1L0132		SV	30/03/2021	~10 min sampling time		-30	-7	X	X											1,1-dichloroethene
SHROUD01	1L0107		SV	30/03/2021	~10 min sampling time		-30	-5		X											Vinyl chloride
								TOTAL	7	8	0	0	0	0	0	0	0	0	0	0	

764189.

JBS & G Australia (SA) P/L
100 Hutt St
Adelaide
SA 5000

Attention: **Kate Lough**

Report **784279-W**
Project name MELROSE PARK
Project ID 60610
Received Date Mar 31, 2021

Client Sample ID			**RB01**
Sample Matrix			**Water**
Eurofins Sample No.			**M21-Ma57393**
Date Sampled			**Mar 26, 2021**
Test/Reference	LOR	Unit	
Volatile Organics			
1.1-Dichloroethane	0.001	mg/L	< 0.001
1.1-Dichloroethene	0.001	mg/L	< 0.001
1.1.1-Trichloroethane	0.001	mg/L	< 0.001
1.1.1.2-Tetrachloroethane	0.001	mg/L	< 0.001
1.1.2-Trichloroethane	0.001	mg/L	< 0.001
1.1.2.2-Tetrachloroethane	0.001	mg/L	< 0.001
1.2-Dibromoethane	0.001	mg/L	< 0.001
1.2-Dichlorobenzene	0.001	mg/L	< 0.001
1.2-Dichloroethane	0.001	mg/L	< 0.001
1.2-Dichloropropane	0.001	mg/L	< 0.001
1.2.3-Trichloropropane	0.001	mg/L	< 0.001
1.2.4-Trimethylbenzene	0.001	mg/L	< 0.001
1.3-Dichlorobenzene	0.001	mg/L	< 0.001
1.3-Dichloropropane	0.001	mg/L	< 0.001
1.3.5-Trimethylbenzene	0.001	mg/L	< 0.001
1.4-Dichlorobenzene	0.001	mg/L	< 0.001
2-Butanone (MEK)	0.001	mg/L	< 0.001
2-Propanone (Acetone)	0.001	mg/L	< 0.001
4-Chlorotoluene	0.001	mg/L	< 0.001
4-Methyl-2-pentanone (MIBK)	0.001	mg/L	< 0.001
Allyl chloride	0.001	mg/L	< 0.001
Benzene	0.001	mg/L	< 0.001
Bromobenzene	0.001	mg/L	< 0.001
Bromochloromethane	0.001	mg/L	< 0.001
Bromodichloromethane	0.001	mg/L	< 0.001
Bromoform	0.001	mg/L	< 0.001
Bromomethane	0.001	mg/L	< 0.001
Carbon disulfide	0.001	mg/L	< 0.001
Carbon Tetrachloride	0.001	mg/L	< 0.001
Chlorobenzene	0.001	mg/L	< 0.001
Chloroethane	0.001	mg/L	< 0.001
Chloroform	0.005	mg/L	< 0.005
Chloromethane	0.001	mg/L	< 0.001
cis-1.2-Dichloroethene	0.001	mg/L	< 0.001
cis-1.3-Dichloropropene	0.001	mg/L	< 0.001

Client Sample ID			RB01
Sample Matrix			Water
Eurofins Sample No.			M21-Ma57393
Date Sampled			Mar 26, 2021
Test/Reference	LOR	Unit	
Volatile Organics			
Dibromochloromethane	0.001	mg/L	< 0.001
Dibromomethane	0.001	mg/L	< 0.001
Dichlorodifluoromethane	0.001	mg/L	< 0.001
Ethylbenzene	0.001	mg/L	< 0.001
Iodomethane	0.001	mg/L	< 0.001
Isopropyl benzene (Cumene)	0.001	mg/L	< 0.001
m&p-Xylenes	0.002	mg/L	< 0.002
Methylene Chloride	0.001	mg/L	< 0.001
o-Xylene	0.001	mg/L	< 0.001
Styrene	0.001	mg/L	< 0.001
Tetrachloroethene	0.001	mg/L	< 0.001
Toluene	0.001	mg/L	< 0.001
trans-1.2-Dichloroethene	0.001	mg/L	< 0.001
trans-1.3-Dichloropropene	0.001	mg/L	< 0.001
Trichloroethene	0.001	mg/L	< 0.001
Trichlorofluoromethane	0.001	mg/L	< 0.001
Vinyl chloride	0.001	mg/L	< 0.001
Xylenes - Total*	0.003	mg/L	< 0.003
Total MAH*	0.003	mg/L	< 0.003
Vic EPA IWRG 621 CHC (Total)*	0.005	mg/L	< 0.005
Vic EPA IWRG 621 Other CHC (Total)*	0.005	mg/L	< 0.005
4-Bromofluorobenzene (surr.)	1	%	109
Toluene-d8 (surr.)	1	%	105

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

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

Description	Testing Site	Extracted	Holding Time
Volatile Organics	Melbourne	Apr 01, 2021	7 Days

- Method: LTM-ORG-2150 VOCs in Soils Liquid and other Aqueous Matrices (USEPA 8260)

eurofins | Environment Testing

ABN: 50 005 085 521 web: www.eurofins.com.au email: EnviroSales@eurofins.com

Australia

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Site # 1254 & 14271

Sydney
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NATA # 1261 Site # 18217

Brisbane
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Murarrie QLD 4172
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NATA # 1261 Site # 20794

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2/91 Leach Highway
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NATA # 1261
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Penrose, Auckland 1061
Phone : +64 9 526 45 51
IANZ # 1327

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43 Detroit Drive
Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

Company Name: JBS & G Australia (SA) P/L
Address: 100 Hutt St
Adelaide
SA 5000

Project Name: MELROSE PARK
Project ID: 60610

Order No.:
Report #: 784279
Phone: 08 8431 7113
Fax: 08 8431 7115

Received: Mar 31, 2021 3:00 PM
Due: Apr 9, 2021
Priority: 5 Day
Contact Name: Kate Lough

Eurofins Analytical Services Manager : Michael Cassidy

Sample Detail						Volatile Organics	Moisture Set	SA Waste Screen
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NATA Site # 23736								
Mayfield Laboratory								
External Laboratory								
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	SOIL01	Mar 26, 2021		Soil	M21-Ma57392		X	X
2	RB01	Mar 26, 2021		Water	M21-Ma57393	X		
Test Counts						1	1	1

Internal Quality Control Review and Glossary

General

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

Holding Times

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

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

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

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

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

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

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

Results <10 times the LOR : No Limit

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

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

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Volatile Organics							
1.1-Dichloroethane	mg/L	< 0.001			0.001	Pass	
1.1-Dichloroethene	mg/L	< 0.001			0.001	Pass	
1.1.1-Trichloroethane	mg/L	< 0.001			0.001	Pass	
1.1.1.2-Tetrachloroethane	mg/L	< 0.001			0.001	Pass	
1.1.2-Trichloroethane	mg/L	< 0.001			0.001	Pass	
1.1.2.2-Tetrachloroethane	mg/L	< 0.001			0.001	Pass	
1.2-Dibromoethane	mg/L	< 0.001			0.001	Pass	
1.2-Dichlorobenzene	mg/L	< 0.001			0.001	Pass	
1.2-Dichloroethane	mg/L	< 0.001			0.001	Pass	
1.2-Dichloropropane	mg/L	< 0.001			0.001	Pass	
1.2.3-Trichloropropane	mg/L	< 0.001			0.001	Pass	
1.2.4-Trimethylbenzene	mg/L	< 0.001			0.001	Pass	
1.3-Dichlorobenzene	mg/L	< 0.001			0.001	Pass	
1.3-Dichloropropane	mg/L	< 0.001			0.001	Pass	
1.3.5-Trimethylbenzene	mg/L	< 0.001			0.001	Pass	
1.4-Dichlorobenzene	mg/L	< 0.001			0.001	Pass	
2-Butanone (MEK)	mg/L	< 0.001			0.001	Pass	
2-Propanone (Acetone)	mg/L	< 0.001			0.001	Pass	
4-Chlorotoluene	mg/L	< 0.001			0.001	Pass	
4-Methyl-2-pentanone (MIBK)	mg/L	< 0.001			0.001	Pass	
Allyl chloride	mg/L	< 0.001			0.001	Pass	
Benzene	mg/L	< 0.001			0.001	Pass	
Bromobenzene	mg/L	< 0.001			0.001	Pass	
Bromochloromethane	mg/L	< 0.001			0.001	Pass	
Bromodichloromethane	mg/L	< 0.001			0.001	Pass	
Bromoform	mg/L	< 0.001			0.001	Pass	
Bromomethane	mg/L	< 0.001			0.001	Pass	
Carbon disulfide	mg/L	< 0.001			0.001	Pass	
Carbon Tetrachloride	mg/L	< 0.001			0.001	Pass	
Chlorobenzene	mg/L	< 0.001			0.001	Pass	
Chloroethane	mg/L	< 0.001			0.001	Pass	
Chloroform	mg/L	< 0.005			0.005	Pass	
Chloromethane	mg/L	< 0.001			0.001	Pass	
cis-1.2-Dichloroethene	mg/L	< 0.001			0.001	Pass	
cis-1.3-Dichloropropene	mg/L	< 0.001			0.001	Pass	
Dibromochloromethane	mg/L	< 0.001			0.001	Pass	
Dibromomethane	mg/L	< 0.001			0.001	Pass	
Dichlorodifluoromethane	mg/L	< 0.001			0.001	Pass	
Ethylbenzene	mg/L	< 0.001			0.001	Pass	
Iodomethane	mg/L	< 0.001			0.001	Pass	
Isopropyl benzene (Cumene)	mg/L	< 0.001			0.001	Pass	
m&p-Xylenes	mg/L	< 0.002			0.002	Pass	
Methylene Chloride	mg/L	< 0.001			0.001	Pass	
o-Xylene	mg/L	< 0.001			0.001	Pass	
Styrene	mg/L	< 0.001			0.001	Pass	
Tetrachloroethene	mg/L	< 0.001			0.001	Pass	
Toluene	mg/L	< 0.001			0.001	Pass	
trans-1.2-Dichloroethene	mg/L	< 0.001			0.001	Pass	
trans-1.3-Dichloropropene	mg/L	< 0.001			0.001	Pass	
Trichloroethene	mg/L	< 0.001			0.001	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Trichlorofluoromethane	mg/L	< 0.001			0.001	Pass	
Vinyl chloride	mg/L	< 0.001			0.001	Pass	
Xylenes - Total*	mg/L	< 0.003			0.003	Pass	
LCS - % Recovery							
Volatile Organics							
1.1-Dichloroethene	%	119			70-130	Pass	
1.1.1-Trichloroethane	%	113			70-130	Pass	
1.2-Dichlorobenzene	%	97			70-130	Pass	
1.2-Dichloroethane	%	115			70-130	Pass	
Benzene	%	122			70-130	Pass	
Ethylbenzene	%	107			70-130	Pass	
m&p-Xylenes	%	102			70-130	Pass	
Toluene	%	105			70-130	Pass	
Trichloroethene	%	108			70-130	Pass	
Xylenes - Total*	%	105			70-130	Pass	

Comments

Sample Integrity

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

Authorised by:

Michael Cassidy	Analytical Services Manager
Vivian Wang	Senior Analyst-Volatile (VIC)

Glenn Jackson
General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

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

JBS & G Australia (SA) P/L
100 Hutt St
Adelaide
SA 5000

Attention: **Kate Lough**

Report **784279-S**
Project name MELROSE PARK
Project ID 60610
Received Date Mar 31, 2021

Client Sample ID			**SOIL01**
Sample Matrix			**Soil**
Eurofins Sample No.			**M21-Ma57392**
Date Sampled			**Mar 26, 2021**
Test/Reference	LOR	Unit	
Total Recoverable Hydrocarbons - 1999 NEPM Fractions			
TRH C6-C9	20	mg/kg	< 20
TRH C10-C14	20	mg/kg	< 20
TRH C15-C28	50	mg/kg	< 50
TRH C29-C36	50	mg/kg	< 50
TRH C10-C36 (Total)	50	mg/kg	< 50
Volatile Organics			
Tetrachloroethene	0.5	mg/kg	< 0.5
BTEX			
Benzene	0.1	mg/kg	< 0.1
Toluene	0.1	mg/kg	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2
o-Xylene	0.1	mg/kg	< 0.1
Xylenes - Total*	0.3	mg/kg	< 0.3
4-Bromofluorobenzene (surr.)	1	%	70
Total Recoverable Hydrocarbons - 2013 NEPM Fractions			
Naphthalene[N02]	0.5	mg/kg	< 0.5
TRH C6-C10	20	mg/kg	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20
TRH >C10-C16	50	mg/kg	< 50
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50
TRH >C16-C34	100	mg/kg	< 100
TRH >C34-C40	100	mg/kg	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100
Polycyclic Aromatic Hydrocarbons			
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2
Acenaphthene	0.5	mg/kg	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5
Anthracene	0.5	mg/kg	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5

Client Sample ID			SOIL01
Sample Matrix			Soil
Eurofins Sample No.			M21-Ma57392
Date Sampled			Mar 26, 2021
Test/Reference	LOR	Unit	
Polycyclic Aromatic Hydrocarbons			
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5
Chrysene	0.5	mg/kg	< 0.5
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5
Fluoranthene	0.5	mg/kg	< 0.5
Fluorene	0.5	mg/kg	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5
Naphthalene	0.5	mg/kg	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5
Pyrene	0.5	mg/kg	< 0.5
Total PAH*	0.5	mg/kg	< 0.5
2-Fluorobiphenyl (surr.)	1	%	65
p-Terphenyl-d14 (surr.)	1	%	56
Organochlorine Pesticides			
Chlordanes - Total	0.1	mg/kg	< 0.1
4.4'-DDD	0.05	mg/kg	< 0.05
4.4'-DDE	0.05	mg/kg	< 0.05
4.4'-DDT	0.05	mg/kg	< 0.05
a-BHC	0.05	mg/kg	< 0.05
Aldrin	0.05	mg/kg	< 0.05
b-BHC	0.05	mg/kg	< 0.05
d-BHC	0.05	mg/kg	< 0.05
Dieldrin	0.05	mg/kg	< 0.05
Endosulfan I	0.05	mg/kg	< 0.05
Endosulfan II	0.05	mg/kg	< 0.05
Endosulfan sulphate	0.05	mg/kg	< 0.05
Endrin	0.05	mg/kg	< 0.05
Endrin aldehyde	0.05	mg/kg	< 0.05
Endrin ketone	0.05	mg/kg	< 0.05
g-BHC (Lindane)	0.05	mg/kg	< 0.05
Heptachlor	0.05	mg/kg	< 0.05
Heptachlor epoxide	0.05	mg/kg	< 0.05
Hexachlorobenzene	0.05	mg/kg	< 0.05
Methoxychlor	0.05	mg/kg	< 0.05
Toxaphene	0.1	mg/kg	< 0.1
Aldrin and Dieldrin (Total)*	0.05	mg/kg	< 0.05
DDT + DDE + DDD (Total)*	0.05	mg/kg	< 0.05
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	< 0.1
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	< 0.1
Dibutylchlorendate (surr.)	1	%	87
Tetrachloro-m-xylene (surr.)	1	%	57
Polychlorinated Biphenyls			
Aroclor-1016	0.1	mg/kg	< 0.1
Aroclor-1221	0.1	mg/kg	< 0.1
Aroclor-1232	0.1	mg/kg	< 0.1
Aroclor-1242	0.1	mg/kg	< 0.1
Aroclor-1248	0.1	mg/kg	< 0.1
Aroclor-1254	0.1	mg/kg	< 0.1
Aroclor-1260	0.1	mg/kg	< 0.1
Total PCB*	0.1	mg/kg	< 0.1

