

Information sheet for environmental audits and preliminary risk screen assessments (PRSAs)



Publication 2009 June 2021

Victoria's audit system

An environmental audit system has operated in Victoria since 1989. The *Environment Protection Act 2017* (the Act) provides for the appointment of environmental auditors. It also provides for Environment Protection Authority (EPA or the Authority) to have a system of preliminary risk screen assessments (PRSAs) and environmental audits. These are used in the planning, approval, regulation and management of activities, and in protection of human health and the environment.

Under the Act, the functions of an environmental auditor include to:

- conduct PRSAs and environmental audits
- prepare and issue PRSA statements and reports, and environmental audit statements and reports.

The purpose of a PRSA is to:

- assess the likelihood of the presence of contaminated land
- determine if an environmental audit is required
- recommend a scope for the environmental audit if an environmental audit is required.

The purpose of an environmental audit is to:

- assess the nature and extent of the risk of harm to human health or the environment from contaminated land, waste, pollution, or any activity
- recommend measures to manage the risk of harm to human health or the environment from contaminated land, waste, pollution, or any activity
- make recommendations to manage any contaminated land, waste, pollution or activity.

Upon completion, all PRSAs and environmental audits require preparation of either a PRSA statement, accompanied by a PRSA report, or an environmental audit statement, accompanied by an environmental audit report.

A person may engage an environmental auditor to conduct a PRSA or an environmental audit.

EPA administers the environmental audit system and ensures an acceptable quality of environmental auditing is maintained. This is achieved by assessing auditor applications and conducting a quality assurance program. These measures ensure that PRSAs and environmental audits that environmental auditors undertake are completed in accordance with the relevant sections of the Act or any other Act, and with the guidelines the Authority or other government agencies have published.

Information sheet for environmental audits and preliminary risk screen assessments (PRSAs)

File structures

EPA stores digital statements and reports from PRSAs and environmental audits in three parts:

- Part A, the PRSA or environmental audit report
- Part B, report appendices
- Part C, the PRSA statement and executive summary or environmental audit statement and executive summary.

Report executive summaries, findings and recommendations should be read and relied upon only in the context of the whole document, including any appendices and the PRSA statement or environmental audit statement.

Currency of PRSAs and environmental audits

PRSAs and environmental audits are based on the conditions encountered and information reviewed at the time of preparation. They don't represent any changes that may have occurred since the completion date. As it's not possible for the PRSA or audit report to present all data that could be of interest to all readers, consideration should be made to any appendices or referenced documentation for further information.

When information about the site changes from what was available at the time the PRSA or environmental audit was completed, or where an administrative error is identified, an environmental auditor may amend or withdraw PRSA or environmental audit statements and/or reports. Users are advised to check EPA's website to ensure documents' currency.

PDF searchability and printing

EPA can only provide PRSAs and environmental audit statements, reports and appendices that the environmental auditor provided to EPA via the EPA portal on the EPA website.

All statements and reports should be in a Portable Document Format (PDF) and searchable; however at times some appendices may be provided as image-only PDFs, which can affect searchability.

The PDF is compatible with Adobe Acrobat Reader, which is downloadable free from Adobe's Website (www.adobe.com).

Further information

For more information on Victoria's environmental audit system, visit EPA's website or contact EPA's Environmental Audit Unit.

Web: www.epa.vic.gov.au

Email: environmental.audit@epa.vic.gov.au



For languages other than English, please call **131 450**.

Visit epa.vic.gov.au/language-help for next steps.

If you need assistance because of a hearing or speech impairment, please visit relayservice.gov.au

PRELIMINARY RISK SCREEN ASSESSMENT REPORT

**36 EAST ESPLANADE
ST ALBANS, VICTORIA**

HILLSYDE NOMINEES PTY LTD

22 DECEMBER 2021



Report Title:

Preliminary Risk Screen Assessment Report
36 East Esplanade, St Albans, Victoria
Hillsyde Nominees Pty Ltd
22 December 2021

Author:

A44 Environmental Pty Ltd
8/153 La Trobe Street
Melbourne 3000

© A44 Environmental Pty Ltd 2021

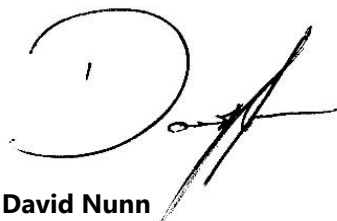
Cover image: Google Earth 2021

Document Distribution

Rev	Copies	Recipient	Date
0	1 x Electronic PDF Report	EPA - Manager Environmental Audit Brimbank City Council - Principal Planner Hillsyde Nominees Pty Ltd	22 December 2021

Document Authorisation

Authorised by:



David Nunn

Environmental Auditor

(appointed pursuant to the Environment Protection Act 2017)





Preliminary risk screen assessment statement

Under Part 8.3 of the *Environment Protection Act 2017*

This statement is a summary of the findings of a preliminary risk screen assessment conducted under Part 8.3 of the *Environment Protection Act 2017* for:

36 East Esplanade, St Albans, Victoria

Further details are provided in the preliminary risk screen assessment report that accompanies this statement.

Section 1: Preliminary risk screen assessment overview

Environmental auditor details

Name:	David Nunn
Company:	AAA Environmental Pty Ltd
Address:	8 / 153 La Trobe Street, Melbourne, 3000
Phone:	0407 526 074
Email:	david@aaaenvironmental.com.au

Site owner/occupant

Name:	Sherlaine Charisiou
Company:	36 East Esplanade Pty Ltd

Environmental auditor engaged by

Name:	Mario Charisiou
Company:	Hillsyde Nominees Pty Ltd
Relationship to site owner:	Project Manager

Reason for preliminary risk screen assessment

Planning scheme:	Requirement of Planning Permit issued by Brimbank City Council
Other:	

Preliminary risk screen assessment statement

Section 2: Assessment scope

Site details

Address:	36 East Esplanade, St Albans, Victoria
Title details:	Volume 10775 Folio 259, Lot 1 on Plan of Subdivision PS513024B Volume 10775 Folio 260, Lot 2 on Plan of Subdivision PS513024B Volume 10775 Folio 261, Lot 3 on Plan of Subdivision PS513024B Volume 10775 Folio 262, Lot 4 on Plan of Subdivision PS513024B Volume 10775 Folio 263, Common Property 1 on Plan of Subdivision PS513024B
Area (hectares):	0.118
<input checked="" type="checkbox"/> a plan of the site is attached	

Use or proposed use assessed

- ☐ Sensitive use (including land used for residential use, a child care centre, pre-school, or primary schools) and secondary schools and children's playgrounds – other (lower density)
- ☒ Sensitive use (including land used for residential use, a child care centre, pre-school, or primary schools) and secondary schools and children's playgrounds – high density
- ☐ Recreation/open space
- ☐ Parks and reserves
- ☐ Agricultural
- ☒ Commercial
- ☐ Industrial
- ☐ Other

Environmental elements assessed

- ☐ Ambient air
 - ☐ all environmental values were considered **OR**
 - ☐ all environmental values other than the following were considered:
- ☐ Ambient sound
 - ☐ all environmental values were considered **OR**
 - ☐ all environmental values other than the following were considered:
- ☒ Land
 - ☒ all environmental values that apply to the land use category were considered **OR**
 - ☐ all environmental values that apply to the land use category, other than the following, were considered:
- ☒ Water
 - ☐ Surface water
 - ☐ all environmental values that apply to the applicable segment were considered **OR**
 - ☐ all environmental values that apply to the applicable segment, other than the following, were considered:
 - ☒ Groundwater
 - ☒ all environmental values that apply to the applicable segment were considered **OR**
 - ☐ all environmental values that apply to the applicable segment, other than the following, were considered:

Preliminary risk screen assessment statement

Standards considered

Environment Reference Standard 2021

National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended 2013

Assumptions made during the assessment or any limitations

The Auditor has only considered the proposed mixed commercial and high density residential use of the site as depicted in the proposed development plans provided in Appendix B of this PRSA report. Should substantial changes be made to the proposed development, another assessment would need to be completed.

Exclusions from the assessment and the rationale for these

Surface water has been excluded from the assessment because no surface water bodies are present on the site or immediately adjacent to the site. Ambient sound has been excluded from the assessment because the site is located within an existing mixed use area and there are no specific activities in the vicinity of the site that would disrupt site use. Ambient Air is not considered a relevant environmental value in this setting and has also been excluded from the assessment.

This statement is accompanied by the following preliminary risk screen assessment report

Title: Preliminary Risk Screen Assessment Report
36 East Esplanade, St Albans, Victoria
Hillsyde Nominees Pty Ltd

Report no: 20181 Rev0

Date: 22 December 2021

Preliminary risk screen assessment statement

Section 3: Assessment outcome

Based on my assessment, I am of the opinion that an environmental audit is **not required** for the following land uses, **including** the use or proposed use for which the site has been assessed:

- ☐ Sensitive use (including land used for residential use, a child care centre, pre-school, or primary schools) and secondary schools and children's playgrounds — other (lower density)
- ☒ Sensitive use (including land used for residential use, a child care centre, pre-school, or primary schools) and secondary schools and children's playgrounds — high density
- ☐ Recreation/open space
- ☐ Parks and reserves
- ☐ Agricultural
- ☒ Commercial
- ☒ Industrial
- ☐ Other

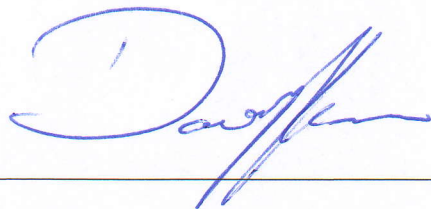
Section 4: Environmental auditor's declaration

I state that:

- I am appointed as an environmental auditor by the Environment Protection Authority Victoria under the *Environment Protection Act 2017*.
- The findings contained in this statement represents a true and accurate summary of the findings of the preliminary risk screen assessment that I have completed.

Date: 22 December 2021

Signed:



Name: David Nunn
Environmental Auditor

Attachment 1
Surveyed Site Plan

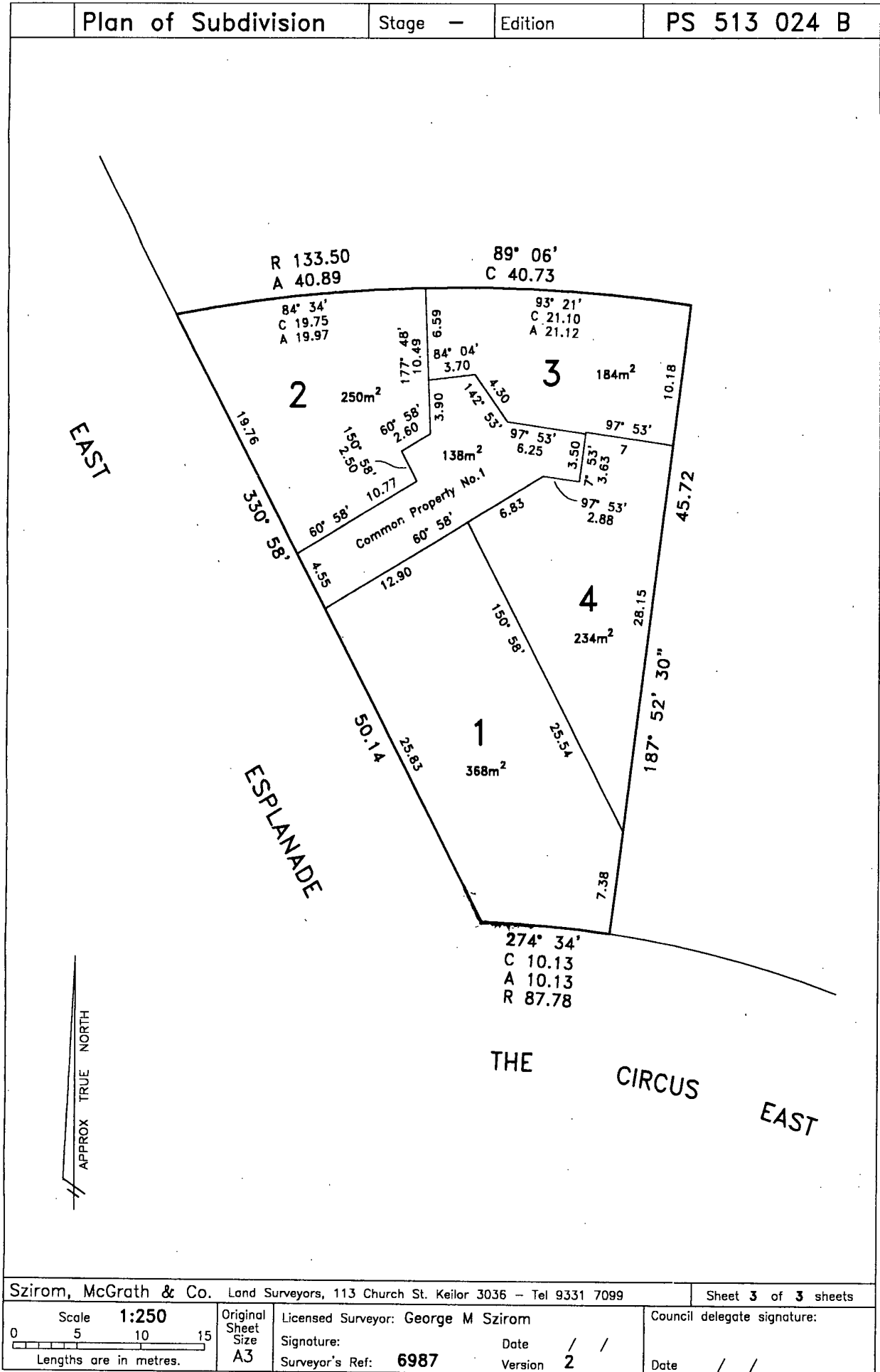


Table of Contents

EXECUTIVE SUMMARY	IV
1 INTRODUCTION	1
1.1 Background Information	1
1.2 PRSA Scope	1
1.3 PRSA Objectives	2
1.4 PRSA Methodology	2
1.5 Assessment Consultant Reports	3
1.6 Guidance Documents	3
2 SITE CHARACTERISATION	6
2.1 Current Site Status	6
2.2 Proposed Use	6
2.3 Zoning	6
2.4 Site Features and Potential Sources of Contamination	6
2.4.1 Above ground Storage Tanks	6
2.4.2 Underground Storage Tanks	6
2.4.3 Other Potential Sources	6
2.5 Surrounding Land Use	7
2.6 Environmental Setting Review	7
2.6.1 Topography	7
2.6.2 Regional Geology and Onsite Soils	7
2.6.3 Acid Sulphate Soils	7
2.6.4 Regional Hydrology	7
2.6.5 Regional and Local Hydrogeology	8
2.6.6 Surface Water Receptors	8
2.6.7 Groundwater Database Search	8
3 AUDITOR REVIEW OF PSI	9
3.1 Site Inspection	9
3.2 Local Government Records	9
3.3 Land Ownership	9
3.4 Sands & McDougall Directories Records	10
3.5 Historical Maps	10
3.6 EnergySafe Victoria Cathodic Protection Records	11
3.7 Dangerous Goods Database Records	11
3.8 EPA Priority Sites Register	11
3.9 EPA Licensed Facilities Search	11
3.10 Nearby Sites Previously Subject to an Environmental Audit	12
3.11 EPA Groundwater Quality Restricted Use Zones	13
3.12 Aerial Photograph Review	14
3.13 Other Historical Information	15
3.14 Previous Contamination Assessments	15
3.15 Areas and Chemicals of Interest	15
3.15.1 Potential Onsite Sources	15

3.15.2	Potential Offsite Sources.....	15
3.16	Auditor Conclusion.....	15
4	AUDITOR REVIEW OF SITE ASSESSMENT.....	17
4.1	Auditor Opinion on the Adequacy and Quality of the AGS Assessment Works	19
5	SOIL ASSESSMENT.....	20
5.1	Environmental Values - Land	20
5.2	Soil Guidelines.....	21
5.2.1	Ecological Screening Guidelines	21
5.2.2	Human Health Guidelines.....	22
5.2.3	Buildings and Structures	23
5.2.4	Aesthetics	23
5.2.5	Auditor's Adopted Soil Criteria.....	23
5.2.6	Soil Guideline Summary	24
5.3	Contamination Status of Onsite Soils	25
5.3.1	Field Observations	25
5.3.2	Soil Analytical Results.....	25
5.3.3	Asbestos Containing Materials	25
5.4	Assessment of Environmental Values – Land	25
5.5	Soil Assessment Conclusions	27
6	SOIL VAPOUR ASSESSMENT	28
6.1	Soil Vapour Assessment Criteria	28
6.2	Soil Vapour Probe Installation	28
6.3	Soil Vapour Sampling.....	29
6.3.1	Sampling Event	29
6.3.2	Field Based Assessment of Gases	29
6.3.3	Analytical Results.....	30
6.3.4	Data Usability Assessment.....	30
6.3.5	Soil Vapour Assessment Conclusion	30
7	GROUNDWATER ASSESSMENT.....	31
7.1	Groundwater.....	31
7.2	Potential for Site Sourced Groundwater Contamination to Occur	31
7.3	Potential for Off Site Sourced Groundwater Contamination to Occur.....	32
7.4	Assessment of Potential Impacts on Groundwater Environmental Values.....	32
7.5	Groundwater Assessment Conclusion	34
8	CONCEPTUAL SITE MODEL.....	36
8.1	Setting.....	36
8.2	Proposed Land Use	36
8.3	Known and Potential Sources of Contamination	36
8.4	Contaminants of Concern.....	37
8.5	Mechanisms of Contamination	37
8.6	Potentially Affected Media.....	37
8.7	Human and Ecological Receptors	37
8.8	Potential and Complete Exposure Pathways	38
8.9	Preferential Pathways for Vapour Migration.....	38

