

AUSTRALIAN
ENVIRONMENTAL AUDITORS

Environmental Audit Report

15 Breese Street, Brunswick, Victoria

Prepared for:
MH Property

Prepared by:
Australian Environmental Auditors Pty Ltd

Date:
8 September 2016

Project Number:
EA0480

Service Order No.:
8005071

CARMs No.:
74533-1

Environmental Audit Report

15 Breese Street
Brunswick, VIC 3056

Prepared for:

Mr Michael Hristovski
MH Property
3.01/17-19 Yarra Street
Abbotsford VIC 3067

Prepared by:

Australian Environmental Auditors Pty Ltd
Suite 21, 1 Ricketts Road
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Date of Report:

8 September 2016

Author:



Charles D Barber
Environmental Auditor (Contaminated Land)
(Appointed pursuant to section 53S (1) of the *Environment Protection Act 1970* (Vic.)

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ENVIRONMENT PROTECTION ACT 1970

CERTIFICATE OF ENVIRONMENTAL AUDIT

I, Charles David Barber of Australian Environmental Auditors Pty Ltd, a person appointed by the Environment Protection Authority ('the Authority') under the *Environment Protection Act 1970* ('the Act') as an environmental auditor for the purposes of the Act, having

1. been requested by Mr Michael Hristovski the owner of MH Property and caveator to issue a certificate of environmental audit in relation to the site located at 15 Breese Street, Brunswick Victoria 3056 ('the site').

2. had regard to, among other things,

   (i) guidelines issued by the Authority for the purposes of Part IXD of the Act,
   (ii) the beneficial uses that may be made of the site
   (iii) relevant State environment protection policies/industrial waste management policies, namely,

   - SEPP (Air Quality Management)
   - SEPP (Ambient Air Quality)
   - SEPP (Waters of Victoria)
   - SEPP (Groundwaters of Victoria)
   - SEPP (Prevention and Management of Contamination of Land)
   - Environment Protection (Industrial Waste Resource) Regulations 2009

   in making a total assessment of the nature and extent of any harm or detriment caused to, or the risk of any possible harm or detriment which may be caused to, any beneficial use made of the site by any industrial processes or activity, waste or substance (including any chemical substance), and

3. completed an environmental audit report in accordance with section 53X of the Act, a copy of which has been sent to the Authority and the relevant planning and responsible authority.

HEREBY CERTIFY that I am of the opinion that the condition of the site is neither detrimental nor potentially detrimental to any beneficial use of the site.

Other related information

- Groundwater beneath the site is polluted. The site is not the source of the pollution and is considered not to affect any relevant beneficial uses of the site;
- Groundwater at the site contains elevated concentrations of nitrate (based on information from surrounding audit sites). The levels are considered to be associated with off-site regional sources of pollution. The pollution is not sourced from the site and is considered not to affect any beneficial uses of the site.
- The site is not considered a source of groundwater pollution and groundwater was not tested as it does not impact on the beneficial uses of land and/or groundwater. If groundwater is to be extracted from the site, advice including testing, should be sought from a suitably qualified person to ensure the groundwater is suitable for the intended use;
- The auditor is satisfied that the groundwater has been cleaned up to the extent practicable and the site is a groundwater quality restricted use zone (also known as a GQRUZ). The extent of the recommended GQRUZ is shown on Figure A, attached;
- Groundwater must not be used for any precluded beneficial use without prior testing and review of results by a suitably qualified professional to confirm its suitability for the proposed use. It may be extracted for the purpose of environmental monitoring or remediation;

- In accordance with clause 19(3) of SEPP – Groundwaters of Victoria (1997), the Authority may require periodic reassessment of the practicality of groundwater clean-up;
- Any fill or soil imported to the site must be chemically tested soil or fill that classifies as "fill material" in accordance EPA Publication IWRG 621;
- Any material excavated from the site and disposed of off-site must be classified and managed in accordance with relevant statutory regulations and EPA Publication IWRG 621; and
- In accordance with section 53ZE of the Act, the owner/occupier of the site should provide a copy of this certificate to any person who becomes or proposes to become an occupier of the site.

This certificate forms part of an environmental audit report (Australian Environmental Auditors Pty Ltd, Environmental Audit Report, 15 Breese Street, Brunswick, Victoria, 3056; Report Ref: EA0480, EPA CARMS No. 74533-1, Service Order No. 8005071, 7 September 2016). Further details regarding the condition of the site may be found in the environmental audit report.

DATED 8 September 2016

Signed:



Charles David Barber
ENVIRONMENTAL AUDITOR (appointed pursuant to the *Environment Protection Act 1970*)

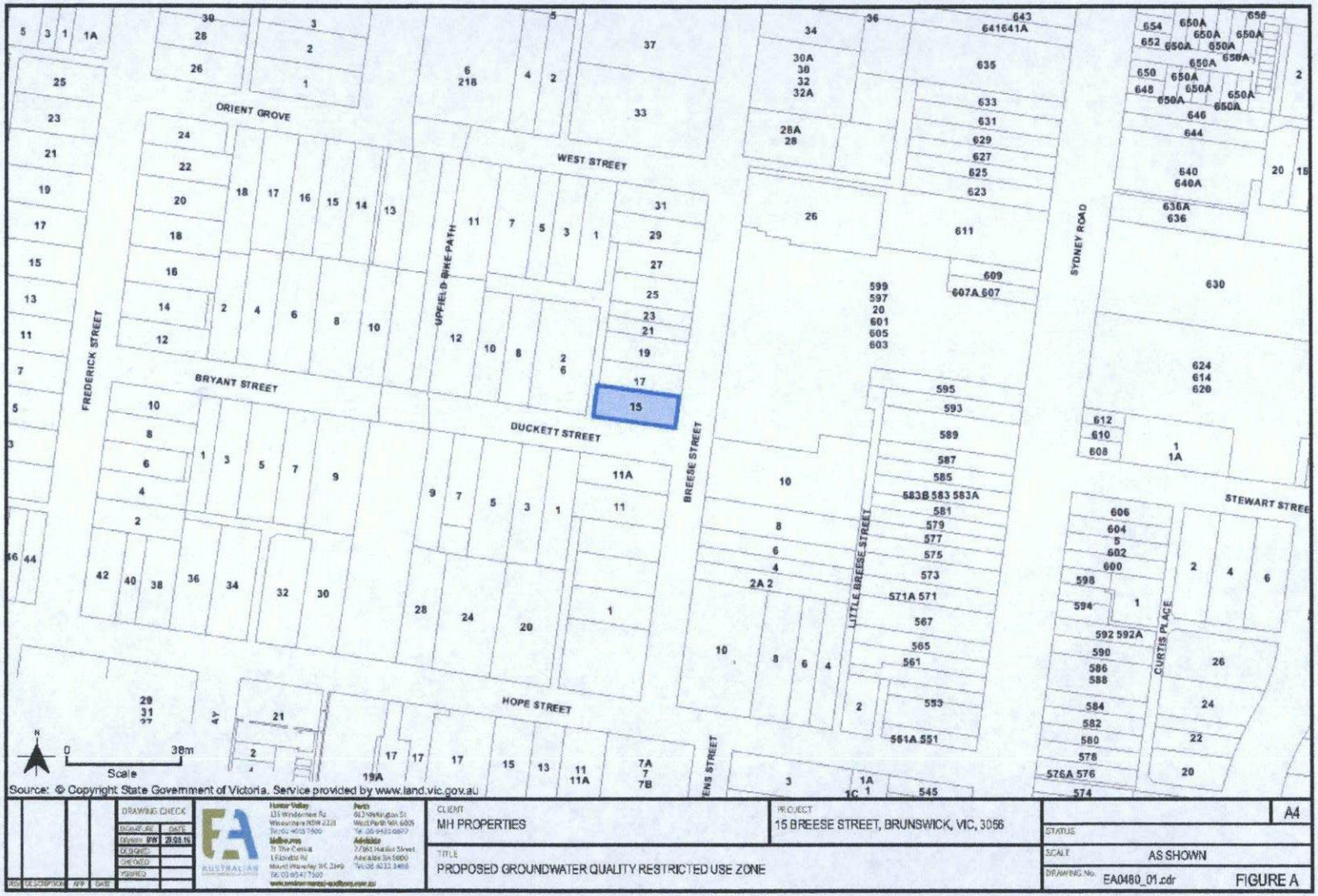


Figure A: Proposed groundwater quality restricted use zone (End of Statement)

Executive Summary

Mr Charles Barber of Australian Environmental Auditors Pty Ltd (AEA) is a Victorian EPA appointed Environmental Auditor (Contaminated Land), appointed pursuant to Section 53S (1) of the *Environment Protection Act 1970*. Mr Barber was engaged on 7 June 2016 by Mr Michael Hristovski of MH Property and a caveator of the site to complete an environmental audit for the site identified as 15 Breese Street, Victoria, 3056. The environmental audit relates to land defined as Lot 1 on Title Plan 554267D. The audit is based on investigations made by the site assessors EP Risk Management (EP Risk) and subsequently confirmed by the auditor.

In accordance with EPA Victoria Publication 1147.2, relevant information is summarised in Table 1 and Table 2.

Table 1: Summary of audit information

Item	Detail
Auditor	Charles Barber
Auditor account number	75634
Auditor appointment end date	26 July 2014 to 25 July 2019
Auditor's appointment category	CL
Audit Type	53X
Date EPA notified of audit	14 June 2016
Audit service order number	8005071
Name of person requesting audit	Mr Michael Hristovski
Relationship of person requesting audit to site	Caveator to the site
Name of premises owner	Paraon Pty Ltd
Date of auditor engagement	7 June 2016
Completion date of the audit	8 September 2016
Reason for Audit	Planning Permit Conditions (MPS/2015/279) Environmental Audit Overlay
Audit Categorisation	'Risk'
Environmental Segments	'Air, Land, Groundwater, Surface Water'
If the audit was required by an EPA notice, licence or other, please provide EPA reference number	–
Current land use zoning	Commercial 1 Zone (C1Z)
EPA Region	Metro
Municipality	Moreland City Council
Dominant Lot on title plan	Lot 1 on Title Plan 554267D
Additional Lot on title plan(s)	–
Site/Premises name	–
Building/complex sub-unit/lot No.	–

Item	Detail
Street/Lot – Lower No.	15
Street/Lot – Upper No.	–
Street Name	Breese
Street type (road, court, etc)	Street
Street suffix (North, South etc)	–
Suburb	Brunswick
Postcode	3056
GIS Coordinate of Site centroid1 Latitude (GDA94) s2 Longitude (GDA94)	 -37.763211 144.961219
Site area (in square metres)	~267 m^2
Members and categories of support team utilised	Gurdeep Khosa (Internal Auditor's Assistant)
Further works or requirements	None
Nature and extent of continuing risk	None
Outcome of the audit	A Certificate of Environmental Audit was issued for the site
Has EPA determined CUTEP at this site?	No
Has EPA determined CUTEP at this site?	No
Has the Auditor determined CUTEP at this site?	Yes
Has a GQRUZ been identified at the site/beyond the site by EPA?	No
Does NAPL remain at the site?	N/A
Please indicate which of the Protected Beneficial Uses of groundwater are precluded due to pollution	See table below

Protected Use	Precluded?
Maintenance of Ecosystems	YES[1]
Potable Water Supply (Desirable)	n/a
Potable Water Supply (Acceptable)	n/a
Potable Mineral Water Supply	^
Agriculture, Parks and Gardens	YES[1]
Stock Watering	NO
Primary Contact Recreation	NO
Industrial water use	NO
Buildings and Structures	NO

1 – beneficial use precluded due to assumed groundwater concentrations however not considered to be relevant on site and not likely to be realised offsite

n/a – not assessed as part of this audit.

^ not in a mineral water zone.

^The following equation can be used to convert Degrees° Minutes' Seconds" (D°M'S") into Decimal Degrees (DD°): DD° = Degrees + ((Minutes × 60 + Seconds)/3600).