Client Sample ID			SOIL01
Sample Matrix			Soil
Eurofins Sample No.			M21-Ma57392
Date Sampled			Mar 26, 2021
Test/Reference	LOR	Unit	
Polychlorinated Biphenyls			
Dibutylchlorendate (surr.)	1	%	87
Tetrachloro-m-xylene (surr.)	1	%	57
Phenols (Halogenated)			
2-Chlorophenol	0.5	mg/kg	< 0.5
2.4-Dichlorophenol	0.5	mg/kg	< 0.5
2.4.5-Trichlorophenol	1	mg/kg	< 1
2.4.6-Trichlorophenol	1	mg/kg	< 1
2.6-Dichlorophenol	0.5	mg/kg	< 0.5
4-Chloro-3-methylphenol	1	mg/kg	< 1
Pentachlorophenol	1	mg/kg	< 1
Tetrachlorophenols - Total	10	mg/kg	< 10
Total Halogenated Phenol*	1	mg/kg	< 1
Phenols (non-Halogenated)			
2-Cyclohexyl-4.6-dinitrophenol	20	mg/kg	< 20
2-Methyl-4.6-dinitrophenol	5	mg/kg	< 5
2-Methylphenol (o-Cresol)	0.2	mg/kg	< 0.2
2-Nitrophenol	1.0	mg/kg	< 1
2.4-Dimethylphenol	0.5	mg/kg	< 0.5
2.4-Dinitrophenol	5	mg/kg	< 5
3&4-Methylphenol (m&p-Cresol)	0.4	mg/kg	< 0.4
4-Nitrophenol	5	mg/kg	< 5
Dinoseb	20	mg/kg	< 20
Phenol	0.5	mg/kg	< 0.5
Total Non-Halogenated Phenol*	20	mg/kg	< 20
Phenol-d6 (surr.)	1	%	50
Chromium (hexavalent)	1	mg/kg	< 1
Chromium (trivalent)	5	mg/kg	35
Cyanide (total)	5	mg/kg	< 5
% Moisture	1	%	11
Heavy Metals			
Arsenic	2	mg/kg	11
Barium	10	mg/kg	120
Beryllium	2	mg/kg	< 2
Cadmium	0.4	mg/kg	< 0.4
Chromium	5	mg/kg	35
Cobalt	5	mg/kg	19
Copper	5	mg/kg	41
Iron	20	mg/kg	26000
Lead	5	mg/kg	17
Manganese	5	mg/kg	220
Mercury	0.1	mg/kg	< 0.1
Nickel	5	mg/kg	18
Silver	2	mg/kg	2.7
Zinc	5	mg/kg	33

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

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

Description	Testing Site	Extracted	Holding Time
SA Waste Screen			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Melbourne	Apr 06, 2021	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Volatile Organics	Melbourne	Apr 06, 2021	7 Days
- Method: USEPA 8260 - MGT 350A Volatile Organics by GCMS			
BTEX	Melbourne	Apr 06, 2021	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Apr 06, 2021	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Apr 06, 2021	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Polycyclic Aromatic Hydrocarbons	Melbourne	Apr 06, 2021	14 Days
- Method: LTM-ORG-2130 PAH and Phenols in Soil and Water			
Organochlorine Pesticides	Melbourne	Apr 06, 2021	14 Days
- Method: LTM-ORG-2220 OCP & PCB in Soil and Water (USEPA 8270)			
Polychlorinated Biphenyls	Melbourne	Apr 06, 2021	28 Days
- Method: LTM-ORG-2220 OCP & PCB in Soil and Water (USEPA 8082)			
Phenols (Halogenated)	Melbourne	Apr 06, 2021	14 Days
- Method: LTM-ORG-2130 PAH and Phenols in Soil and Water			
Phenols (non-Halogenated)	Melbourne	Apr 06, 2021	14 Days
- Method: LTM-ORG-2130 PAH and Phenols in Soil and Water			
Chromium (hexavalent)	Melbourne	Apr 06, 2021	28 Days
- Method: APHA 3500-Cr Hexavalent Chromium- (Extraction:- USEPA3060)			
Cyanide (total)	Melbourne	Apr 06, 2021	14 Days
- Method: LTM-INO-4020 Total Free WAD Cyanide by CFA			
SA Waste Metals : Metals M14SA	Melbourne	Apr 06, 2021	28 Days
- Method: LTM-MET-3030 by ICP-OES (hydride ICP-OES for Mercury)			
% Moisture	Melbourne	Mar 31, 2021	14 Days
- Method: LTM-GEN-7080 Moisture			

eurofins | Environment Testing

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Project Name: MELROSE PARK
Project ID: 60610

Order No.:
Report #: 784279
Phone: 08 8431 7113
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Received: Mar 31, 2021 3:00 PM
Due: Apr 9, 2021
Priority: 5 Day
Contact Name: Kate Lough

Eurofins Analytical Services Manager : Michael Cassidy

Sample Detail						Volatile Organics	Moisture Set	SA Waste Screen
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NATA Site # 23736								
Mayfield Laboratory								
External Laboratory								
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	SOIL01	Mar 26, 2021		Soil	M21-Ma57392		X	X
2	RB01	Mar 26, 2021		Water	M21-Ma57393	X		
Test Counts						1	1	1

Internal Quality Control Review and Glossary

General

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

Holding Times

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

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

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

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

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

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram | **mg/L:** milligrams per litre | **ug/L:** micrograms per litre

ppm: Parts per million | **ppb:** Parts per billion | **%:** Percentage

org/100mL: Organisms per 100 millilitres | **NTU:** Nephelometric Turbidity Units | **MPN/100mL:** Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

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

Results <10 times the LOR : No Limit

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

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

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	mg/kg	< 20			20	Pass	
TRH C10-C14	mg/kg	< 20			20	Pass	
TRH C15-C28	mg/kg	< 50			50	Pass	
TRH C29-C36	mg/kg	< 50			50	Pass	
Method Blank							
Volatile Organics							
Tetrachloroethene	mg/kg	< 0.5			0.5	Pass	
Method Blank							
BTEX							
Benzene	mg/kg	< 0.1			0.1	Pass	
Toluene	mg/kg	< 0.1			0.1	Pass	
Ethylbenzene	mg/kg	< 0.1			0.1	Pass	
m&p-Xylenes	mg/kg	< 0.2			0.2	Pass	
o-Xylene	mg/kg	< 0.1			0.1	Pass	
Xylenes - Total*	mg/kg	< 0.3			0.3	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/kg	< 0.5			0.5	Pass	
TRH C6-C10	mg/kg	< 20			20	Pass	
TRH >C10-C16	mg/kg	< 50			50	Pass	
TRH >C16-C34	mg/kg	< 100			100	Pass	
TRH >C34-C40	mg/kg	< 100			100	Pass	
Method Blank							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	mg/kg	< 0.5			0.5	Pass	
Acenaphthylene	mg/kg	< 0.5			0.5	Pass	
Anthracene	mg/kg	< 0.5			0.5	Pass	
Benz(a)anthracene	mg/kg	< 0.5			0.5	Pass	
Benzo(a)pyrene	mg/kg	< 0.5			0.5	Pass	
Benzo(b&j)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Benzo(g.h.i)perylene	mg/kg	< 0.5			0.5	Pass	
Benzo(k)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Chrysene	mg/kg	< 0.5			0.5	Pass	
Dibenz(a.h)anthracene	mg/kg	< 0.5			0.5	Pass	
Fluoranthene	mg/kg	< 0.5			0.5	Pass	
Fluorene	mg/kg	< 0.5			0.5	Pass	
Indeno(1.2.3-cd)pyrene	mg/kg	< 0.5			0.5	Pass	
Naphthalene	mg/kg	< 0.5			0.5	Pass	
Phenanthrene	mg/kg	< 0.5			0.5	Pass	
Pyrene	mg/kg	< 0.5			0.5	Pass	
Method Blank							
Organochlorine Pesticides							
Chlordanes - Total	mg/kg	< 0.1			0.1	Pass	
4.4'-DDD	mg/kg	< 0.05			0.05	Pass	
4.4'-DDE	mg/kg	< 0.05			0.05	Pass	
4.4'-DDT	mg/kg	< 0.05			0.05	Pass	
a-BHC	mg/kg	< 0.05			0.05	Pass	
Aldrin	mg/kg	< 0.05			0.05	Pass	
b-BHC	mg/kg	< 0.05			0.05	Pass	
d-BHC	mg/kg	< 0.05			0.05	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Dieldrin	mg/kg	< 0.05			0.05	Pass	
Endosulfan I	mg/kg	< 0.05			0.05	Pass	
Endosulfan II	mg/kg	< 0.05			0.05	Pass	
Endosulfan sulphate	mg/kg	< 0.05			0.05	Pass	
Endrin	mg/kg	< 0.05			0.05	Pass	
Endrin aldehyde	mg/kg	< 0.05			0.05	Pass	
Endrin ketone	mg/kg	< 0.05			0.05	Pass	
g-BHC (Lindane)	mg/kg	< 0.05			0.05	Pass	
Heptachlor	mg/kg	< 0.05			0.05	Pass	
Heptachlor epoxide	mg/kg	< 0.05			0.05	Pass	
Hexachlorobenzene	mg/kg	< 0.05			0.05	Pass	
Methoxychlor	mg/kg	< 0.05			0.05	Pass	
Toxaphene	mg/kg	< 0.1			0.1	Pass	
Method Blank							
Polychlorinated Biphenyls							
Aroclor-1016	mg/kg	< 0.1			0.1	Pass	
Aroclor-1221	mg/kg	< 0.1			0.1	Pass	
Aroclor-1232	mg/kg	< 0.1			0.1	Pass	
Aroclor-1242	mg/kg	< 0.1			0.1	Pass	
Aroclor-1248	mg/kg	< 0.1			0.1	Pass	
Aroclor-1254	mg/kg	< 0.1			0.1	Pass	
Aroclor-1260	mg/kg	< 0.1			0.1	Pass	
Total PCB*	mg/kg	< 0.1			0.1	Pass	
Method Blank							
Phenols (Halogenated)							
2-Chlorophenol	mg/kg	< 0.5			0.5	Pass	
2.4-Dichlorophenol	mg/kg	< 0.5			0.5	Pass	
2.4.5-Trichlorophenol	mg/kg	< 1			1	Pass	
2.4.6-Trichlorophenol	mg/kg	< 1			1	Pass	
2.6-Dichlorophenol	mg/kg	< 0.5			0.5	Pass	
4-Chloro-3-methylphenol	mg/kg	< 1			1	Pass	
Pentachlorophenol	mg/kg	< 1			1	Pass	
Tetrachlorophenols - Total	mg/kg	< 10			10	Pass	
Method Blank							
Phenols (non-Halogenated)							
2-Cyclohexyl-4.6-dinitrophenol	mg/kg	< 20			20	Pass	
2-Methyl-4.6-dinitrophenol	mg/kg	< 5			5	Pass	
2-Methylphenol (o-Cresol)	mg/kg	< 0.2			0.2	Pass	
2-Nitrophenol	mg/kg	< 1			1.0	Pass	
2.4-Dimethylphenol	mg/kg	< 0.5			0.5	Pass	
2.4-Dinitrophenol	mg/kg	< 5			5	Pass	
3&4-Methylphenol (m&p-Cresol)	mg/kg	< 0.4			0.4	Pass	
4-Nitrophenol	mg/kg	< 5			5	Pass	
Dinoseb	mg/kg	< 20			20	Pass	
Phenol	mg/kg	< 0.5			0.5	Pass	
Method Blank							
Chromium (hexavalent)	mg/kg	< 1			1	Pass	
Cyanide (total)	mg/kg	< 5			5	Pass	
Method Blank							
Heavy Metals							
Arsenic	mg/kg	< 2			2	Pass	
Barium	mg/kg	< 10			10	Pass	
Beryllium	mg/kg	< 2			2	Pass	
Cadmium	mg/kg	< 0.4			0.4	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Chromium	mg/kg	< 5			5	Pass	
Cobalt	mg/kg	< 5			5	Pass	
Copper	mg/kg	< 5			5	Pass	
Iron	mg/kg	< 20			20	Pass	
Lead	mg/kg	< 5			5	Pass	
Manganese	mg/kg	< 5			5	Pass	
Mercury	mg/kg	< 0.1			0.1	Pass	
Nickel	mg/kg	< 5			5	Pass	
Silver	mg/kg	< 2			2	Pass	
Zinc	mg/kg	< 5			5	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	113			70-130	Pass	
TRH C10-C14	%	113			70-130	Pass	
LCS - % Recovery							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	%	96			70-130	Pass	
Acenaphthylene	%	113			70-130	Pass	
Anthracene	%	86			70-130	Pass	
Benz(a)anthracene	%	102			70-130	Pass	
Benzo(a)pyrene	%	83			70-130	Pass	
Benzo(b&j)fluoranthene	%	81			70-130	Pass	
Benzo(g.h.i)perylene	%	73			70-130	Pass	
Benzo(k)fluoranthene	%	82			70-130	Pass	
Chrysene	%	92			70-130	Pass	
Dibenz(a.h)anthracene	%	88			70-130	Pass	
Fluoranthene	%	87			70-130	Pass	
Fluorene	%	108			70-130	Pass	
Indeno(1.2.3-cd)pyrene	%	85			70-130	Pass	
Naphthalene	%	91			70-130	Pass	
Phenanthrene	%	93			70-130	Pass	
Pyrene	%	91			70-130	Pass	
LCS - % Recovery							
Organochlorine Pesticides							
Chlordanes - Total	%	91			70-130	Pass	
4.4'-DDD	%	98			70-130	Pass	
4.4'-DDE	%	108			70-130	Pass	
b-BHC	%	97			70-130	Pass	
Endosulfan I	%	104			70-130	Pass	
Endosulfan II	%	89			70-130	Pass	
Endosulfan sulphate	%	88			70-130	Pass	
Endrin	%	112			70-130	Pass	
Endrin ketone	%	96			70-130	Pass	
Heptachlor	%	92			70-130	Pass	
Hexachlorobenzene	%	95			70-130	Pass	
Methoxychlor	%	85			70-130	Pass	
LCS - % Recovery							
Chromium (hexavalent)	%	107			70-130	Pass	
Cyanide (total)	%	91			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	M21-Ap05508	NCP	%	88			70-130	Pass	
TRH C10-C14	M21-Ap02705	NCP	%	98			70-130	Pass	
Spike - % Recovery									
BTEX				Result 1					
Benzene	M21-Ap05508	NCP	%	82			70-130	Pass	
Toluene	M21-Ap05508	NCP	%	82			70-130	Pass	
Ethylbenzene	M21-Ap05508	NCP	%	79			70-130	Pass	
m&p-Xylenes	M21-Ap05508	NCP	%	90			70-130	Pass	
o-Xylene	M21-Ap05508	NCP	%	86			70-130	Pass	
Xylenes - Total*	M21-Ap05508	NCP	%	89			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	M21-Ap05508	NCP	%	80			70-130	Pass	
TRH C6-C10	M21-Ap05508	NCP	%	86			70-130	Pass	
TRH >C10-C16	M21-Ap02705	NCP	%	122			70-130	Pass	
Spike - % Recovery									
Polycyclic Aromatic Hydrocarbons				Result 1					
Acenaphthene	M21-Ap05370	NCP	%	119			70-130	Pass	
Acenaphthylene	M21-Ap05370	NCP	%	102			70-130	Pass	
Anthracene	M21-Ap05370	NCP	%	101			70-130	Pass	
Benz(a)anthracene	M21-Ap05370	NCP	%	90			70-130	Pass	
Benzo(a)pyrene	M21-Ap05370	NCP	%	102			70-130	Pass	
Benzo(b&j)fluoranthene	M21-Ap05370	NCP	%	90			70-130	Pass	
Benzo(g.h.i)perylene	M21-Ap05370	NCP	%	84			70-130	Pass	
Benzo(k)fluoranthene	M21-Ap05370	NCP	%	129			70-130	Pass	
Chrysene	M21-Ap05370	NCP	%	93			70-130	Pass	
Dibenz(a.h)anthracene	M21-Ap05370	NCP	%	78			70-130	Pass	
Fluoranthene	M21-Ap05370	NCP	%	105			70-130	Pass	
Fluorene	M21-Ap05370	NCP	%	121			70-130	Pass	
Indeno(1.2.3-cd)pyrene	M21-Ap05370	NCP	%	74			70-130	Pass	
Naphthalene	M21-Ap05370	NCP	%	115			70-130	Pass	
Phenanthrene	M21-Ap05370	NCP	%	121			70-130	Pass	
Pyrene	M21-Ap05370	NCP	%	114			70-130	Pass	
Spike - % Recovery									
Organochlorine Pesticides				Result 1					
Chlordanes - Total	M21-Ap04728	NCP	%	104			70-130	Pass	
4.4'-DDD	M21-Ap04728	NCP	%	110			70-130	Pass	
4.4'-DDE	M21-Ap04728	NCP	%	75			70-130	Pass	
4.4'-DDT	M21-Ap04728	NCP	%	71			70-130	Pass	
a-BHC	M21-Ap04728	NCP	%	81			70-130	Pass	
Aldrin	M21-Ap04728	NCP	%	100			70-130	Pass	
b-BHC	M21-Ap04728	NCP	%	102			70-130	Pass	
d-BHC	M21-Ap04728	NCP	%	74			70-130	Pass	
Dieldrin	M21-Ap04728	NCP	%	101			70-130	Pass	
Endosulfan I	M21-Ap04728	NCP	%	77			70-130	Pass	
Endosulfan II	M21-Ap04728	NCP	%	94			70-130	Pass	
Endosulfan sulphate	M21-Ap04728	NCP	%	77			70-130	Pass	
Endrin	M21-Ap04728	NCP	%	110			70-130	Pass	
Endrin aldehyde	M21-Ap04728	NCP	%	82			70-130	Pass	
Endrin ketone	M21-Ap04728	NCP	%	82			70-130	Pass	
g-BHC (Lindane)	M21-Ap04728	NCP	%	97			70-130	Pass	
Heptachlor	M21-Ap04728	NCP	%	82			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Heptachlor epoxide	M21-Ap04728	NCP	%	109			70-130	Pass	
Hexachlorobenzene	M21-Ap04728	NCP	%	102			70-130	Pass	
Methoxychlor	M21-Ap04728	NCP	%	83			70-130	Pass	
Spike - % Recovery									
Phenols (Halogenated)				Result 1					
2-Chlorophenol	M21-Ap05370	NCP	%	115			30-130	Pass	
2.4-Dichlorophenol	M21-Ap05370	NCP	%	117			30-130	Pass	
2.4.5-Trichlorophenol	M21-Ap05370	NCP	%	89			30-130	Pass	
2.4.6-Trichlorophenol	M21-Ap05370	NCP	%	115			30-130	Pass	
2.6-Dichlorophenol	M21-Ap05370	NCP	%	118			30-130	Pass	
4-Chloro-3-methylphenol	M21-Ap05370	NCP	%	108			30-130	Pass	
Pentachlorophenol	M21-Ap05370	NCP	%	36			30-130	Pass	
Tetrachlorophenols - Total	M21-Ap05370	NCP	%	65			30-130	Pass	
Spike - % Recovery									
Phenols (non-Halogenated)				Result 1					
2-Methylphenol (o-Cresol)	M21-Ap05370	NCP	%	100			30-130	Pass	
2-Nitrophenol	M21-Ap05370	NCP	%	93			30-130	Pass	
2.4-Dimethylphenol	M21-Ap05370	NCP	%	91			30-130	Pass	
3&4-Methylphenol (m&p-Cresol)	M21-Ap05370	NCP	%	122			30-130	Pass	
4-Nitrophenol	M21-Ap05370	NCP	%	104			30-130	Pass	
Phenol	M21-Ap05370	NCP	%	115			30-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	M21-Ap00024	NCP	%	96			75-125	Pass	
Barium	M21-Ap00024	NCP	%	93			75-125	Pass	
Beryllium	M21-Ap00024	NCP	%	92			75-125	Pass	
Cadmium	M21-Ap00024	NCP	%	94			75-125	Pass	
Chromium	M21-Ap00024	NCP	%	87			75-125	Pass	
Cobalt	M21-Ap00024	NCP	%	112			75-125	Pass	
Copper	M21-Ap00024	NCP	%	109			75-125	Pass	
Lead	M21-Ap00024	NCP	%	97			75-125	Pass	
Manganese	M21-Ap00024	NCP	%	98			75-125	Pass	
Mercury	M21-Ap00024	NCP	%	105			75-125	Pass	
Nickel	M21-Ap00024	NCP	%	105			75-125	Pass	
Silver	M21-Ap00024	NCP	%	96			75-125	Pass	
Zinc	M21-Ap00024	NCP	%	69			75-125	Fail	Q08
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	M21-Ap08310	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C10-C14	B21-Ap01964	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C15-C28	B21-Ap01964	NCP	mg/kg	99	130	23	30%	Pass	
TRH C29-C36	B21-Ap01964	NCP	mg/kg	150	180	18	30%	Pass	
Duplicate									
Volatile Organics				Result 1	Result 2	RPD			
Tetrachloroethene	M21-Ap05370	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	M21-Ap08310	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	M21-Ap08310	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	M21-Ap08310	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	M21-Ap08310	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	M21-Ap08310	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total*	M21-Ap08310	NCP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	

Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	M21-Ap08310	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
TRH C6-C10	M21-Ap08310	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH >C10-C16	B21-Ap01964	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH >C16-C34	B21-Ap01964	NCP	mg/kg	220	270	20	30%	Pass	
TRH >C34-C40	B21-Ap01964	NCP	mg/kg	< 100	< 100	<1	30%	Pass	
Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Acenaphthene	M21-Ap05369	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Acenaphthylene	M21-Ap05369	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Anthracene	M21-Ap05369	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benz(a)anthracene	M21-Ap05369	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(a)pyrene	M21-Ap05369	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(b&j)fluoranthene	M21-Ap05369	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(g.h.i)perylene	M21-Ap05369	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(k)fluoranthene	M21-Ap05369	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Chrysene	M21-Ap05369	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Dibenz(a.h)anthracene	M21-Ap05369	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluoranthene	M21-Ap05369	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluorene	M21-Ap05369	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Indeno(1.2.3-cd)pyrene	M21-Ap05369	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Naphthalene	M21-Ap05369	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Phenanthrene	M21-Ap05369	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Pyrene	M21-Ap05369	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
Organochlorine Pesticides				Result 1	Result 2	RPD			
Chlordanes - Total	M21-Ap05369	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
4.4'-DDD	M21-Ap05369	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4'-DDE	M21-Ap05369	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4'-DDT	M21-Ap05369	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
a-BHC	M21-Ap05369	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Aldrin	M21-Ap05369	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
b-BHC	M21-Ap05369	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
d-BHC	M21-Ap05369	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Dieldrin	M21-Ap05369	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan I	M21-Ap05369	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan II	M21-Ap05369	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan sulphate	M21-Ap05369	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin	M21-Ap05369	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin aldehyde	M21-Ap05369	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin ketone	M21-Ap05369	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
g-BHC (Lindane)	M21-Ap05369	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor	M21-Ap05369	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor epoxide	M21-Ap05369	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Hexachlorobenzene	M21-Ap05369	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Methoxychlor	M21-Ap05369	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Duplicate									
Phenols (Halogenated)				Result 1	Result 2	RPD			
2-Chlorophenol	M21-Ap05369	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
2.4-Dichlorophenol	M21-Ap05369	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
2.4.5-Trichlorophenol	M21-Ap05369	NCP	mg/kg	< 1	< 1	<1	30%	Pass	
2.4.6-Trichlorophenol	M21-Ap05369	NCP	mg/kg	< 1	< 1	<1	30%	Pass	
2.6-Dichlorophenol	M21-Ap05369	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
4-Chloro-3-methylphenol	M21-Ap05369	NCP	mg/kg	< 1	< 1	<1	30%	Pass	
Pentachlorophenol	M21-Ap05369	NCP	mg/kg	< 1	< 1	<1	30%	Pass	
Tetrachlorophenols - Total	M21-Ap05369	NCP	mg/kg	< 10	< 10	<1	30%	Pass	

Duplicate									
Phenols (non-Halogenated)				Result 1	Result 2	RPD			
2-Cyclohexyl-4.6-dinitrophenol	M21-Ap05369	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
2-Methyl-4.6-dinitrophenol	M21-Ap05369	NCP	mg/kg	< 5	< 5	<1	30%	Pass	
2-Methylphenol (o-Cresol)	M21-Ap05369	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
2-Nitrophenol	M21-Ap05369	NCP	mg/kg	< 1	< 1	<1	30%	Pass	
2.4-Dimethylphenol	M21-Ap05369	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
2.4-Dinitrophenol	M21-Ap05369	NCP	mg/kg	< 5	< 5	<1	30%	Pass	
3&4-Methylphenol (m&p-Cresol)	M21-Ap05369	NCP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
4-Nitrophenol	M21-Ap05369	NCP	mg/kg	< 5	< 5	<1	30%	Pass	
Dinoseb	M21-Ap05369	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
Phenol	M21-Ap05369	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Cyanide (total)	M21-Ap02149	NCP	mg/kg	< 5	< 5	<1	30%	Pass	
% Moisture	B21-Ma57227	NCP	%	10	9.8	6.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	M21-Ap02488	NCP	mg/kg	11	4.8	79	30%	Fail	Q15
Barium	M21-Ap02488	NCP	mg/kg	17	23	29	30%	Pass	
Beryllium	M21-Ap02488	NCP	mg/kg	< 2	< 2	<1	30%	Pass	
Cadmium	M21-Ap02488	NCP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	M21-Ap02488	NCP	mg/kg	60	50	18	30%	Pass	
Cobalt	M21-Ap02488	NCP	mg/kg	< 5	< 5	<1	30%	Pass	
Copper	M21-Ap02488	NCP	mg/kg	< 5	< 5	<1	30%	Pass	
Iron	M21-Ap02309	NCP	mg/kg	31000	31000	2.0	30%	Pass	
Lead	M21-Ap02488	NCP	mg/kg	11	14	26	30%	Pass	
Manganese	M21-Ap02488	NCP	mg/kg	16	17	8.0	30%	Pass	
Mercury	M21-Ap02488	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Nickel	M21-Ap02488	NCP	mg/kg	7.4	8.2	10	30%	Pass	
Silver	M21-Ap02488	NCP	mg/kg	< 2	< 2	<1	30%	Pass	
Zinc	M21-Ap02488	NCP	mg/kg	6.7	6.5	4.0	30%	Pass	

Comments

Sample Integrity

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

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
N07	Please note:- These two PAH isomers closely co-elute using the most contemporary analytical methods and both the reported concentration (and the TEQ) apply specifically to the total of the two co-eluting PAHs
Q08	The matrix spike recovery is outside of the recommended acceptance criteria. An acceptable recovery was obtained for the laboratory control sample indicating a sample matrix interference.
Q15	The RPD reported passes Eurofins Environment Testing's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report.

Authorised by:

Michael Cassidy	Analytical Services Manager
Emily Rosenberg	Senior Analyst-Metal (VIC)
Joseph Edouard	Senior Analyst-Organic (VIC)
Scott Beddoes	Senior Analyst-Inorganic (VIC)
Vivian Wang	Senior Analyst-Volatile (VIC)

Glenn Jackson
General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

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

CHAIN OF CUSTODY DOCUMENTATION

JBS&G (Australia) Pty Ltd

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ACN 100 220 479 · ABN 62 100 220 479

JBS&G

CLIENT: EPA	LABORATORY: MGT	LABORATORY BATCH NO.:	
SITE/PROJECT NAME: Melrose Park	COC Reference #: 60610_1_Install	SAMPLERS: HF	
SEND REPORT TO: JBS&G Australia Pty Ltd	SEND INVOICE TO: JBS&G Australia Pty Ltd	PHONE: 08 8431 7113 FAX: 08 8431 7115	
DATA NEEDED BY: 5 day t/a	REPORT NEEDED BY: 5 day t/a	REPORT FORMAT: HARD: NO FAX: NO E-MAIL: YES	
SITE/PROJECT NUMBER: 60610	QUOTE #:	JBS&G OFFICE TO SEND RESULTS: South Australia	
RELINQUISHED BY:		RECEIVED BY	METHOD OF SHIPMENT: Overnight
NAME : Kate Lough	DATE: 31/3/21	NAME : Pasquale DATE: 31/03	CONSIGNMENT NOTE NO.
OF: JBS&G (Australia) Pty Ltd	TIME:	OF: Eurofins TIME: 3pm	
NAME:	DATE:	NAME : DATE:	TRANSPORT CO. NAME.
OF:	TIME:	OF: TIME:	

P.O. NO.:	COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:	ANALYSIS REQUIRED
FOR LAB USE ONLY COOLER SEAL Yes ..... No ..... Broken ..... Intact .... COOLER TEMP: deg.C	**Please forward results and invoice to:** **labresults@jbsg.com.au, klough@jbsg.com.au**	***Container Type and Preservative Codes:** P = Neutral Plastic; N = Nitric Acid Preserved; C = Sodium Hydroxide Preserved; J = Solvent Washed Jar; S = Solvent Washed Glass Bottle; VC = HCL Preserved Vial; PC = HCL Preserved Plastic; PS = Sulfuric Acid Preserved Plastic; BS = Sulfuric Acid Preserved Glass Bottle; Z = Zinc Acetate Preserved Bottle; ST =Sodium Thiosuplhate Preserved Plastic, E = EDTA Preserved Bottles; ST = Sterile Bottle; O = Other.