9	PRSA CONCLUSIONS.....	39
9.1	Soil/Soil Vapour Contamination Status.....	39
9.2	Groundwater Contamination Status.....	39
9.3	Likelihood of Contamination Based on PSI Assessment.....	40
9.4	PRSA Outcome.....	40
10	REFERENCES.....	41

Tables

Table 1 – Summary of PRSA Information	1
Table 2 – Summary of Completed Environmental Audit Sites	12
Table 3 – Review of AGS Site Assessment – Soil Investigation.....	17
Table 4 – Review of AGS Site Assessment - Soil Vapour Investigation	18
Table 5 – Environmental Values of Land.....	20
Table 6 – Auditor Soil Screening Criteria (mg/kg)	23
Table 7 – Existing and Potential Environmental Values of Land	26
Table 8 – Summary of Field Based Gas Monitoring Results	30
Table 9 – Environmental Values of Groundwater.....	31
Table 10 – Existing and Potential Environmental Values of Groundwater	33

Figures

Figure 1: Site Location Plan

Figure 2: Site Layout and Soil and Soil Vapour Sampling Locations

Appendices

Figures

Summary Tables

Appendix A – Current Certificates of Title

Appendix B – Proposed Development Plan

Appendix C – AGS PSI Report

Appendix D – Data Usability Assessment

Appendix E – Correspondence from Auditor’s Expert Support Team Member

Executive Summary

Mr David Nunn is an appointed Environmental Auditor under Division 1 of Part 8.3 of the Environment Protection Act 2017 and was requested by a representative of the site owner, to conduct a Preliminary Risk Screen Assessment (PRSA) of the property located at 36 East Esplanade St Albans, Victoria (the site).

The PRSA was completed under Division 2 of Part 8.3 of the Environment Protection Act 2017.

It is understood that a Planning Permit has been issued by Brimbank City Council for the proposed development of the site which includes ground floor commercial uses (retail and car parking with limited garden areas) and two and three storeys of residential apartments above the ground floor level. The PRSA is required to comply with the conditions of the Planning Permit.

Soil / Soil Vapour Contamination Status

The historical information was provided for the site in a Preliminary Site Investigation (PSI) report prepared by AGS Environmental Services Pty Ltd (AGS), which indicated a low potential for soil contamination to be occur at the site based on the long period of use of the site for residential purposes, and most recently for car parking purposes. The PSI information was reviewed and verified by the Auditor and the Auditor concurred that sufficient information was available to indicate that the site was not likely to be contaminated by on site sources of contamination.

A limited soil investigation was completed at two locations which indicated that concentrations of contaminants did not exceed the adopted ecological or human health screening values, therefore indicating that the site soils were unlikely to be contaminated, as anticipated by the Auditor based on the historical site use.

The environmental values *Land dependent ecosystems and species, Human health, Buildings and structures* and *Aesthetics* relevant to the proposed commercial and high density residential uses are considered unlikely to be impacted by site derived soil contamination.

A potential vapour intrusion pathway was identified, associated with the former use of the adjacent site as a service station site. The adjacent site is currently in use for vehicle repair. Two soil vapour probes were installed along the eastern site boundary to verify the Auditor's assessment that the risk posed to the use of the subject site was low. Based on the assessment findings, the Auditor concluded that the condition of the soil vapour does not restrict any use of the site or the intended use.

Groundwater Contamination Status

A desktop assessment of the potential for groundwater contamination to occur at the site was completed by the Auditor. The long period of use of the site for residential purposes and the recent use of the site for car parking purposes were considered unlikely to have resulted in site derived groundwater contamination.

The Auditor determined that the risk of significant groundwater petroleum hydrocarbon contamination at the site associated with the adjacent former service station site was likely to be low based on the prevailing groundwater flow direction. This conclusion was verified by the limited soil vapour assessment at the subject site's eastern boundary. The soil vapour assessment verified that the potential risk to future users of the site is low and acceptable. In addition, groundwater is not proposed to be used for extractive purposes as part of the proposed mixed

use development and therefore there are no likely exposure pathways associated with potentially impacted groundwater occurring in the vicinity of the site. While the soil vapour assessment concluded that the risks posed to the use of the site were low and acceptable, low hydrocarbon concentrations were identified in the soil vapour assessment which may indicate the presence of some hydrocarbon contamination in groundwater at the site. As the risk posed to the use of the site is low and acceptable, and the subject site is not the source of the contamination, the Auditor considered that there was no requirement for further assessment of this issue.

Likelihood of Contamination Based on PSI Assessment

Based on the historical use of the site for residential purposes and more recent car parking purposes, and the results of the PSI, the Auditor concluded that significant soil and groundwater contamination were unlikely to exist at the site.

A limited soil assessment was undertaken which confirmed the Auditor's preliminary conclusion with regard to site derived soil contamination.

The only potential source of contamination in the vicinity of the site was associated with the adjacent site to the east which was a former service station. Based on the groundwater flow direction, the Auditor assessed that the risks posed by the adjacent site were likely to be acceptable for the proposed ground floor commercial use. No groundwater use is to occur as part of the proposed development. The only potential complete exposure pathway was associated with vapour intrusion risks with respect to the future users / residents of the site. A limited soil vapour assessment was completed along the eastern site boundary at two locations to verify the Auditor's preliminary conclusion. The soil vapour assessment indicated that the potential risks to future receptors from soil vapour were low and acceptable.

PRSA Outcome

The Auditor concludes that the site is not likely to be a source of either soil or groundwater contamination, and that there are no contamination risks to the proposed use of the site, and therefore no environmental audit is required.

Given the presence of a potential offsite source of groundwater contamination on the adjacent site (former service station), and the findings of the soil vapour assessment, the Auditor considers that if groundwater contamination is present beneath the site, then it would not restrict or preclude the proposed mixed use of the site for commercial and high density residential purposes. The potential presence of groundwater contamination beneath the site has not been excluded by the assessment.

Based on the above considerations, the Auditor has determined that the outcome of the PRSA is as follows:

Likely that contaminated land is present, but no environmental audit is required.

Summary of PRSA Information

Category	Details
Auditor	David John Nunn
Auditor Account Number	EXT001145
Name of Person Requesting PRSA	Mario Charisiou

Category	Details
Relationship of Person Requesting PRSA to site	Project Manager
Name of site owner	36 East Esplanade Pty Ltd
Date of Auditor Engagement	28 October 2021
Completion date of the PRSA	22 December 2021
Reason for PRSA	Planning system
Elements of the environment assessed	Land and water
Planning permit number or requirement detail if applicable	P234/2021
EPA Region	West Metro
Municipality	Brimbank City Council
Dominant Lot on Plan	Volume 10775 Folio 259, Lot 1 on Plan of Subdivision PS513024B
Additional Lot on Plan(s)	Volume 10775 Folio 260, Lot 2 on Plan of Subdivision PS513024B Volume 10775 Folio 261, Lot 3 on Plan of Subdivision PS513024B Volume 10775 Folio 262, Lot 4 on Plan of Subdivision PS513024B Volume 10775 Folio 263, Common Property 1 on Plan of Subdivision PS513024B
Site Premises name	NA
Building/Complex sub-unit No.	
Street/Lot – Lower No.	36
Street/Lot – Upper no.	
Street Name	East
Street Type	Esplanade
Street Suffix	
Suburb	St Albans
Postcode	3021
Site Area (in square metres)	1,180 m ² (approximately)
Plan of site/premises showing the site boundary attached	Attachment 1 of the PRSA
Members and Categories of Support Team Utilised	Victoria Lazenby for Human Health Risk Assessment
Further works or requirements	None
Nature and extent of continuing risk of harm	None
Outcome of the PRSA report	Likely that contaminated land is present, but no environmental audit is required.

Physical Site Information

Historical land use	Residential, car parking
Current land use	Vacant
Proposed land use	Ground floor commercial use with limited garden areas, with two and three storeys of residential apartments above.
Current land use zoning	Commercial 1 Zone
Proposed land use zoning	To be determined
Surrounding land use - north	Residential properties followed by Victoria Crescent and further residential properties.
Surrounding land use - south	East Esplanade roundabout followed by railway station car parking
Surrounding land use - east	Double T Auto Repairs followed by Arthur Street and commercial properties (employment service, childcare centre, medical offices).
Surrounding land use - west	East Esplanade followed by the Sunbury line railway corridor.

Has EPA been notified about the site under Section 40 of the Environment Protection Act?	No
Nearest surface water receptor-name	Jones Creek
Nearest surface water receptor - direction	South west
Site aquifer formation	Newer Volcanics Basalt
Groundwater segment	Segment B (inferred)

Common Abbreviations

Term	Definition
ACM	Asbestos Containing Materials
AF	Soil vapour to indoor air attenuation factor
AHD	Australian Height Datum
ALS	ALS Environmental
ANZECC	Australian and New Zealand Environment and Conservation Council
AS	Australian Standards
NEPM	National Environment Protection (Assessment of Site Contamination) Measure (2013)
CEC	Cation Exchange Capacity
COC	Chain of Custody
CSM	Conceptual Site Model
CT	Certificate of Title
cis-1,2-DCE	cis-1,2-Dichloroethene
DO	Dissolved Oxygen
DQI	Data Quality Indicators
DQO	Data Quality Objectives
DSI	Detailed Site Investigation
EAO	Environmental Audit Overlay
EC	Electrical Conductivity
Eco-SSLs	US EPA Ecological Soil Screening Levels
EIL	Ecological Investigation Level
EPA	Environment Protection Authority Victoria
ESL	Ecological Screening Level
GQRUZ	Groundwater Quality Restricted Use Zone
ha	Hectares
HI	Hazard Index
HIL	Health Investigation Level
HSL	Health Screening Level
ILCR	Incremental lifetime cancer risk
km	Kilometres
LOR	Limit of Reporting
m	Metres
m bgl	Metres Below Ground Level
mg/kg	Milligrams per Kilogram
mg/L	Milligrams per Litre
MGT	Eurofins MGT
ml	Millilitres
NAPL	Non-Aqueous Phase Liquid
NATA	National Association of Testing Authorities
NC	Not Calculated
ND	Not Detected
NEPC	National Environmental Protection Council
NHMRC	National Health and Medical Research Council
OCPs	Organochlorine Pesticides
OPPs	Organophosphorus pesticides
PAH	Polycyclic Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
PCE	Perchloroethene / tetrachloroethene
pH	A measure of acidity, hydrogen ion activity
PID	Photoionisation Detector
ppb	Parts Per Billion
ppm	Parts Per Million
PSI	Preliminary Site Investigation

Term	Definition
QA/QC	Quality Assurance / Quality Control
RHSV	Royal Historical Society of Victoria
RPD	Relative Percent Difference
RSLs	US EPA Regional Screening Levels
SAQP	Sampling, Analysis and Quality Plan
SD	Standard Deviation
SEPPs	State Environment Protection Policies
SIW	Solid Inert Waste
SQGs	Canadian Soil Quality Guidelines
TCE	Trichloroethene
TDS	Total Dissolved Solids
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbons
TRH	Total Recoverable Hydrocarbons
US EPA	United States Environmental Protection Agency
UST / AST	Underground / Aboveground Storage Tank
VC	Vinyl Chloride
VOCs	Volatile Organic Compounds
VVG	Visualising Victoria's Groundwater Database
95% UCL	95% Upper Confidence Level of the Mean

1 Introduction

1.1 Background Information

Mr David Nunn an appointed Environmental Auditor under Division 1 of Part 8.3 of the Environment Protection Act 2017 and was requested by a representative of the site owner, to conduct a Preliminary Risk Screen Assessment (PRSA) of the property located at 36 East Esplanade St Albans, Victoria (the site). A site location plan is provided as Figure 1 attached to this report.

The PRSA was completed under Division 2 of Part 8.3 of the Environment Protection Act 2017.

The subject site comprises an area of approximately 1,180 m² and is described by the Certificates of Title outlined in Table 1. Copies of the current Certificates of Title are provided in Appendix A of this report.

It is understood that a Planning Permit has been issued by Brimbank City Council for the proposed development of the site which includes ground floor commercial uses (retail and car parking with some limited garden areas) and two and three storeys of residential apartments above the ground floor level. The PRSA is required to comply with the conditions of the Planning Permit.

This PRSA was prepared in accordance with the prevailing guidance issued by the Environment Protection Authority (EPA) for the Conduct of Preliminary Risk Screen Assessments. This report details the outcome of the PRSA completed for the subject site.

1.2 PRSA Scope

The scope of the PRSA included an assessment of the environmental elements of land (including soil vapour) and groundwater. Surface water was excluded on the basis that no surface water bodies occur within the site or in the immediate vicinity of the site, and the elements Ambient Air and Ambient Sound do not apply in this mixed use setting.

Relevant details associated with the PRSA are presented in Table 1.

Table 1 – Summary of PRSA Information

Category	Details
Name of Auditor	Mr David Nunn
Site address	36 East Esplanade St Albans, Victoria
Certificate of Title/Property description	Volume 10775 Folio 259, Lot 1 on Plan of Subdivision PS513024B Volume 10775 Folio 260, Lot 2 on Plan of Subdivision PS513024B Volume 10775 Folio 261, Lot 3 on Plan of Subdivision PS513024B Volume 10775 Folio 262, Lot 4 on Plan of Subdivision PS513024B Volume 10775 Folio 263, Common Property 1 on Plan of Subdivision PS513024B
Site Owner	36 East Esplanade Pty Ltd
Proposed use of the Site	The PRSA has considered the proposed use of the site provided in Planning Permit P234/2021 issued by the Brimbank City Council as follows: <ul style="list-style-type: none"> Commercial use comprising retail and car parking (ground floor); and High density residential use (Levels 1, 2, and 3).

Category	Details
	A copy of the proposed development plan is provided in Appendix B of this PRSA report.
Reason for PRSA	Condition of Planning Permit P234/2021 issued by Brimbank City Council
Elements of environment assessed	Land and water
Current site zoning	Commercial 1 Zone
Standards considered	Environment Reference Standard, May 2021. Other guidance and reference documents are included in Section 1.6 of this report.
Assumptions made by the Environmental Auditor	None
Limitations on the Environmental Auditor's assessment	The Auditor has only considered the proposed mixed commercial and high density residential use of the site as depicted in the proposed development plans provided in Appendix B of this PRSA report. Should substantial changes be made to the proposed development, another assessment would need to be completed.
Exclusions from the assessment and rationale	Surface water has been excluded from the assessment because no surface water bodies are present on the site or immediately adjacent to the site. The elements Ambient Air and Ambient Sound do not apply in this mixed use setting.
Completion date of PRSA	22 December 2021

1.3 PRSA Objectives

In accordance with Section 204(2) of the Environment Protection Act 2017, the objectives of the PRSA are outlined as follows:

- assess the likelihood of the presence of contaminated land;
- determine if an environmental audit is required; and
- recommend a scope for the environmental audit, if an environmental audit is required.

1.4 PRSA Methodology

The Auditor was involved in the following activities in order to fulfil the scope of the PRSA completed for the site:

- The Auditor completed a site inspection on 15 December 2021 to observe the site conditions;
- Review of the sampling and quality plans prepared by the assessment consultant for soil and soil vapour investigations;
- Review and verification of the PSI report prepared by AGS;
- Developed an initial conceptual site model to identify contamination sources, potential receptors and potential pathways;
- Provided an assessment of whether the site is likely to be contaminated land;
- Considered the requirement for further assessment of the site;

- Determined whether an environmental audit is required to assess the risk of harm posed by identified contamination;
- Prepared a PRSA statement and PRSA report in accordance with Section 205, Part 8.3 of the Environment Protection Act 2017 and prevailing EPA guidance; and
- The Auditor's Expert Support Member for Human Health Risk Assessment, Victoria Lazenby of Terravale Consulting Pty Ltd, provided advice with respect to potential vapour intrusion risks associated with an offsite source based on review and assessment soil vapour analytical results.