[1] Longitude and latitude (decimal degrees) co-ordinates in the 1994 Geocentric Datum of Australia (GDA94) is required to six decimal places.
[2] The following equation can be used to convert Degrees° Minutes' Second" (D°M'S") into Decimal Degrees (DD°). DD° = Degrees + ((Minutes * 60 + Seconds)/3600).

Table 2: Physical site information

Item	Detail
Historical land use	1884 – 1997: site listed as residential; and 1997: current use, owner Paraon Pty Ltd
Current land use	Vacant/commercial storage
Proposed future land use	Sensitive Use – High-density residential and commercial
Surrounding land use – north	Low density residential
Surrounding land use – south	Combination of low density residential and commercial
Surrounding land use – east	Recently constructed high density residential building, with commercial on the ground floor
Surrounding land use – west	High density residential development abuts the site with commercial properties and a railway line beyond
Proposed land use zoning	High-density residential
Nearest surface water receptor – name	Moonee Ponds Creek
Nearest surface water receptor – distance (m)	~2.8 km
Nearest surface water receptor – direction	Moonee Ponds Creek – southwest
Likely point of groundwater discharge	Moonee Ponds Creek ~2.8 km southwest
Site aquifer formation	Newer Volcanics
Groundwater flow direction	Southerly (surrounding audits indicate southwest to southeast)
Groundwater TDS range (mg/L)	1001–3500 mg/L (based on surrounding audit information
Groundwater Segment	B (based on surrounding audit information)
Are there multiple aquifers impacted by pollution at the site	No
Perched groundwater depth – upper (metres below ground level (mbgl))	N/A
Perched groundwater depth – lower (mbgl)	N/A
Regional groundwater depth – upper (mbgl)	N/A – Groundwater not investigated during audit
Regional groundwater depth – lower (mbgl)	N/A – Groundwater not investigated during audit
Number of bores within 2 km	473
Closest extractive use (distance in m)	Domestic and Stock (1,150 m southeast)
Zone of groundwater plume influence (m from site boundary)	N/A
Year groundwater last monitored	N/A
Have you attached electronic copies of Current Groundwater Analytical Results presented as a summary table?	N/A – Groundwater not investigated during audit

The auditor concludes that the site is suitable for the issue of a Certificate of Environmental Audit (CoEA). The CoEA states that the site is suitable for any beneficial use.

Proposed Site Development

It is proposed that the site will be developed for mixed land uses of Sensitive Use (high density) and Commercial, consisting of multi storey, mixed high density residential development with ground floor commercial use and tenant parking. The proposed development will cover all areas of the site.

The proposed development is considered:

- Sensitive Use (high density) and Commercial in terms of the State Environment Protection Policy (SEPP) – Prevention and Management of Contamination of Land (2002); and
- Residential B scenario, with minimal opportunities for soil access, in terms of the Amended National Environment Protection (Assessment of Site Contamination) Measure 1999 (Amended ASC NEPM, 2013).

Site Assessment

EP Risk (the assessor) undertook a site history review to establish potential areas and contamination of concern. The resulting soil assessment included installation of five soil bores (BH1-BH5). The maximum depth of investigation was ~1.0 to 1.3 metres below ground level (m bgl) and was terminated due to refusal on basalt/rock. The assessor collected and requested selected laboratory analysis from shallow (~0.25 mbgl) and deeper (1.0 mbgl) borehole samples. Soil bores were advanced to assess the potential for contamination and need for further assessment including whether a groundwater investigation was required.

The site consisted of a two storey building with front and rear areas consisting of concrete hardstand and grass cover. At the time of site investigations, the assessor reported that a building was occupied by a tenant and there were no commercial operations or indications of potential contamination or contaminating activities observed.

Risk Assessment – Land

The results of the assessment indicated that the site's historical activities have resulted in minimal soil contamination. The assessor reported no visual or olfactory signs of contamination during soil assessment works associated with the Detailed Site Investigation (DSI). Analytical results reported concentrations of contaminants of potential concern (CoPC) below the adopted human health and ecological criteria.

Risk Assessment – Groundwater

Groundwater was not assessed as part of the audit. However, based on the outcome from nearby surrounding audits, relevant groundwater beneficial uses are precluded by a regional source of pollution for nitrate (Maintenance of Ecosystems and Agriculture Parks and Garden). The site is not the source of pollution. The groundwater beneficial uses precluded by contamination are not relevant at the site nor do they preclude any beneficial uses of land.

Audit Outcome

A Certificate of Environmental Audit has been issued for the audit site. The auditor concluded that the site is suitable for any beneficial use.

Read in Conjunction with Audit Report

This Executive Summary summarises the key points of the audit report. The Executive Summary must be read in conjunction with the full Environmental Audit Report, Australian Environmental Auditors Pty Ltd, Environmental Audit Report, 15 Breese Street, Brunswick, Victoria, 3192; Report Ref: EA0480, EPA CARMS No. 74533-1, Service Order No. 8005071, 7 September 2016, and the associated Certificate of Environmental Audit.

Citation of State Environment Protection Policies in Text

The following style has been used for citation of State Environment Protection Policies (SEPPs) in this report.

In-text Citation	SEPP
Groundwater SEPP	State Environment Protection Policy. *Groundwaters of Victoria*. Victorian Government Gazette, S160, 17 December 1997 as varied by Victoria Government Gazette G12 21 March 2002
Land SEPP	State Environmental Protection Policy. *Prevention and Management of Contamination of Land*. Victorian Government Gazette, S95, 3 June 2002 as varied by Victorian Government Gazette G39, 26 September 2013
Ambient Air SEPP	State Environment Protection Policy. *Ambient Air Quality*. Victorian Government Gazette, S19, 9 February 1999 as varied by the Victoria Government Gazette S240 on 21 December 2001
Air Management SEPP	State Environment Protection Policy. *Air Quality Management*. Victoria Government Gazette S240, 21 December 2001
Water SEPP	State Environment Protection Policy. *Waters of Victoria*. Victorian Government Gazette, 15 March 1988, as varied to Victoria Government Gazette S210 on 3 October 2004.

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1 Introduction

This statutory Environmental Audit Report (EAR) has been prepared in response to a request by Mr Michael Hristovski of MH Property and caveator to the site located at 15 Breese Street, Brunswick, Victoria (the site). The completion of a statutory Environmental Audit (audit) for the site was required for the proposed redevelopment to multi storey mixed commercial and high density residential use.

This report has been prepared by Mr Charles Barber, appointed as an Environmental Auditor (Contaminated Land) pursuant to the *Environment Protection Act 1970 (the Act)*. The audit has been performed in accordance and with regard to *the Act*, relevant state environmental protection policies (SEPPs) and Environment Protection Authority Victoria (EPA) guidelines.

The assessor reporting on the Detailed Site Investigation (DSI) which was used as a basis for this audit was EP Risk Management (EP Risk). The auditor has relied on the assessor's report when forming his opinion regarding the condition of the site. The auditor inspected the site and his representative conducted an inspection and verification of the site near the completion of excavation works, prior to the completion of the assessor's final report.

1.1 Input to this Report by Auditor's Support Team

The auditor did not need the assistance of his external expert support team for the audit. However, he did utilise his internal support from AEA, specifically Mr Gurdeep Khosa who assisted with detailed review of assessment reports, liaison with the assessor and preparing a draft of this environmental audit report (EAR).

1.2 Background Information

The site is located on the western side of Breese Street, Brunswick, Victoria (corner of Breese Street and Duckett Street) and is rectangular shape, with an approximate area of ~267m^2. The site has been used for residential purposes until somewhat recently and then used for storage. The location/setting of the site is illustrated in Figure 1, the site layout including the site building location and features of the environmental investigations is shown in Figure 2.

1.3 Purpose of the Audit

The audit of the site was completed to meet requirements outlined in Condition 7 of the planning permit (MPS/2015/279) and to satisfy assessment associated with an Environmental Audit Overlay (EAO). The audit included assessing the site with regard to historical activities potentially impacting on beneficial uses. The auditor considered the site conditions relative to the proposed use and made an assessment of the suitability of the site for the proposed use of mixed commercial and residential as well as all potential protected beneficial uses.

1.4 Audit Objective

The objective of the audit was to determine the suitability of the site for its proposed use as per the Minister's Direction No. 1 (1992), *Potentially Contaminated Land* by issuing a Certificate of Environmental Audit (CEA) or Statement of Environmental Audit (SEA). Where the environmental condition of the site does not preclude any of the applicable beneficial uses a CEA can be issued by the auditor for the site. However, if the environmental condition of the site precludes any of the applicable beneficial uses a SEA detailing specific uses and any conditions that must be undertaken to enable the site to be used for that specific use. The CEA or SEA is designed to provide community decision makers such as the planning authority, prospective purchasers and financial institutions, with information regarding both the environmental condition of the site and its suitability for use.

More specifically, the objectives of the audit are to:

- identify and understand the segment to be audited;

- identify and understand the existing and potential beneficial uses of the land (including land, groundwater, surface water and atmosphere (air));
- evaluate the effectiveness of the assessment program;
- evaluate the adequacy of any site remediation that was conducted;
- evaluate the suitability of the site for the proposed redevelopment; and
- provide recommendations as necessary to ensure that the redevelopment of the site is conducted with adequate safeguards.



Figure 1: Site location map

(Source: EP Risk, July 2016)



Figure 2: Site layout, features and sampling locations

(Source: EP Risk, July 2016)

2 Site Characterisation

The audit site is the property identified as 15 Breese Street, Brunswick, Victoria. It is located on the western side of Breese Street, Brunswick, Victoria on the corner of Breese Street and Duckett Street.

2.1 Site Details and Definition

The audit site is generally rectangular in shape, and covers an area of ~267m^2. The site is identified as Lot 1 on Title Plan 554267D of Parent Title Volume 01555 Folio 920. Copies of the Certificate of Title are included as Appendix A of this EAR.

At the time audit, the site consisted of a two storey concrete prefabricated building with a sealed car park to the rear/west of site and grassed front/east of the site. A plan showing the layout of the site at the time of reporting is presented in Figure 2. The site surface is generally flat. The site condition was consistent with observations made by the auditor on 9 June 2016.

2.2 Surrounding Land Uses and Sensitive Receptors

The site is located within a mixed use area comprising commercial and low density residential developments and is surrounded by residential low density housing to the north and to the south, east and west by commercial/residential properties. The uses of land surrounding the site are summarised in Table 3.

Potential receptors within the general vicinity of the site were identified and including the following:

- future residents, workers and site workers at the site and current and future residents and workers at neighbouring properties;
- subsurface groundwater down gradient surface water bodies (Monee Ponds Creek, Merri Creek/Port Phillip Bay); and
- maintenance workers at the site and at neighbouring properties.

The site is located hydrogeologically up gradient of Merri Creek, which is situated approximately 2km east of the site and 8.9km north of Port Phillip Bay. Groundwater from the site is expected to flow towards Monee Ponds Creek located approximately 2.8km in a southwest direction.

Table 3: Surrounding land use

Direction	Surrounding land use
North	Low density residential
East	Recently constructed high density residential building, with commercial on the ground floor
South	Combination of low density residential and commercial.
West	High density residential development abuts the site with commercial properties and a railway line beyond

2.3 Council Planning Scheme

The site is located within a Moreland City Council Planning Scheme Commercial 1 Zone (C1Z). The site is subject to a number of planning overlays including an EAO. An illustration of zoning of the site and surrounding properties is provided in Figure 3.

2.4 Proposed Site Development

It is proposed that the site will be developed for mixed land uses of Sensitive Use (high density) and Commercial. It is understood that the proposed developed is for multi storey, mixed high density residential

development with ground floor commercial use and above ground tenant parking. The final flooring structure of the building will be slab on ground, with subsurface features consisting of lift well and no basement (Appendix B).

2.5 Previous Environmental Audits

The site has not been subject to a previous environmental audit, however, multiple audits have been completed in the vicinity of the site. A search of EPA's online database was undertaken by the assessor and also by the auditor (28 July 2016), which identified numerous audit sites within ~500m radius of the site. Information from eight of the closest audit sites with pertinent information relating to these audit sites is provided in Table 4. The auditor has previously conducted audits at 74–80 Tinning Street and 29–31 Frith Street, Brunswick which is located ~620m northwest and 480m southeast of the site.