SAMPLE DATA				CONTAINER DATA																		
SAMPLE ID	MATRIX	DATE	TIME	TYPE & PRESERVATIVE	NO.	pH field	VOCs	R7 (SA Waste Screen)														'NOTES
SOIL01	Soil	26/03/2021	PM	1x unpreserved soil jar	1	-		X														
RB01	Water	26/03/2021	PM	2x VC	2	-	X															
						TOTAL	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

#784279
Pasquale
18.8°C
−0.3°C
18.5°C
on IB

Envirolab Services Pty Ltd
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CERTIFICATE OF ANALYSIS 265789

Client Details

Client	JBS & G Australia Pty Ltd
Attention	A Smith
Address	100 Hutt St, ADELAIDE, SA, 5000

Sample Details

Your Reference	**60610 Melrose Park**
Number of Samples	1xCanister
Date samples received	06/04/2021
Date completed instructions received	06/04/2021

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	13/04/2021
Date of Issue	13/04/2021

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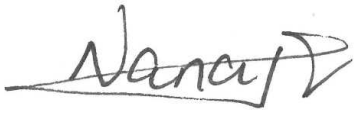
Accredited for compliance with ISO/IEC 17025 - Testing. **Tests not covered by NATA are denoted with ***

Results Approved By
Giovanni Agosti, Group Technical Manager

Authorised By



Nancy Zhang, Laboratory Manager

TO15 Chlorinated in Cans ppbv		
Our Reference		265789-1
Your Reference	UNITS	DUP02
Date Sampled		30/03/2021
Type of sample		Air
Air Kit Security No.		1L0132
Vacuum before Shipment	Hg"	[NT]
Vacuum before Analysis	Hg"	-8
Date prepared	-	08/04/2021
Date analysed	-	08/04/2021
Vinyl chloride	ppbv	<2
1,1-Dichloroethene	ppbv	5.6
Trichloroethene	ppbv	1,300
trans-1,2-dichloroethene	ppbv	<3
cis-1,2-Dichloroethene	ppbv	<3
Tetrachloroethene	ppbv	5
Isopropyl Alcohol	ppbv	110
Surrogate-Bromochloromethane	% rec	105
Surrogate -1,4-Difluorobenzene	% rec	101
Surrogate-Chlorobenzene-D5	% rec	98

TO15 chlorinated in Cans ug/m3		
Our Reference		265789-1
Your Reference	UNITS	DUP02
Date Sampled		30/03/2021
Type of sample		Air
Air Kit Security No.		1L0132
Vacuum before Shipment	Hg"	[NT]
Vacuum before Analysis	Hg"	-8
Date prepared	-	08/04/2021
Date analysed	-	08/04/2021
Vinyl chloride	µg/m^3	<4
1,1-Dichloroethene	µg/m^3	22
Trichloroethene	µg/m^3	7,200
trans-1,2-dichloroethene	µg/m^3	<10
cis-1,2-Dichloroethene	µg/m^3	<10
Tetrachloroethene	µg/m^3	30
Isopropyl Alcohol	µg/m^3	280
Surrogate-Bromochloromethane	% rec	105
Surrogate -1,4-Difluorobenzene	% rec	101
Surrogate-Chlorobenzene-D5	% rec	98

Method ID	Methodology Summary
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.

QUALITY CONTROL: TO15 Chlorinated in Cans ppbv						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Vacuum before Analysis	Hg"			[NT]	1	-8	-8	0	[NT]	[NT]
Date prepared	-			08/04/2021	1	08/04/2021	08/04/2021		08/04/2021	[NT]
Date analysed	-			08/04/2021	1	08/04/2021	08/04/2021		08/04/2021	[NT]
Vinyl chloride	ppbv	0.3	TO15	<0.3	1	<2	<2	0	[NT]	[NT]
1,1-Dichloroethene	ppbv	0.5	TO15	<0.5	1	5.6	5.4	4	[NT]	[NT]
Trichloroethene	ppbv	0.3	TO15	<0.3	1	1300	1300	0	[NT]	[NT]
trans-1,2-dichloroethene	ppbv	0.5	TO15	<0.5	1	<3	<3	0	[NT]	[NT]
cis-1,2-Dichloroethene	ppbv	0.5	TO15	<0.5	1	<3	<3	0	[NT]	[NT]
Tetrachloroethene	ppbv	0.5	TO15	<0.5	1	5	4	22	[NT]	[NT]
Isopropyl Alcohol	ppbv	5	TO15	<5	1	110	110	0	[NT]	[NT]
Surrogate-Bromochloromethane	% rec		TO15	109	1	105	104	1	104	[NT]
Surrogate -1,4-Difluorobenzene	% rec		TO15	106	1	101	99	2	100	[NT]
Surrogate-Chlorobenzene-D5	% rec		TO15	104	1	98	96	2	101	[NT]

QUALITY CONTROL: TO15 chlorinated in Cans ug/m3						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Vacuum before Analysis	Hg"			[NT]	1	-8	-8	0	[NT]	[NT]
Date prepared	-			08/04/2021	1	08/04/2021	08/04/2021		[NT]	[NT]
Date analysed	-			08/04/2021	1	08/04/2021	08/04/2021		[NT]	[NT]
Vinyl chloride	µg/m³	0.8	TO15	<0.8	1	<4	<4	0	[NT]	[NT]
1,1-Dichloroethene	µg/m³	2.0	TO15	<2.0	1	22	22	0	[NT]	[NT]
Trichloroethene	µg/m³	1.6	TO15	<1.6	1	7200	7000	3	[NT]	[NT]
trans-1,2-dichloroethene	µg/m³	2.0	TO15	<2.0	1	<10	<10	0	[NT]	[NT]
cis-1,2-Dichloroethene	µg/m³	2.0	TO15	<2.0	1	<10	<10	0	[NT]	[NT]
Tetrachloroethene	µg/m³	3.4	TO15	<3.4	1	30	30	0	[NT]	[NT]
Isopropyl Alcohol	µg/m³	12	TO15	<12	1	280	280	0	[NT]	[NT]
Surrogate-Bromochloromethane	% rec		TO15	109	1	105	104	1	[NT]	[NT]
Surrogate -1,4-Difluorobenzene	% rec		TO15	106	1	101	99	2	[NT]	[NT]
Surrogate-Chlorobenzene-D5	% rec		TO15	104	1	98	96	2	[NT]	[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.

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

AIR_TO-15

PQL has been raised due to the high level of analytes present in the sample.

LCS has been run as Ozone Precursor standard; the recovery of LCS cannot be reported due to the fact they are not in the list of analytes requested. However, the non-reported analytes within the LCS had acceptable recoveries.

CHAIN OF CUSTODY DOCUMENTATION

JBS&G

CLIENT: EPA	LABORATORY: Eurofins
PROJECT: Melrose Park	COC Reference #: COC_60610_2_SVP
SEND REPORT TO: JBS&G	SEND INVOICE TO: JBS&G
DATA NEEDED BY: 5 day t/a	REPORT NEEDED BY: 5 day t/a
PROJECT ID: 60610	QUOTE #:

RELINQUISHED BY:

NAME : Ashley Smith	DATE: 30/3/21
OF: JBS&G	TIME: PM
NAME :	DATE:
OF:	TIME:

LABORATORY BATCH NO.: 764189	
SAMPLERS: AS	
PHONE: 08 8431 7113 FAX: 08 8431 7115	
REPORT FORMAT: HARD:YES FAX: NO E-MAIL: YES	

RECEIVED BY

NAME: Ben Sutton	DATE: 31/03/2021
OF: Eurofins	TIME: 10:30 AM
NAME	DATE:
OF:	TIME:

METHOD OF SHIPMENT: Overnight

CONSIGNMENT NOTE NO.

TRANSPORT CO. NAME.

P.O. NO.:

COMMENTS/SPECIAL HANDLING/STORAGE OR DIPOSAL:

Please forward results to:
labresults@jbsg.com.au, kdough@jbsg.com.au

FOR LAB USE ONLY

COOLER SEAL

Yes ..... No .....

Broken ..... Intact .....

COOLER TEMP: deg.C

ANALYSIS REQUIRED

*Container Type and Preservative Codes: P = Neutral Plastic; N = Nitric Acid Preserved; C = Sodium Hydroxide Preserved; J = Solvent Washed Acid Rinced Jar; S = Solvent Washed Acid Rinced Glass Bottle; VC = Hydrochloric Acid Preserved Vial; VS = Sulfuric Acid Preserved Vial; BS = Sulfuric Acid Preserved Glass Bottle; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; O = Other.

SAMPLE DATA

JBS&G SAMPLE ID	LAB ID	PID	MATRIX	DATE	COLLECTION TIME		CANISTER PRESSURE		Chlorinated Ethenes**	Isopropanol
					TIME ON	TIME OFF	PRE-SAMPLING	POST-SAMPLING		
SVP01	1L0104	1.3	SV	30/03/2021	9:05	9:15	-30	-7	X	X
SVP02	1L0044	0.9	SV	30/03/2021	10:17	10:26	-30	-10	X	X
SVP03	1L0083	1.6	SV	30/03/2021	9:45	9:56	-30	-5	X	X
SVP04	1L0087	0.5	SV	30/03/2021	7:40	7:51	-30	-7	X	X
SVP05	1L0162	2.7	SV	30/03/2021	8:26	8:36	-30	-4	X	X
DUP01	1L0078		SV	30/03/2021	~10 min sampling time		-30	-7	X	X
DUP02	1L0132		SV	30/03/2021	~10 min sampling time		-30	-7	X	X
SHROUD01	1L0107		SV	30/03/2021	~10 min sampling time		-30	-5		X
								TOTAL	7	8

*Chlorinated ethenes includes:
Tetrachloroethene
Trichloroethene
cis-1,2-dichloroethene
trans-1,2-dichloroethene
1,1-dichloroethene
Vinyl chloride

NOTES

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

Job No: 265789

Date Received: 6/04/2021
Time Received: 10:20
Received By: AE
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

764189.

Please note Client advised sending of Dup02 after pressurisation. Initial Pressure is 11.29 PSIA (7a "Hg), post ~~sample~~ pressure is 30.14 PSIA

Appendix K Geotechnical Sample Laboratory Certificate of Analysis

SMS Geotechnical Pty. Ltd.
Unit 9/21 Beafield Road
Para Hills West, South Australia 5096
Ph. (08) 8258 7498
www.smsgeotechnical.com.au

Report No: MAT:1-2106306
Issue No: 1

Material Test Report

Client:	JBS&G (VIC & SA) Pty Ltd
	38 Dequetteville Terrace, Kent Town SA 5067
Project No:	SMS1.21186
Project:	Geotechnical Testing
Location:	Submitted Samples

NATA Accredited Laboratory Number:19225

Accredited for compliance with ISO/IEC 17025-Testing
The results in this report relate only to the items/samples that were tested.

Approved Signatory: Simon Nelson
(Laboratory Coordinator)
Date of Issue: 31/03/2021

Sample Details

Sample ID	1-2106306
Sample Location	Melrose Park
	0.60m - 0.70m
Sampling Method	Submitted by client
Specification	-
Material Description	CLAY, brown

Test Results

Description	Method	Result	Limits
Specimen Height (mm)*		83.6	
Specimen Diameter (mm)*		29.3	
Specimen Bulk Density (t/m3)*		2.01	
Specimen Dry Density (t/m3)*		1.67	
Void Ratio (e)*		0.58	
Degree of Saturation S(%)*		92.6	
Porosity (n)*		0.37	
Date Tested		29/03/2021	
Moisture Content (%)	AS 1289.2.1.1	20.5	
Date Tested		29/03/2021	
Avg Particle Density - passing 2.36mm (g/cm³)	AS 1289.3.5.1	2.64	
Temperature - passing 2.36mm (°C)		23	
Avg Particle Density - retained 2.36mm (g/cm³)			
Temperature - retained 2.36mm (°C)			
Soil Particle Density (g/cm³)		2.64	
Date Tested		31/03/2021	

Comments

* NATA does not cover the performance of this service.
*Non NATA - Calculation only

Appendix L Groundwater Laboratory Certificates of Analysis and Chain of Custody Documentation

JBS & G Australia (SA) P/L
100 Hutt St
Adelaide
SA 5000

Attention: **Kate Lough**

Report **784255-W**
Project name MELROSE PARK
Project ID 60610
Received Date Mar 31, 2021

Client Sample ID			**GW3034B**	**DUP01**	**RB02**	**TB01**
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**M21-Ma57157**	**M21-Ma57158**	**M21-Ma57160**	**M21-Ma57161**
Date Sampled			**Mar 30, 2021**	**Mar 30, 2021**	**Mar 30, 2021**	**Mar 30, 2021**
Test/Reference	LOR	Unit				
Halogenated Volatile Organics						
1.1-Dichloroethene	0.001	mg/L	0.11	0.13	< 0.001	< 0.001
cis-1.2-Dichloroethene	0.001	mg/L	< 0.025	< 0.025	< 0.001	< 0.001
Tetrachloroethene	0.001	mg/L	< 0.025	< 0.025	< 0.001	< 0.001
trans-1.2-Dichloroethene	0.001	mg/L	< 0.025	< 0.025	< 0.001	< 0.001
Trichloroethene	0.001	mg/L	1.2	1.4	< 0.001	< 0.001
Vinyl chloride	0.001	mg/L	< 0.025	< 0.025	< 0.001	< 0.001
4-Bromofluorobenzene (surr.)	1	%	98	106	105	105
Toluene-d8 (surr.)	1	%	90	100	101	102

Client Sample ID			**WSP7893**
Sample Matrix			**Water**
Eurofins Sample No.			**M21-Ma57162**
Date Sampled			**Mar 30, 2021**
Test/Reference	LOR	Unit	
Total Recoverable Hydrocarbons			
Naphthalene	1	%	80
TRH C6-C10	1	%	73
TRH C6-C9	1	%	74
BTEX			
Benzene	1	%	94
Ethylbenzene	1	%	74
m&p-Xylenes	1	%	79
o-Xylene	1	%	70
Toluene	1	%	87
Xylenes - Total	1	%	73
4-Bromofluorobenzene (surr.)	1	%	100

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

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

Description	Testing Site	Extracted	Holding Time
Halogenated Volatile Organics	Melbourne	Mar 31, 2021	7 Days