1.5 Assessment Consultant Reports

The assessment consultant for this project was AGS Environmental Pty Ltd (AGS). The following report was reviewed by the Auditor as part of the PRSA:

- AGS Environmental Pty Ltd (17 December 2021). Preliminary Site Investigation. 36 East Esplanade, St Albans, Victoria. Ref: AGS210302-R01. This report is herein referred to as the PSI Report.

The AGS PSI report is included as Appendix C of this PRSA Report.

1.6 Guidance Documents

The following published guidelines and standards were considered during the PRSA of the site:

Guidelines issued by the Authority under section 203 of the Environment Protection Act 2017

- EPA Victoria (2021). *Draft Proposed Guideline*. Environmental Auditor Guidelines for Appointment and Conduct. EPA Publication 865.13. August 2021
- EPA Victoria (2021). Environmental Auditor Guidelines – Provision of Statements and Reports for Environmental Audits and Preliminary Risk Screen Assessments. EPA Publication 2022. August 2021.
- EPA Victoria (2021). Guidance for the Cleanup and Management of Contaminated Groundwater. EPA Publication 2001. July 2021.

Subordinate Legislation

- Victorian Government Gazette (2021). Environment Reference Standard. S245 Wednesday 26 May 2021.
- Victoria Government (2021). Environment Protection Regulations 2021.

National Environment Protection Measures

- National Environment Protection Council (NEPC) (2021). National Environment Protection (Ambient Air Quality) Measure 1998, as amended May 2021.
- National Environment Protection Council (NEPC) (2013). National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended 2013.

Policies

- EPA Victoria (2021). Contaminated Land Policy. Publication 1915. February 2021.

EPA Victoria Publications

- EPA Victoria (2021). *Proposed Guideline*. Notifiable Contamination Guideline – Duty to Notify of Contaminated Land. EPA Publication 2008.1. July 2021.
- EPA Victoria (2021). Assessing and Controlling Contaminated Land Risks: A Guide to Meeting the Duty to Manage for those in Management or Control of Land. EPA Publication 1977. June 2021.
- EPA Victoria (2021). Guide to the Environment Reference Standard. EPA Publication 1992. June 2021.
- EPA Victoria (2021). Using SEPPs and WMPs in the New Environment Protection Framework. EPA Publication 1994. June 2021.
- EPA Victoria (2021). Contaminated Land: Understanding Section 35 of the *Environment Protection Act 2017*. EPA Publication 1940. February 2021.
- EPA Victoria (2021). Proposed Methodology for Deriving Background Level Concentration when Assessing Potentially Contaminated Land. EPA Publication 1936. January 2021.
- EPA Victoria (2006). Hydrogeological Assessment (Groundwater Quality) Guidelines. EPA Publication 668. September 2006.

Other Published Guidelines and Standards

- Australian & New Zealand Guidelines for Fresh and Marine Water Quality website (<https://www.waterquality.gov.au/anz-guidelines>).
- Australian Government. National Health and Medical Research Council (2008). Guidelines for Managing Risks in Recreational Waters.
- Australian & New Zealand Environment & Conservation Council and Agriculture & Resource Management Council of Australia and New Zealand (2000). Australian and New Zealand Guidelines for Fresh and Marine Water Quality. National Water Quality Management Strategy.
- CRC Care National Remediation Framework Website. (<https://www.crccare.com/knowledge-sharing/national-remediation-framework>).
- Canadian Council of Ministers of the Environment (2007). Canadian Environmental Quality Guidelines (www.ccme.ca/en/resources/canadian_environmental_quality_guidelines/index.html).
- Department of Environment, Land, Water and Planning (July 2021). Potentially Contaminated Land – Planning Practice Note 30.
- Dutch National Institute of Public Health and the Environment, RIVM (2013). Soil Remediation Circular, Version of 1 July 2013.
- Standards Australia (2005). Australian Standard, Guide to the sampling and investigation of potentially contaminated soil, Part 1: Non-volatile and semi-volatile compounds. AS4482.1 – 2005.
- Standards Australia (1999). Australian Standard, Guide to the sampling and investigation of potentially contaminated soil, Part 2: Volatile Substances. AS4482.2 – 1999.

- Victorian Government Department of Sustainability and Environment (2010). Victorian Best Practice Guidelines for Assessing and Managing Coastal Acid Sulfate Soils. October 2010.

2 Site Characterisation

2.1 Current Site Status

The subject site comprises five parcels of land forming an irregular shape. The site comprises an area of approximately 1,180 m² and is located within the northern portion of the East Esplanade circuit (near the corner of Arthur Street) in St Albans, Victoria.

At the time of inspection by the Auditor, the site comprised vacant land with all previous buildings removed. Temporary fencing was constructed along the East Esplanade frontage comprising the western and southern portions of the site.

The Auditor is therefore familiar with the condition of the site and has also verified the condition of the site as reported by AGS.

The site layout is shown in Figure 2 attached to this Report.

2.2 Proposed Use

The subject site is proposed to be redeveloped for mixed use comprising ground floor commercial use consisting of retail spaces and car parking with some limited garden beds areas, and two and three storeys of residential apartments above. The majority of the site (approximately 90%) is proposed to be covered with a concrete slab, with the remaining portion of the site comprising dedicated garden bed / landscaped areas.

The proposed development plans are included in Appendix B of this Report.

2.3 Zoning

The current zoning of the site is Commercial 1 Zone (C1Z). It is expected that the zoning will remain unchanged.

2.4 Site Features and Potential Sources of Contamination

2.4.1 Above ground Storage Tanks

Site inspections completed by the Auditor and the assessment consultant indicated that no above ground storage tanks (ASTs) or evidence of former ASTs were identified at the site.

2.4.2 Underground Storage Tanks

Site inspections completed by the Auditor and the assessment consultant indicated that no underground storage tanks (USTs) or evidence of former USTs were identified at the site.

2.4.3 Other Potential Sources

The potential sources of contamination identified on the subject site were limited to the importation and use of fill materials as road base.

The site located to the east, at 34 East Esplanade, is a current mechanical workshop, however it was historically used as a service station site. Historical Google Street View images provided by AGS indicate that the bowers and USTs appear to have been removed from the adjacent site between February and March 2010. The workshop building was also extended. Therefore, the adjacent site was identified as a potential source of soil vapour and / or groundwater contamination.

The site inspection completed by the Auditor on 15 December 2021 confirmed that the site features and potential sources of contamination were consistent with those identified by AGS as outlined in the PSI Report and summarised above.

2.5 Surrounding Land Use

The following summarises the land uses in the immediate vicinity of the site:

- North – Residential properties followed by Victoria Crescent and further residential properties.
- South – East Esplanade roundabout followed by railway station car parking
- East – Double T Auto Repairs followed by Arthur Street and commercial properties (employment service, childcare centre, medical offices).
- West – East Esplanade followed by the Sunbury line railway corridor.

The Auditor confirmed the surrounding site uses during the inspection of the site.

2.6 Environmental Setting Review

2.6.1 Topography

The site is generally flat with an elevation ranging between 71 to 72 m AHD. Regionally, the land surrounding the site slopes gently to the south east.

2.6.2 Regional Geology and Onsite Soils

According to the Geological Survey of Victoria 1:63,360 Sunbury map sheet (Part of 7822 Zone 55), the regional geology in the vicinity of the site is characterised by Tertiary aged Newer Volcanics comprising olivine basalt, minor limburgite, trachy-andesite, scoria, thin interbedded sand, salt and tuff.

The Auditor has reviewed the above information and has confirmed that it is consistent with geological maps and the observed site conditions.

Site investigations indicated that some areas of the site contained shallow fill material extending to a depth of approximately 0.2 m bgl. The fill materials comprised gravels, sand and brick fragments. The Auditor notes that the identified fill materials were associated with imported road base materials which had been placed across the western portion of the site. The fill was underlain by natural stiff, high plasticity clays with basalt encountered at a depth of approximately 1 m bgl.

2.6.3 Acid Sulphate Soils

AGS indicated that the site does not fall within the identified Coastal Acid Sulfate Soil zone. The Auditor concurs that basalt derived soils are not identified as Potential or Actual Acid Sulphate Soils, therefore, these soils are considered unlikely to be encountered at the site.

2.6.4 Regional Hydrology

The nearest surface water body is Jones Creek, which is located approximately 950 m south west of the site at its nearest point.

However, given that nearby completed Audit sites reported groundwater flow direction to be in a south to south easterly direction, AGS indicated that Stony Creek, located approximately 2.3 km

south east of the site, was the likely discharge point of groundwater emanating from the site.

The Auditor has considered the potential impact to both of these surface waterways as part of the PRSA assessment.

2.6.5 Regional and Local Hydrogeology

The Visualising Victoria's Groundwater Database (VVG website)¹ indicates that groundwater is expected to be encountered at depths between 5 and 10 m below ground level (bgl) within the Newer Volcanics basalt aquifer. The VVG website indicates that groundwater in the vicinity of the site has a salinity in the range of 3,500 to 7,000 mg/L total dissolved solids (TDS).

According to Leonard (1992), the Newer Volcanics basalt aquifer is comprised of a number of superimposed basalt flows that are often separated by silt and clay aquitards. The uppermost basalts were likely to be more vesicular, highly fractured and more weathered than the deeper basalt systems. Groundwater is encountered in the fractures, joints and vesicular openings and in the contact zone between flows.

A review of completed Environmental Audit Reports for nearby sites indicated that groundwater was encountered at depths greater than 10 m bgl and the groundwater flow direction was expected to be in a south to south easterly direction, which is consistent with the observed regional topography.

2.6.6 Surface Water Receptors

The nearest surface water body is Jones Creek, which is located approximately 950 m south west of the site at its nearest point.

2.6.7 Groundwater Database Search

A search for registered groundwater users in the vicinity of the site was completed by AGS on 12 October 2021 using information provided by the Visualising Victoria's Groundwater (VVG) database. The results of the search indicated there were 50 bores registered within a 2 km radius of the site, of which:

- 2 bores were registered for irrigation purposes;
- 33 bores were registered for investigation or observation purposes; and
- 15 bores were registered for an unknown purpose.

The nearest registered bore used for extractive uses was identified to be Bore 144297, located approximately 1.8 km south of the site within park land, and was registered for irrigation purposes.

The Auditor completed a search of the Department of Environment, Land, Water and Planning (DELWP), Water Measurement Information System database (WMIS) on 15 December 2021 and verified the information provided by AGS is consistent with the most recently updated information.

The Auditor concluded that due to the distance of the irrigation bore from the site, it is considered unlikely that any potential groundwater pollution emanating from the site would impact on the quality of groundwater extracted in this well.

¹ <http://maps.ubspatial.com.au/vvg.php#>

3 Auditor Review of PSI

The majority of the PSI information was reported by AGS. The Auditor has also completed some reviews and this additional information forms part of the overall PSI for the site. The following was included in the PSI:

- Site inspections;
- Review of historical land ownership records;
- Review of historical Street directories;
- Review of Sands and McDougall directories;
- Review of the EnergySafe Victoria cathodic protection records;
- Review of the Dangerous Goods Database records;
- Search of EPA Registers;
- Review of issued Certificates and Statements of Environmental Audit completed in the vicinity of the site; and
- Aerial photograph search and review (between 1931 and 2021).

The Auditor has reviewed and considered the report prepared by AGS in assessing the historical information relating to the site.

3.1 Site Inspection

A site inspection was conducted by AGS as part of the investigations completed at the site. The site was observed to be vacant and covered with thick grass. Temporary fencing was installed along the East Esplanade frontage, with permanent fencing present along the remaining site boundaries.

The Auditor conducted a site inspection on 15 December 2021. At the time of the Auditor's site inspection, the site appearance was consistent with that described by AGS. No other significant features were noted.

3.2 Local Government Records

AGS obtained the Planning Property Report (PPR) for the site via the Department of Environment Land, Water and Planning website² in order to review the zoning of the site and adjacent properties.

The review indicated that the site is located within a Commercial 1 Zone (C1Z) with the adjacent land parcels to the east also located within a Commercial 1 Zone (C1Z). A large area to the north of the site is located within a Residential Growth Zone (RGZ). The Auditor has verified that this information was correct at the time of writing the Report.

3.3 Land Ownership

A search of the historical land ownership was conducted by AGS. Copies of the Historical Certificates of Title are provided in Appendix B of the AGS PSI report. The Auditor has reviewed the information

² <http://services.land.vic.gov.au/maps/pmo.jsp>

provided by AGS and provided the following summary of the historical land ownership.

- The earliest Certificate of Title for the site was issued in February 1919 to Sydney Luxford, a carpenter. The land parcel appeared similar in disposition and area to the current site configuration.
- Various private individuals subsequently acquired the site between 1921 and 2005.
- The site was subdivided into five smaller parcels of land which form the current site boundaries.
- The site was acquired by Dinh Tho Le and Thuong Le Thi Tran in 2016.
- The site was acquired by the current owner, 36 East Esplanade Pty Ltd, in October 2020.

The Auditor concludes that the long history of ownership by private individuals indicates that the site is likely to have been used for either vacant land or residential purposes since at least 1919. No other information was ascertained from the review of the historical Certificates of Title.

3.4 Sands & McDougall Directories Records

A summary of the entries in the various Sands & McDougall Directories and other historical information was reviewed by the Auditor. The pertinent findings are summarised as follows:

- The 1950 Sands & McDougall directory had no listings for the St Albans area.
- The 1955 Sands & McDougall directory had no listings for the St Albans area.
- The 1960 Sands & McDougall directory indicated that the subject site and the surrounding land parcels were all occupied by private individuals.
- The 1965 Sands & McDougall directory indicated that the subject site and the surrounding land parcels were all occupied by private individuals. The Circus Auto Service Station occupies the corner of Arthur Street and East Esplanade.
- The 1970 Sands & McDougall directory indicated that the subject site and the surrounding land parcels were all occupied by private individuals. The Circus Auto Service Station occupies the corner of Arthur Street and East Esplanade.
- The final Sands & McDougall directory published in 1974 indicated that the subject site and the surrounding land parcels were all occupied by private individuals. The Circus Auto Service Station occupies the corner of Arthur Street and East Esplanade.

The Auditor notes that the findings of the Sands & McDougall Directories review were generally consistent with information obtained from the aerial photograph and Certificate of Title review, indicating that the site had a long history of use for residential purposes. The Sands & McDougall directories also indicated that the adjacent land parcel was developed as a service station between 1960 and 1965.

3.5 Historical Maps

AGS reviewed the 1966 Melways map which indicated that, with the exception of the Sydenham railway line, there were no significant features of concern identified in the vicinity of the site.

The Auditor reviewed the University of Melbourne online digitised Melways maps for the years 1970,

1975, 1980, 1985, 1990, 1995 and 1999. No significant features of concern were identified in the vicinity of the site.

The Auditor concludes that the Melways map provides an indication that significant sources of contamination, in particular large manufacturing facilities, industrial areas or landfills were not located in the vicinity of the subject site.

3.6 EnergySafe Victoria Cathodic Protection Records

AGS requested a cathodic protection systems records search for the site by EnergySafe Victoria in order to assess the historical presence of USTs.

The search indicated that no cathodic protection systems had been registered for the site.

3.7 Dangerous Goods Database Records

AGS requested a Dangerous Goods records search for the site by WorkSafe Victoria.

The search indicated that there was no record of dangerous goods storage or handling for the site.

3.8 EPA Priority Sites Register

The EPA Priority Sites Register is updated on a regular basis by EPA and provides a list of sites which have been issued with the following:

- Clean Up Notice;
- Pollution Abatement Notice;
- Environment Action Notice;
- Site Management Order;
- Improvement Notice; or
- Prohibition Notice.

Therefore, a Priority Site indicates that the site or a nearby property may present a potential risk to human health or the environment and therefore requires cleanup and / or management.

The Auditor conducted a search of the EPA Priority Sites Register on 16 December 2021, which indicated that the site is not listed in the Register.

No Priority Sites were listed within a 2 km radius of the site. Therefore, the Auditor concluded that Priority Sites were unlikely to pose a source of offsite contamination in the vicinity of the site.

3.9 EPA Licensed Facilities Search

The Auditor undertook a search of the EPA register of facilities licensed under the Environment Protection Act 1970 to identify any potentially significant offsite contamination sources³.

No licensed facilities were listed in the St Albans area. Therefore, the Auditor concluded that

³https://portal.epa.vic.gov.au/iri/portal/anonymous?NavigationTarget=ROLES://portal_content/epa_content/epa_roles/epa.vic.gov.au.anonrole/epa.vic.gov.au.searchanon&trans_type=Z001

licensed facilities were unlikely to pose a source of offsite contamination in the vicinity of the site.

3.10 Nearby Sites Previously Subject to an Environmental Audit

AGS undertook a search of completed Audit sites within a 1 km radius of the subject site and identified three completed Audits. The Auditor confirmed that this information is correct at the time of writing the report.