Based on the information presented in Table 4 from nearby and up gradient audit sites (CARMS No. 73645-1 and 72363-1), regional groundwater in the site vicinity is expected to have elevated levels nitrate and metals. Nitrate contamination is considered to be a regional issue (e.g. leaking sewers/drains) and based on this assumption, groundwater beneath the site may be impacted.

Some organic contamination associated with an EPA determined CUTEP and associated groundwater quality restricted use zone (GQRUZ) was also identified however the site was ~480m down gradient of the site.

Table 4: Summary of surrounding audit sites

CARMs No.	Site address of audit	Outcome and completion date	Approx. distance and direction from site	Inferred hydraulic position in relation to site^	Soil condition	Groundwater condition / CUTEP / Segment of Groundwater
73645-1	34 Breese Street, Brunswick	Certificate 23 September 2015	120m north-northeast	Up to cross gradient	All results were below laboratory reporting limits or adopted human health and ecological criteria.	Groundwater not assessed CUTEP determined by auditor based on nitrate conditions in groundwater assessed at 37-43 Breese Street (reported audit site – details not available on EPA website at the time of reporting) Assumed Segment B
72363-1	37-43 Breese Street, Brunswick	Statement 22 November 2015	120m north	Up to cross gradient	Nickel concentrations reported above adopted environmental criteria	Naturally-occurring concentrations of certain metals, consistent with the Newer Volcanics aquifer beneath the site. Nitrate and ammonia levels precluded several beneficial uses and deemed to be from leaking sewers. No CUTEP Segment B
63250-1	10-12 Breese Street, Brunswick	Certificate 11 March 2008	10m east	Cross gradient	Fill material contained elevated metals and PAHs above adopted criteria Fill removed from site and remaining soils contained copper and nickel levels.	Elevated concentrations of Heavy Metals (Total Chromium, Copper, Nickel and Zinc) and Phenols precluding maintenance of ecosystems and primary contact recreation beneficial uses were reported. Auditor determined impacts were due to impacts from historical industrial activities within the region. Auditor determined CUTEP determined Segment B
73234-1	6 Florence Street	Statement 17 June 2015	20m north-northwest	Up to cross gradient	Some metals and organics detected above adopted criteria. Semi-quantitative risk assessment concluded that no unacceptable risk was posed to future residents. Construction and environmental management plans were prepared for site works.	Not assessed Assumed Segment B
52306-1	Lots D and K - 21-35 Hope Street, Brunswick	Statement 15 November 2005	220m southwest	Down gradient	PAH and aesthetic impacts identified. Impacted fill was removed from the east portion of the site, but remains below the heritage building and adjacent areas.	Groundwater flows southwest to southeast. Metals and nitrate impacts identified and considered to be associated with off-site pollution or regional conditions. Auditor concluded that groundwater was not polluted from site uses and no clean-up is required. No CUTEP Segment B

CARMs No.	Site address of audit	Outcome and completion date	Approx. distance and direction from site	Inferred hydraulic position in relation to site^	Soil condition	Groundwater condition / CUTEP / Segment of Groundwater
N/A	21-35 Hope Street, Brunswick	Statement 5 April 2006	220m southwest	Down gradient	PAH and aesthetic impacts identified. Extensive excavation and on site containment was conducted. Soil at the site is suitable for high density residential use, but not low density.	Groundwater flow southwest to southeast. Ammonia, benzene and cyanide impacts above criteria identified around former tar tanks. Source of impacts considered by auditor to have been adequately removed. Other groundwater impacts considered to be background or regional. EPA determined CUTEP Segment B
40502-1-A	515-517 Sydney Road Brunswick	Certificate 27 January 2000	220m southeast	Down gradient	Contamination identified in surface fill - excavated and disposed of off-site. New site surface validated to be below adopted criteria.	Qualitative assessment of site groundwater undertaken. CUTEP not assessed Segment not reported
72611-1	80-86 Hope Street	Statement 12 November 2014	380m west-southwest	Down/cross gradient	USTs removed from site and impacted soil excavated. Soil excavated and validated.	Elevated metals and inorganics considered to be background/ off-site pollution sources. Flow measured to the northwest. CUTEP auditor determined Segment B
68776-2	29–31 Frith Street, Brunswick, Victoria (also referred to as 306 Victoria Street, Brunswick)	Statement 7 April 2014	480m southeast	Down gradient	Fill materials contain certain metals and benzo(a)pyrene (B(a)P) above adopted criteria	Groundwater contains elevated metals, chloride, nitrate, chlorinated solvents and dissolved phase hydrocarbons - on and adjacent to the site. Contamination considered to be a combination of naturally occurring, regional conditions and site sourced pollution. On-going management includes groundwater monitoring and mechanical ventilation apparatus into the basement car park. EPA determined CUTEP, site and surrounding areas determined to be within a GQRUZ Segment B
72579-1	74–80 Tinning Street, Brunswick, Victoria	20 March 2014	620m northwest	Up gradient	Shallow fill contained contaminant concentrations above the audit screening criteria for selected metals and B(a)P	Groundwater quality precludes the maintenance of ecosystems and primary contact recreation beneficial uses. However, concentrations considered to be natural and/or regional in nature and do not constitute pollution CUTEP not assessed Segment B

Note:
^based on expected regional groundwater flow direction from surrounding audit information
m bgl – metres below ground level
N/A not available

2.6 Geology

2.6.1 Regional Geology

The assessor's review of the 1974 Geological Survey of Victoria 1:63, 360 Geological Map (Melbourne Sheet) indicates the geology of the site consists of Pleistocene Volcanics of dark to light grey, vesicular olivine basalt with minor interbedded silty sand and baked soil. Underlying lithology consisted of silt and silty sand of the Miocene aged Newport Formation.

2.6.2 Site Geology

Geological conditions at the site have been detailed in the assessor's report based on soil investigations undertaken. Based on the assessor's investigation and review of previous soil borings undertaken at the site, the geology encountered consisted of weathered basalt clay, underlain by competent basalt at depths ranging from 1.0 to 1.3 metres below ground level (m bgl).

2.7 Hydrogeology

2.7.1 Regional Hydrogeology

The assessor's review of the site's regional hydrogeology was based on the Geological Survey of Victoria 1:1,000,000 Groundwater Basins of Victoria map which indicated that the underlying aquifer lithology consisted of basalt, tuff and scoria, the bore yield in the area is expected to be greater than 10 litres per second (L/s), and groundwater salinity is expected to be between 3,000 and 7,000 milligrams per litre (mg/L) total dissolved solids (TDS).

Shallow groundwater at nearby audited properties has been encountered at depths of approximately 10m bgl and inferred regional groundwater flow was generally south to southwest towards Moonee Ponds Creek and Port Phillip Bay. The shallow water table is unconfined, present within the Newer Volcanics and likely to display relatively low hydraulic conductivity.

A review of the Department of Conservation and Natural Resources Victorian Groundwater Beneficial Use Map Series, South Western Victoria Water Table Aquifers (DCNR, 1995) indicates a bedrock aquifer in the vicinity of the Site and that regionally the groundwater quality is likely to classify as Segment C (3,501 – 13,000mg/L TDS). However, based on a review of surrounding audits, the Site groundwater is expected to be Segment B.

2.7.2 Site-specific Hydrogeology

No site specific groundwater investigations were undertaken by the assessor as part of this audit. The basis of groundwater not being investigated is discussed in Section 7.2. Based on the information from surrounding audit sites groundwater is expected to present at a depth of approximately 10 mbgl.

2.7.3 Bore Search

A 2km radius bore search was undertaken by the auditor on 25 June 2016 of the Federation University and Visualising Victoria's Groundwater online database which identified 473 registered bores. The majority of the bores were observation or investigation wells however, domestic, stock and irrigation use sites were also identified. Well depth ranged from 4 to 150m bgl and no groundwater quality details were available. The use of the bores identified included:

- Domestic and Stock (7);
- SEC Bore [Use unidentified] (165)
- Groundwater and Investigation (23);
- Observation (53);
- Non Groundwater (191); and

- Unknown (34).

The assessor reported the following two wells located within 500m of the site:

- WRK066619 – 15m deep observation bore that is not currently monitored, located approximately 420m to the south-southeast (down gradient position); and
- WRK983506 – 25m deep well with use not listed and not currently monitored. The well is located approximately 460m to the north-northwest in a likely up hydraulic gradient position.

The location, distance and hydraulic relationship of the extractive bores in relation to the site are listed in the table below. All extractive use bores were located at least ~1.1km away in a downgradient location to the site.

Table 5: Summary of bores with an extractive use (within 2km)

Bore ID	Extractive Use	Location Relative to Site	Up gradient/Downgradient
WRK057763	Domestic and Stock	2km SW	Downgradient
WRK963742	Domestic and Stock	1.4km SSW	
WRK971588	Domestic and Stock	1.6km SE	
WRK971589	Domestic and Stock	1.6km SE	
WRK972758	Domestic and Stock	1.15km SE	
WRK972759	Domestic and Stock	1.18km SE	
WRK972760	Domestic and Stock	1.15km SE	

2.7.4 Groundwater Quality Restricted Use Zones

A 22 June 2016 groundwater quality restricted use zones (GQRUZ) search did not identify any associated with the site. The four closest GQRUZ to the site are summarised below. The listed hydraulic gradient positions are based on likely regional groundwater flow direction:

- 21-34 Hope Street, Brunswick – 220m southwest cross and down gradient of the Site. Historical use listed as gas works. Current restricted uses are drinking water, stock water and recreational;
- 80-86 Hope Street, Brunswick – 380m west-southwest and cross to down gradient of the Site. Historical use listed as automotive repair. Current restricted uses are drinking water, stock water and irrigation;
- 29 – 31 Frith Street, Brunswick – 500m southeast and cross to down gradient of the Site. Historical use listed as general manufacturing. Current restricted uses are drinking water, stock watering, irrigation and recreational; and
- 408 – 432 Lygon Street, Brunswick East – 1.2km southeast and cross to down gradient of the Site. Historical use listed as engineering works. Current restricted uses are drinking water, stock watering, irrigation and recreational.

A map illustrating GQRUZ locations surrounding the site (denoted by a blue water drop) is included as Appendix D.

2.7.5 Surface Water

There was no surface water present at the site at the time of assessment or auditor's inspection, and surface water is not expected to enter the site from neighbouring properties or streets. Surface water runoff from the site is expected to be in a southerly, easterly or westerly direction towards Duckett Street, Breese Street, and the laneway to the rear (eastern boundary) of the property.

Surface water bodies deemed to influence groundwater flow from the site as observed from data in surrounding audit reports includes:

- Wetlands (filtration lakes) associated with the Monee Ponds Creek in Travancore approximately 2.8km to the southwest and downgradient; and
- The Yarra River and Port Phillip Bay, located approximately 5.8 and 9km south-southwest of the site at its nearest point. Other nearby surface water bodies include.

The nearest water body to the site is Merri Creek located ~1.7km east, however considered to be hydraulically cross gradient and not likely to be influenced by site surface water.

3 Site History and Identification of Potential Contamination Sources

The following sections outline the findings of the site history review and identify potential contamination sources at the site and their associated contaminants of potential concern (CoPC).

3.1 Site History Review

A comprehensive site history review was undertaken by the assessor which included a review of previous investigation reports. The following sources of information were utilised in completing the review:

- current and historical certificates of title;
- EPA Victoria priority sites register;
- EPA list of issued certificates and statements of environmental audit;
- Victorian groundwater database;
- historical trade waste records;
- Energy Safe Victoria cathodic protection database;
- WorkSafe Victoria dangerous goods database;
- historical aerial photographs;
- local planning schemes and environmental overlays;
- historical society enquiries;
- Sands & McDougall historical directories; and
- historical online maps.