- Method: USEPA 8260 MGT 350A Halogenated Volatile Organics

eurofins | Environment Testing

ABN: 50 005 085 521 web: www.eurofins.com.au email: EnviroSales@eurofins.com

Australia

Melbourne
6 Monterey Road
Dandenong South VIC 3175
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney
Unit F3, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Perth
2/91 Leach Highway
Kewdale WA 6105
Phone : +61 8 9251 9600
NATA # 1261
Site # 23736

Newcastle
4/52 Industrial Drive
Mayfield East NSW 2304
PO Box 60 Wickham 2293
Phone : +61 2 4968 8448

New Zealand

Auckland
35 O'Rorke Road
Penrose, Auckland 1061
Phone : +64 9 526 45 51
IANZ # 1327

Christchurch
43 Detroit Drive
Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

Company Name: JBS & G Australia (SA) P/L
Address: 100 Hutt St
Adelaide
SA 5000

Project Name: MELROSE PARK
Project ID: 60610

Order No.:
Report #: 784255
Phone: 08 8431 7113
Fax: 08 8431 7115

Received: Mar 31, 2021 10:13 AM
Due: Apr 9, 2021
Priority: 5 Day
Contact Name: Kate Lough

Eurofins Analytical Services Manager : Michael Cassidy

Sample Detail						CANCELLED	Halogenated Volatile Organics	BTEXN and Volatile TRH
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NATA Site # 23736								
Mayfield Laboratory								
External Laboratory								
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	GW3034B	Mar 30, 2021		Water	M21-Ma57157		X	
2	DUP01	Mar 30, 2021		Water	M21-Ma57158		X	
3	SPLIT01	Mar 30, 2021		Water	M21-Ma57159	X		
4	RB02	Mar 30, 2021		Water	M21-Ma57160		X	
5	TB01	Mar 30, 2021		Water	M21-Ma57161		X	
6	WSP7893	Mar 30, 2021		Water	M21-Ma57162			X
Test Counts						1	4	1

Internal Quality Control Review and Glossary

General

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

Holding Times

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

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

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

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

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

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

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

Results <10 times the LOR : No Limit

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

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

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Halogenated Volatile Organics							
1.1-Dichloroethene	mg/L	< 0.001			0.001	Pass	
cis-1.2-Dichloroethene	mg/L	< 0.001			0.001	Pass	
Tetrachloroethene	mg/L	< 0.001			0.001	Pass	
trans-1.2-Dichloroethene	mg/L	< 0.001			0.001	Pass	
Trichloroethene	mg/L	< 0.001			0.001	Pass	
Vinyl chloride	mg/L	< 0.001			0.001	Pass	
LCS - % Recovery							
Halogenated Volatile Organics							
1.1-Dichloroethene	%	125			70-130	Pass	
Trichloroethene	%	86			70-130	Pass	

Comments

Sample Integrity

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

Authorised by:

Emily Daos	Analytical Services Manager
Vivian Wang	Senior Analyst-Volatile (VIC)

Glenn Jackson
General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

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

CHAIN OF CUSTODY DOCUMENTATION

JBS&G (Australia) Pty Ltd

Adelaide
38 Dequetteville Tce KENT TOWN SA 5067
T: + 61 8 8431 7113 · F: + 61 8 8431 7115
ACN 100 220 479 · ABN 62 100 220 479

JBS&G

CLIENT: EPA	LABORATORY: Eurofins	LABORATORY BATCH NO.:	
SITE/PROJECT NAME: Melrose Park	COC Reference #: 60610_3_GW	SAMPLERS: AS	
SEND REPORT TO: JBS&G Australia Pty Ltd	SEND INVOICE TO: JBS&G Australia Pty Ltd	PHONE: 08 8431 7113 FAX: 08 8431 7115	
DATA NEEDED BY: 5 day t/a	REPORT NEEDED BY: 5 day t/a	REPORT FORMAT: HARD: NO FAX: NO E-MAIL: YES	
SITE/PROJECT NUMBER: 60610	**QUOTE #:**	JBS&G OFFICE TO SEND RESULTS: South Australia	
RELINQUISHED BY:		**RECEIVED BY**	METHOD OF SHIPMENT: Overnight
NAME : Ashley Smith	DATE: 30/3/21	NAME : **DATE:**	CONSIGNMENT NOTE NO.
OF: JBS&G (Australia) Pty Ltd	TIME: PM	OF: TIME:	
NAME:	DATE:	NAME : DATE:	TRANSPORT CO. NAME.
OF:	TIME:	OF: TIME:	

P.O. NO.:	COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:	ANALYSIS REQUIRED
FOR LAB USE ONLY COOLER SEAL Yes ..... No ..... Broken ..... Intact .... COOLER TEMP: deg.C	**Please forward results and Invoice to:** **labresults@jbsg.com.au, klough@jbsg.com.au**	***Container Type and Preservative Codes:** P = Neutral Plastic; N = Nitric Acid Preserved; C = Sodium Hydroxide Preserved; J = Solvent Washed Jar; S = Solvent Washed Glass Bottle; VC = HCL Preserved Vial; PC = HCL Preserved Plastic; PS = Sulfuric Acid Preserved Plastic; BS = Sulfuric Acid Preserved Glass Bottle; Z = Zinc Acetate Preserved Bottle; ST =Sodium Thiosuplhate Preserved Plastic, E = EDTA Preserved Bottles; ST = Sterile Bottle; O = Other.

SAMPLE DATA				CONTAINER DATA			Chlorinated Ethenes**	Trichloroethene	TRH													**'NOTES**
SAMPLE ID	MATRIX	DATE	TIME	TYPE & PRESERVATIVE	NO.	pH field																
GW3034b	Water	30/03/2021	PM	2x VC	2	7.1	X															
DUP01	Water	30/03/2021	PM	2x VC	2	7.1	X															****Chlorinated ethenes includes:**
SPLIT01	Water	30/03/2021	PM	2x VC	2	7.1	X															Tetrachloroethene
RB02	Water	30/03/2021	PM	2x VC	2	-	X															Trichloroethene
TB01	Water	30/03/2021	PM	2x VC	2	-	X															cis-1,2-dichloroethene
WSP7893	Water	30/03/2021	PM	2x VC	2	-		X	X													trans-1,2-dichloroethene
																						1,1-dichloroethene
																						Vinyl chloride
						TOTAL	5	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	

784255

Envirolab Services Pty Ltd
ABN 37 112 535 645 - 002
25 Research Drive Croydon South VIC 3136
ph 03 9763 2500 fax 03 9763 2633
melbourne@envirolab.com.au
www.envirolab.com.au

CERTIFICATE OF ANALYSIS 25139

Client Details

Client	JBS & G Australia Pty Ltd
Attention	Kate Lough
Address	Level 2, 155 Queen Street, Melbourne, VIC, 3000

Sample Details

Your Reference	**Melrose Park - 60610**
Number of Samples	1 Water
Date samples received	01/04/2021
Date completed instructions received	01/04/2021

Analysis Details

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

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

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

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

Report Details

Date results requested by	09/04/2021
Date of Issue	09/04/2021

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
Chris De Luca, Operations Manager

Authorised By

Pamela Adams, Laboratory Manager

VOCs in water		
Our Reference		25139-1
Your Reference	UNITS	SPLIT01
Date Sampled		30/03/2021
Type of sample		Water
Date extracted	-	07/04/2021
Date analysed	-	07/04/2021
Dichlorodifluoromethane	µg/L	<500
Chloromethane	µg/L	<500
Vinyl Chloride	µg/L	<500
Bromomethane	µg/L	<500
Chloroethane	µg/L	<500
Trichlorofluoromethane	µg/L	<500
1,1-Dichloroethene	µg/L	93
Trans-1,2-dichloroethene	µg/L	<50
1,1-dichloroethane	µg/L	<50
Cis-1,2-dichloroethene	µg/L	<50
Bromochloromethane	µg/L	<50
Chloroform	µg/L	<50
2,2-dichloropropane	µg/L	<50
1,2-dichloroethane	µg/L	<50
1,1,1-trichloroethane	µg/L	<50
1,1-dichloropropene	µg/L	<50
Cyclohexane	µg/L	<50
Carbon tetrachloride	µg/L	<50
Benzene	µg/L	<50
Dibromomethane	µg/L	<50
1,2-dichloropropane	µg/L	<50
Trichloroethene	µg/L	1,200
Bromodichloromethane	µg/L	<50
trans-1,3-dichloropropene	µg/L	<50
cis-1,3-dichloropropene	µg/L	<50
1,1,2-trichloroethane	µg/L	<50
Toluene	µg/L	<50
1,3-dichloropropane	µg/L	<50
Dibromochloromethane	µg/L	<50
1,2-dibromoethane	µg/L	<50
Tetrachloroethene	µg/L	<50
1,1,1,2-tetrachloroethane	µg/L	<50
Chlorobenzene	µg/L	<50
Ethylbenzene	µg/L	<50

VOCs in water		
Our Reference		25139-1
Your Reference	UNITS	SPLIT01
Date Sampled		30/03/2021
Type of sample		Water
Bromoform	µg/L	<50
m+p-xylene	µg/L	<100
Styrene	µg/L	<50
1,1,2,2-tetrachloroethane	µg/L	<50
o-xylene	µg/L	<50
1,2,3-trichloropropane	µg/L	<50
Isopropylbenzene	µg/L	<50
Bromobenzene	µg/L	<50
n-propyl benzene	µg/L	<50
2-chlorotoluene	µg/L	<50
4-chlorotoluene	µg/L	<50
1,3,5-trimethyl benzene	µg/L	<50
Tert-butyl benzene	µg/L	<50
1,2,4-trimethyl benzene	µg/L	<50
1,3-dichlorobenzene	µg/L	<50
Sec-butyl benzene	µg/L	<50
1,4-dichlorobenzene	µg/L	<50
4-isopropyl toluene	µg/L	<50
1,2-dichlorobenzene	µg/L	<50
n-butyl benzene	µg/L	<50
1,2-dibromo-3-chloropropane	µg/L	<50
1,2,4-trichlorobenzene	µg/L	<50
Hexachlorobutadiene	µg/L	<50
1,2,3-trichlorobenzene	µg/L	<50
Surrogate Dibromofluoromethane	%	98
Surrogate toluene-d8	%	95
Surrogate 4-BFB	%	101

Method ID	Methodology Summary
Org-023	Water samples are analysed directly by purge and trap GC-MS.

QUALITY CONTROL: VOCs in water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			07/04/2021	[NT]	[NT]	[NT]	[NT]	07/04/2021	[NT]
Date analysed	-			07/04/2021	[NT]	[NT]	[NT]	[NT]	07/04/2021	[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]	97	[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]	99	[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]	99	[NT]
1,1,1-trichloroethane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	97	[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]	100	[NT]
Bromodichloromethane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	97	[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]	97	[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]	100	[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-1	[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	99	[NT]	[NT]	[NT]	[NT]	101	[NT]
Surrogate toluene-d8	%		Org-023	99	[NT]	[NT]	[NT]	[NT]	101	[NT]
Surrogate 4-BFB	%		Org-023	99	[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.

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

VOC_W: PQL has been raised due to the high concentration of analytes in the sample/s, resulting in the sample/s requiring dilution.

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DATA QUALITY ASSESSMENT SUMMARY

Report Details

Envirolab Report Reference	**25139**
Client ID	JBS & G Australia Pty Ltd
Project Reference	Melrose Park - 60610
Date Issued	09/04/2021

QC DATA

All laboratory QC data was within the Envirolab Group's specifications.

HOLDING TIME COMPLIANCE EVALUATION

All preservation / holding times (based on AS/ASPHA/ISO/NEPM/USEPA reference documents and standards) are compliant.

Certain analyses have had their recommended technical holding times elongated by filtering and/or freezing on receipt at the laboratory (e.g. BOD, chlorophyll/Pheophytin, nutrients and acid sulphate soil tests).

COMPLIANCE TO QC FREQUENCY (NEPM)

Internal laboratory QC rate complies with NEPM requirements (LCS/MB/MS 1 in 20, Duplicates 1 in 10 samples). Note, samples are batched together with other sample consignments in order to assign QC sample frequency.

QC Evaluation

Duplicate(s) was performed as per NEPM frequency	✓
Laboratory Control Sample(s) were analysed with the samples received	✓
A Method Blank was performed with the samples received	✓
Matrix spike(s) was performed as per NEPM frequency (Not Applicable for Air samples)	✓

Refer to Certificate of Analysis for all Quality Control data.

CHAIN OF CUSTODY DOCUMENTATION

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JBS&G

CLIENT: EPA	LABORATORY: Eurofins	LABORATORY BATCH NO.:	
SITE/PROJECT NAME: Melrose Park	COC Reference #: 60610_3_GW	SAMPLERS: AS	
SEND REPORT TO: JBS&G Australia Pty Ltd	SEND INVOICE TO: JBS&G Australia Pty Ltd	PHONE: 08 8431 7113 FAX: 08 8431 7115	
DATA NEEDED BY: 5 day t/a	REPORT NEEDED BY: 5 day t/a	REPORT FORMAT: HARD: NO FAX: NO E-MAIL: YES	
SITE/PROJECT NUMBER: 60610	**QUOTE #:**	JBS&G OFFICE TO SEND RESULTS: South Australia	
RELINQUISHED BY:		**RECEIVED BY**	METHOD OF SHIPMENT: Overnight
NAME : Ashley Smith	DATE: 30/3/21	NAME : **DATE:**	CONSIGNMENT NOTE NO.
OF: JBS&G (Australia) Pty Ltd	TIME: PM	OF: TIME:	
NAME:	DATE:	NAME : DATE:	TRANSPORT CO. NAME.
OF:	TIME:	OF: TIME:	

P.O. NO.:	COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:	ANALYSIS REQUIRED
FOR LAB USE ONLY COOLER SEAL Yes ..... No ..... Broken ..... Intact .... COOLER TEMP: deg.C	**Please forward results and Invoice to:** **labresults@jbsg.com.au, klough@jbsg.com.au**	***Container Type and Preservative Codes:** P = Neutral Plastic; N = Nitric Acid Preserved; C = Sodium Hydroxide Preserved; J = Solvent Washed Jar; S = Solvent Washed Glass Bottle; VC = HCL Preserved Vial; PC = HCL Preserved Plastic; PS = Sulfuric Acid Preserved Plastic; BS = Sulfuric Acid Preserved Glass Bottle; Z = Zinc Acetate Preserved Bottle; ST =Sodium Thiosuplhate Preserved Plastic, E = EDTA Preserved Bottles; ST = Sterile Bottle; O = Other.