The Auditor noted that an additional 16 completed Audit Reports were located greater than 1.5 km south west of the site and were associated with the former Albion Explosives Factory, which was identified to be a source of groundwater contamination. Given that groundwater flow direction was inferred to be towards the south to south east, the former Albion Explosives Factory is considered unlikely to impact the groundwater beneath the site.

Therefore, a review of the three completed Audit Reports located closest to the site was considered to be adequate to provide an understanding of the local groundwater conditions and to determine the potential for groundwater contamination associated with these Audit sites to impact the subject site.

A summary of pertinent information obtained is summarised in Table 2 below.

Table 2 – Summary of Completed Environmental Audit Sites

Address/CARMS	Distance and Direction from Subject Site	Former Land Uses	Identified Sources of Contamination	Groundwater Depth and Flow Direction
311 Main Road, East St Albans (February 2003) 51152-1	580 m south east	Former Service Station	USTs Total Recoverable Hydrocarbons (TRH) and Benzene, Toluene, Ethylbenzene and Xylenes (BTEX) impacted soils	Groundwater was encountered at depths between 15.86 and 16.62 m below ground level (bgl). Groundwater flow was determined to be in a south easterly direction. TDS values were measured to be between 3,600 and 7,500 mg/L. Groundwater reported background concentrations of boron, manganese, molybdenum and selenium.
Stage 1 Part of 10 McKechnie Street St Albans (September 2015) 70292-2	900 m south	Crane and truck trailer fabrication	Contaminated fill (Asbestos Containing Materials [ACM], TRH and metals) USTs Storage of paints and solvents	Groundwater was encountered at depths between 10 and 13 m bgl. Groundwater flow was determined to be in an east to south easterly direction. TDS values were measured to be between 1,500 and 4,600 mg/L.

Address/CARMS	Distance and Direction from Subject Site	Former Land Uses	Identified Sources of Contamination	Groundwater Depth and Flow Direction
				Groundwater reported background concentrations of boron, chromium, cobalt, copper, nickel, vanadium and zinc.
Stage 2 Part of 10 McKechnie Street, St Albans (January 2016) 70292-3	900 m south	Crane and truck trailer fabrication	Contaminated fill (ACM, TRH and metals) UST Alkane gas from a leaking liquified petroleum gas transfer line	Groundwater was encountered at depths between 10 and 13 m bgl. Groundwater flow was determined to be in an east to south easterly direction. TDS values were measured to be between 1,500 and 4,600 mg/L. Groundwater reported background concentrations of boron, chromium, cobalt, copper, manganese, nickel, vanadium and zinc.

The key findings of the completed Audit sites are summarised as follows:

- Fill materials contaminated with metals, TRH and ACM were identified at the majority of the Audit sites and appeared to be associated with identified sources of contamination at each site.
- The groundwater investigations indicated that elevated concentrations of metals (boron, chromium, cobalt, copper, manganese, nickel, vanadium and zinc) were identified to be associated with background aquifer conditions.

Therefore, the Auditor concludes that background concentrations of metals in groundwater are considered unlikely to pose a contamination risk to the subject site.

3.11 EPA Groundwater Quality Restricted Use Zones

The Auditor undertook a review of the Victoria Unearthed website⁴ to identify any potentially significant offsite contamination sources.

The search did not identify any Groundwater Quality Restricted Use Zones (GQRUZs) within a 2 km radius of the site. Therefore, the Auditor concludes that no identified groundwater plumes are likely to be impacting the groundwater beneath the site.

⁴ <https://www.environment.vic.gov.au/sustainability/victoria-unearthed>

3.12 Aerial Photograph Review

AGS obtained copies of historical aerial photographs which cover the site for the period 1931 to 2021. Copies of the images reviewed are included in Appendix G of the PSI report. The Auditor reviewed the aerial photographs and the historical aerial photograph review provided by AGS in the PSI report.

The key findings of the aerial photograph review as follows:

- The 1931 aerial photograph is not clearly discernible, however the site appears to be vacant.

The adjacent property to the east is vacant. A residential dwelling was present to the north of the site. The main railway corridor is present to the west of the site. East Esplanade and West Esplanade have been constructed.

- The 1947 aerial photograph indicates that the site is vacant.

The surrounding area remains largely unchanged from the previous aerial photograph, with the exception of a number of new dwellings that had been constructed to the east.

- The 1954 aerial photograph indicates that a dwelling had been constructed on the site.

The surrounding area remains largely unchanged from the previous aerial photograph, with the exception of a number of new dwellings which have been constructed to the north and east of the site and west of the railway line.

- The 1968 aerial photograph indicates that a garage has been added to the northern portion of the dwelling.

A service station has been constructed on the adjacent land parcel to the east of the site, with a large paved area along the eastern portion of the site. Further residential development has occurred in the vicinity of the site. Several large buildings are present to the south east of the site along Main Road.

- The 1989 aerial photograph indicates that the site appears similar in disposition to the previous aerial photograph.

The immediately surrounding area appears largely unchanged to the previous aerial photograph.

- The 2001 aerial photograph indicates that a shed type structure has been constructed adjacent to the garage building.

The immediately surrounding area appears largely unchanged to the previous aerial photograph. Properties to the south east of the site have been developed for commercial purposes.

- The 2021 aerial photograph indicates that the site is vacant, with the exception of some trees located in the southern portion of the site.

The immediately surrounding area appears largely unchanged to the previous aerial photograph. The service station building to the east of the site has been extended.

The Auditor has reviewed the provided aerial photographs of the site and surrounding area and has verified it is consistent with the summary provided above and consistent with the historical use of the site for residential purposes.

3.13 Other Historical Information

Historical Google Earth images were reviewed by AGS which indicate that the site was occupied by a brick veneer dwelling from at least 1985. The northern portion of the site was covered with gravel and was used for car parking purposes since at least 2007, at which time the residence appeared to be unoccupied. This use continued until at least August 2019, when the house was placed on the market.

Historical Google Street View images indicated that the service station bowzers were present on the adjacent site until January 2010, at which time the bowzers and USTs were removed as part of the expansion of the workshop. The new workshop was completed by April 2010.

The Auditor has reviewed the historical Google Street View images for the site and verified the information provided by AGS.

3.14 Previous Contamination Assessments

The Auditor is not aware of any previous environmental investigations completed at the site.

3.15 Areas and Chemicals of Interest

Based on the findings of the site history review, the following activities, areas and chemicals of interest may present an environmental contamination risk at the subject site.

3.15.1 Potential Onsite Sources

- Importation and use of fill from unknown origin and / or reuse of site derived fill – contaminants include metals, polycyclic aromatic hydrocarbons (PAH), total recoverable hydrocarbons (TRH) and asbestos containing materials (ACM).

3.15.2 Potential Offsite Sources

- Fuel storage and delivery in USTs associated with the former service station site – TRH, BTEX, PAH and lead.
- Mechanical vehicle repairs – TRH and PAH.

3.16 Auditor Conclusion

The Auditor completed a review of the information provided by AGS as part of the PSI report prepared for the site. The information provided by AGS complied with the requirements outlined in Schedule B(2) of the *National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended 2013*, published by the National Environment Protection Council (NEPC) (2013). This document is herein referred to as the ASC NEPM.

The Auditor considers that information provided by AGS and supplemented by additional findings conducted by the Auditor, provide a thorough review of the available site history information, which confirms that the subject site has a long history of use for residential purposes and was most recently used for car parking purposes.

The adjacent land parcel was in use as a service station for approximately 45 to 50 years, with the bowzers and USTs removed in 2010 when the workshop building was extended.

The Auditor considers that all the key contaminants and contaminated media which may occur at the site as a result of both onsite and offsite sources of contamination have been identified. The main potential source of contamination identified with the historical use of the site is considered to be

limited to the importation of gravel fill for car parking purposes. The adjacent site was considered to be a potential offsite source of TRH, BTEX, PAH and lead contamination based on the historical use of the site as a service station.

4 Auditor Review of Site Assessment

Limited targeted soil sampling and soil vapour sampling was completed by AGS in accordance with the guidance provided in the ASC NEPM to verify whether:

- the imported road base at the site is contaminated;
- the northern portion of the site which remained undeveloped during the historical residential occupancy was contaminated; and
- soil vapour beneath the site is impacted by the historical use of the adjacent site as a service station.

The Auditor has reviewed the adequacy of the limited site assessment completed by AGS. A summary of the pertinent information pertaining to the soil investigation is presented in Table 3 below.

Table 3 – Review of AGS Site Assessment – Soil Investigation

Item	Work Completed	Auditor's Comments
Soil sampling and sampling plan methodology	<p>The soil investigations comprised the completion of the following investigations for the site:</p> <ul style="list-style-type: none"> • Two targeted soil bores (SB01 and SB02) both located in the northern vacant portion of the site. • Soil bores were installed to a maximum depth of 0.6 m. • Hand auger methods were adopted for this investigation. • Soil bores were logged and discrete samples were collected from fill and natural soils. • Replicate samples were screened in the field using a Photoionisation Detection (PID). • Decontamination of all exposed equipment between sampling locations. • The soil sampling program was completed by AGS on 8 November 2021. 	The investigation completed was appropriate for the limited targeted assessment and to support the PSI conclusions.
Analytical Methods	The laboratory methods are summarised on the laboratory certificates of analysis presented in the Appendices of the report.	The methods adopted are generally consistent with those presented in the ASC NEPM.
Laboratories used	Eurofins Environment Testing Australia Pty Ltd (Eurofins) was used as the primary laboratory for soil samples. Envirolab Services Pty Ltd was used as the secondary laboratory for soil samples.	Both laboratories are NATA accredited for the analyses completed, which provides confidence that the laboratories comply with the specified methods.
Laboratory testing	<p>A total of four soil samples were submitted for laboratory analysis.</p> <p>One sample was analysed for metals (arsenic, cadmium, chromium, hexavalent chromium, copper, nickel, lead, mercury silver, tin molybdenum, selenium and zinc), cyanide, fluoride, pH, TRH, BTEX, PAH, phenols, organochlorine pesticides (OCP), herbicides, polychlorinated biphenyls (PCB), volatile organic</p>	The broad range of chemical substances selected for each sample provide a good understanding the potential contamination status of soils at the targeted locations.

Item	Work Completed	Auditor's Comments
	<p>compounds (VOC) and semi volatile organic compounds (SVOC).</p> <p>One sample was analysed for metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc), TRH, BTEX and PAH.</p> <p>Two samples were analysed for metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc) and TRH.</p>	
Quality Assurance / Quality Control	A detailed review of the quality assurance / quality control (QA/QC) program adopted for the investigation is provided in Appendix D of this PRSA report.	<p>The QA/QC program adopted for the site investigation comprised the collection of blind duplicates, split duplicates, rinsate blank and trip blank samples.</p> <p>The QA/QC program adopted for the soil investigation complied with the requirements of the ASC NEPM and is therefore considered to be suitable with respect to verifying the results of the assessment.</p>
Guidelines used and their relevance	ASC NEPM EIL, ASC NEPM ESL, ASC NEPM HIL D and NEPM HSL D	Appropriate and consistent with the Auditor's adopted screening values.

The soil sampling locations are provided in Figure 2 of this report.

A summary of the pertinent information relating to the soil vapour investigation completed at the site by AGS is presented in Table 4 below.

Table 4 – Review of AGS Site Assessment - Soil Vapour Investigation

Item	Work Completed	Auditor's Comments
Sampling and sampling plan methodology	<p>The soil vapour investigations comprised the completion of the following:</p> <ul style="list-style-type: none"> • Installation of two soil vapour probes (SV01 and SV02) along the eastern boundary of the site to a depth of 1.0 m, adjacent to the former service station site. The soil vapour bore was terminated on basalt rock. The soil vapour probe installation was completed by AGS on 8 November 2021. • Recording of general gas readings (carbon dioxide, methane, oxygen, hydrogen sulphide and carbon monoxide) in ambient air and in soil vapour; • Pressure testing of the soil vapour sampling train prior to the collection of samples; • Collection of samples from the soil vapour probes using Summa canisters; and • Pressure testing of the Summa canisters prior to and subsequent to sampling. • One round of soil vapour sampling was completed by Eurofins on 17 November 2021. 	<p>The locations of the soil vapour probes were appropriate to determine whether potential petroleum hydrocarbon groundwater contamination or soil vapour contamination associated with the adjacent former service station, was likely to pose a potential vapour intrusion risk commensurate with the proposed development of the site.</p> <p>The sampling methodologies adopted were appropriate and consistent with current industry practice.</p> <p>One round of assessment was considered satisfactory to verify the condition of soil vapour based on both the Auditor's expectations and the initial analytical findings.</p>

Item	Work Completed	Auditor's Comments
Analytical Methods	The laboratory methods are summarised on the laboratory certificates of analysis presented in the Appendices of the report.	The methods adopted are generally consistent with those presented in the ASC NEPM.
Laboratories used	Eurofins was used as the primary laboratory. A secondary laboratory was not used for this investigation.	Eurofins is NATA accredited for the analyses completed, which provides confidence that the laboratory complies with the specified methods. Soil vapour duplicate samples were not submitted to a secondary laboratory for analysis.
Laboratory testing	Collected samples were analysed for volatile organics using the USEPA TO-15 method, TRH and atmospheric gases.	The adopted analytical suite is considered to be appropriate.
Quality Assurance/Quality Control	A detailed review of the QA/QC program adopted for the investigation is provided in Appendix D of this PRSA report.	The QA/QC program adopted for the site investigation comprised the collection of a blind duplicate and trip blank samples. The QA/QC program adopted for the soil vapour investigation complied with the requirements of the ASC NEPM (given the limitations of split duplicate soil vapour sampling) and is therefore considered to be suitable with respect to verifying the results of the assessment.
Guidelines used and their relevance	<ul style="list-style-type: none"> ASC NEPM Interim Soil Vapour Health Investigation Levels (HILs) for Volatile Chlorinated Hydrocarbons; and ASC NEPM Soil Vapour Health Screening Levels (HSLs) for selected petroleum hydrocarbons. 	The selected screening criteria were considered to be appropriate to assess potential soil vapour intrusion risks.

The soil vapour sampling locations are provided in Figure 2 of this report.

4.1 Auditor Opinion on the Adequacy and Quality of the AGS Assessment Works

The Auditor considered that the intrusive investigations completed by AGS was generally compliant with ASC NEPM requirements.

The documented field and laboratory techniques are considered appropriate and consistent with ASC NEPM requirements and accepted industry practice.

The Auditor considers that the targeted assessment works completed have provided a suitable verification of the contamination status of soils and soil vapour beneath the site for the purpose of the PRSA.

The Auditor considers that the investigation tasks have been generally completed in accordance with the guidelines issued or approved by the EPA.

5 Soil Assessment

The *Environment Reference Standard* (ERS) is a legislative instrument under section 93(1) of the *Environment Protection Act 2017* and specifies the environmental values for land environments in Victoria and the relevant indicators and objectives to be used to evaluate any risk of harm or detriment. Therefore, the indicators and objectives identified in the ERS have been used as appropriate criteria to assess whether the environmental values of land are impacted and therefore to determine whether the land at the site is likely to be contaminated.

5.1 Environmental Values - Land

In Victoria, the applicable environmental values for the land element are determined by land use categories outlined in Part 4, Clause 11 of the ERS and summarised in the table below.

Table 5 – Environmental Values of Land

Environmental Values	Parks & Reserves	Agricultural	Sensitive use (High density)	Sensitive use - other (lower density)	Recreation / Open space	Commercial	Industrial
Land dependent ecosystems and species							
- Natural ecosystems	✓						
- Modified ecosystems	✓	✓		✓	✓		
- Highly modified ecosystems		✓	✓	✓	✓	✓	✓
Human health	✓	✓	✓	✓	✓	✓	✓
Buildings and structures	✓	✓	✓	✓	✓	✓	✓
Aesthetics	✓		✓	✓	✓	✓	
Production of food, flora and fibre	✓	✓		✓			

It is understood that the site is proposed to be redeveloped for mixed use comprising ground floor retail and carparking with limited garden areas, and two and three storeys of residential apartments above the ground floor.

Therefore, the ground floor of the development comprises commercial uses and the following environmental values of the land at the site are required to be protected:

- Land dependent ecosystems and species – highly modified ecosystems;
- Human Health;
- Buildings and Structures; and
- Aesthetics.

All the above environmental values have been assessed as part of PRSA completed for the site.

5.2 Soil Guidelines

The ERS refers to various sections of the ASC NEPM for the appropriate indicators and objectives for the environmental values identified. Therefore, these indicators and objectives have been adopted as appropriate criteria for the assessment of risk to the environmental values of land as discussed below.