From the findings of the site history review which is presented in full in the DSI (EP Risk 2016), the current site building was likely to have been constructed between 1988 and 2003. Certificate of title history indicates that the site has been used for residential purposes from at least the 1890s as reflected from aerial photography records (post 1942). The site's land use may have changed to light commercial/residential following the change in the site's building after 1988 which is shown in the appearance of the of the current site structure. Since at least 1942, the surrounding area has been a combination of residential and commercial properties.

The assessor reported that during soil investigation works, the building was vacant and there were no commercial operations or indications of potential contamination or prior contaminating activities observed. There is the potential for impacted fill to be present at the site and nearby properties with agricultural activities to have also occurred prior to the development of the area.

Off-site potentially contaminating land uses included light and heavy commercial industries as well as a railway line identified in the site history review. A former gas works and foundry is located southwest of the Site at 21-35 Hope Street, Brunswick. The gas works has been assessed and audited and redeveloped. Based on the results of the investigation, subsequent remediation, and its distance and assumed down gradient position in relation to the site, the former gas works and foundry is not considered likely to present a risk of contamination to the site. No other likely sources of contamination from nearby surrounding areas were identified by the assessor.

3.2 Potential Contamination Sources and Chemicals of Concern

Based on the site history review Table 6 details a summary of the potential contaminating sources considered, the associated CoPCs, and the likelihood for these to be present on-site.

Table 6: Potential on-site contamination sources and associated COPC

Potential source	Associated CoPCs	Potential presence
Imported fill	Metals, TRH, PAH, polychlorinated biphenyls (PCB), phenols, volatile organic compounds (VOC), asbestos	Possible (On and off-site) Imported fill from surrounding land uses may have been used on the site however considered a low probability due to the residential nature of its previous land use
Market gardens, farms, agriculture	Organochlorine pesticides (OCP), organophosphate pesticides (OPP), nitrate	Possible (On and off-site) Immediate and surrounding historical land use included market garden

Note:
Total recoverable hydrocarbons (TRH), Polycyclic Aromatic Hydrocarbons (PAHs), metals: arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), mercury (Hg), nickel (Ni), lead (Pb) and zinc (Zn)

3.3 Site Conceptual Site Model

A preliminary conceptual site model (CSM) was provided by the assessor and included an assessment of potential linkage between source, receptors, and pathways. The DSI provided the following relationship between on- and offsite contaminating activities, contamination sources and CoPCs, as shown in the table below.

Table 7: Potentially contaminating sources and CoPCs

Source	Potential Contaminating Activity	CoPC	Media
On-site	Imported fill	Metals, TRH, PAH, PCBs, phenols, VOC, asbestos	Soil and groundwater
Off-site			
On-site	Market gardens, farms, agriculture	OCP, OPP and nitrate	
Off-site			

3.3.1 Human and Ecological Receptors

The following potential receptors have been identified based on current and proposed site uses:

- On-site Receptors:
  - Current commercial workers;
  - Future residents;
  - Future commercial workers;
  - Construction and maintenance workers during Site development; and
  - Site visitors.
- Off-site Receptors:
  - Residents, maintenance workers and visitors at nearby residential properties;
  - Commercial workers, maintenance workers and visitors at nearby commercial properties; and
  - Moonee Ponds Creek / Port Phillip Bay.

3.3.2 Potential and Complete Exposure Pathways

The following potential pathways have been identified:

- Human - Direct and Indirect:
  - Dermal contact with impacted soil and/or groundwater;
  - Ingestion of impacted soil and/or groundwater; and

- Consumption of vegetables grown in impacted soil and/or irrigated with impacted groundwater.

- Ecological:
  - In-situ impact to soil flora and fauna
  - Contact with impacted soil; and
  - Groundwater migration to a surface water body.

Under the existing site development and proposed site development scenarios, it is unlikely that there will be direct contact with soil. Similarly, it is unlikely that groundwater will be used for at the site given the proposed site use and presence of reticulated municipal water supply. Site contamination migrating to an open surface water body is also considered to be unlikely due to the distance (2.8km to Moonee Ponds Creek).

4 Environmental Reports

The purpose of this audit, which relies upon site assessment works completed by the assessor, is to provide an independent review of the segments of the environment relevant to the site. The assessor produced a report entitled: Detailed Site Investigation (DSI – EP Risk 2015) summarising investigations associated with a Preliminary Site Investigation (PSI) and intrusive soil investigation works completed.

Table 8 provides detail of the auditor's evaluation of the DSI on which the basis of this EAR is formed and their assessment of the relevant segments of the environment. This evaluation is in accordance with the practices described within the guidelines for site assessment provided within Appendix 2 (*Guidelines for a Site Assessment Report*) of EPA Victoria Publication 759.3.

Table 8: Quality and completeness of environmental assessment works

Contents of a site assessment report	
Component	**Objective and comments**
a) History of adjacent land uses	*Objective: to review site history references to assess site development and use of the site.* A summary of the site history is provided in Section 3.1 of this EAR and an in depth site history is presented in the DSI (EP Risk, 2016). The site history has been sufficiently derived from various sources including aerial photographs, historical maps, certificates of title, planning information, historical directories, EPA Priority Sites Register and previously completed environmental audits in the vicinity of the site.
b) Visual inspections	*Objective: to record inspections of the site to determine site specific activities and confirm site history findings.* The assessor undertook a site inspection as part of their soil investigation works on 7 June 2016 and documented the site layout. The auditor visited the site 7 June 2016 to document the site layout for the purpose of the audit.
c) Geology and hydrogeology	*Objective: to record the geology and hydrogeology both on-site and on a regional basis.* An adequate description of the regional geology and hydrogeology is provided within Section 3.2.3 and 3.2.4 of the DSI (EP Risk 2016).
d) Condition of site structures and water courses	*Objective: to record any buildings structures or materials that may present specific hazards or sources of soil and/or groundwater contamination.* This objective has been adequately met and is provided within Sections 3.1 of the assessor report DSI (EP Risk, 2016). The building materials and shallow subsurface fill still remain on site at the time of preparing this EAR.
e) Analytical detection limits	*Objective: to ensure that the detection limits used were adequate for the purposes of the audit.* Detection limits were set by ALS Environmental (ALS) and Envirolab Services (Envirolab) which were all NATA accredited laboratories utilised by the assessor. In general, the detection limits were such that potential impacts could be adequately assessed against relevant guideline values, as evidenced by laboratory certificates of analysis provided in as Appendix M of the DSI (EP Risk 2016).

Scope of site investigations to support an environmental audit	
Sampling and analysis program	*Objective: to ensure the presence of COPCs is assessed at all appropriate locations, in accordance with the relevant standard or guideline.* Soil investigation sample location density exceeded that recommended in AS4482.1 for a site which is potentially contaminated. Five locations (BH1-BH5) were sampled by the assessor and analysed for suite of analytes set out in Section 6.2 of the DSI (EP Risk 2016).to confirm the findings of the site history review. Based on the auditor's review of the site history, the sampling density and locations, methodology and the analytical suite, the works are considered to adhere to the principles of the Amended ASC NEPM (1999) and relevant Victorian legislation.
Compliance with approved methods and protocols	*Objective: to ensure sampling methodology is appropriate and in accordance with relevant standards and guidelines to ensure appropriate representative samples.* The field procedures followed within the assessor report generally complied with, and conformed to, industry best practise.
Laboratory accreditation	*Objective: to ensure the use of competent certified laboratories for analysis undertaken.* Envirolab and ALS were used as the primary laboratories for the analysis of all samples collected for the site assessment sampling works. All laboratories engaged were NATA accredited for the methods used.
Site diagrams and bore logs	*Objective: to ensure that clear figures detailing locations of pertinent infrastructure and assessment locations were provided, including bore logs and similar records.* Site figures, including sample locations, and soil bore logs for works completed in 2016 are provided within the DSI (EP Risk 2016). No groundwater investigations were submitted as part of the DSI.
Quality Assurance	*Objective: to ensure that a suitable quality assurance program was followed to certify accuracy of the sampling program.* The QA/QC program, as detailed in Section 10 of the DSI, is deemed adequate to ensure the accuracy of the sampling completed.
Background samples	*Objective: to adequately assess the potential for COPC to be non-site related and be resultant of elevated natural or regional conditions.* Suitable sampling and adequately broad spectrum analysis of fill and naturally occurring soil has occurred. This was completed in combination with the examination of background information relating to surrounding sites and land uses to allow an adequate assessment of background concentrations to be completed.
Soil screen samples	*Objective: to ensure testing for COPC has been adequate, and enable implementation and completion of a suitable broad spectrum analysis to ensure no additional contaminants are present.* Analysis of soil included a broad suite of common contaminants to provide suitable assurance of the contamination status across the site.
Targeted chemicals	*Objective: to ensure testing for COPC has been adequate, and enable implementation and completion of targeted analysis to ensure no additional contaminants are present.* Soil analysis included targeted suitable CoPCs which was further confirmed by site history.
Other environmental hazards	*Objective: to ensure compliance with Section 14.7 of EPA Victoria Publication 759.3.* None identified by the assessor or auditor.
Information required for COPCs	
Properties	*Objective: to ensure that appropriate chemical analysis has been completed.* The analytes selected were identified as CoPC based on the results of the site history and observations. The appropriate media were selected for sampling given the potential exposure pathways and appropriate laboratory methodology utilised to assess chemical concentrations. The results of each analysis, background and/or ambient concentrations and possible cumulative effect were taken into consideration when evaluating potential harm, beneficial uses and potential migration effects.
Form/species	
Physical characteristics	
Potential exposure pathways	
Potential harm	
Detriment to beneficial uses	
Potential off-site effects	

Assessing the significance of site investigation results	
Reference to Land and Water SEPPs	*Objective: to ensure soil results are assessed against the relevant beneficial uses of the SEPPs.* The auditor has compared the results to the appropriate criteria specified in the SEPPs.
Evaluation of risk	*Objective: to evaluate risk of the proposed usage of the site.* The reported chemical concentrations in soil enabled the risk that residual concentrations would pose to the receptors and associated beneficial uses to be evaluated.
Compliance with NEPM	*Objective: to ensure that results of investigation to comply with relevant NEPM criteria.* The auditor considered the work with regard to the amended NEPM criteria and considers this to have been essentially achieved for the purpose of the investigation. ASC NEPM ecological investigation levels (EILs) and ecological screening levels (ESLs) were adopted for the protection of terrestrial ecosystems derived for common contaminants in soil based on a species sensitivity distribution model developed for Australian conditions, where possible. EILs were derived using Olszowy, H, Torr, P, Imray, P 1995, *Trace element concentrations in soils from rural and urban areas of Australia, Contaminated sites monograph no. 4, South Australian Health Commission* conservative for screening purposes, rather than collecting all of the required soil data to allow a site-specific and lithology EIL selection. ASC NEPM health investigation levels (HILs) and health based screening levels (HSLs) have been adopted to assess the potential risk to human health in light of the proposed development. ASC NEPM health screening levels (HSLs) have been used to assess the potential risk to future occupants of the site from potentially volatile compounds.
Use of guidelines	*Objective: where appropriate, to ensure that correct use of relevant guidelines has been applied to assess the risk.* The relevant guidelines were utilised for the assessment of risk.
Evaluation of impact to beneficial uses	*Objective: to evaluate the risk of the site impact on beneficial uses.* The results of the assessment and validation were compared to the criteria for the various beneficial uses in the applicable SEPPs. Refer to Section 6 for further detail.
Use of waste classification criteria	*Objective: to ensure all waste is appropriately classified using the applicable criteria.* No waste was removed as part of the works reported by the assessor.

The auditor concludes that the DSI (EP Risk 2016) contains sufficient information with detail to adequately describe the condition of the site at the time of the assessment.

5 Data Quality

The previous section of this EAR details the auditor's review of the content and quality of the assessment report provided. This section details the auditor's assessment of data quality within the provided assessment report.