SAMPLE DATA				CONTAINER DATA			Chlorinated Ethenes**	Trichloroethene	TRH													**'NOTES**
SAMPLE ID	MATRIX	DATE	TIME	TYPE & PRESERVATIVE	NO.	pH field																
GW3034b	Water	30/03/2021	PM	2x VC	2	7.1	X															
DUP01	Water	30/03/2021	PM	2x VC	2	7.1	X															****Chlorinated ethenes includes:**
SPLIT01	Water	30/03/2021	PM	2x VC	2	7.1	X															Tetrachloroethene
RB02	Water	30/03/2021	PM	2x VC	2	-	X															Trichloroethene
TB01	Water	30/03/2021	PM	2x VC	2	-	X															cis-1,2-dichloroethene
WSP7893	Water	30/03/2021	PM	2x VC	2	-		X	X													trans-1,2-dichloroethene
																						1,1-dichloroethene
																						Vinyl chloride
						TOTAL	5	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	

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Appendix M Modelling Spreadsheets

Model Input **Site Name/Run Number:** Melrose Park, Residential (Slab on Grade)

Note:
-Yellow highlighted cells indicate parameters that typically are changed or must be inputted by the user.
-Dotted outline cells indicate default values that may be changed with justification.
-Toxicity values are taken from Regional Screening Level tables. These tables are updated semi-annually and may not reflect the most current toxicity information.

Use English / Metric Converter

Source Characteristics:	Units	Symbol	Value	Default	Potential Span	CV	Flag	Comment
Source medium		Source	Exterior Soil Gas					
Soil gas concentration	(ug/m3)	Cmedium	14000		NA			
Depth below grade to soil gas sample	(m)	Ls	1.00		Vary - 50	NA	WARNING	Ls should be >= Lb +1 m
Average vadose zone temperature	(°C)	Ts	25	25	3-30			
Calc: Source vapor concentration	(ug/m3)	Cs	14000					
Calc: % of pure component saturated vapor concentration	(%)	%Sat	0.003%					

Chemical:	Units	Symbol	Value	Default	Potential Span	CV	Flag	Comment
Chemical Name		Chem	Trichloroethylene					
CAS No.		CAS	79-01-6					
Toxicity Factors								
Unit risk factor	$(ug/m^3)^{-1}$	IUR	see note	see note	NA	NA		
Mutagenic compound		Mut	Yes	NA	NA	NA		
Reference concentration	(mg/m^3)	RfC	2.00E-03	2.00E-03	NA	NA		

Chemical Properties:	Units	Symbol	Value	Default	Potential Span	CV	Flag	Comment
Pure component water solubility	(mg/L)	S	1.28E+03	1.28E+03	NA	NA		
Henry's Law Constant @ 25°C	$(atm\text{-}m^3/mol)$	Hc	9.85E-03	9.85E-03	NA	NA		
Calc: Henry's Law Constant @ 25°C	(dimensionless)	Hr	4.03E-01	4.03E-01				
Calc: Henry's Law Constant @ system temperature	(dimensionless)	Hs	4.03E-01	4.03E-01				
Diffusivity in air	(cm2/s)	Dair	6.87E-02	6.87E-02	NA	NA		
Diffusivity in water	(cm2/s)	Dwater	1.02E-05	1.02E-05	NA	NA		

Building Characteristics:

Select Building Assumptions

○ Use ratio for Qsoil/Qbuilding (recommended if no site specific data available)

● Specify Qsoil and Qbuilding separately; calculate ratio

WARNING: DEFAULT RATIO FOR Qsoil/Qbuilding not used.
Please enter site specific data for Qs and Qb.

	Units	Symbol	Value	Default	Potential Span	CV	Flag	Comment
Building setting		Bldg_Setting	Residential	Residential				
Foundation type		Found_Type	Slab-on-grade	Slab-on-grade				
Depth below grade to base of foundation	(m)	Lb	0.10	0.10	0.1 - 2.44	NA		
Foundation thickness	(m)	Lf	0.10	0.10	0.1 - 0.25	NA		
Fraction of foundation area with cracks	(-)	eta	0.001	0.001	0.00019-0.0019	1.00		
Enclosed space floor area	(m2)	Abf	150.00	150.00	80 - 200	NA		
Enclosed space mixing height	(m)	Hb	2.40	2.44	2.13 - 3.05	NA	WARNING	Value is different from default value
Indoor air exchange rate	(1 / hr)	ach	0.60	0.45	.15-1.26	NA	WARNING	Value is different from default value
Qsoil/Qbuilding	(-)	Qsoil_Qb	0.0050	0.0030	0.0001 - 0.05	1.24	WARNING	Value is different from default value
Calc: Building ventilation rate	(m3/hr)	Qb	216.00	164.70	NA	0.30		
Calc: Average vapor flow rate into building	(m3/hr)	Qsoil	1.08	0.49	NA	NA		

Model Input **Site Name/Run Number:** Melrose Park, Residential (Slab on Grade)

Chemical Name: Trichloroethylene CAS No. 79-01-6

Depth below grade to soil gas sample: 1.00 meters

Vadose zone characteristics:	Units	Symbol	Value	Default	Potential Span	CV	Flag	Comment
Stratum A (Top of soil profile):								
Stratum A SCS soil type		SCS_A	Sandy Clay					
Stratum A thickness (from surface)	(m)	hSA	1.20					
Stratum A total porosity	(-)	nSA	0.370	0.385	NA	0.20	WARNING	Value is different from default value
Stratum A water-filled porosity	(-)	nwSA	0.340	0.197	0.117 - 0.28	0.25	WARNING	Value is different from default value
Stratum A bulk density	(g/cm^3)	rhoSA	2.010	1.630	NA	0.05	WARNING	Value is different from default value
Stratum B (Soil layer below Stratum A):								
Stratum B SCS soil type		SCS_B	Not Present					
Stratum B thickness	(m)	hSB	0.00					
Stratum B total porosity	(-)	nSB			NA	NA		
Stratum B water-filled porosity	(-)	nwSB			NA	NA		
Stratum B bulk density	(g/cm^3)	rhoSB			NA	NA		
Stratum C (Soil layer below Stratum B):								
Stratum C SCS soil type		SCS_C	Not Present					
Stratum C thickness	(m)	hSC	0.00					
Stratum C total porosity	(-)	nSC			NA	NA		
Stratum C water-filled porosity	(-)	nwSC			NA	NA		
Stratum C bulk density	(g/cm^3)	rhoSC			NA	NA		
Stratum containing soil gas sample								
Stratum A, B, or C		src_soil	Stratum A					

Model Output **Site Name/Run Number:** Melrose Park, Residential (Slab on Grade)

Chemical Name: Trichloroethylene **CAS No.** 79-01-6

Range is based on the reasonable range of Qsoil/Qbuilding values, as reported in the literature.

Source to Indoor Air Attenuation Factor	Units	Symbol	Value	Range	Default	Default Range	Flag
Soil gas to indoor air attenuation coefficient	(-)	alpha	2.7E-06	2.6E-06 - 2.7E-06	5.5E-04	8.7E-05 - 6.6E-04	WARNING
Predicted Indoor Air Concentration	**Units**	**Symbol**	**Value**	**Range**	**Default**	**Default Range**	**Flag**
Indoor air concentration due to vapor intrusion	(ug/m3)	Cia	3.8E-02	3.7E-02 - 3.8E-02	7.6E+00	1.2E+00 - 9.2E+00	WARNING
	(ppbv)		7.0E-03	6.8E-03 - 7.0E-03	1.4E+00	2.3E-01 - 1.7E+00	WARNING
Predicted Vapor Conc. Beneath Foundation	**Units**	**Symbol**	**Value**	**Range**	**Default**	**Default Range**	**Flag**
Subslab vapor concentration	(ug/m3)	Css	7.5E+00	7.5E-01 - 3.7E+02	2.5E+03	1.2E+04 - 9.2E+04	
	(ppbv)		1.4E+00	1.4E-01 - 6.8E+01	4.7E+02	2.3E+03 - 1.7E+04	
Diffusive Transport Upward Through Vadose Zone	**Units**	**Symbol**	**Value**	**Range**	**Default**	**Default Range**	**Flag**
Effective diffusion coefficient through Stratum A	(cm2/sec)	DeffA	9.3E-06	-	1.8E-03	-	
Effective diffusion coefficient through Stratum B	(cm2/sec)	DeffB		-		-	
Effective diffusion coefficient through Stratum C	(cm2/sec)	DeffC		-		-	
				-		-	
Effective diffusion coefficient through unsaturated zone	(cm2/sec)	Deff$_T$	9.3E-06	-	1.8E-03	-	
Critical Parameters		**Symbol**	**Value**	**Range**	**Default**	**Default Range**	**Flag**
α for diffusive transport from source to building with dirt floor foundation	(-)	A_Param	2.7E-06	-	6.7E-04		
Pe (Peclet Number) for transport through the foundation (advection / diffusion)	(-)	B_Param	2.1E+05	4.1E+03 - 2.1E+06	5.0E+02	1.7E+01 - 8.3E+03	
α for convective transport from subslab to building	(-)	C_Param	5.0E-03	1.0E-04 - 5.0E-02	3.0E-03	1.0E-04 - 5.0E-02	

Model Input **Site Name/Run Number:** Melrose Park, Residential (Slab on Grade)

Note:
-Yellow highlighted cells indicate parameters that typically are changed or must be inputted by the user.
-Dotted outline cells indicate default values that may be changed with justification.
-Toxicity values are taken from Regional Screening Level tables. These tables are updated semi-annually and may not reflect the most current toxicity information.

Use English / Metric Converter

Source Characteristics:	Units	Symbol	Value	Default	Potential Span	CV	Flag	Comment
Source medium		Source	Exterior Soil Gas					
Soil gas concentration	(ug/m3)	Cmedium	540		NA			
Depth below grade to soil gas sample	(m)	Ls	1.00		Vary - 50	NA	WARNING	Ls should be >= Lb +1 m
Average vadose zone temperature	(°C)	Ts	25	25	3-30			
Calc: Source vapor concentration	(ug/m3)	Cs	540					
Calc: % of pure component saturated vapor concentration	(%)	%Sat	0.000%					

Chemical:	Units	Symbol	Value	Default	Potential Span	CV	Flag	Comment
Chemical Name		Chem	Dichloroethylene, 1,1-					
CAS No.		CAS	75-35-4					
Toxicity Factors								
Unit risk factor	$(ug/m^3)^{-1}$	IUR	Not Available	Not Available	NA	NA		No IUR available for this compound.
Mutagenic compound		Mut	No	NA	NA	NA		
Reference concentration	(mg/m^3)	RfC	2.00E-01	2.00E-01	NA	NA		

Chemical Properties:	Units	Symbol	Value	Default	Potential Span	CV	Flag	Comment
Pure component water solubility	(mg/L)	S	2.42E+03	2.42E+03	NA	NA		
Henry's Law Constant @ 25°C	$(atm\text{-}m^3/mol)$	Hc	2.61E-02	2.61E-02	NA	NA		
Calc: Henry's Law Constant @ 25°C	(dimensionless)	Hr	1.07E+00	1.07E+00				
Calc: Henry's Law Constant @ system temperature	(dimensionless)	Hs	1.07E+00	1.07E+00				
Diffusivity in air	(cm2/s)	Dair	8.63E-02	8.63E-02	NA	NA		
Diffusivity in water	(cm2/s)	Dwater	1.10E-05	1.10E-05	NA	NA		

Building Characteristics:

Select Building Assumptions

○ Use ratio for Qsoil/Qbuilding (recommended if no site specific data available)

● Specify Qsoil and Qbuilding separately; calculate ratio

WARNING: DEFAULT RATIO FOR Qsoil/Qbuilding not used.
Please enter site specific data for Qs and Qb.

	Units	Symbol	Value	Default	Potential Span	CV	Flag	Comment
Building setting		Bldg_Setting	Residential	Residential				
Foundation type		Found_Type	Slab-on-grade	Slab-on-grade				
Depth below grade to base of foundation	(m)	Lb	0.10	0.10	0.1 - 2.44	NA		
Foundation thickness	(m)	Lf	0.10	0.10	0.1 - 0.25	NA		
Fraction of foundation area with cracks	(-)	eta	0.001	0.001	0.00019-0.0019	1.00		
Enclosed space floor area	(m2)	Abf	150.00	150.00	80 - 200	NA		
Enclosed space mixing height	(m)	Hb	2.40	2.44	2.13 - 3.05	NA	WARNING	Value is different from default value
Indoor air exchange rate	(1 / hr)	ach	0.60	0.45	.15-1.26	NA	WARNING	Value is different from default value
Qsoil/Qbuilding	(-)	Qsoil_Qb	0.0050	0.0030	0.0001 - 0.05	1.24	WARNING	Value is different from default value
Calc: Building ventilation rate	(m3/hr)	Qb	216.00	164.70	NA	0.30		
Calc: Average vapor flow rate into building	(m3/hr)	Qsoil	1.08	0.49	NA	NA		

Model Input **Site Name/Run Number:** Melrose Park, Residential (Slab on Grade)

Chemical Name: Dichloroethylene, 1,1- CAS No. 75-35-4

Depth below grade to soil gas sample: 1.00 meters

Vadose zone characteristics:	Units	Symbol	Value	Default	Potential Span	CV	Flag	Comment
Stratum A (Top of soil profile):								
Stratum A SCS soil type		SCS_A	Sandy Clay					
Stratum A thickness (from surface)	(m)	hSA	1.20					
Stratum A total porosity	(-)	nSA	0.370	0.385	NA	0.20	WARNING	Value is different from default value
Stratum A water-filled porosity	(-)	nwSA	0.340	0.197	0.117 - 0.28	0.25	WARNING	Value is different from default value
Stratum A bulk density	(g/cm^3)	rhoSA	2.010	1.630	NA	0.05	WARNING	Value is different from default value
Stratum B (Soil layer below Stratum A):								
Stratum B SCS soil type		SCS_B	Not Present					
Stratum B thickness	(m)	hSB	0.00					
Stratum B total porosity	(-)	nSB			NA	NA		
Stratum B water-filled porosity	(-)	nwSB			NA	NA		
Stratum B bulk density	(g/cm^3)	rhoSB			NA	NA		
Stratum C (Soil layer below Stratum B):								
Stratum C SCS soil type		SCS_C	Not Present					
Stratum C thickness	(m)	hSC	0.00					
Stratum C total porosity	(-)	nSC			NA	NA		
Stratum C water-filled porosity	(-)	nwSC			NA	NA		
Stratum C bulk density	(g/cm^3)	rhoSC			NA	NA		
Stratum containing soil gas sample								
Stratum A, B, or C		src_soil	Stratum A					

Model Output **Site Name/Run Number:** Melrose Park, Residential (Slab on Grade)

Chemical Name: Dichloroethylene, 1,1- **CAS No. 75-35-4**

Range is based on the reasonable range of Qsoil/Qbuilding values, as reported in the literature.