5.2.1 Ecological Screening Guidelines

Certain contaminants, for example heavy metals, are phytotoxic and human health-based levels may not afford protection to some species of plants if grown on the site. In order to consider the potential for phytotoxicity, contaminant concentrations have been initially compared to the Ecological Investigation Levels (EILs) presented in *Schedule B1 Guideline on Investigation Levels for Soil and Groundwater* included in the ASC NEPM.

Schedule B1 of the ASC NEPM provides EILs for selected metals and organic substances that are applicable for assessing risk to terrestrial ecosystems. In particular, EILs have been derived for arsenic, copper, chromium (III), nickel, lead, zinc, DDT and naphthalene for three generic land use settings as follows:

- Areas of ecological significance (99% level of species protection);
- Urban residential areas and public open space (80% level of species protection); and
- Commercial and industrial land uses (60% level of species protection).

The EILs are used as screening values, below which indicate that ecological impacts are unlikely to occur. Should guideline values be exceeded, then further investigation and evaluation may be necessary.

Similarly, Ecological Screening Levels (ESLs) provided in Schedule B1 of the ASC NEPM have been adopted for petroleum hydrocarbons that are applicable for assessing potential risks to terrestrial ecosystems. It is noted that the ESLs broadly apply to coarse and fine grained soils and various land uses. They are applicable to the upper 2 m of soil at the subject site.

Where EIL / ESL values have not been defined in the ASC NEPM, or where site-specific EILs for certain inorganic parameters have not been derived as part of the assessment process, other criteria have been adopted from the following sources:

- Canadian Council of Ministers for the Environment (CCME), *Canadian Soil Quality Guidelines (SQGs) for the Protection of Environmental and Human Health*; and
- United States Environmental Protection Authority (US EPA) *Ecological Soil Screening Levels (Eco-SSLs)*.

The use of the SQGs for initial screening of soil quality data is considered appropriate where EILs / ESLs are unavailable, as these values have been derived using a comparable methodology to the ASC NEPM approach, utilising a risk based species sensitivity distribution methodology based on land use as follows:

- Agricultural (75% level of species protection);
- Residential / Parkland (75% level of species protection);
- Commercial (50% level of species protection); and

- Industrial (50% level of species protection).

In the absence of available Canadian SQGs, the lowest US EPA Eco-SSLs have been adopted. The Eco-SSLs were derived using a less preferred geometric mean method and are not risk-based. For that reason, the Eco-SSLs are generally more conservative than the Canadian SQGs.

5.2.2 Human Health Guidelines

The ASC NEPM Health Investigation levels (HILs) have been developed for a broad range of inorganic and organic substances. The HILs are applicable for assessing human health risk via all relevant pathways of exposure. The HILs are generic to all soil types and apply generally to a maximum depth of 3 m below the surface for residential use.

Health Screening Levels (HSLs) have been developed for selected petroleum compounds and fractions and are applicable to assessing human health risk via the inhalation and direct contact pathways. The HSLs are dependent upon specific soil physicochemical properties, land use scenarios, and the characteristics of building structures. They apply to different soil types, and depths below ground surface.

The health investigation and screening levels are provided for a range of land uses including:

- HIL / HSL A: Residential with garden / accessible soil (home grown produce <10% fruit and vegetable intake, (no poultry), also includes children's day care centres, preschools and primary schools;
- HIL / HSL B: Residential with minimal opportunities for soil access includes dwellings with fully and permanently paved yard space such as high-rise buildings and flats;
- HIL / HSL C: Public open space such as parks, playgrounds, playing fields (e.g. ovals), secondary schools and footpaths. It does not include undeveloped public open space (such as urban bush land and reserves) which should be subject to a site-specific assessment where appropriate; and
- HIL / HSL D: Commercial / industrial such as shops, offices, factories and industrial sites.

The HIL / HSL D values have been adopted as the applicable human health screening criteria for the assessment of the proposed mixed use comprising ground floor commercial uses. Clay soils have been adopted for the HSLs.

In addition to appropriate consideration and application of the HSLs and ESLs, the ASC NEPM (2013) provides "Management Limits" for petroleum hydrocarbons, which reflect the nature and properties of petroleum hydrocarbons including:

- Formation of observable light non-aqueous phase liquids (LNAPL);
- Fire and explosive hazards; and
- Effects on buried infrastructure e.g. penetration of, or damage to, in-ground services by hydrocarbons.

TRH results will also be screened against the ASC NEPM Management Limits for TRH fractions F1–F4.

An exceedance of an investigation 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.

5.2.3 Buildings and Structures

For some substances such as phenols and sulphates, their impact on structures (effects on PVC piping and cement) may override the health and environmental considerations. As outlined in the ASC NEPM (1999), a structural guideline of 2,000 mg/kg is set for sulphate in soil.

Australian Standard AS 2159 (2009) *Piling – Design and Installation* provides exposure classification values for concrete and steel piles in soil (non-aggressive to very severely aggressive). These guidelines are considered to be appropriate in assessing the potential for detrimental impacts of site soils to buildings and structures.

In addition, the presence of other aggressive chemical compounds (e.g. acids) may be potentially detrimental to buildings or structures.

5.2.4 Aesthetics

The ERS states that the indicator for the environmental value aesthetics is *"Any chemical substance or waste that may be offensive to the senses."* and the objective is *"Land that is not offensive to the senses of human beings."*

Therefore, these indicators have been adopted for evaluating the risk to aesthetics of land.

5.2.5 Auditor's Adopted Soil Criteria

The soil screening values adopted for the PRSA are summarised in Table 6.

Table 6 – Auditor Soil Screening Criteria (mg/kg)

Chemical substance	EIL / ESL	HIL / HSL D Commercial/Industrial
Inorganics / Metals		
Arsenic	100	3,000
Beryllium	4 ⁽¹⁾	500
Boron	-	300,000
Cadmium	10 ⁽¹⁾	900
Trivalent Chromium	410 ⁽²⁾	180,000 ⁽⁵⁾
Hexavalent Chromium	0.4 ⁽¹⁾	3,600
Cobalt	50 ⁽¹⁾	4,000
Copper	230 ⁽²⁾	240,000
Lead	1,170 ⁽²⁾	1,500
Manganese	220 ⁽³⁾	60,000
Mercury (inorganic)	6.6 ⁽¹⁾	730
Mercury (methyl)	-	180
Nickel	430 ⁽²⁾	6,000
Selenium	1 ⁽¹⁾	10,000
Tin	50 ⁽¹⁾	70,000 ⁽⁵⁾
Vanadium	130 ⁽¹⁾	580 ⁽⁵⁾
Zinc	935 ⁽²⁾	400,000
Organics		
Aldrin + Dieldrin	-	45
Dieldrin	0.0049 ⁽³⁾	0.14 ⁽⁶⁾
Chlordane	-	530
DDT+DDD+DDE	-	3,600
DDT	180	8.5 ⁽⁶⁾

Chemical substance	EIL / ESL	HIL / HSL D Commercial/Industrial
Endosulfan	-	2,000
Endrin	-	100
Heptachlor	-	50
HCB	-	80
Methoxychlor	-	2,500
Mirex	-	100
Toxaphene	-	160
Benzo(a)pyrene or as Benzo(a)pyrene TEQ (Toxicity Equivalent Quotient)	0.7	40
Naphthalene	170	Not Limiting
Total PAHs	18 ⁽³⁾	4,000
Polychlorinated Biphenyls (PCB)	1.3 ⁽¹⁾	7
Phenol	3.8 ⁽¹⁾	450,000
F1 C ₆ -C ₁₀	215 ⁽⁴⁾	310 ⁽⁷⁾
F2 >C ₁₀ -C ₁₆	215 ⁽⁴⁾	Not Limiting
F3 >C ₁₆ -C ₃₄	1,700 ⁽⁴⁾	3,500 ⁽⁸⁾
F4 >C ₃₄ -C ₄₀	3,300 ⁽⁴⁾	10,000 ⁽⁸⁾
Benzene	50 ⁽⁴⁾	4 ⁽⁷⁾
Toluene	85 ⁽⁴⁾	Not Limiting
Ethylbenzene	70 ⁽⁴⁾	Not Limiting
Xylene	105 ⁽⁴⁾	Not Limiting
Miscellaneous		
Cyanide (free)	-	1,500
pH	6-8 ⁽¹⁾	6-8 ⁽¹⁾
Fluoride	400 ⁽¹⁾	4,700 ⁽⁵⁾

Notes:

(1) CCME, Canadian Soil Quality Guidelines (SQG) for the Protection of Environmental and Human Health - Residential/Parkland

(2) Site Specific EIL

(3) US EPA Ecological Soil Screening Levels (Eco-SSLs): PAH – soil invertebrate criterion

(4) ASC NEPM 2013 Generic ESL for Urban Residential and Public Open Space for coarse soils

(5) US EPA (2021) Regional Screening Levels, industrial soil, noncarcinogenic, adult, HI=0.1

(6) US EPA (2021) Regional Screening Levels, industrial soil, carcinogenic, adult, risk=1:1,000,000

(7) ASC NEPM Soil HSLs for Vapour Intrusion for sandy soils, depth 0 to <1 m, screening values for other depths were also considered as appropriate

(8) ASC NEPM Management Limits for TRH fractions, coarse soils

5.2.6 Soil Guideline Summary

The soil guidelines and the order in which they have been adopted for screening purposes were as follows:

Ecological

- ASC NEPM EILs (site specific for chromium (III), copper, nickel and zinc using the methodology provided in the ASC NEPM) and ESLs;
- CCME, Canadian Soil Quality Guidelines (SQGs) for the Protection of Environmental and Human Health; and
- US EPA Ecological Soil Screening Levels (Eco-SSLs).

Human Health

- ASC NEPM HILs and HSLs for commercial/industrial (Setting D);
- ASC NEPM Management Limits for TRH; and
- United States Environmental Protection Agency (US EPA) Regional Screening Levels (November 2021).

5.3 Contamination Status of Onsite Soils

5.3.1 Field Observations

The site comprised vacant land and the surface was generally covered by thick grass.

The soil profile comprised of:

- Road base comprising gravels, sand and minor brick fragments were encountered to a depth of approximately 0.2 m, which appeared to have been placed across the eastern and northern portions of the site.
- The underlying natural soils comprised high plasticity clays to a depth of approximately 1.0 m.
- Basalt was encountered at a depth of approximately 1.0 m.

PID readings did not exceed 0 ppm indicating a low potential for significant volatile contamination to be present in the site soils.

The borelogs for the investigation locations are provided in Appendix J of the AGS PSI Report (refer to Appendix C of this PRSA Report).

5.3.2 Soil Analytical Results

A limited assessment of soils was completed with four primary soil samples selected for laboratory analysis. The results of the analyses have indicated that reported contaminant concentrations in soils were below the Auditor's adopted ecological and human health screening levels.

The tabulated soil data is included in the Tables section of the PRSA Report.

5.3.3 Asbestos Containing Materials

No potential Asbestos Containing Material (ACM) was identified within the fill or natural soils during the investigation.

5.4 Assessment of Environmental Values – Land

To evaluate whether environmental values of land are likely to be impacted by potential soil contamination associated with the subject site, the Auditor has completed an assessment of the relevant existing and potential environmental values of land at the site.

This assessment has been summarised in Table 7 below.

Table 7 – Existing and Potential Environmental Values of Land

Environmental Value	Existing Use	Proposed Use
Land dependent ecosystems and species – highly modified ecosystems	The site is likely to contain ecosystems which have been modified by the historical use of the site. The land parcel is currently vacant and healthy grass was observed at the site. Therefore, this environmental value is considered to be an existing use and is currently maintained at the site.	<p>The proposed use of the site comprises ground floor commercial including retail and car parking with limited garden areas, and two or three levels of high density residential use above the ground floor. The proposed development plan indicates that approximately 10% of the site is proposed to comprise landscaped garden beds, therefore, this environmental value is also a proposed use of the site.</p> <p>The results of the PRSA indicate that soil contamination is not expected to occur at the site, therefore the environmental value <i>Land dependent ecosystems and species – highly modified ecosystems</i>, can be maintained at the site.</p>
Human Health	The site currently comprises vacant land, therefore <i>Human health</i> is not an existing environmental value.	<p>Human health is a potential environmental value given that a mixed commercial / high density residential development is proposed for the site.</p> <p>The results of the PRSA indicate that soil contamination is not expected to occur at the site, therefore the environmental value <i>Land dependent ecosystems and species – highly modified ecosystems</i>, can be maintained at the site.</p>
Buildings and Structures	The site currently comprised vacant land, therefore <i>Buildings and structures</i> is not an existing environmental value.	<p><i>Building and structures</i> is a potential environmental value given that a mixed commercial / high density residential development is proposed for the site.</p> <p>The results of the PRSA indicate that soil contaminants impacting the environmental value <i>Buildings and structures</i> were not expected to be encountered at the site.</p>
Aesthetics	The site currently comprised vacant land, therefore <i>Aesthetics</i> is not an existing environmental value.	<p><i>Aesthetics</i> is a potential environmental value given that a mixed commercial / high density residential development is proposed for the site.</p> <p>Minor quantities of gravel, sand and brick fragments were identified at some locations. It is noted that these materials were consistent with the type of materials commonly encountered in an urban residential environment and therefore on this basis are considered unlikely to preclude the environmental value of <i>Aesthetics</i>, commensurate with the proposed site development.</p>

5.5 Soil Assessment Conclusions

A review of the PSI information collected for the site and the results of a limited soil investigation completed at the site indicated that the soil contamination was unlikely to occur at the site.

Therefore, the protected environmental values relevant to commercial and high density residential uses are not considered to be impacted.

6 Soil Vapour Assessment

The historical uses of the site present a very low risk of potential groundwater contamination, in addition, no significant soil contamination was identified which would pose a source of groundwater contamination.

The adjacent former service station site may pose a potential offsite source of groundwater contamination and soil vapour contamination, although based on the prevailing groundwater flow direction to the south or south east, the former service station site is located across or down hydraulic gradient of the subject site.

In order to verify whether petroleum hydrocarbon vapours associated with contamination arising from the adjacent former service station site are likely to pose a potential inhalation risk to future site receptors, a limited and targeted soil vapour assessment was completed at the site to support the PRSA conclusions.

6.1 Soil Vapour Assessment Criteria

The ASC NEPM provides interim soil vapour HILs to assess the vapour inhalation pathway for specific chlorinated compounds. The HILs are derived using a conservative approach which relates indoor air to soil vapour. These investigation limit criteria are provided as Tier 1 health risk screening tools and are considered appropriate for screening purposes.

The ASC NEPM also provides HSLs as a screening tool to assess the potential risks to human health posed by volatile petroleum hydrocarbons. The HSLs are based on generally conservative assumptions for the estimated exposure of site occupants in various land use scenarios.

The HILs and HSLs provided in the ASC NEPM are based on generally conservative assumptions for the estimated allowable exposure dependent on landuse. An exceedance of a screening level does not indicate that there is a definite risk to human health, but rather that further site-specific assessment is required to quantify the potential risk to human health in the selected landuse scenario.

The NEPM currently does not provide Tier 1 screening levels for other compounds occurring in soil vapour.

6.2 Soil Vapour Probe Installation

The targeted soil vapour assessment was conducted at two locations adjacent to the eastern site boundary. The assessment locations are shown in Figure 2 of this report. Two soil bores (SV01 and SV02) were constructed at the site, with construction details as follows:

- The soil vapour probes were installed on 8 November 2021.
- The bore was drilled using a hand auger.
- Both soil vapour probes were installed at depths of 1.0 m bgl.
- The probe comprised a 152 mm perforated stainless steel screen attached to a 6 mm Teflon tubing.
- The probe was installed within washed sand pack.
- The sand pack was sealed above with a bentonite seal to the near surface.

- The protruding tube was installed beneath a flush mounted Gatic-type cover concreted into the concrete surface. A gas-tight end cap was placed on the tubing. Eurofins installed quick connect sample fittings at each of the locations.
- The probe was allowed to equilibrate for at least seven days prior to sampling.

The Auditor notes that the adopted construction method is consistent with current best practice guidelines for the installation of soil vapour probes.

6.3 Soil Vapour Sampling

One round of soil vapour sampling was conducted on 17 November 2021. The sampling method included appropriate pin integrity and sample train leak testing, collection of appropriate field data including atmospheric gases and volatile organic compounds, appropriate Summa sample container filling and handling, appropriate QC samples and a broad analytical suite consistent with the objectives of the monitoring requirement.

The analytical program included a broad range of volatile organic compounds using the TO-15 VOC suite, TRH and atmospheric gases including helium.

The sampling and laboratory analysis was conducted by Eurofins.

6.3.1 Sampling Event

The soil vapour sampling event was conducted on 17 November 2021. The stabilisation period between vapour pin installation and sampling is considered by the Auditor to be appropriate to allow for equilibration of the soil vapour with the soil vapour probe.