5.1 Soil

Soil sampling at the site was as described by EP Risk (2016). All EP Risk work was conducted in general accordance with the amended ASC NEPM 1999 and Australian Standards AS4482.1-1999 and AS4482.2-2005 for all recent investigations. The methods and procedures for all fieldwork, decontamination procedures and sample handling were mostly consistent with ASC NEPM 1999, amended ASC NEPM (1999) and Australian Standards AS4482.1-1999 and AS4482.2-2005. Soil sampling methodologies are provided as Section 6 of the DSI and associated quality assurance protocols and review are provided in Section 10 (EP Risk 2016).

The results of the auditor's soil data quality review are summarised in Table 9.

Table 9: Soil data quality review

Item	Objective	Comments	Compliance
Sampling method	Compliance with appropriate industry standards to ensure representative samples were collected.	Soil was sampled with decontaminated sampling equipment.	Yes
Comparison between field and laboratory analytical results	Field photoionisation detector (PID) readings, visual and olfactory observations align with laboratory results.	The report shows adequate consistency between field observations and laboratory results.	Yes
Chain of Custody Documentation	Chain-of-custody (COC) appropriately completed and evidenced.	Fully signed COCs are provided in Appendix M of the DSI (EP Risk 2016).	Yes
Sample holding times	Sample holding times observed and complied with.	All analyses were conducted within the holding times recommended by AS4482.1 and AS 4482.2.	Yes
Field blind duplicate sampling	Appropriate duplicate sampling undertaken to confirm repeatability of analysis.	The number of primary and blind/split duplicate soil samples is in accordance with the 1:20 ratio specified in AS4482.1.	Yes
Field split duplicate sampling	Appropriate field split duplicate sampling undertaken to confirm accuracy of analysis.	The complete suite of CoPC requested in the primary sample was not reflected in the blind/split duplicate. Although considered to be a non-compliance, the overall results are considered adequate for the conclusions of the assessment.	
Blank samples	Appropriate blank samples taken to ensure no field cross contamination or introduction of contaminants has occurred.	Appropriate trip and rinsate blank samples were collected and analysed to ensure cross contamination had not occurred. The results from the decontamination and transport procedures indicate that the likelihood of cross-contamination was low.	Yes
Laboratory method blanks	Results all below laboratory reporting limit.	All primary and secondary laboratory method blanks were below laboratory reporting limits.	Yes

Item	Objective	Comments	Compliance
Laboratory spike samples	Recoveries within laboratory targets are achieved.	For spike samples the recovery range obtained for samples were mostly within the recommended range 70–130%. Multiple spike recovery percentages were reported outside of the ideal 70 – 130% spike recovery range however below the laboratory reporting limit. Based on this observation, the spike recovery results are not considered to affect the outcome of the report.	Yes
Laboratory prepared duplicate samples	Relative percentage differences (RPDs) within laboratory targets are achieved.	The auditor is of the opinion that the internal laboratory quality control program implemented showed acceptable results. It was concluded that the sampling and analytical program was acceptable and the analytical data were of reliable quality for the purpose of this assessment	Yes
NATA accredited laboratory	Analysis to be completed by appropriate NATA accredited laboratory.	The primary and secondary laboratory was NATA accredited for the analyses that were performed.	Yes
Calibration of field instruments	Evidence that field instruments have been calibrated at least daily.	A PID calibration certificate is provided within Appendix L of the DSI (EP Risk 2016).	Yes

5.2 Auditor Verification

Assessor sampling techniques and laboratories used were considered acceptable and no auditor verification samples were considered necessary for this audit. The auditor visited the site on 9 June 2016 to verify site conditions and layout of the surrounding neighbourhood. Soil sampling procedures at the site, including sample storage and transport methods, were considered to be adequate.

5.3 Auditor Comment on the Data Quality

The auditor has reviewed the data reported for the site and in addition has noted some minor variations in compliance with agreed standards, which are outlined in Table 8 and Table 9. Upon consideration of the variations and the data set as a whole, the auditor considers the variations are of minor significance with regards to the overall reliability and representativeness of the data collected. The auditor considers the data to be reliable and suitable to adequately characterise the site condition.

6 Assessment of Beneficial Uses

The *Act* defines an environmental audit as:

"a total assessment of the nature and extent of any harm or detriment caused to, or the risk of any possible harm or detriment which may be caused to, any beneficial use made of any segment of the environment by any industrial process or activity, waste, substance (including any chemical substance) or noise".

All potential beneficial uses of land, groundwater and surface water have been considered for the site, in accordance with the relevant SEPPs as follows:

- Land SEPP;
- Groundwaters SEPP;
- Air SEPP; and
- Water SEPP.

6.1 Beneficial Uses of Land

Table 10 summarises the beneficial uses for each segment of land that need to be protected in accordance with the Land SEPP. The land uses Sensitive Use –High Density and Commercial are applicable to the site, and are highlighted in the table. Table 11 details the adopted soil criteria applicable to each beneficial use.

Table 10: Beneficial uses of land to be protected

Beneficial use	Land use						
	Parks and Reserves	Agriculture	Sensitive use		Recreation /Open Space	Commercial	Industrial
			High density	Other			
Maintenance of Modified Ecosystems							
Natural	✓	N/A	N/A	N/A	N/A	N/A	N/A
Modified	✓	✓	N/A	✓	✓	N/A	N/A
Highly Modified Ecosystems	N/A	✓	✓	✓	✓	✓	✓
Protection of Human Health	✓	✓	✓	✓	✓	✓	✓
Buildings and Structures	✓	✓	✓	✓	✓	✓	✓
Aesthetics	✓	N/A	✓	✓	✓	✓	✓
Production of Food Flora and Fibre	✓	✓	N/A	✓	N/A	N/A	N/A

Note: N/A = not applicable.

Table 11: Assessment of the beneficial uses of land

Protected beneficial use	Indicators	Objectives/guidelines
Maintenance of Highly Modified Ecosystems	Chemical substances or waste identified through the application of the ASC NEPM (Schedule B1 and B5) for any other chemical substance or waste.	• Selected criteria for CoPCs based on the amended ASC NEPM (1999) ecologically based investigation levels (EILs) and Ecological Screening Levels (ESLs) for urban residential areas and public open space using fine texture and aged (greater than 2 years) contamination where appropriate – further discussed as (1) below; • Auditor adopted alternative guidelines listed below as (2)
Protection of Human Health	Chemical substances or waste identified through the application of the ASC NEPM (Schedule B1) or any other chemical substance or waste.	• Amended ASC NEPM (1999) vapour intrusion HSLs A/B – Low to high density residential for sand soils between 0 and <1 mbgl; and • HILs A – residential use with soil access and HIL-B – residential use with minimal opportunities for soil access.
Buildings and Structures	pH, sulphate, redox potential, salinity or any chemical substance or waste that may have a detrimental impact on the structural integrity of buildings or other structures.	• Standards Australia AS2159-2009 Piling Design and Installation; • Standards Australia AS 3600 2009 – Concrete Structures; and • Amended ASC NEPM (1999) EILs value for sulphate for protection of built structures.
Aesthetics	Any chemical substance or waste that may be offensive to the senses.	• Criteria specific to the assessment of aesthetic impact have not been set in Victoria. However, the Land SEPP states *"contamination must not cause the land to be offensive to the senses of human beings"*. • The NEPM specifies the fundamental principle that soil should not be highly malodorous or discoloured.

Notes:
(1) The EILs adopted from Schedule B1 of the amended ASC NEPM (1999) include the following CoPCs based on site specific conditions:
- Generic level for aged arsenic, fresh DDT, fresh naphthalene (presented as total soil contaminant concentrations in Tables 1B(4) and 1B(5) of Schedule B1 of the amended ASC NEPM (1999)); and
- Added contaminant limit for copper, chromium (III), nickel, zinc based on a combination of site specific parameters such as cation exchange capacity (CEC), pH and %clay (as outlined in Table 4 of Schedule B1, the amended ASC NEPM (1999)).

(2) For analytes where the amended ASC NEPM (1999) does not prescribe an EIL, the auditor adopted the following guidelines:
- ANZECC (1992) Environmental Investigation Levels;
- USEPA Ecological Soil Screening Levels; and
- CCME Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health (CCME 2007) for the protection of modified ecosystems/ Residential/Parkland values.

The assessor's method for calculating site specific EILs in accordance with Schedule B1 of the amended ASC NEPM (1999) is outlined in Section 5.1 of the DSI (Ep risk 2016). Based on the data provided, the auditor concurs that the EILs calculated are suitable for the purposes of the investigation presented in this EAR.

6.1.1 Soil and Waste Disposal

Any soils or wastes removed from the site must be classified in accordance with EPA publication IWRG621 (2009) and IWRG702 (2009), or their replacement publications.

6.2 Beneficial Uses of Groundwater

The Groundwaters SEPP identifies the beneficial uses to be protected under each segment of groundwater based on TDS. The Victorian Groundwater Beneficial Use Map Series 'South Western Victoria Water Table Aquifers indicates that the aquifer is expected to have a total dissolved solids (TDS) concentration between 3,501 – 13,000mg/L (Segment C). However, based on a review of surrounding audits, the site groundwater is

expected to be classified as Segment B. Table 12 presents the protected beneficial uses of groundwater based on TDS and in accordance with the Groundwaters SEPP, highlighting beneficial uses protected for Segment B.

Table 12: Beneficial uses of groundwater to be protected

Beneficial use	Segments (mg/L TDS)				
	A1 (0–500)	A2 (501–1000)	B (1001–3500)	C (3501–13,000)	D (>13,000)
Maintenance of Ecosystems	✓	✓	✓	✓	✓
Potable Water Supply – desirable	✓	N/A	**N/A**	N/A	N/A
Potable Water Supply – acceptable	✓	✓	**N/A**	N/A	N/A
Potable Mineral Water	✓	✓	✓	N/A	N/A
Agriculture, Parks and Gardens	✓	✓	✓	N/A	N/A
Stock Watering	✓	✓	✓	✓	N/A
Industrial Water Use	✓	✓	✓	✓	✓
Primary Contact Recreation	✓	✓	✓	✓	N/A
Building and Structures	✓	✓	✓	✓	✓

Note: N/A = not applicable.

The following criteria were applied to each of the protected beneficial uses:

- Maintenance of Ecosystems;
- Potable Mineral Water;
- Agriculture, Parks and Gardens;
- Stock Watering;
- Industrial Water Use;
- Primary Contact Recreation; and
- Buildings and Structures.

Beneficial uses for potable mineral water uses are deemed to not be applicable at the site as the site is not within one of the designated mineral water areas. Relevant groundwater screening criteria is presented in Table 13.