Source to Indoor Air Attenuation Factor	Units	Symbol	Value	Range	Default	Default Range	Flag
Soil gas to indoor air attenuation coefficient	**(-)**	**alpha**	**2.1E-06**	2.1E-06 - 2.1E-06	**6.6E-04**	8.9E-05 - 8.2E-04	WARNING
Predicted Indoor Air Concentration	**Units**	**Symbol**	**Value**	**Range**	**Default**	**Default Range**	**Flag**
Indoor air concentration due to vapor intrusion	(ug/m3)	**Cia**	**1.1E-03**	1.1E-03 - 1.1E-03	**3.5E-01**	4.8E-02 - 4.5E-01	WARNING
	(ppbv)		**2.9E-04**	2.8E-04 - 2.9E-04	**8.9E-02**	1.2E-02 - 1.1E-01	WARNING
Predicted Vapor Conc. Beneath Foundation	**Units**	**Symbol**	**Value**	**Range**	**Default**	**Default Range**	**Flag**
Subslab vapor concentration	(ug/m3)	**Css**	**2.3E-01**	2.3E-02 - 1.1E+01	**1.2E+02**	4.8E+02 - 4.5E+03	
	(ppbv)		**5.8E-02**	5.8E-03 - 2.8E+00	**3.0E+01**	1.2E+02 - 1.1E+03	
Diffusive Transport Upward Through Vadose Zone	**Units**	**Symbol**	**Value**	**Range**	**Default**	**Default Range**	**Flag**
Effective diffusion coefficient through Stratum A	(cm2/sec)	DeffA	7.4E-06	-	2.2E-03	-	
Effective diffusion coefficient through Stratum B	(cm2/sec)	DeffB		-		-	
Effective diffusion coefficient through Stratum C	(cm2/sec)	DeffC		-		-	
				-		-	
Effective diffusion coefficient through unsaturated zone	(cm2/sec)	Deff$_T$	7.4E-06	-	2.2E-03	-	
Critical Parameters		**Symbol**	**Value**	**Range**	**Default**	**Default Range**	**Flag**
α for diffusive transport from source to building with dirt floor foundation	(-)	A_Param	2.1E-06	-	8.4E-04		
Pe (Peclet Number) for transport through the foundation (advection / diffusion)	(-)	B_Param	2.6E+05	5.2E+03 - 2.6E+06	4.0E+02	1.3E+01 - 6.6E+03	
α for convective transport from subslab to building	(-)	C_Param	5.0E-03	1.0E-04 - 5.0E-02	3.0E-03	1.0E-04 - 5.0E-02	

Model Input **Site Name/Run Number:** Melrose Park, Commerical

Note:
-Yellow highlighted cells indicate parameters that typically are changed or must be inputted by the user.
-Dotted outline cells indicate default values that may be changed with justification.
-Toxicity values are taken from Regional Screening Level tables. These tables are updated semi-annually and may not reflect the most current toxicity information.

Use English / Metric Converter

Source Characteristics:	Units	Symbol	Value	Default	Potential Span	CV	Flag	Comment
Source medium		Source	Exterior Soil Gas					
Soil gas concentration	(ug/m3)	Cmedium	14000		NA			
Depth below grade to soil gas sample	(m)	Ls	1.00		Vary - 50	NA	WARNING	Ls should be >= Lb +1 m
Average vadose zone temperature	(^{o}C)	Ts	25	25	3-30			
Calc: Source vapor concentration	(ug/m3)	Cs	14000					
Calc: % of pure component saturated vapor concentration	(%)	%Sat	0.003%					

Chemical:	Units	Symbol	Value	Default	Potential Span	CV	Flag	Comment
Chemical Name		Chem	Trichloroethylene					
CAS No.		CAS	79-01-6					
Toxicity Factors								
Unit risk factor	$(ug/m^3)^{-1}$	IUR	see note	see note	NA	NA		
Mutagenic compound		Mut	Yes	NA	NA	NA		
Reference concentration	(mg/m^3)	RfC	2.00E-03	2.00E-03	NA	NA		

Chemical Properties:	Units	Symbol	Value	Default	Potential Span	CV	Flag	Comment
Pure component water solubility	(mg/L)	S	1.28E+03	1.28E+03	NA	NA		
Henry's Law Constant @ 25^{o}C	(atm-m^3/mol)	Hc	9.85E-03	9.85E-03	NA	NA		
Calc: Henry's Law Constant @ 25^{o}C	(dimensionless)	Hr	4.03E-01	4.03E-01				
Calc: Henry's Law Constant @ system temperature	(dimensionless)	Hs	4.03E-01	4.03E-01				
Diffusivity in air	(cm2/s)	Dair	6.87E-02	6.87E-02	NA	NA		
Diffusivity in water	(cm2/s)	Dwater	1.02E-05	1.02E-05	NA	NA		

Building Characteristics:

Select Building Assumptions

○ Use ratio for Qsoil/Qbuilding (recommended if no site specific data available)

● Specify Qsoil and Qbuilding separately; calculate ratio

WARNING: DEFAULT RATIO FOR Qsoil/Qbuilding not used.
Please enter site specific data for Qs and Qb.

	Units	Symbol	Value	Default	Potential Span	CV	Flag	Comment
Building setting		Bldg_Setting	Commercial	Commercial				
Foundation type		Found_Type	Slab-on-grade	Slab-on-grade				
Depth below grade to base of foundation	(m)	Lb	0.15	0.20	0.1 - 2.44	NA	WARNING	Value is different from default value
Foundation thickness	(m)	Lf	0.15	0.20	0.1 - 0.25	NA	WARNING	Value is different from default value
Fraction of foundation area with cracks	(-)	eta	0.001	0.001	0.00019-0.0019	1.00		
Enclosed space floor area	(m2)	Abf	400.00	1500.00	80-1000	NA	WARNING	Value is different from default value
Enclosed space mixing height	(m)	Hb	3.00	3.00	2.13 - 3.05	NA		
Indoor air exchange rate	(1 / hr)	ach	0.83	1.50	.3-4.1	NA	WARNING	Value is different from default value
Qsoil/Qbuilding	(-)	Qsoil_Qb	0.0050	0.0030	0.0001 - 0.05	1.24	WARNING	Value is different from default value
Calc: Building ventilation rate	(m3/hr)	Qb	996.00	6750.00	NA	0.30		
Calc: Average vapor flow rate into building	(m3/hr)	Qsoil	4.98	20.25	NA	NA		

Model Input **Site Name/Run Number:** Melrose Park, Commercial

Chemical Name: Trichloroethylene CAS No. 79-01-6

Depth below grade to soil gas sample: 1.00 meters

Vadose zone characteristics:	Units	Symbol	Value	Default	Potential Span	CV	Flag	Comment
Stratum A (Top of soil profile):								
Stratum A SCS soil type		SCS_A	Sandy Clay					
Stratum A thickness (from surface)	(m)	hSA	1.20					
Stratum A total porosity	(-)	nSA	0.370	0.385	NA	0.20	WARNING	Value is different from default value
Stratum A water-filled porosity	(-)	nwSA	0.340	0.197	0.117 - 0.28	0.25	WARNING	Value is different from default value
Stratum A bulk density	(g/cm^3)	rhoSA	2.010	1.630	NA	0.05	WARNING	Value is different from default value
Stratum B (Soil layer below Stratum A):								
Stratum B SCS soil type		SCS_B	Not Present					
Stratum B thickness	(m)	hSB	0.00					
Stratum B total porosity	(-)	nSB			NA	NA		
Stratum B water-filled porosity	(-)	nwSB			NA	NA		
Stratum B bulk density	(g/cm^3)	rhoSB			NA	NA		
Stratum C (Soil layer below Stratum B):								
Stratum C SCS soil type		SCS_C	Not Present					
Stratum C thickness	(m)	hSC	0.00					
Stratum C total porosity	(-)	nSC			NA	NA		
Stratum C water-filled porosity	(-)	nwSC			NA	NA		
Stratum C bulk density	(g/cm^3)	rhoSC			NA	NA		
Stratum containing soil gas sample								
Stratum A, B, or C		src_soil	Stratum A					

Model Output **Site Name/Run Number:** Melrose Park, Commerical

Chemical Name: Trichloroethylene **CAS No.** 79-01-6

Range is based on the reasonable range of Qsoil/Qbuilding values, as reported in the literature.

Source to Indoor Air Attenuation Factor	Units	Symbol	Value	Range	Default	Default Range	Flag
Soil gas to indoor air attenuation coefficient	**(-)**	**alpha**	**1.6E-06**	1.6E-06 - 1.6E-06	**1.7E-04**	6.4E-05 - 1.8E-04	WARNING
Predicted Indoor Air Concentration	**Units**	**Symbol**	**Value**	**Range**	**Default**	**Default Range**	**Flag**
Indoor air concentration due to vapor intrusion	(ug/m3)	**Cia**	**2.3E-02**	2.3E-02 - 2.3E-02	**2.4E+00**	9.0E-01 - 2.5E+00	WARNING
	(ppbv)		**4.3E-03**	4.2E-03 - 4.3E-03	**4.5E-01**	1.7E-01 - 4.7E-01	WARNING
Predicted Vapor Conc. Beneath Foundation	**Units**	**Symbol**	**Value**	**Range**	**Default**	**Default Range**	**Flag**
Subslab vapor concentration	(ug/m3)	**Css**	**4.6E+00**	4.6E-01 - 2.3E+02	**8.0E+02**	9.0E+03 - 2.5E+04	
	(ppbv)		**8.5E-01**	8.5E-02 - 4.2E+01	**1.5E+02**	1.7E+03 - 4.7E+03	
Diffusive Transport Upward Through Vadose Zone	**Units**	**Symbol**	**Value**	**Range**	**Default**	**Default Range**	**Flag**
Effective diffusion coefficient through Stratum A	(cm2/sec)	DeffA	9.3E-06	-	1.8E-03	-	
Effective diffusion coefficient through Stratum B	(cm2/sec)	DeffB		-		-	
Effective diffusion coefficient through Stratum C	(cm2/sec)	DeffC		-		-	
				-		-	
Effective diffusion coefficient through unsaturated zone	(cm2/sec)	Deff$_T$	9.3E-06	-	1.8E-03	-	
Critical Parameters		**Symbol**	**Value**	**Range**	**Default**	**Default Range**	**Flag**
α for diffusive transport from source to building with dirt floor foundation	(-)	A_Param	1.6E-06	-	1.8E-04		
Pe (Peclet Number) for transport through the foundation (advection / diffusion)	(-)	B_Param	5.4E+05	1.1E+04 - 5.4E+06	4.1E+03	1.4E+02 - 6.9E+04	
α for convective transport from subslab to building	(-)	C_Param	5.0E-03	1.0E-04 - 5.0E-02	3.0E-03	1.0E-04 - 5.0E-02	

Model Input **Site Name/Run Number:** Melrose Park, Trench

Note:
-Yellow highlighted cells indicate parameters that typically are changed or must be inputted by the user.
-Dotted outline cells indicate default values that may be changed with justification.
-Toxicity values are taken from Regional Screening Level tables. These tables are updated semi-annually and may not reflect the most current toxicity information.

Use English / Metric Converter

Source Characteristics:	Units	Symbol	Value	Default	Potential Span	CV	Flag	Comment
Source medium		Source	Exterior Soil Gas					
Soil gas concentration	(ug/m3)	Cmedium	14000		NA			
Depth below grade to soil gas sample	(m)	Ls	0.10		Vary - 50	NA	WARNING	Ls should be >= Lb +1 m
Average vadose zone temperature	(°C)	Ts	25	25	3-30			
Calc: Source vapor concentration	(ug/m3)	Cs	14000					
Calc: % of pure component saturated vapor concentration	(%)	%Sat	0.003%					

Chemical:	Units	Symbol	Value	Default	Potential Span	CV	Flag	Comment
Chemical Name		Chem	Trichloroethylene					
CAS No.		CAS	79-01-6					
Toxicity Factors								
Unit risk factor	$(ug/m^3)^{-1}$	IUR	see note	see note	NA	NA		
Mutagenic compound		Mut	Yes	NA	NA	NA		
Reference concentration	(mg/m^3)	RfC	2.00E-03	2.00E-03	NA	NA		

Chemical Properties:	Units	Symbol	Value	Default	Potential Span	CV	Flag	Comment
Pure component water solubility	(mg/L)	S	1.28E+03	1.28E+03	NA	NA		
Henry's Law Constant @ 25°C	$(atm\text{-}m^3/mol)$	Hc	9.85E-03	9.85E-03	NA	NA		
Calc: Henry's Law Constant @ 25°C	(dimensionless)	Hr	4.03E-01	4.03E-01				
Calc: Henry's Law Constant @ system temperature	(dimensionless)	Hs	4.03E-01	4.03E-01				
Diffusivity in air	(cm2/s)	Dair	6.87E-02	6.87E-02	NA	NA		
Diffusivity in water	(cm2/s)	Dwater	1.02E-05	1.02E-05	NA	NA		

Building Characteristics:

Select Building Assumptions

○ Use ratio for Qsoil/Qbuilding (recommended if no site specific data available)

● Specify Qsoil and Qbuilding separately; calculate ratio

WARNING: DEFAULT RATIO FOR Qsoil/Qbuilding not used.
Please enter site specific data for Qs and Qb.

	Units	Symbol	Value	Default	Potential Span	CV	Flag	Comment
Building setting		Bldg_Setting	Residential	Residential				
Foundation type		Found_Type	Basement w/ dirt floor	Basement w/ dirt floor				
Depth below grade to base of foundation	(m)	Lb	0.00	2.00	0.1 - 2.44	NA	WARNING	Value is different from default value
Foundation thickness	(m)	Lf	0.00	0.00	NA	NA		Value is different from default value
Fraction of foundation area with cracks	(-)	eta	1.000	1.000	NA	1.00		
Enclosed space floor area	(m2)	Abf	10.00	150.00	80 - 200	NA	WARNING	Value is different from default value
Enclosed space mixing height	(m)	Hb	1.00	3.66	2.44 - 4.88	NA	WARNING	
Indoor air exchange rate	(1 / hr)	ach	87.50	0.45	.15-1.26	NA	WARNING	Value is different from default value
Qsoil/Qbuilding	(-)	Qsoil_Qb	0.0000	0.0030	0.0001 - 0.05	1.24		Value is different from default value
Calc: Building ventilation rate	(m3/hr)	Qb	875.00	247.05	NA	0.30		
Calc: Average vapor flow rate into building	(m3/hr)	Qsoil	N/A	NA	NA	NA		

Model Input

Site Name/Run Number: Melrose Park, Trench

Chemical Name: Trichloroethylene CAS No. 79-01-6

Depth below grade to soil gas sample: 0.10 meters

Vadose zone characteristics:	Units	Symbol	Value	Default	Potential Span	CV	Flag	Comment
Stratum A (Top of soil profile):								
Stratum A SCS soil type		SCS_A	Sandy Clay					
Stratum A thickness (from surface)	(m)	hSA	1.20					
Stratum A total porosity	(-)	nSA	0.370	0.385	NA	0.20	WARNING	Value is different from default value
Stratum A water-filled porosity	(-)	nwSA	0.340	0.197	0.117 - 0.28	0.25	WARNING	Value is different from default value
Stratum A bulk density	(g/cm^3)	rhoSA	2.010	1.630	NA	0.05	WARNING	Value is different from default value
Stratum B (Soil layer below Stratum A):								
Stratum B SCS soil type		SCS_B	Not Present					
Stratum B thickness	(m)	hSB	0.00					
Stratum B total porosity	(-)	nSB			NA	NA		
Stratum B water-filled porosity	(-)	nwSB			NA	NA		
Stratum B bulk density	(g/cm^3)	rhoSB			NA	NA		
Stratum C (Soil layer below Stratum B):								
Stratum C SCS soil type		SCS_C	Not Present					
Stratum C thickness	(m)	hSC	0.00					
Stratum C total porosity	(-)	nSC			NA	NA		
Stratum C water-filled porosity	(-)	nwSC			NA	NA		
Stratum C bulk density	(g/cm^3)	rhoSC			NA	NA		
Stratum containing soil gas sample								
Stratum A, B, or C		src_soil	Stratum A					

Model Output **Site Name/Run Number:** Melrose Park, Trench

Chemical Name: Trichloroethylene **CAS No.** 79-01-6

Range is based on the reasonable range of Qsoil/Qbuilding values, as reported in the literature.