The barometric pressure was decreasing during the sampling event completed on 17 November 2021 with results of 1023.7 hPa at 9am and 1020.7 hPa at 3pm, based on data obtained from the Olympic Park weather station and obtained from the BOM website. The temperature on the day of sampling ranged from 13.3°C (at 9am) to 16.5°C (at 3pm).

Rainfall was reported on the day prior to the sampling event. Total rainfall reported prior to sampling was 0.2 mm. Whilst rainfall can interfere with the reporting of soil vapours, in this case the relatively small rainfall total and the soil lithology would suggest a low potential for rainfall to have a significantly influenced the soil vapour sampling.

The sampling procedure involved both leak testing the probes prior to sampling and then assessing the sampling train for leaks through the use of a helium enriched shroud. It is noted by the Auditor that this approach is consistent with the sampling program included in CRC Care Technical Report No.23 (2013).

The pre and post sampling canister pressures and the canister pressure on receipt at the laboratory indicated that the gas samples had been taken and transported securely.

6.3.2 Field Based Assessment of Gases

The field monitoring data is summarised in the following table. The detailed sampling field sheets are included in Appendix I of the AGS PSI report. The tabulated soil vapour data is included in the Tables section of the PRSA Report.

Table 8 – Summary of Field Based Gas Monitoring Results

Bore	Stable Concentrations					Flow Rate (L/hr)
	CH ₄ (% vol.)	CO ₂ (% vol.)	Oxygen (% vol.)	CO (ppm)	H ₂ S (ppm)	
Sampling Event 1						
SV01	<0.1	1.8	17.3	<1	<1	0.00
SV02	<0.1	2.3	15.0	<1	<1	0.00

6.3.3 Analytical Results

The soil vapour analytical results have been tabulated and compared to the adopted assessment criteria in the Summary Tables appended to this report.

All soil vapour concentrations were below the adopted screening values, with the exception of trimethylbenzenes and isopropanol, both of which exceeded the laboratory reporting limits. It is noted, however, that no Australian soil vapour screening values were available for these contaminants.

The Auditor's Expert Support Member for Human Health Risk Assessment, Victoria Lazenby of Terravale Consulting, completed a screening level assessment to determine whether reported soil vapour concentrations of trimethylbenzene and isopropanol are likely to pose a vapour intrusion risk with respect to the proposed development.

The assessment completed by Victoria Lazenby indicated that concentrations of trimethylbenzene and isopropanol were several orders of magnitude below the adopted Tier 1 screening values, therefore the soil vapour risks to future site users was considered to be low and acceptable.

The correspondence provided by Victoria Lazenby is attached as Appendix E of this PRSA report.

6.3.4 Data Usability Assessment

The Auditor has considered the usability of the soil vapour data against the DQIs in Appendix D. Based on this review, the Auditor considers that the soil vapour analytical data is adequately reliable and usable for the purposes of the PRSA.

6.3.5 Soil Vapour Assessment Conclusion

Based on the above assessment findings, it is concluded that all soil vapour results are below the Tier 1 screening criteria or below the relevant health based criteria for all land uses.

On that basis, the Auditor concludes that the condition of the soil vapour does not restrict any use of the site or the proposed use and therefore no further consideration of potential soil vapour impacts is warranted.

7 Groundwater Assessment

7.1 Groundwater

In Victoria, the applicable environmental values for the groundwater element are determined by the salinity of the groundwater measured as TDS, which defines the Segment of the groundwater.

The environmental values for each Segment are provided in Part 5, Division 2, Clause 15 of the ERS, which is reproduced below.

Table 9 – Environmental Values of Groundwater

Environmental Value	Segments (mg/L TDS)						
	A1 (0-600)	A2 (601- 1,200)	B (1,201- 3,100)	C (3,101- 5,400)	D (5,401- 7,100)	E (7,101- 10,000)	F (> 10,001)
1. Water dependent ecosystems and species	✓	✓	✓	✓	✓	✓	✓
2. Potable water supply							
- desirable	✓						
- acceptable		✓					
3. Potable mineral water supply	✓	✓	✓	✓			
4. Agriculture and irrigation (irrigation)	✓	✓	✓				
5. Agriculture and irrigation (stock watering)	✓	✓	✓	✓	✓	✓	
6. Industrial and commercial use	✓	✓	✓	✓	✓		
7. Water-based recreation (primary contact recreation)	✓	✓	✓	✓	✓	✓	✓
8. Traditional Owner cultural values	✓	✓	✓	✓	✓	✓	✓
9. Buildings and structures	✓	✓	✓	✓	✓	✓	✓
10. Geothermal properties	✓	✓	✓	✓	✓	✓	✓

According to the VVG database, groundwater beneath the site is expected to have TDS concentrations between 3,500 and 7,000 mg/L. This would place the site groundwater in Segments C and D as outlined in the ERS.

TDS values reported for groundwater samples collected from nearby completed Audit sites ranged between 1,500 and 4,600 mg/L. Therefore, adopting the most conservative TDS values classifies groundwater within Segment B as outlined in the ERS.

7.2 Potential for Site Sourced Groundwater Contamination to Occur

No significant soil contamination associated with historical site activities was identified through the PSI review. In addition, the limited soil sampling completed at the site also indicated that it is unlikely that soil contamination exists at the site. Therefore, the Auditor considered that the risk of groundwater contamination arising from historical site practices to be unlikely for the following reasons:

- No underground fuel tanks or fuel storage were reported to have occurred at the site and no evidence of any underground fuel tanks was observed during the site inspections completed at the site;
- No other point sources of contamination were identified in the site history assessment;
- Residential properties have been present at the site since at least 1954 and therefore the long history of the site for residential purposes indicates that activities undertaken at the site are unlikely to have contaminated underlying groundwater.
- Soil contaminant concentrations did not exceed the adopted ecological or human health screening values in either fill or underlying natural soils;
- The natural properties of the clay soils at the site (i.e. relatively low permeability, cation exchange capacity) would significantly retard the vertical migration of any contaminants present in soils.
- Groundwater is located at depths greater than 10 m (based on regional hydrogeological information) and is unlikely to have been impacted by historical site activities.

7.3 Potential for Off Site Sourced Groundwater Contamination to Occur

The Auditor considered that there is some potential for groundwater contamination to have occurred at the adjacent site located to the east given that it was an operational service station for a period of between 45 and 50 years. However, the potential for a significant plume of petroleum hydrocarbon to exist beneath the subject site is considered to be low for the following reasons:

- The adjacent former service station site is located to the east and slightly down slope of the subject site with respect to the surrounding topography.
- Regional groundwater flow direction as determined from completed nearby Audit reports indicated that flow was likely to be in a south to south easterly direction, which is consistent with observed site topography.
- Sands & McDougall directories indicated that the adjacent service station site was established between 1960 and 1965 and Nearmap and Google Earth images indicate that the USTs were removed between February and April 2010. Therefore, the primary sources of contamination were removed from the adjacent site approximately 11 years ago. It is expected that natural attenuation of the petroleum hydrocarbon groundwater contamination (if present) would have occurred over this time.
- Basalt was encountered at a depth of approximately 1 m bgl at the subject site, therefore it is likely that the USTs on the adjacent site have been placed within the basalt rock.

Regional groundwater was encountered at depths greater than 10 m bgl within the Newer Volcanics Basalt aquifer. Groundwater in the Newer Volcanics aquifer is encountered in the fractures, joints and vesicular openings and in the contact zone between flows. Therefore, the vertical transport pathway to groundwater cannot be easily predicted and for this reason the Auditor considers that potential groundwater contamination associated with the adjacent site cannot be disregarded, although the risk of significant contamination at the subject site is expected to be low.

7.4 Assessment of Potential Impacts on Groundwater Environmental Values

To evaluate whether environmental values of groundwater are likely to be impacted by potential

groundwater contamination emanating from the adjacent site, the Auditor has completed an assessment of the existing and potential environmental values of groundwater at the site. This assessment has been summarised in Table 10 below.

Table 10 – Existing and Potential Environmental Values of Groundwater

Environmental Value	Existing Use	Potential Use
Water dependent ecosystems and species	Aquatic ecosystems do not currently exist at the site and are considered unlikely to exist in the future. As such, this environmental value does not occur on the site.	<p>The nearest surface water receptor is Jones Creek, which is located approximately 950 m south west of the site at its nearest point.</p> <p>Nearby completed Audit sites reported groundwater flow to be in a south to south easterly direction towards Stony Creek located approximately 2.3 km south east of the site. Therefore, Stony Creek is the likely discharge point for groundwater emanating from the site.</p> <p>Site sourced groundwater contamination is considered unlikely to occur, therefore the environmental value <i>Water dependent ecosystems and species</i> is not expected to be impacted.</p>
Potable mineral water supply	The site is not located in a recognised mineral water province and so this is not an existing environmental value at the site.	The site is not located in a recognised mineral water province and therefore this is also not a potential use of groundwater in the future.
Agriculture and irrigation (irrigation)	There are no groundwater bores located on the site which are currently used for irrigation purposes. Therefore, irrigation is not an existing environmental value within the site.	<p>The proposed development plan indicates that the proposed building and car parking areas would cover the majority of the site and therefore there would be insufficient space to accommodate drilling rigs for the installation of groundwater wells. It is further noted that groundwater is not proposed to be used for this purpose as part of the proposed mixed use development.</p> <p>In addition, the proposed site development plans indicate that two 30,000 L rainwater tanks will be constructed beneath the garden bed areas. Therefore, tank water is proposed to be used for irrigation of the dedicated garden beds. On these bases, the Auditor has concluded that <i>Agriculture and irrigation (irrigation)</i> is not considered to be a potential use of groundwater at the site.</p>
Agriculture and irrigation (stock watering)	There are no groundwater bores used for this purpose within the site. Therefore, <i>Agriculture and irrigation (stock watering)</i> is not an existing environmental value within the site.	The groundwater database search indicates that no bores are registered for stock and domestic purposes within a 2 km radius of the site, therefore <i>Agriculture and irrigation (stock watering)</i> is not considered to be a potential use of groundwater at the site.

Environmental Value	Existing Use	Potential Use
Water-based recreation (primary contact recreation)	There are no surface water bodies on the site or swimming pools which are filled using groundwater. Therefore, <i>Water-based recreation (primary contact recreation)</i> is not an existing value within the site.	The groundwater database search indicates that no bores are registered for domestic purposes within a 2 km radius of the site. In addition, no swimming pools are proposed as part of the site development, therefore <i>Water-based recreation (primary contact recreation)</i> is not considered to be a potential use of groundwater at the site.
Industrial and commercial	There are no existing groundwater bores used for this purpose within the site.	No existing bores were registered for industrial or commercial purposes within a 2 km radius of the site. The proposed development plan indicates that the proposed building and car parking areas would cover the majority of the site and therefore there would be insufficient space to accommodate drilling rigs for the installation of groundwater wells. It is noted that groundwater is not proposed to be used for this purpose as part of the proposed mixed use development. Based on the above, this environmental value is unlikely to occur onsite.
Traditional Owner cultural values	There are no surface water bodies on the site. Groundwater beneath the site is not currently extracted for this potential environmental value.	Groundwater emanating from the site is expected to discharge to Stony Creek located approximately 2.3 km south east of the site. Site sourced groundwater contamination is considered unlikely to occur, therefore the environmental value <i>Traditional Owner cultural values</i> is not expected to be impacted.
Buildings and structures	There are no buildings currently present at the site, therefore this use of groundwater does not exist at the site.	A slab on ground mixed use development is proposed for the site, therefore basements are not proposed to be constructed at the site in future. Given the depth of groundwater within the basalt rock, building foundations are not expected to extend to the watertable. Therefore, <i>Buildings and structures</i> is not a potential use of groundwater at the site.
Geothermal properties	Groundwater is not currently used for this purpose at the site.	The site is not located in a recognised geothermal area and so this use is not relevant and therefore Geothermal properties is not a potential use of groundwater at the site.

7.5 Groundwater Assessment Conclusion

The Auditor has completed a desk top assessment with respect to the potential for groundwater contamination to occur at the site. The conclusions are summarised as follows:

- The PRSA has indicated that long term use of the site for residential purposes and the recent use of the site for car parking purposes were considered unlikely to have contaminated groundwater beneath the site.

- The adjacent former service station site is considered to be a potential source of groundwater contamination. However, the Auditor has completed an assessment of the existing and potential uses of groundwater with respect to the proposed development which indicated that groundwater is not proposed to be used for any extractive purpose. Therefore, the environmental values of groundwater are unlikely to be realised at the site.
- The only potential complete exposure pathway was associated with the potential vapour intrusion risk associated with petroleum hydrocarbon contamination associated with the adjacent former service station site. A soil vapour assessment indicated that the potential vapour intrusion risks posed by petroleum hydrocarbons on the subject site was low and acceptable.

Therefore, the Auditor concluded that groundwater at the site may be impacted by petroleum hydrocarbon contamination associated with the offsite former service station site, however the soil vapour assessment has indicated that the potential risks to future users of the site is low and acceptable. In addition, groundwater is not proposed to be used for extractive purposes as part of the proposed mixed use development and therefore there are no likely exposure pathways associated with the use of impacted groundwater (if it occurs at the site).

8 Conceptual Site Model

As outlined in the ASC NEPM, a Conceptual Site Model (CSM) should include the following components:

- Known and potential sources of contamination;
- Chemicals of concern / interest;
- Potentially affected media (soil, sediment, groundwater, surface water, indoor and ambient air);
- Human and ecological receptors; and
- Potential and complete exposure pathways.

The Auditor developed the following CSM based on the information obtained from the PSI. A summary of the pertinent information is summarised in the following sections.

8.1 Setting

The site is located within a developed area of Melbourne with a mixture of commercial, retail and residential properties nearby. The site currently comprises vacant land covered with grass. A temporary fence has been constructed along the western site boundary and the southern site boundary. Permanent fences are present along the northern boundary and eastern boundary.

Site investigations indicated that the sampled locations contain shallow fill material extending to a depth of approximately 0.2 m. The fill materials comprised imported gravels, sand and brick fragments which were associated with road base placed across the majority of the site. The fill was underlain by naturally occurring high plasticity clays and basalt bedrock.

No stained or odorous soils were encountered at the site.

Regional groundwater data indicated that groundwater was expected to be located at a depth of greater than 10 m below surface, within the Newer Volcanics basalt aquifer. A review of completed Audit Reports in the vicinity of the site indicated that groundwater was encountered at depths generally between 10 and 15 m bgl.

8.2 Proposed Land Use

The subject site is proposed to be redeveloped for mixed use comprising ground floor commercial consisting of retail spaces and car parking with limited garden areas, and two and three storeys of residential apartments above the ground floor. The majority of the site (approximately 90%) is proposed to be covered with a concrete slab, with the remaining portion of the site comprising dedicated garden bed / landscaped areas.

8.3 Known and Potential Sources of Contamination

Based on the historical use of the site for residential purposes, and car parking purposes between 2007 and 2020, the potential for site sourced soil and groundwater contamination to have occurred was considered to be low.

A former service station site was located on the adjacent land parcel to the east of the site, however, given the south to south easterly direction of regional groundwater flow, the service station is considered to be located across or down hydraulic gradient of the subject site. Therefore, an

assessment of the potential for groundwater beneath the site to be contaminated by an offsite petroleum hydrocarbon plume was assessed by the Auditor as part of this PRSA.

8.4 Contaminants of Concern

The primary sources and contaminants of concern at the site are considered to be:

- Importation and use of fill from unknown origin and / or reuse of site derived fill – contaminants include metals, PAH, TRH and ACM.

In addition, the following offsite potential sources of contamination were also identified:

- Fuel storage and delivery in USTs associated with the former service station site – TRH, BTEX, PAH and lead.
- Mechanical vehicle repairs – TRH and PAH.

8.5 Mechanisms of Contamination

The primary mechanisms of contamination are:

- Importation of road base fill material for car parking purposes.
- Contamination derived from the former offsite service station primarily associated with groundwater contamination and soil vapour contamination.

A secondary pathway could be the leaching of contaminants from shallow soils to deeper soil and groundwater. However, the secondary pathways are considered to be minor given that the investigations have indicated that no significant impacts to the underlying natural soils have occurred and the clayey nature of those underlying soils which would further retard migration of any leached contaminants. Therefore, the potential for contaminants leaching from site soils to the groundwater at the site is considered to be negligible.

8.6 Potentially Affected Media

On the basis of the mechanisms of contamination mentioned above, the Auditor considers that it is likely that shallow fill is the only affected media resulting from historical site activities. Leaching to the underlying natural clay soils is not expected to be significant. This conclusion is supported by the low concentrations of contaminants reported in underlying natural soils.

On the basis of the above findings, the contamination occurring at the site as a result of site activities is considered to be restricted to the shallow fill materials. The source of this contamination is considered by the Auditor to be the result of importation of historical fill used as road base at the subject site.

There is some potential for the groundwater and soil vapour to be contaminated from the adjacent service station site. The subject site is not considered by the Auditor to be a source of groundwater or soil vapour contamination.