Table 12: Assessment of the beneficial uses of groundwater

Protected Beneficial Use	Adopted for Site Characterisation	Objectives/Guidelines
Maintenance of Ecosystems	Yes	In accordance with SEPP (1997 – Groundwaters of Victoria) the environmental quality objectives for the Maintenance of Ecosystems are those specified in the relevant SEPP for the receiving surface waters. The SEPP (2003 – Waters of Victoria) provides a legal framework for the protection and rehabilitation of Victoria's surface water environments. Unless specific objectives are described in the SEPP, the environmental quality objectives for the maintenance of surface water ecosystems are those values specified in ANZECC (2000). There is no surface water body on the site; however, Moonee Ponds Creek is located ~2.8km south-west of the site boundary. Based on the point of discharge, the site is considered to lie within the Urban Waterways segment which is deemed to be most appropriate for the surface water located closest to the site (Schedule F7). This is considered to be slightly to moderately modified ecosystem with environmental quality objectives for the protection of

Protected Beneficial Use	Adopted for Site Characterisation	Objectives/Guidelines
		this beneficial use generally corresponding to a 95% level of protection as defined in ANZECC and ARMCANZ (2000)
Potable mineral water supply	Yes, although the beneficial use is unlikely	The Victorian Mineral Water Committee (VMWC) has the responsibility for the protection and management of the State's natural mineral water assets. The aquifers identified at the site are not designated as a potable mineral water resource by the VMWC; therefore, this beneficial use is not considered to be realised at the site and is not discussed further
Agriculture, parks and gardens (irrigation)	Yes	The Groundwater SEPP refers to the (ANZECC 2000) water quality objectives for irrigation waters. The values for short and long-term irrigation were therefore adopted for the assessment of this beneficial use of groundwater
Stock Watering	Yes, although the beneficial use is unlikely	As specified for livestock in the Australian Water Quality Guidelines for Fresh and Marine Waters: • ANZECC/ARMCANZ (2000) Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Note: for organics these criteria default to potable water
Industrial Water Use	Yes, although the beneficial use is unlikely	As specified for industrial use in the Australian Water Quality Guidelines for Fresh and Marine Waters: • ANZECC (1992) Australian Water Quality Guidelines for Fresh and Marine Waters. Note: these vary depending on the type of industry. Based on the proposed development plan for the site, groundwater at the site was unlikely to be extracted for industrial use. Although commercial/industrial properties operate in the area, the likelihood of extraction was also considered to be low based on sensitivity associated with TDS values for certain industrial processes and the presence of a reticulated water system (see Table 12)
Primary Contact Recreation	Yes, although the beneficial use is unlikely	As specified for primary contact recreation in the Australian Water Quality Guidelines for Fresh and Marine Waters: • NHMRC (2008) – Guidelines for Managing Risks In Recreational Water. These default to the ADWG guidelines, which were revised in 2011 (NHMRC 2011). A modification factor of 10 has been adopted for inorganics, where the criteria were not based on aesthetic considerations. A modification of the adopted criteria for organics to account for the different ingestion rates has not been considered appropriate due to the vapour and dermal contact pathway that may dominate the exposure
Building and Structures	Yes	The Groundwater SEPP states that introduced contaminants shall not cause groundwater to become corrosive to structures and building materials. AS2159-2009 has been referred to for evaluation based on an assessment of pH, sulphate and redox potential

Guidelines more recent to those referred to in Table 13 have been published. EPA Victoria has not formally accepted these guidelines, however, EPA guidance to the auditor has included advice that ANZECC (2000) or other references may be used if they represent 'better science'.

An errata slip issued for ANZECC (2000) dated June 2005 notes that nitrate trigger levels should be deleted and noted to be 'under review'. Calculations presented in National Institute of Water and Atmospheric Research Pty Ltd (2002) Memorandum, Nitrate Guideline Values in ANZECC (2000) suggest that ANZECC (2000) significantly underestimated nitrate criteria and suggests nitrate (as N) values of 4.1mg/L (for 99%), 7.2mg/L (95%), 8.7mg/L (90%) and 12mg/L (80%) respectively[3].

[3] Hickey (2013) Updating Nitrate Toxicity Effects on Freshwater Aquatic Species

Table 13: Classification of water for industrial use

Industrial water use	TDS (mg/L)
Once through cooling system and make-up water system for fresh water	<1000 to <500 respectively
Textile industry	<100
Food and beverage industry	<850
Iron and Steel industry	<1000
Pulp and paper industry	<500
Petroleum industry	<750

6.3 Surface Water

No surface water bodies are present at the site, but surface water has been considered as part of this EAR, in accordance with the SEPP (2003 – Waters of Victoria). The surface water body located closest to the site is Moonee Ponds Creek located ~2.8km -southwest of the site, which drains in turn into the Yarra River, located ~ 5.8km south-southwest of the site.

Table 15 presents the beneficial uses that the Water SEPP dictates need to be protected for each segment of surface water. The Urban Waterways segment is deemed to be most appropriate for the surface water located closest to the site. The section of Moonee Ponds Creek is considered to be the point of discharge for groundwater emanating from the site and is part of the Urban Waterways segment of the catchment. Schedule F7 of the Water SEPP has been applied and is defined as being a modified ecosystem. Given the site is and will continue to be developed; management of surface water is and will be through stormwater drains. As such, the site is not deemed to have any potential impact to surrounding surface water bodies.

Table 14: Protected beneficial uses of surface water

Beneficial Uses	Segment						
	Aquatic Reserves	Parks and Forests	Rural Eastern Waterways	Rural Western Waterways	Urban Waterways	Upper Estuary	Yarra Port
Maintenance of Natural Ecosystems and Associated Wildlife							
Natural Ecosystems	✓						
Natural Ecosystems with Occasional Disturbance due to Human Activity		✓					
Substantially Natural Ecosystems with some Modification			✓				
Modified Ecosystems				✓	✓		
Highly Modified Ecosystems with some Habitat Values						✓	✓
Passage of Indigenous Fish	✓	✓	✓	✓	✓	✓	✓
Maintenance of Indigenous Riparian Vegetation	✓	✓	✓	✓	✓		
Water Based Recreation							
Primary Contact (e.g. Swimming, Water Skiing)	✓	✓	✓	✓	✓	✓	
Secondary Contact (e.g. Boating, Fishing)	✓	✓	✓	✓	✓	✓	✓
Aesthetic Enjoyment (e.g. Walking by the Waters)	✓	✓	✓	✓	✓	✓	✓
Commercial and Recreational Use of Edible Fish and Crustacea	✓	✓	✓	✓	✓	✓	✓
Potable Water Supply							
Untreated	✓						
With Treatment (Disinfectant Only)		✓					
With Treatment ((Disinfectant & Removal of Suspended Solids)			✓				
Agricultural Water Supply							
Stock Water		✓	✓	✓	✓		
Irrigation (Including Watering Parks and Gardens)		✓	✓	✓	✓	✓	
Other Commercial Purposes							
Industrial Water Use			✓	✓	✓	✓	✓
Navigation and Shipping						✓	✓

#Beneficial use is protected only in parts of the segment where the activity is permitted under approved management plans.

6.4 Ambient Air

The 2001 –Air Quality Management (Air Management SEPP) and 1999 – Ambient Air Quality (Air Quality SEPP) are the relevant SEPPs that provide the framework for ambient air (air being defined in Part IV of the

Air Management SEPP and Part I of the Air Quality SEPP as *"the external air environment, it does not include the air environment inside buildings or structures"*). The Air Quality SEPP was prepared to adopt the requirements of the National Environmental Protection Council (NEPC). The Air Management SEPP was prepared in part to ensure that the objectives of Air Quality SEPP are met.

6.4.1 Beneficial Uses to be Protected

Section 9 of the Air Management SEPP states that the following beneficial uses of ambient air (as defined above) are protected throughout Victoria:

'(a) life, health and well-being of humans;

(b) life, health and well-being of other forms of life, including the protection of ecosystems and biodiversity;

(c) local amenity and aesthetic enjoyment;

(d) visibility;

(e) the useful life and aesthetic appearance of buildings, structures, property and materials; and

(f) climate systems that are consistent with human development, the life, health and well-being of humans, and the protection of ecosystems and biodiversity.'

6.4.2 Qualitative Criteria

The auditor assesses whether or not ambient air is likely to be polluted on the basis of:

- Land pollution (including soil, soil gas and soil vapour);
- Groundwater pollution; and
- Surface water pollution.

Where ambient air pollution is considered to be likely, ambient air sampling/analysis is conducted and quantitative criteria are considered.

6.4.3 Air Quality Objectives

The Air Management SEPP does not provide indicators and objectives for the majority of contaminants that can be of concern at a typical contaminated site.

Section 10 of the Air Management SEPP defines four classes of ambient air quality indicators, namely:

'(a) Class 1 indicators: common or widely distributed air pollutants which are established as environmental indicators in the State Environment Protection Policy (Ambient Air Quality) and may threaten the beneficial uses of both local and regional air environments;

(b) Class 2 indicators: hazardous substances that may threaten the beneficial uses of the air environment by virtue of their toxicity, bio-accumulation or odorous characteristics;

(c) Class 3 indicators: extremely hazardous substances that are carcinogenic, mutagenic, teratogenic, highly toxic or highly persistent, and which may threaten the beneficial uses of the air environment; and

(d) Unclassified indicators: indicators of the beneficial uses of local amenity and aesthetic enjoyment, namely odour and total suspended particles (nuisance dust).'

The Air Management SEPP provides environmental quality objectives and goals for carbon monoxide, nitrogen dioxide, photochemical oxidants, sulphur dioxide, lead, particles as PM10 and visibility reducing particles. The Air Management SEPP provides:

- design criteria for new or expanded emission sources (Schedule A);

- intervention levels for the substances noted in Schedule A (Schedule B);
- emission limits for existing stationary sources (Schedule D); and
- emission limits for new stationary sources (Schedule E).

Table 6.4 of EPA Victoria Publication No. 788.1 provides action levels of 100ppm (measured at 5cm above ground surface) for *"landfill surface final cover areas and penetrations through it"* and 1000ppm (measured at 5cm above ground surface) for *"within immediate vicinity of penetrations through final cover"*. This action level is only applicable for landfill sites.

For scenarios where the abovementioned indicators/objectives are not relevant, impacts to air quality are assessed on a case-by-case basis.

7 Site Investigation and Results

The scope and results of the site investigations are presented in the sections below. The DSI (EP Risk 2016) consisted of:

- Site history desk top assessment – reported as a preliminary site investigation (PSI) within the DSI;
- Site inspection and soil investigation; and
- Preparation of a final report detailing the findings of the desktop review and soil sampling including conclusions on the potential for contamination at the site.

The assessors' reports are included as Appendix E.

7.1.1 Desktop Assessment and Site Inspection

The desktop assessment completed by the assessor is summarised in Sections 2 and 3 of this audit report and included the following:

- Historical aerial photographs, historical certificates of title, surrounding audit review, historical society searches, published mapping, historical plans and EPA Victoria documents;
- Characterisation of the regional environmental setting of the site through the review of readily available published geological and hydrogeological information; and
- Preparation of a preliminary desk top conceptual site model to assess potential source, exposure pathway and receptor linkages at the site prior to intrusive investigations.

The assessor undertook an inspection of the site and surrounding area on 23 February 2016, with the following conditions reported:

- The site is rectangular in shape, with the long axis orientated approximately east-west;
- The western boundary of the site contained an open concrete area which serves as an apron for the rear entry of the property;
- The central portion of the site contained a two-storey, slab-on-grade concrete prefabricated building that may have been ~20-30 years old;
- No obvious asbestos containing material (ACM) were observed;
- The eastern portion of the site contained a landscaped area with grass and plants with a chain link metal fence affronting Breese Street;
- No observed staining, odours, pooled liquid, stressed vegetation or any other evidence of contamination at the Site or surrounding properties; and
- A drycleaner is located on the ground floor of the high density residential/commercial property located across the road from the site (10-12 Breese Street, CARMS No. 63250-1). The presence of this land use is not considered to impact on the site due to its recent period of operation and cross/down gradient location.

7.1.2 Soil investigation

Subsurface conditions were generally consistent with the observations outlined in the Section 2.6.2 of this audit report. No suspicious odour or staining was noted during the soil investigation. Subsurface geology generally consisted of a shallow lens of silt/sand and fill consisting of well graded sand was encountered within the 0 to 0.25m profile or under concrete hardstand. Underlying lithology included weathered basalt clay, followed by competent basalt at depths ranging from 1.0 to 1.3 m bgl. Soil boring logs are provided as Appendix K of the DSI (Appendix E). All photo ionisation detector (PID) readings (Appendix K of the DSI) reported concentrations within natural background ranges.

7.1.3 Sampling and Methodology

Soil investigation methodology for soil boring assessment works is detailed Section 6.1 of the DSI (EP Risk 2016). Five soil samples (BH1 – BH5) were collected either from hand augers or via disposable push tube drill rig sampling methodology. The maximum depth of investigation was ~1.0 to 1.3mbgl and was terminated

due to refusal on basalt/rock. The assessor collected and requested analysis of selected CoPCs of shallow (~0.25mbgl) and deeper (1.0mbgl) sample from each borehole with the exception of sample BH3/1.0. All soil samples were sent for laboratory chemical analysis under chain of custody documentation for the CoPCs as summarised in the analytical schedules provide in detailed Section 6 of the DSI (EP Risk 2016).

7.1.4 Results

The results of the soil and validation investigation works are presented in Section 8 of the DSI (EP Risk 2016). No exceedance above the adopted criteria were reported for the CoPCs analysed. The assessor reported that the potential impacts to buildings and structures based on sulfate and pH results are considered to be non-aggressive in accordance with AS 2159-2009, Piling – Design and installation:

- Sulfate concentrations were all below the reporting limit of 50mg/kg.
- pH values ranged from 6.7 to 7.6.