Source to Indoor Air Attenuation Factor	Units	Symbol	Value	Range	Default	Default Range	Flag
Soil gas to indoor air attenuation coefficient	**(-)**	**alpha**	**3.8E-07**	3.8E-07 - 3.8E-07	**-3.4E-04**	-3.4E-04 - -3.4E-04	WARNING
Predicted Indoor Air Concentration	**Units**	**Symbol**	**Value**	**Range**	**Default**	**Default Range**	**Flag**
Indoor air concentration due to vapor intrusion	(ug/m3)	**Cia**	**5.4E-03**	5.4E-03 - 5.4E-03	**-4.7E+00**	-4.7E+00 - -4.7E+00	WARNING
	(ppbv)		**1.0E-03**	1.0E-03 - 1.0E-03	**-8.8E-01**	-8.8E-01 - -8.8E-01	WARNING
Predicted Vapor Conc. Beneath Foundation	**Units**	**Symbol**	**Value**	**Range**	**Default**	**Default Range**	**Flag**
Subslab vapor concentration	(ug/m3)	**Css**	**NA**	NA - NA	**NA**	NA - NA	
	(ppbv)		**NA**	NA - NA	**NA**	NA - NA	
Diffusive Transport Upward Through Vadose Zone	**Units**	**Symbol**	**Value**	**Range**	**Default**	**Default Range**	**Flag**
Effective diffusion coefficient through Stratum A	(cm2/sec)	DeffA	9.3E-06	-	1.8E-03	-	
Effective diffusion coefficient through Stratum B	(cm2/sec)	DeffB		-		-	
Effective diffusion coefficient through Stratum C	(cm2/sec)	DeffC		-		-	
				-		-	
Effective diffusion coefficient through unsaturated zone	(cm2/sec)	DeffT	9.3E-06	-	1.8E-03	-	
Critical Parameters		**Symbol**	**Value**	**Range**	**Default**	**Default Range**	**Flag**
α for diffusive transport from source to building with dirt floor foundation	(-)	A_Param	3.8E-07	-	-3.4E-04		
Pe (Peclet Number) for transport through the foundation (advection / diffusion)	(-)	B_Param	0.0E+00	0.0E+00 - 0.0E+00	0.0E+00	0.0E+00 - 0.0E+00	
α for convective transport from subslab to building	(-)	C_Param	0.0E+00	0.0E+00 - 5.0E-02	3.0E-03	0.0E+00 - 5.0E-02	

Model Input **Site Name/Run Number:** Melrose Park, Trench

Note:
-Yellow highlighted cells indicate parameters that typically are changed or must be inputted by the user.
-Dotted outline cells indicate default values that may be changed with justification.
-Toxicity values are taken from Regional Screening Level tables. These tables are updated semi-annually and may not reflect the most current toxicity information.

Use English / Metric Converter

Source Characteristics:	Units	Symbol	Value	Default	Potential Span	CV	Flag	Comment
Source medium		Source	Exterior Soil Gas					
Soil gas concentration	(ug/m3)	Cmedium	540		NA			
Depth below grade to soil gas sample	(m)	Ls	0.10		Vary - 50	NA	WARNING	Ls should be >= Lb +1 m
Average vadose zone temperature	(°C)	Ts	25	25	3-30			
Calc: Source vapor concentration	(ug/m3)	Cs	540					
Calc: % of pure component saturated vapor concentration	(%)	%Sat	0.000%					

Chemical:	Units	Symbol	Value	Default	Potential Span	CV	Flag	Comment
Chemical Name		Chem	Dichloroethylene, 1,1-					
CAS No.		CAS	75-35-4					
Toxicity Factors								
Unit risk factor	$(ug/m^3)^{-1}$	IUR	Not Available	Not Available	NA	NA		No IUR available for this compound.
Mutagenic compound		Mut	No	NA	NA	NA		
Reference concentration	(mg/m^3)	RfC	2.00E-01	2.00E-01	NA	NA		

Chemical Properties:	Units	Symbol	Value	Default	Potential Span	CV	Flag	Comment
Pure component water solubility	(mg/L)	S	2.42E+03	2.42E+03	NA	NA		
Henry's Law Constant @ 25°C	$(atm\text{-}m^3/mol)$	Hc	2.61E-02	2.61E-02	NA	NA		
Calc: Henry's Law Constant @ 25°C	(dimensionless)	Hr	1.07E+00	1.07E+00				
Calc: Henry's Law Constant @ system temperature	(dimensionless)	Hs	1.07E+00	1.07E+00				
Diffusivity in air	(cm2/s)	Dair	8.63E-02	8.63E-02	NA	NA		
Diffusivity in water	(cm2/s)	Dwater	1.10E-05	1.10E-05	NA	NA		

Building Characteristics:

Select Building Assumptions

- ○ Use ratio for Qsoil/Qbuilding (recommended if no site specific data available)
- ● Specify Qsoil and Qbuilding separately; calculate ratio

WARNING: DEFAULT RATIO FOR Qsoil/Qbuilding not used.
Please enter site specific data for Qs and Qb.

	Units	Symbol	Value	Default	Potential Span	CV	Flag	Comment
Building setting		Bldg_Setting	Residential	Residential				
Foundation type		Found_Type	Basement w/ dirt floor	Basement w/ dirt floor				
Depth below grade to base of foundation	(m)	Lb	0.00	2.00	0.1 - 2.44	NA	WARNING	Value is different from default value
Foundation thickness	(m)	Lf	0.00	0.00	NA	NA		Value is different from default value
Fraction of foundation area with cracks	(-)	eta	1.000	1.000	NA	1.00		
Enclosed space floor area	(m2)	Abf	10.00	150.00	80 - 200	NA	WARNING	Value is different from default value
Enclosed space mixing height	(m)	Hb	1.00	3.66	2.44 - 4.88	NA	WARNING	
Indoor air exchange rate	(1 / hr)	ach	87.50	0.45	.15-1.26	NA	WARNING	Value is different from default value
Qsoil/Qbuilding	(-)	Qsoil_Qb	0.0000	0.0030	0.0001 - 0.05	1.24		Value is different from default value
Calc: Building ventilation rate	(m3/hr)	Qb	875.00	247.05	NA	0.30		
Calc: Average vapor flow rate into building	(m3/hr)	Qsoil	N/A	NA	NA	NA		

Model Input **Site Name/Run Number:** Melrose Park, Trench

Chemical Name: Dichloroethylene, 1,1- CAS No. 75-35-4

Depth below grade to soil gas sample: 0.10 meters

Vadose zone characteristics:	Units	Symbol	Value	Default	Potential Span	CV	Flag	Comment
Stratum A (Top of soil profile):								
Stratum A SCS soil type		SCS_A	Sandy Clay					
Stratum A thickness (from surface)	(m)	hSA	1.20					
Stratum A total porosity	(-)	nSA	0.370	0.385	NA	0.20	WARNING	Value is different from default value
Stratum A water-filled porosity	(-)	nwSA	0.340	0.197	0.117 - 0.28	0.25	WARNING	Value is different from default value
Stratum A bulk density	(g/cm^3)	rhoSA	2.010	1.630	NA	0.05	WARNING	Value is different from default value
Stratum B (Soil layer below Stratum A):								
Stratum B SCS soil type		SCS_B	Not Present					
Stratum B thickness	(m)	hSB	0.00					
Stratum B total porosity	(-)	nSB			NA	NA		
Stratum B water-filled porosity	(-)	nwSB			NA	NA		
Stratum B bulk density	(g/cm^3)	rhoSB			NA	NA		
Stratum C (Soil layer below Stratum B):								
Stratum C SCS soil type		SCS_C	Not Present					
Stratum C thickness	(m)	hSC	0.00					
Stratum C total porosity	(-)	nSC			NA	NA		
Stratum C water-filled porosity	(-)	nwSC			NA	NA		
Stratum C bulk density	(g/cm^3)	rhoSC			NA	NA		
Stratum containing soil gas sample								
Stratum A, B, or C		src_soil	Stratum A					

Model Output **Site Name/Run Number:** Melrose Park, Trench

Chemical Name: Dichloroethylene, 1,1- **CAS No. 75-35-4**

Range is based on the reasonable range of Qsoil/Qbuilding values, as reported in the literature.

Source to Indoor Air Attenuation Factor	Units	Symbol	Value	Range	Default	Default Range	Flag
Soil gas to indoor air attenuation coefficient	**(-)**	**alpha**	**3.1E-07**	3.1E-07 - 3.1E-07	**-4.2E-04**	-4.2E-04 - -4.2E-04	WARNING
Predicted Indoor Air Concentration	**Units**	**Symbol**	**Value**	**Range**	**Default**	**Default Range**	**Flag**
Indoor air concentration due to vapor intrusion	(ug/m3)	**Cia**	**1.6E-04**	1.6E-04 - 1.6E-04	**-2.3E-01**	-2.3E-01 - -2.3E-01	WARNING
	(ppbv)		**4.2E-05**	4.2E-05 - 4.2E-05	**-5.8E-02**	-5.8E-02 - -5.8E-02	WARNING
Predicted Vapor Conc. Beneath Foundation	**Units**	**Symbol**	**Value**	**Range**	**Default**	**Default Range**	**Flag**
Subslab vapor concentration	(ug/m3)	**Css**	**NA**	NA - NA	**NA**	NA - NA	
	(ppbv)		**NA**	NA - NA	**NA**	NA - NA	
Diffusive Transport Upward Through Vadose Zone	**Units**	**Symbol**	**Value**	**Range**	**Default**	**Default Range**	**Flag**
Effective diffusion coefficient through Stratum A	(cm2/sec)	DeffA	7.4E-06	-	2.2E-03	-	
Effective diffusion coefficient through Stratum B	(cm2/sec)	DeffB		-		-	
Effective diffusion coefficient through Stratum C	(cm2/sec)	DeffC		-		-	
				-		-	
Effective diffusion coefficient through unsaturated zone	(cm2/sec)	Deff$_T$	7.4E-06	-	2.2E-03	-	
Critical Parameters		**Symbol**	**Value**	**Range**	**Default**	**Default Range**	**Flag**
α for diffusive transport from source to building with dirt floor foundation	(-)	A_Param	3.1E-07	-	-4.2E-04		
Pe (Peclet Number) for transport through the foundation (advection / diffusion)	(-)	B_Param	0.0E+00	0.0E+00 - 0.0E+00	0.0E+00	0.0E+00 - 0.0E+00	
α for convective transport from subslab to building	(-)	C_Param	0.0E+00	0.0E+00 - 5.0E-02	3.0E-03	0.0E+00 - 5.0E-02	

Appendix N ILCR and HI Calculation Spreadsheets

INCREASED LIFETIME CANCER RISK AND HAZARD INDEX CALCULATION
RESIDENTIAL DWELLING

Calculation of Hazard Index (non-carcinogenic endpoints)

Constituent (mg/m3)	Risk/HI	Inhalation Tox (mg/m^3)	RAGS F	Background Inhalation Concentration Percentage of RfC (%)	Background Inhalation Concentration (mg/m3)	Residential Dwelling	
						Modelled Indoor Air Concentration (mg/m3)	INHALATION HI
Trichloroethene	HI	2.0E-03	8.3E-01	10%	2.0E-04	3.8E-05	1.8E-02
1,1-dichloroethene	HI	2.0E-01	8.3E-01	N/A	N/A	1.1E-06	4.6E-06

Calculation of Increased Lifetime Cancer Risk (carcinogenic endpoints)

Constituent (mg/m3)	Risk/HI	Unit Risk $(mg/m^3)^{-1}$	RAGS F	Residential Dwelling	
				Modelled Indoor Air Concentration (mg/m3)	INHALATION RISK
Trichloroethene	Risk	4.0E-03	4.2E-01	3.8E-05	6.4E-08

INCREASED LIFETIME CANCER RISK AND HAZARD INDEX CALCULATION
COMMERCIAL BUILDING

Calculation of Hazard Index (non-carcinogenic endpoints)

Constituent (mg/m3)	Risk/HI	Inhalation Tox (mg/m^3)	RAGS F	Background Inhalation Concentration Percentage of RfC (%)	Background Inhalation Concentration (mg/m3)	Commercial Building	
						Modelled Indoor Air Concentration (mg/m3)	INHALATION HI
Trichloroethene	HI	2.0E-03	2.2E-01	10%	2.0E-04	2.3E-05	2.8E-03

Calculation of Increased Lifetime Cancer Risk (carcinogenic endpoints)

Constituent (mg/m3)	Risk/HI	Unit Risk $(mg/m^3)^{-1}$	RAGS F	Commercial Building	
				Modelled Indoor Air Concentration (mg/m3)	INHALATION RISK
Trichloroethene	Risk	4.0E-03	9.4E-02	2.3E-05	8.6E-09

INCREASED LIFETIME CANCER RISK AND HAZARD INDEX CALCULATION
SUBSURFACE TRENCH

Calculation of Hazard Index (non-carcinogenic endpoints)

Constituent (mg/m3)	Risk/HI	Inhalation Tox (mg/m^3)	RAGS F	Background Inhalation Concentration Percentage of RfC (%)	Background Inhalation Concentration (mg/m3)	Subsurface Trench	
						Modelled Indoor Air Concentration (mg/m3)	INHALATION HI
Trichloroethene	HI	2.0E-03	1.8E-02	10%	2.0E-04	5.4E-06	5.4E-05
1,1-dichloroethene	HI	2.0E-01	1.8E-02	N/A	N/A	1.6E-07	1.4E-08

Calculation of Increased Lifetime Cancer Risk (carcinogenic endpoints)

Constituent (mg/m3)	Risk/HI	Unit Risk $(mg/m^3)^{-1}$	RAGS F	Subsurface Trench	
				Modelled Indoor Air Concentration (mg/m3)	INHALATION RISK
Trichloroethene	Risk	4.0E-03	7.8E-03	5.4E-06	1.7E-10

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