8.7 Human and Ecological Receptors

The Auditor considers that the primary human receptors of concern are:

- Construction workers involved in redevelopment of the site and subsurface maintenance workers post redevelopment; and

- Future users of the site post redevelopment.

The Auditor considers that the primary ecological receptors of concern would be any vegetation which may be established as part of the site redevelopment. The Auditor notes that the proposed development includes approximately 10% dedicated garden bed or landscaped areas and so ecological values and human health need to be considered in these areas. The remainder of the site is to comprise buildings or permanent pavement materials.

Other ecological receptors (such as soil fauna) will be highly modified as a result of the long term presence of any contamination and on that basis, will have acclimatised to the presence of the contamination or be insensitive to it.

8.8 Potential and Complete Exposure Pathways

The Auditor considers that of the possible potential exposure pathways which can be relevant for a contaminated site, the significant potentially complete pathways for the site are limited to:

- Contaminated groundwater / soil vapour > soil vapour exposure > construction workers associated with the proposed redevelopment works; and
- Contaminated groundwater / soil vapour > soil vapour exposure > future users of the site (occupants, visitors, subsurface maintenance workers) post development.

8.9 Preferential Pathways for Vapour Migration

The potential for petroleum hydrocarbon soil vapour associated with the adjacent former service station site was considered by the Auditor and was addressed as part of the soil vapour assessment completed at the site.

The soil vapour assessment concluded that the potential vapour intrusion risks associated with future site receptors is low and acceptable, therefore the potential exposure pathways are incomplete.

9 PRSA Conclusions

Mr David Nunn, an appointed Environmental Auditor under Division 1 of Part 8.3 of the Environment Protection Act 2017, completed a Preliminary Risk Screen Assessment (PRSA) for the site located at 36 East Esplanade, St Albans.

A PRSA was required to comply with the conditions of the Planning Permit issued by Brimbank City Council. The objectives of the PRSA were to determine whether the site is likely to be contaminated and to determine whether an Environmental Audit is required to provide a further assessment of contamination.

9.1 Soil / Soil Vapour Contamination Status

The historical information was provided for the site in a PSI report prepared by AGS Environmental Services Pty Ltd, which indicated a low potential for soil contamination to occur at the site based on the long use of the site for residential purposes, and most recently for car parking purposes. The PSI information was reviewed and verified by the Auditor and the Auditor concurred that sufficient information was available to suggest that the site was not likely to be contaminated by on site sources of contamination.

A limited soil investigation was completed at two locations which indicated that concentrations of contaminants did not exceed the adopted ecological or human health screening values, therefore indicating that the site soils were unlikely to be contaminated.

The environmental values *Land dependent ecosystems and species, Human health, Buildings and structures* and *Aesthetics* relevant to the proposed use of the site are considered unlikely to be impacted.

A potential vapour intrusion pathway was identified, associated with the use of the adjacent site as a service station site. Two soil vapour probes were installed along the eastern site boundary to verify the risk posed by potential soil vapour contamination. Based on the assessment findings, the Auditor concluded that the condition of the soil vapour does not restrict any use of the site or the intended use.

9.2 Groundwater Contamination Status

A desktop assessment of the potential for groundwater contamination to occur at the site was completed by the Auditor. The long term use of the site for residential purposes and the recent use of the site for car parking purposes were considered unlikely to have contaminated groundwater beneath the site.

The Auditor concluded that groundwater at the site may be impacted by petroleum hydrocarbon contamination associated with the adjacent former service station site, however the soil vapour assessment has indicated that the potential risk to future users of the site is low and acceptable. In addition, groundwater is not proposed to be used for extractive purposes as part of the proposed mixed use development and therefore there are no likely exposure pathways associated with the use of impacted groundwater (if groundwater contamination occurs at the site).

9.3 Likelihood of Contamination Based on PSI Assessment

Based on the results of the PSI, the Auditor concluded that soil contamination was unlikely to exist at the site, which is supported by the historical use of the site for residential purposes and subsequent car parking purposes, and the findings of the limited soil assessment.

The only potential source of contamination was associated with a former service station which was located on the adjacent site to the east. The only potential complete exposure pathway was associated with vapour intrusion risks with respect to the future users / residents of the subject site. A soil vapour assessment completed along the eastern site boundary at two locations indicated that the potential risk to future receptors from soil vapour contamination was low and acceptable.

9.4 PRSA Outcome

The Auditor concludes that the site is not likely to be a source of either soil or groundwater contamination, therefore no environmental audit is required.

Given the presence of a potential offsite source of groundwater contamination arising from the adjacent site (former service station), the Auditor considers that if groundwater contamination is present, it would not restrict or preclude the proposed mixed use of the site for commercial and high density residential purposes. Therefore, the Auditor has determined that the outcome of the PRSA is as follows:

Likely that contaminated land is present, but no environmental audit is required.

10 References

AGS Environmental Pty Ltd (17 December 2021). Preliminary Site Investigation. 36 East Esplanade, St Albans, Victoria. Ref: AGS210302-R01.

Australian & New Zealand Guidelines for Fresh and Marine Water Quality website.
(<https://www.waterquality.gov.au/anz-guidelines>).

Australian Government. National Health and Medical Research Council (2008). Guidelines for Managing Risks in Recreational Waters.

Australian & New Zealand Environment & Conservation Council and Agriculture & Resource Management Council of Australia and New Zealand (2000). Australian and New Zealand Guidelines for Fresh and Marine Water Quality. National Water Quality Management Strategy.

Canadian Council of Ministers of the Environment (2007) Canadian Environmental Quality Guidelines.

CRC Care National Remediation Framework Website. (<https://www.crccare.com/knowledge-sharing/national-remediation-framework>).

Dutch National Institute of Public Health and the Environment, RIVM (2013) Soil Remediation Circular, Version of 1 July 2013.

enHealth (2012). Environmental Health Risk Assessment, Guidelines for Assessing Human Health Risks from Environmental Hazards. June 2012.

EPA Victoria (2021). *Draft Proposed Guideline*. Environmental Auditor Guidelines for Appointment and Conduct. EPA Publication 865.13. August 2021

EPA Victoria (2021). Environmental Auditor Guidelines – Provision of Statements and Reports for Environmental Audits and Preliminary Risk Screen Assessments. EPA Publication 2022. August 2021.

EPA Victoria (2021). *Draft* Guidelines for Conducting Environmental Audits. Publication TBA. July 2021.

EPA Victoria (2021). Guidance for the Cleanup and Management of Contaminated Groundwater. EPA Publication 2001. July 2021.

EPA Victoria (2021). *Proposed Guideline*. Notifiable Contamination Guideline – Duty to Notify of Contaminated Land. EPA Publication 2008.1. July 2021.

EPA Victoria (2021). Assessing and Controlling Contaminated Land Risks: A Guide to Meeting the Duty to Manage for those in Management or Control of Land. EPA Publication 1977. June 2021.

EPA Victoria (2021). Guide to the Environment Reference Standard. EPA Publication 1992. June 2021.

EPA Victoria (2021). Using SEPPs and WMPs in the New Environment Protection Framework. EPA Publication 1994. June 2021.

EPA Victoria (2021). Contaminated Land: Understanding Section 35 of the *Environment Protection Act 2017*. EPA Publication 1940. February 2021.

EPA Victoria (2021). Contaminated Land Policy. Publication 1915. February 2021.

EPA Victoria (2021). Proposed Methodology for Deriving Background Level Concentration when Assessing Potentially Contaminated Land. EPA Publication 1936. January 2021.

EPA Victoria (2006). Hydrogeological Assessment (Groundwater Quality) Guidelines. EPA Publication 668. September 2006.

EPA Victoria (2000). Groundwater Sampling Guidelines. EPA Publication 669. April 2000.

Government of Western Australia Department of Health (2021). *Guidelines for the Assessment, Remediation and Management of Asbestos Contaminated Sites in Western Australia*.

National Environment Protection Council (NEPM) (2021). National Environment Protection (Ambient Air Quality) Measure 1998, as amended May 2021.

National Environment Protection Council (NEPC) (2013). National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended 2013.

National Health and Medical Research Council and Natural Resource Management Ministerial Council (2011). Australian Drinking Water Guidelines 6 2011 Version 3.6 March 2021. National Water Quality Management Strategy.

Standards Australia (2005). Australian Standard, Guide to the sampling and investigation of potentially contaminated soil, Part 1: Non-volatile and semi-volatile compounds. AS4482.1 - 2005.

Standards Australia, (1999). Australian Standard, Guide to the sampling and investigation of potentially contaminated soil, Part 2: Volatile Substances. AS4482.2 – 1999.

United States Environmental Protection Authority (2005). Ecological Soil Screening Levels.

United States Environmental Protection Authority (2021). Regional Screening Levels.

Victorian Government Gazette (2021). Environment Reference Standard. S245 Wednesday 26 May 2021.

Victoria Government (2021). Environment Protection Regulations 2021.

Figures

Figure 1: Site Location Plan

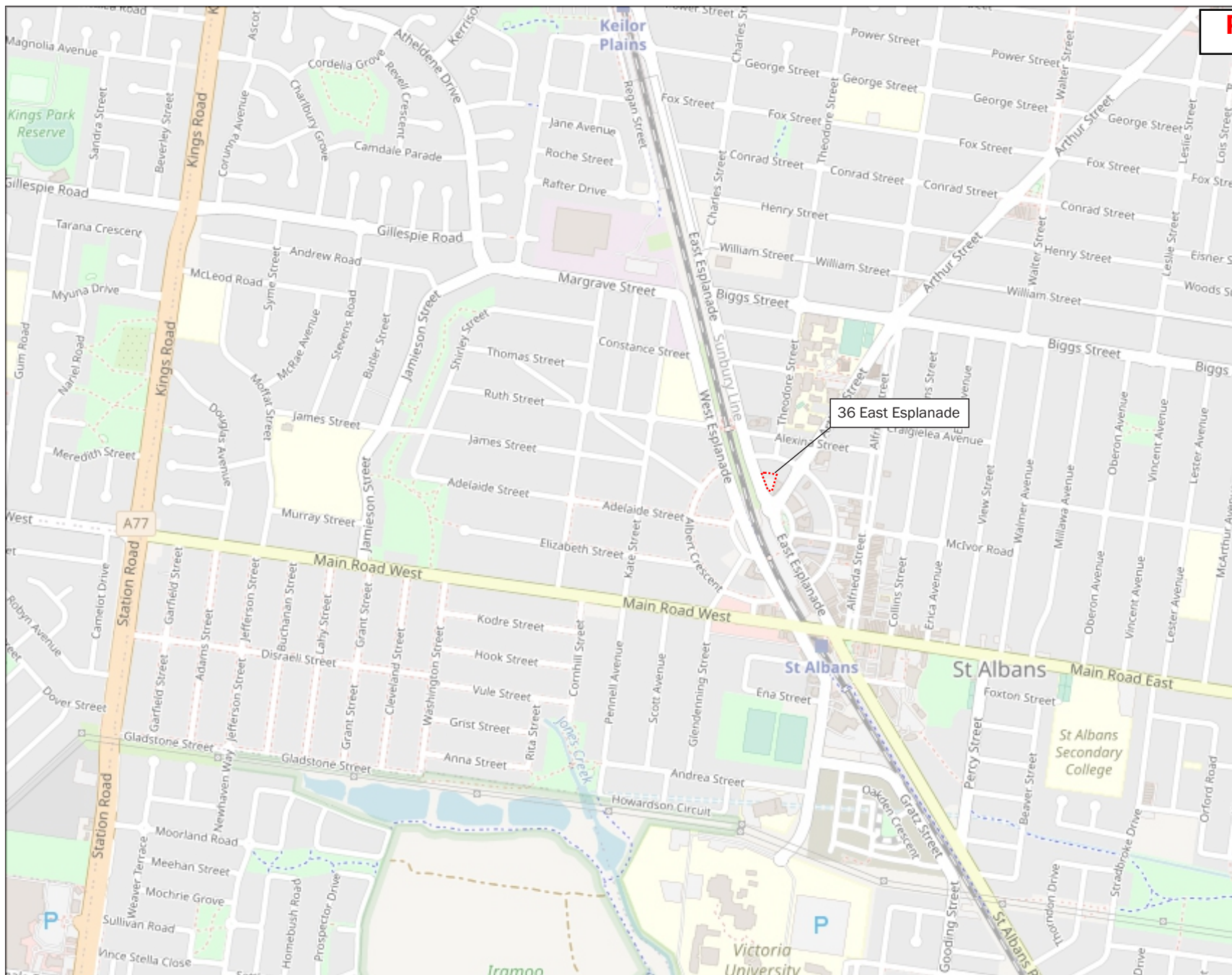
Figure 2: Site Layout and Soil and Soil Vapour Sampling Locations

PRSA REPORT FIGURE 1

LEGEND



SITE BOUNDARY



NOTE: ALL LOCATIONS ARE APPROXIMATE.
DIMENSIONS IN METRES (m)



Source: Open Street Map

AGS
ENVIRONMENTAL SERVICES

PROJ. REF: AGS210302
DATE: 28/09/2021
DRAWN: SJJP
APPROVED: CH
FILENAME: AGS210302 St Albans\DWG\Report Figures\Site Location.cdr

SITE LOCATION

36 East Esplanade, St Albans

FIGURE
1

PRSA REPORT FIGURE 2

LEGEND



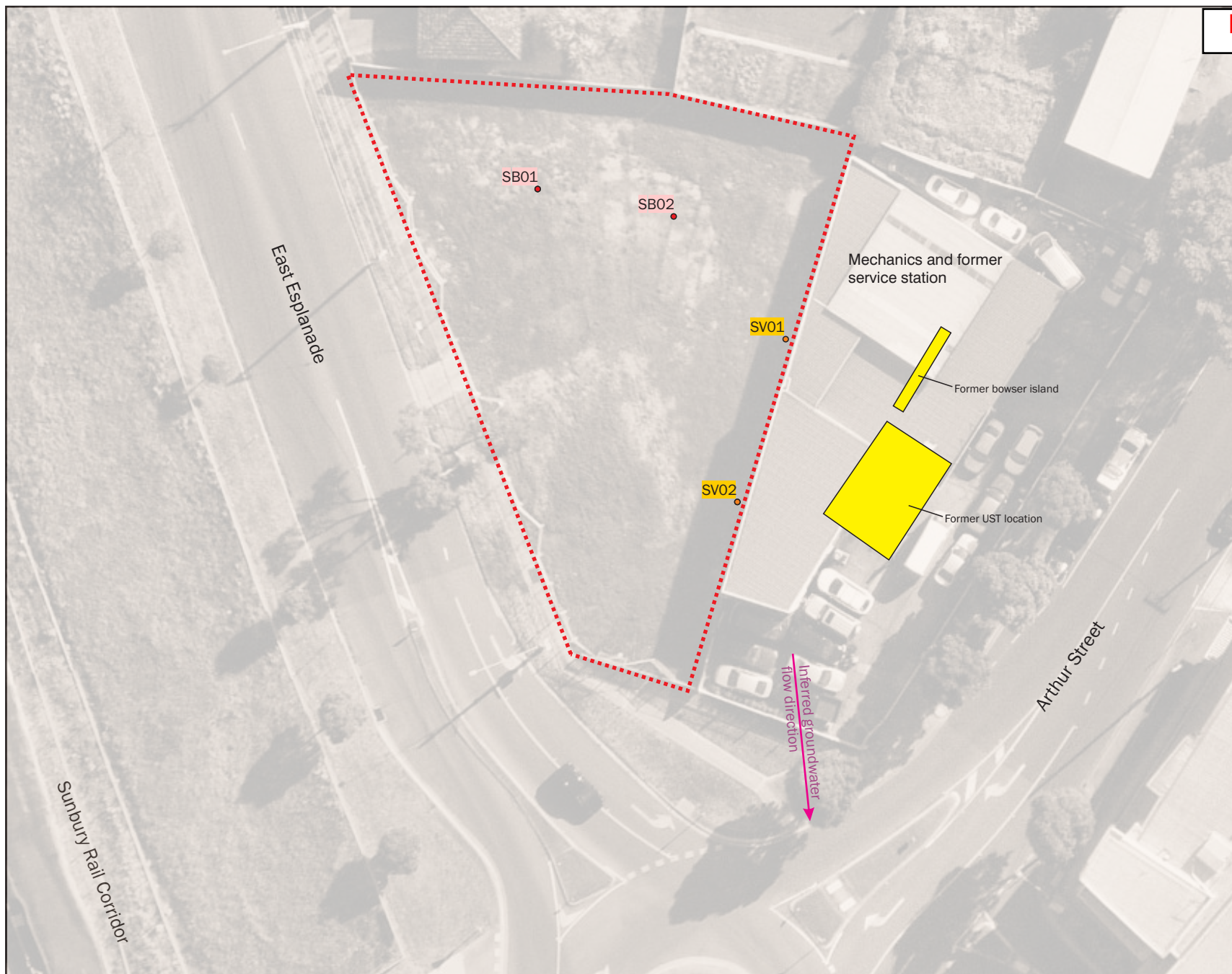
SITE BOUNDARY



Soil Sample location



Soil Gas Location



NOTE: ALL LOCATIONS ARE APPROXIMATE.
DIMENSIONS IN METRES (m)