Based on the results of the investigation and visual/olfactory observations, the assessor concluded that the results are not considered to present an unacceptable human health or ecological risk given the current commercial or proposed mixed commercial and high density residential land use. Soil analytical results were deemed suitable for its intended mixed commercial and high density residential use.

7.1.5 Waste Disposal

No soil was disposed offsite. The assessor reinstated soil cuttings removed from each soil investigation locations.

7.2 Groundwater Investigation

A groundwater investigation was not completed as part of the DSI completed by the assessor based on the following:

- The results of the site history, which did not indicate any likely sources of groundwater contamination;
- Nearby audit sites identified regional metals and nitrate contamination, which are not considered to present an unacceptable risk to the future site use; and
- The proposed land use of the site does not include extraction of groundwater for any use.

Based on the outcome of the surrounding audit assessment, groundwater beneath the site may be impacted by a regional contamination associated with nitrate. The beneficial use of groundwater associated with the site is discussed in Section 8.2 with an auditor determined CUTEP assessment made in Section 9.

8 Assessment of Risk at the Site

From the results of investigations undertaken and presented by the assessor, the auditor considers that the site currently does not present a risk that would preclude the site to remain as it is or be developed in accordance with the proposed development plans.

Based on the information from surrounding audits, the auditor considers the groundwater beneath the site to be polluted from a regional source of nitrate contamination. Although a groundwater assessment was not completed, an evaluation of the risks to the protected beneficial uses of groundwater at the site from the pollution is provided below. The following sections discuss the assessment of risk in consideration of the potential on and offsite receptors.

8.1 Beneficial Use Assessment – Land

On the evidence provided in the site history, the inspection of soil samples taken during the DSI (EP Risk 2016), the auditor considers that soil conditions at the site do not warrant further investigation. The auditor concludes that the site is suitable for any beneficial use.

The beneficial uses of land at the site which required protection are:

- Maintenance of Highly Modified Ecosystems;
- Human Health;
- Buildings and Structures; and
- Aesthetics.

8.1.1 Maintenance of Highly Modified Ecosystems

No significant ecosystems are considered to be present at the site as the site had been significantly disturbed by human activity for a number of decades. However, a potential for highly modified ecosystems may exist.

No soil samples exceeded the adopted criteria for the CoPCs tested. Given that the proposed use for the site will be a high-density residential development with no access to subsurface soil and ground level car parking, the opportunity for any ecosystem to exist is low. The beneficial use of maintenance of ecosystems is not precluded at the site.

8.1.2 Human Health

Based on the analytical data presented, no soil samples exceeded the adopted criteria for the CoPCs tested. The beneficial use of maintenance of ecosystems is not precluded at the site.

8.1.3 Buildings and Structures

The potential impact to Buildings and Structures was assessed based on the reported soil pH and sulphate/chloride levels. Levels of pH were reported to exist between 6.7 to 7.6 pH units in natural soil, indicating non-aggressive conditions. Chloride levels for soil were not analysed; however, sulphate concentrations (50mg/kg) were reported below the adopted criteria for this land use (5000mg/kg).

On the basis of a comparison against the adopted criteria and lack of chloride concentrations in soils, the beneficial use of buildings and structures is not precluded by the condition of soils at the site.

8.1.4 Aesthetics

No odours, staining or waste products were observed across the site or within fill/natural materials. The assessment of soils at the site concludes that the beneficial use of aesthetics is protected.

8.2 Beneficial Use Assessment – Groundwater

8.2.1 General

In accordance with Section 13 of EPA Victoria Publication No 759.3, an assessment of the potential for polluted groundwater to be present at the site, or arising from the site, was undertaken. Also under Section 13 of EPA Victoria Publication No 759.3, the auditor must answer the following questions:

- Is groundwater likely to be polluted? – see below;
- Is groundwater polluted? – see below; and
- Are the beneficial uses of the groundwater precluded by the pollution relevant or is the site the source of pollution? – see Section 8.2.2.

Is Groundwater Likely to be Polluted?

Based on the investigations the auditor considers groundwater was not likely to be polluted from on-site sources. However, based on the results of the surrounding audit sites (37-43 Breese Street, Brunswick (120m north of site), CARMs No. 72363-1), groundwater in the vicinity of the site is deemed to be impacted by either regional or a diffuse source(s) of nitrate and naturally occurring selected heavy metals. Nitrate concentrations were deemed to be present based on regional impacts from leaking sewers however heavy metal levels were considered to be background in nature.

Is Groundwater Polluted?

Based on the assumption that groundwater in the vicinity of the site is deemed to be impacted by a regional source of nitrate contamination, the groundwater at the site is considered to be polluted. The site is not considered to be a source site for pollution.

As outlined in Section 13.2 of EPA Victoria Publication No 759.3, the following requirements needs to be met relating to an exemption in investigating groundwater pollution:

> Where the audit site is not the source site of the groundwater pollution and the potentially affected beneficial uses are not relevant there may be no need to investigate groundwater quality. An exemption from such an investigation may be granted where:
>
> a) groundwater is likely to be polluted, but the site is not a source of groundwater pollution (answered above);
> b) the beneficial uses of groundwater are not likely to occur at the site (see table below); and
> c) any pollution of groundwater would not affect any other beneficial use of the site (see Table 16).

Based on the above assessment, the assumed pollution of groundwater (regional source of nitrate) is not considered to affect the relevant beneficial uses of land. An assessment of the likely and relevant beneficial uses of groundwater applicable to the site is discussed below.

8.2.2 Beneficial Use Assessment

Groundwater at the site is classified as Segment B based upon data from surrounding audit sites under the SEPP (1997 – Groundwaters of Victoria), therefore, the following relevant beneficial uses require consideration:

- Maintenance of Ecosystems;
- Potable Mineral Water;
- Agriculture, parks and gardens;
- Stock watering;
- Industrial water use;

- Primary contact recreation; and
- Building and structures.

Based upon the applicable beneficial uses assessed and comparison of site water quality with the adopted water quality criteria, the following beneficial uses were assessed to be potentially precluded based on the assumed concentrations of nitrate[4]:

- Maintenance of Ecosystems;
- Agriculture, parks and gardens.

8.2.2.1 Maintenance of Ecosystems

Based on concentrations from the up gradient audit site at 37-43 Breese Street, nitrate levels of 68mg/L were reported and exceeded the adopted maintenance of ecosystems criteria level of 2.4mg/L. The concentrations are considered to be reflective of regional and/or a diffuse source of contamination likely associated with leaking sewer infrastructure.

Based upon the assessment provided, the auditor considers that the beneficial use of Maintenance of Ecosystems is precluded based on a regional and /or diffuse source of nitrate.

8.2.2.2 Potable Mineral Water Use

The site is not within a designated mineral water zone and therefore the use of groundwater at this site for this purpose has not been considered.

8.2.2.3 Agriculture, Parks and Gardens

The long term (5mg/L) and short term (25mg/L) criteria for this beneficial use is considered precluded based on the nitrate levels from the up gradient audit site discussed above.

8.2.2.4 Stock Watering

The adopted criteria for stock watering was not exceeded and therefore this beneficial use is not considered to have been precluded.

8.2.2.5 Industrial Water Use

Based on TDS concentrations, this beneficial use, albeit unlikely to be realised in this area, has not been precluded. Notwithstanding, the use of reticulated water will most likely be used on site if industrial processes were to occur.

8.2.2.6 Primary Contact Recreation

The adopted criteria for primary contact recreation was not exceeded by nitrate concentrations from the up gradient audit listed in Section 8.2.3 and therefore this beneficial use is not considered to have been precluded.

8.2.2.7 Buildings and Structures

This beneficial use is unlikely to be precluded based on nitrate concentrations from the up gradient audit information listed in Section 8.2.1.

8.2.2.8 Summary of Beneficial Uses of Groundwater

Based upon the above discussion, it is considered that the beneficial uses of maintenance of ecosystems and agriculture, parks and gardens are precluded based on nitrate concentrations in groundwater. However, the site is not considered to be a source of pollution as the source is considered to represent regional

[4] Based on data from 37-43 Breese Street, Brunswick (120 m north of site), CARMs No. 72363-1

contamination. From the assessment undertaken, the auditor considers that no relevant beneficial uses are precluded based on the pollution of groundwater. This outcome is summarised in the table below.

Table 15: Assessment of relevant protected beneficial uses of groundwater

Protected Beneficial Use	Adopted Criteria Exceeded#	Likelihood of Beneficial Use Existing On Site		Likelihood of Beneficial Use Existing Off Site
		Existing Land Use/Proposed Land Use^	Relevant	
Maintenance of Ecosystems	Yes	No[1]	No[1]	Unlikely[1]
Potable Mineral Water	N/A	No	No	No
Agriculture, parks and gardens	Yes	No[2]	No[2]	Unlikely[2]
Stock watering	No	No	No	No
Industrial water use	No	No	No	No
Primary contact recreation	No	No	No	Unlikely
Building and structures	No	No	No	No

- Assume nitrate levels of 68 mg/L (from 37-43 Breese Street, Brunswick (CARMS 72363-1))
^ – Commercial and high density residential
1 – Moonee Ponds creek ~2.8 km -southwest of the site
2 – Nearest domestic and stock registered bore is located 1.15 km southeast of the site (Table 5). The BU of agriculture, parks and gardens with respect to watering gardens in the surrounding area will most likely be sourced by mains/tap water rather than water from a bore (if present)

8.2.3 Clean Up To the Extent Practicable (CUTEP)

Based on the assessment that groundwater was deemed to be polluted by nitrate from a regional source, a CUTEP determination is required in accordance with Section 13.6 of EPA Victoria Publication No 759.3. As the site is not a source site, an auditor determined CUTEP was notified to the EPA on 11 August 2016 and is discussed in see Section 9.

8.3 Beneficial Use Assessment – Surface water

The nearest surface water body to the site is Moonee Ponds Creek located ~2.8km to the south-west. The site is not deemed to have any potential impact to the surrounding surface water bodies and is considered to not preclude the beneficial use of surface water. It is considered that local surface water will be managed based on the proposed development of the site (for high density residential development) will include management of surface water through stormwater drains connecting to the pre-existing stormwater drain network off-site.

8.4 Beneficial Use Assessment – Air

As the levels of volatile contaminants in the soil were reported to be either below laboratory detection levels or low, the auditor considers that the conditions of the site are not detrimental to the beneficial uses of air defined in the Air Management SEPP and Air Quality SEPP.

9 Auditor-determined CUTEP

Based on the results from an up gradient audit site located 120m north of the site, the auditor deems the site to be impacted by a regional source of nitrate contamination. As discussed in Section 8.2.2.8, the beneficial uses of maintenance of ecosystems and agriculture, parks and gardens is precluded. The precluded beneficial use summary table as required by Attachment C of EPA Victoria Publication No 840.2 is provided below.

Table 16: Precluded beneficial use summary table

Precluded Beneficial Use	Contaminant(s)
Maintenance of Ecosystems	**Nitrate (b)**
Potable Mineral Water	**N/A**
Agriculture, parks and gardens	**Nitrate (b)**
Stock watering	**N/A**
Industrial water use	**N/A**
Primary contact recreation	**N/A**
Building and structures	**N/A**

(b) – background/regional pollution
N/A – not applicable

Given that the known presence of nitrate concentrations in groundwater within the Brunswick and surrounding suburbs, remediation is impracticable and will have no long term effect on beneficial uses.

The auditor has determined that CUTEP has been achieved at the site and the site is a groundwater quality restricted use zone (GQRUZ – Figure 3). The completed EPA Victoria checklist for an auditor-determined CUTEP is provided below. As required by Attachment D of EPA Victoria Publication No 840.2, a table summarising the status of groundwater concentrations due to an exceedance of the relevant beneficial uses has not been provided as no groundwater testing occurred at the site.