20

AGS
ENVIRONMENTAL SERVICES

PROJ. REF: AGS210302

DATE: 05/11/2021

DRAWN: SJJP

APPROVED: RB

FILENAME: AGS210302 St Albans\DWG\Report Figures\Site Plan.cdr

SITE PLAN

36 East Esplanade, St Albans

FIGURE

2



Summary Tables

		OCP		Phenols		Metals													Organic				Inorganics				
		Organochlorine pesticides EPAVic Other organochlorine pesticides EPAVic		Phenols (non-halogenated) EPAVic Phenols(halogenated) EPAVic		Arsenic Cadmium Chromium (hexavalent) Chromium (III+VI) Copper Lead Mercury Molybdenum Nickel Selenium Silver Tin Zinc													TRH >C10-C16 (after silica gel clean-up) TRH >C10-C40 (total) (after silica-gel clean up)* TRH >C16-C34 (after silica gel clean-up) TRH >C34-C40 (after silica gel clean-up)				Cyanide Total Fluoride Moisture Moisture Content (dried @ 103°C) pH (aqueous extract)				
mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	MG/KG	MG/KG	MG/KG	MG/KG	mg/kg	mg/kg	%	%	pH	pH	
EOL	0.1	0.1			2	0.4	1	1	1	1	0.1	5	1	2	2	10	1	50	100	100	100	5	100	0.1	1	0.1	
NEPM 2013 EIL						100	10		410	230	1170	12		430	0.52		935										
NEPM 2013 Table 1A(1) HILs Comm/Ind D Soil						3000	900	3600		240000	1500	730		6000	10000		400000										
NEPM 2013 Table 1A(3) Res A/B Soil HSL for Vapour Intrusion, Clay																											
0-1m																											
Field_ID	Sampled_Date-Time																										
SB01/0.2	8/11/2021	<0.1	<0.1	<57.7	<5.5	3.3	<0.4	<1	48	23	190	<0.1	<5	34	<2	<2	<10	110	<50	<100	<100	<100	<5	180	-	19 - 22	7.9
SB01/0.6	8/11/2021	-	-	-	-	<2	<0.4	-	52	9.2	17	<0.1	-	32	-	-	-	22	-	-	-	-	-	-	-	23	-
SB02/0.2	8/11/2021	-	-	-	-	2.6	<0.4	-	74	21	41	<0.1	-	39	-	-	-	55	-	-	-	-	-	-	-	22	-
SB02/0.6	8/11/2021	-	-	-	-	<2	<0.4	-	36	8.5	9.5	<0.1	-	23	-	-	-	19	-	-	-	-	-	-	-	22	-

		TPH				TRH - 2013 NEPM Fractions						TRH - 1999 NEPM Fractions						BTX						MAH						Solvents					
		TPH C10-C36 (Total) (after silica gel clean-up)	TPH C10-C14 Fraction after Silica Cleanup	TPH C15-C28 Fraction after Silica Cleanup	TPH C29-C36 Fraction after Silica Cleanup	C6-C10 less BTEX (F1)	F2-NAPHTHALENE	C6-C10	C10-C16	C16-C34	C34-C40	C10 - C40 (Sum of total)	C6 - C9	C10 - C14	C16 - C28	C29-C36	+C10 - C36 (Sum of total)	Benzene	Toluene	Ethylbenzene	Total BTEX	Xylene (m & p)	Xylene (o)	Xylene Total	Total MAH	1,2,4-trimethylbenzene	1,3,5-trimethylbenzene	Isopropylbenzene	Styrene	Monocyclic aromatic hydrocarbons EPA/IC	Methyl Ethyl Ketone	4-Methyl-2-pentanone	Acetone	Allyl chloride	Carbon disulfide
EOL		100	20	50	50	20	50	20	50	100	100	50	20	20	50	50	50	0.1	0.1	0.1	1	0.2	0.1	0.3	0.5	0.5	0.5	0.5	0.5		0.5	0.5	0.5	0.5	0.5
NEPM 2013 EIL						180	120			1300	5600							65	105	125				45											
NEPM 2013 Table 1A(1) HILs Comm/Ind																																			
NEPM 2013 Table 1A(3) Res A/B Soil HS																																			
0-1m						50	280											0.7	480	NL				110											
Field_ID	Sampled_Date-Time																																		
SB01/0.2	8/11/2021	<50	<20	<50	<50	<20	<50	<20	<50	1200	590	1790	<20	<20	420	1200	1620	<0.1	<0.1	<0.1	-	<0.2	<0.1	<0.3	<0.5	<0.5	<0.5	<0.5	<0.5	<1.1	<0.5	<0.5	<0.5	<0.5	<0.5
SB01/0.6	8/11/2021	-	-	-	-	<20	<50	<20	<50	<100	<100	<100	<20	<20	<50	<50	<50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB02/0.2	8/11/2021	-	-	-	-	<20	<50	<20	<50	<100	<100	<100	<20	<20	<50	72	72	<0.1	<0.1	<0.1	-	<0.2	<0.1	<0.3	-	-	-	-	-	<0.6	-	-	-	-	-
SB02/0.6	8/11/2021	-	-	-	-	<20	<50	<20	<50	<100	<100	<100	<20	<20	<50	<50	<50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

		Chlorinated Hydrocarbons																												Halogenated Benzenes											
		1,1,1,2-tetrachloroethane	1,1,1-trichloroethane	1,1,2,2-tetrachloroethane	1,1,2-trichloroethane	1,1-dichloroethane	1,1-dichloroethene	1,2,3,4-tetrachloropropane	1,2-dichloroethane	1,2-dichloropropane	1,3-dichloropropane	Bromochloromethane	Bromodichloromethane	Bromoforn	Carbon tetrachloride	Chlorodibromomethane	Chloroethane	Chloroform	Chloromethane	cis-1,2-dichloroethene	cis-1,3-dichloropropene	Dibromomethane	Dichloromethane	Hexachlorobutadiene	Trichloroethane	Tetrachloroethene	trans-1,2-dichloroethene	trans-1,3-dichloropropene	Vinyl chloride	Chlorinated hydrocarbons EPA1c	Other chlorinated hydrocarbons EPA1c	1,2,4-trichlorobenzene	1,2-dichlorobenzene	1,3-dichlorobenzene	1,4-dichlorobenzene	4-chlorotoluene	Bromobenzene	Chlorobenzene	Hexachlorobenzene		
EOL		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.05
NEPM 2013 EIL																																									
NEPM 2013 Table 1A(1) HILs Comm/Ind																																									80
NEPM 2013 Table 1A(3) Res A/B Soil HS																																									
0-1m																																									
Field_ID	Sampled_Date-Time																																								
SB01/0.2	8/11/2021	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05
SB01/0.6	8/11/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB02/0.2	8/11/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB02/0.6	8/11/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

		Halogenated Hydrocarbons					PAH					PAH/Phenols																														
		1,2-dibromoethane	Bromomethane	Dichlorodifluoromethane	Iodomethane	Trichlorofluoromethane	Benzo(a)pyrene TEQ (lower bound) *	Benzo(a)pyrene TEQ (medium bound) *	Benzo(a)pyrene TEQ (upper bound) *	Benzo(b+ j)fluoranthene	Polycyclic aromatic hydrocarbons EPA/IC	2,4-dimethylphenol	2,4-dinitrophenol	2-methylphenol	2-nitrophenol	3,4-methylphenol	4,6-Dinitro-2-methylphenol	4-chloro-3-methylphenol	4-nitrophenol	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a) pyrene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Cresol Total	Dibenz(a,h)anthracene	Carcinogenic PAHs (as B[a]P TPE, PEFx3)	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	Naphthalene	PAHs (Sum of total)	Phenanthrene	Phenol	Pyrene				
EOL		0.5	0.5	0.5	0.5	0.5	MG/KG	MG/KG	MG/KG	mg/kg	mg/kg	5	0.2	1	0.4	5	1	5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		
NEPM 2013 EIL																					2.5			0.7																		
NEPM 2013 Table 1A(1) HILs Comm/Ind																												25000									4000		240000			
NEPM 2013 Table 1A(3) Res A/B Soil HS																																										
0-1m																																				5						
Field_ID	Sampled_Date-Time																																									
SB01/0.2	8/11/2021	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<7.5	<0.5	<5	<0.2	<1	<0.4	<5	<1	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.21	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
SB01/0.6	8/11/2021	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	
SB02/0.2	8/11/2021	-	-	-	-	-	<0.5	0.6	1.2	<0.5	<7.5	-	-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<1.21	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
SB02/0.6	8/11/2021	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-

		Phenolics		Halogenated Phenols								Herbicides		Organochlorine Pesticides																				Polychlorinated Biphenyls																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
		4,6-Dinitro-o-cyclohexyl phenol	Phenols (Total Halogenated)		Phenols (Total Non Halogenated)	2,4,5-trichlorophenol	2,4,6-trichlorophenol	2,4-dichlorophenol	2,6-dichlorophenol	2-chlorophenol	Pentachlorophenol	tetrachlorophenols	Dinoseb	4,4-DDE	a-BHC	Aldrin	Aldrin + Dieldrin	b-BHC	chlordane	g-BHC	DDD	DDT	DDT + DDE + DDD	Dieldrin	Endosulfan I	Endosulfan II	Endosulfan sulphate	Endrin	Endrin aldehyde	Endrin ketone	g-BHC (Lindane)	Heptachlor	Heptachlor epoxide	Methoxychlor	Toxaphene	Arochlor 1016	Arochlor 1221	Arochlor 1232	Arochlor 1242	Arochlor 1248	Arochlor 1254	Arochlor 1260	PCBs a (Sum of total)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
			mg/kg	mg/kg																																								mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg

						Air														TRH - 2013 NEPM Fractions					
		Freon 113	2-Propanol	Propene		1-Butene	1-Pentene	2-Methyl-2-Butene	2,2,4-Trimethylpentane	Acetylene	cis-2-Pentene		Freon 114	Isobutylene	Methyl Acetylene	Isopentane	Isobutane	Propadiene	trans-2-Butene	trans-2-Pentene		CoC10	CoC10 TRH minus BTEX (F1)	>C10-C12	F2-NAPHTHALENE
		µg/m3	µg/m3	µg/m3		MOL %	MOL %	MOL %	UG/M3	MOL %	MOL %		UG/M3	MOL %	MOL %	MOL %	MOL %	MOL %	MOL %	MOL %		ug/m3	ug/m3	ug/m3	ug/m3
EQL		3.8	50	8.6	0.03	0.01	0.01	9.3	0.01	0.01		3.5	0.03	0.01	0.01	0.03	0.01	0.03	0.01	100	100	100	100		
NEPM 2013 Table 1A(5) Comm/Ind D Soil Vapour HSL for Vapour Intrusion, Clay																									
0-1m																						1,000,000		800000	
NSW Vapour Intrusion - Technical Practice Note 2010																									
NEPM 2013 Table 1A(2) Comm/Ind D Soil Vap VOCC HILs																									
Field_ID	Sampled_Date-Time																								
SV01	17/11/2021	<9	360	<8.6	<0.07	<0.02	<0.02	<23	<0.02	<0.02	<8	<0.07	<0.02	<0.02	<0.07	<0.02	<0.07	<0.02	<0.02	300	<120	<120	<120		
SV02	17/11/2021	<9	<116	<8.6	<0.07	<0.02	<0.02	<22	<0.02	<0.02	<8	<0.07	<0.02	<0.02	<0.07	<0.02	<0.07	<0.02	<0.02	<120	<120	<120	<120		

		BTEX						MAH				Alkanes	VOCs	Solvents														
		Benzene	Ethylbenzene	Toluene	Xylene (m & p)	Xylene (o)	Xylene Total	1,2,4-trimethylbenzene	1,3,5-trimethylbenzene	1-methyl-4 ethyl benzene	Styrene	Hexane	Heptane	1,3-Butadiene	1,4-Dioxane	Methyl Ethyl Ketone	2-hexanone (MBK)	4-Methyl-2-pentanone	Acetone	Allyl chloride	Carbon disulfide	Cyclohexane	Ethanol	MTBE	Tetrahydrofuran	Vinyl acetate		
EQL		µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	ug/m3	ug/m3	µg/m3	ug/m3	µg/m3	ug/m3	µg/m3	µg/m3		
		1.6	2.2	7.5	4.4	2.2	6.6	2.5	2.5	2.5	2.1	5	2.1	2.2	7.2	5.9	8.2	2.1	16.6	1	15.6	3.5	9.4	7.2	1.5	7		
NEPM 2013 Table 1A(5) Comm/Ind D Soil Vapour HSL for Vapour Intrusion																												
0-1m		5000	1800000	6500000			1200000																					
NSW Vapour Intrusion - Technical Practice Note 2010																												
NEPM 2013 Table 1A(2) Comm/Ind D Soil Vap VOCs HILs																												
Field_ID	Sampled_Date-Time																											
SV01	17/11/2021	42	16	230	220	79	300	59	21	<6	<5	<5	<5	<3	<17	<14	<20	<5	<29	<15	<15.6	<4	<9.4	<17	<4	<17		
SV02	17/11/2021	<4	<5	<7.5	<10	<5	<15	<6	<6	<6	<5	<5	<5	<3	<17	<14	<19	<5	<28	<15	<15.6	<4	<9.4	<17	<3	<17		

		Chlorinated Hydrocarbons																							
		1,1,1-trichloroethane	1,1,2,2-tetrachloroethane	1,1,2-trichloroethane	1,1-dichloroethane	1,1-dichloroethene	1,2-dichloroethane	1,2-dichloropropane	Benzyl chloride	Bromodichloromethane	Bromoform	Carbon tetrachloride	Chlorodibromomethane	Chloroethane	Chloroform	Chloromethane	cis-1,2-dichloroethene	cis-1,3-dichloropropene	Dichloromethane	Hexachlorobutadiene	Trichloroethene	Tetrachloroethene	trans-1,2-dichloroethene	trans-1,3-dichloropropene	Vinyl chloride
		µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	ug/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3
EOL		2.7	3.4	2.7	2	2	2	2.3	2.6	3.4	5.2	3.1	4.3	5.3	2.4	10.3	2	2.3	17.4	21.3	2.7	3.4	2	2.3	2.5
NEPM 2013 Table 1A(5) Comm/Ind D Soil Vapour HSL for Vapour Intrusion																									
0-1m																									
NSW Vapour Intrusion - Technical Practice Note 2010					700	200	700								140	3			450						1.1
NEPM 2013 Table 1A(2) Comm/Ind D Soil Vap VOCs HILs		230000															300				80	8000			100
Field_ID	Sampled_Date-Time																								
SV01	17/11/2021	<7	<8	<7	<5	<5	<5	<6	<6	<8	<13	<8	<10	<13	<6	<25	<5	<5	<42	<52	<6	<8	<5	<5	<3
SV02	17/11/2021	<6	<8	<6	<5	<5	<5	<5	<6	<8	<12	<7	<10	<12	<6	<24	<5	<5	<41	<50	<6	<8	<5	<5	<3

	Halogenated Benzenes					Halogenated Hydrocarbons				PAH/Phenols
	1,2,4-trichlorobenzene $\mu\text{g}/\text{m}^3$	1,2-dichlorobenzene $\mu\text{g}/\text{m}^3$	1,3-dichlorobenzene $\mu\text{g}/\text{m}^3$	1,4-dichlorobenzene $\mu\text{g}/\text{m}^3$	Chlorobenzene $\mu\text{g}/\text{m}^3$	1,2-dibromoethane $\mu\text{g}/\text{m}^3$	Bromomethane $\mu\text{g}/\text{m}^3$	Dichlorodifluoromethane $\mu\text{g}/\text{m}^3$	Trichlorofluoromethane $\mu\text{g}/\text{m}^3$	Naphthalene $\mu\text{g}/\text{m}^3$
EQL	15	3	3	3	2.3	3.6	19.4	2.5	2.8	10.5
NEPM 2013 Table 1A(5) Comm/Ind D Soil Vapour HSL for Vapour Intrusion										
0-1m										4000
NSW Vapour Intrusion - Technical Practice Note 2010										
NEPM 2013 Table 1A(2) Comm/Ind D Soil Vapour VOCC HILs										

Field_ID Sampled_Date-Time

SV01	17/11/2021	<36	<7	<7	<7	<6	<9	<47	<6	<7	<26
SV02	17/11/2021	<35	<7	<7	<7	<5	<8	<46	<6	<7	<25