Table 17: Assessment of relevant protected beneficial uses of groundwater

Information included	Section/Page discussed	Included
Title details	Section 2.1, page 3	✓
Land area	Section 2.1, page 3	✓
Past use	Section 3.1, page 11	✓
Surrounding land use (North, South, East and West)	Section 2.2, page 4	✓
Proposed future use	Section 2.4, page 4	✓
Geology	Section 2.6, page 8	✓
Groundwater depth (m)	Section 2.7.2, page 8	✓
Groundwater flow direction	Section 2.7.5 page 9	✓
Nearest surface water receptor (distance and direction)	Section 2.7.5 page 9	✓
Bore search (2 km radius)	Section 2.7.3, page 8	✓
Groundwater segment (note – most conservative segment should be used)	Section 6.2, page 20	✓
Beneficial uses of groundwater identified	Section 6.2, page 21	✓
Precluded beneficial uses of groundwater identified	Section 8.2.2, page 31	✓

Information included		Section/Page discussed	Included
Remediation options table	Discussion of specific options	Remediation is not an option due to the regional and nonpoint source and nature of the pollution. Site specific or even wide spread remediation would not permanently restore any beneficial uses precluded by the impact	✓
	Cost		✓
	Technical feasibility		✓
	Logistical feasibility		✓
Vapour risk considered		Vapour risk was not associated with nitrate pollution and has not been assessed	**N/A**
GQMP	Responsible party identified	No GQMP is required due to the widespread and generally static nature of the impact.	**N/A**
	Cost – establishment and annual		
	Duration		
Water quality summary table showing results from all rounds of monitoring (µg/L)		NA[1]	**N/A**
Separate table showing latest water quality results that are above guidelines (µg/L) as per attached table (as a hard- and soft-copy Word document)		NA[2]	**N/A**
An opinion on the source of all contaminants over criteria in the groundwater (e.g. on-site source, off-site source, co-source)		Section 8.2.2.8 page 30 and Section 9 page 32	✓
Groundwater and soil contamination maps		NA[3]	**N/A**
Hydrogeological cross-section(s) of site showing (as a minimum) geology, groundwater levels, groundwater bores and any relevant features (e.g. USTs, excavations, utility services, building structures, etc)		Not required	**N/A**
Discussion of proposed GQRUZ (if applicable). This should include sufficient information to identify it and an associated figure. N.B. A meeting should be held with EPA to discuss the GQRUZ. The GQRUZ itself should cover the known/modelled extent of all known precluded extractive beneficial uses		Section 9 page 32	✓
Details and records of communications with off-site property owners associated with the GQRUZ (if applicable)		No community consultation undertaken	**N/A**
Any other issues of significance (e.g. Enforcement Notice, Significant Public Interest)		None applicable to this situation	✓
A clear and concise Executive Summary providing all of the above information		Pages (i–iv)	✓

1 – no groundwater investigations undertaken
2 – no groundwater investigations undertaken
3 – no groundwater investigations undertaken and soil results below adopted criteria

9.1 Ongoing Management

As no groundwater monitoring wells were installed at the site future groundwater monitoring and/or management is not considered to be necessary or beneficial and as such, none is recommended. The auditor considers that groundwater contamination associated with nitrate is widespread and remediation will not restore any beneficial uses or have any long term effect on groundwater quality.

As outlined in Section 13.5 of EPA Victoria Publication No 759.3 and in accordance with clause 19(3) of SEPP (Groundwaters of Victoria), the EPA may require periodic reassessment of the practicability of groundwater clean-up.

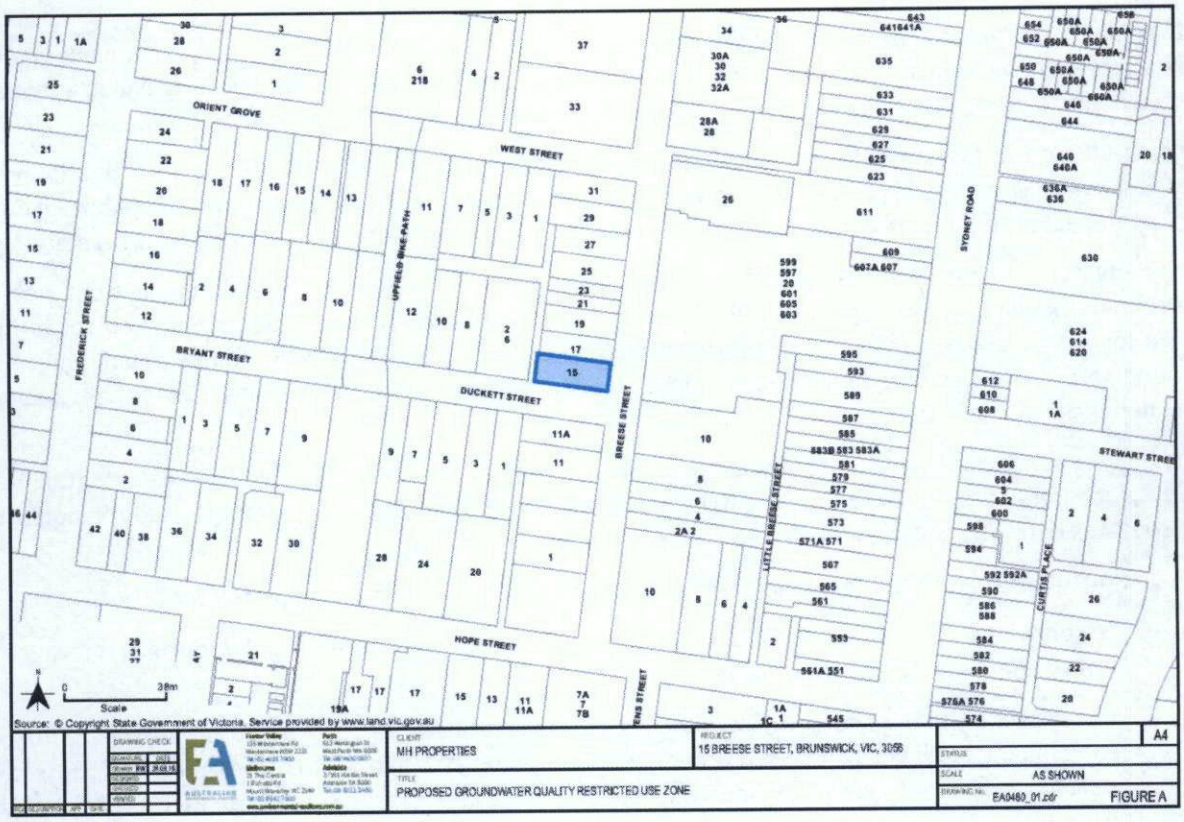


Figure 3: Proposed groundwater quality restricted use zone

10 Audit Outcome

Based on review of the provided information, the auditor is of the opinion that the site has been adequately investigated for historic potentially contaminating activities, and that investigations have provided adequate assessment of the audit site and areas that could have been affected by contamination sources.

The results of the assessment indicated that site activities have not been a source of contamination with respect to its historic use as predominantly residential use. Analytical results reported concentrations of CoPC below the adopted human health and ecological criteria. All relevant beneficial uses of land protected.

Groundwater was not assessed as part of the audit. However, based on the outcome from nearby surrounding audits, relevant groundwater beneficial uses are precluded by regional pollution for nitrate (Maintenance of Ecosystems and Agriculture Parks and Garden). The site is not the source of pollution. The groundwater beneficial uses precluded by contamination are not relevant at the site nor do they preclude any beneficial uses of land.

The auditor concludes that the site is suitable for the issue of a Certificate of Environmental Audit (CoEA). A copy of the CoEA is attached to the Executive Summary at the start of this Environmental Audit Report. The CoEA states that the site is suitable for any beneficial use.

In addition, other related and relevant information made available to interested parties include:

- Groundwater beneath the site is polluted. The site is not the source of the pollution and is considered not to affect any relevant beneficial uses of the site;
- Groundwater at the site contains elevated concentrations of nitrate (based on information from surrounding audit sites). The levels are considered to be associated with off-site regional sources of pollution. The pollution is not sourced from the site and is considered not to affect any beneficial uses of the site.
- The site is not considered a source of groundwater pollution and groundwater was not tested as it does not impact on the beneficial uses of land and/or groundwater. If groundwater is to be extracted from the site, advice including testing, should be sought from a suitably qualified person to ensure the groundwater is suitable for the intended use;
- The auditor is satisfied that the groundwater has been cleaned up to the extent practicable and the site is a groundwater quality restricted use zone (also known as a GQRUZ). The extent of the recommended GQRUZ is shown on Figure A, attached;
- Groundwater must not be used for any precluded beneficial use without prior testing and review of results by a suitably qualified professional to confirm its suitability for the proposed use. It may be extracted for the purpose of environmental monitoring or remediation;
- In accordance with clause 19(3) of SEPP – Groundwaters of Victoria (1997), the Authority may require periodic reassessment of the practicality of groundwater clean-up;
- Any fill or soil imported to the site must be chemically tested soil or fill that classifies as "fill material" in accordance EPA Publication IWRG 621;
- Any material excavated from the site and disposed of off-site must be classified and managed in accordance with relevant statutory regulations and EPA Publication IWRG 621; and
- In accordance with section 53ZE of the Act, the owner/occupier of the site should provide a copy of this certificate to any person who becomes or proposes to become an occupier of the site.

11 References

Legislation and Regulations

Environment Protection Act 1970 (Act No. 8056/1970) Victoria.

Planning and Environment Act 1987 Section 12 (2) (a) Minister's Direction No. 1 Potentially Contaminated Land. (Act No. 45/1987. Direction Amended 27 September 2001).

Water Act 1989 (Act No. 80/1989) Victoria.

SEPP (State Environment Protection Policy) (1997) *Groundwaters of Victoria*. Victorian Government Gazette, S160, 17 December 1997.

SEPP (State Environment Protection Policy) (1999) *Ambient Air Quality*. Victorian Government Gazette, S19, 9 February 1999.

SEPP (State Environment Protection Policy) (2001) *Air Quality Management*. Victorian Government Gazette, S240, 21 December 2001.

SEPP (State Environmental Protection Policy) (2002) *Prevention and Management of Contamination of Land*. Victorian Government Gazette, S95, 4 June 2002.

SEPP (State Environment Protection Policy) (2003) *Waters of Victoria*. Victorian Government Gazette, S107, 4 June 2003.

Guidelines and Policies

Amended ASC NEPM (1999) National Environment Protection (Assessment of Site Contamination) Measure. December 1999 amended in 2013. National Environment Protection Council. Australian Government.

Standards Australia (1999) Guide to the Sampling and Investigation of Potentially Contaminated Soil, Part 2: Volatile Compounds, AS4482.2-1999.

Standards Australia (2005) Guide to the Sampling and Investigation of Potentially Contaminated Soil, Part 1: Non-Volatile and Semi-Volatile Compounds, AS4482.1-2005.

Standards Australia (2009) Piling – Design and Installation. AS2159-2009.

Standards Australia (2009) Concrete Structures. AS 3600 2009.

EPA Victoria Publications and Industrial Waste Resource Guidelines

EPA Publication 759.3. Environmental Auditor (Contaminated Land): Guidelines for Issue of Certificates and Statements of Environmental Audit. December 2015.

EPA Publication 953.2. Environmental Auditor Guidelines for Conducting Environmental Audits. August 2007

EPA Publication 1147.1. Environmental Auditor Guidelines – Provision of Environmental Audit Reports, Certificates and Statements. December 2012.

EPA IWRG 621. Soil Hazard Categorisation and Management. July 2009.

Site-specific Technical Reports

EP Risk (2016) Detailed Site Investigation: 15 Breese Street, Brunswick. EP Risk Management (Ref: EP0326), 28 July 2016.

Appendices

(refer to digital file 74276-1_b)

Appendix A

Certificates of Title

Appendix B

Proposed Development Plans

Appendix C

2km Groundwater Bore Search

Appendix D

GQRUZ Surrounding the Site

Appendix E

Assessor Report

Appendix A

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Appendix B

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