Environmental Site Assessment

PMP Printing Precinct: 209-211 Carinish Road, 31-49 Browns Road, 1455-1457 Centre Road and 11-57 Bendix Drive, Clayton, Victoria

Prepared for:
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29 May 2019

Distribution

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Executive Summary

Senversa was engaged by the Victorian Planning Authority (VPA) to complete an Environmental Site Assessment (ESA) at the PMP Printing Precinct: 209-211 Carinish Road, 31-49 Browns Road, 1455-1457 Centre Road and 11-57 Bendix Drive, Clayton, Victoria (the site) (see **Figure 1**). The Monash Industrial Land Use Strategy (2014) recommends that the PMP Printing precinct is rezoned to an appropriate residential zone subject to an environmental audit being undertaken and that the VPA is facilitating the planning process.

The objectives of Senversa's ESA were to:

- Undertake a desktop assessment of available information on the likelihood and status of potential contamination at the site.
- Determine if any further investigation or remediation will be required.
- Advise if an environmental audit of the site will be required.

Environmental works historically undertaken at the PMP Printing portion of the precinct, have included a preliminary site investigation (PSI), soil sampling from 62 locations, installation and sampling of 12 groundwater monitoring well locations, and in-situ decommissioning of six underground storage tanks.

The finding of are summarised as follows:

- Elevated concentrations of petroleum hydrocarbons, naphthalene and metals are present within shallow soils in multiple locations within the PMP printing site.
- Petroleum hydrocarbon concentrations in soils west of Bendix Drive and in the centre of the main northern portion of the PMP printing site exceed health screening levels for direct contact and / or vapour intrusion and would likely require remediation / management in any future redevelopment scenarios.
- Perched water (shallow water above the regional water table) was identified within three separate areas of the site, with light non-aqueous phase liquid (LNAPL) present on the perched water west of Bendix Drive. The LNAPL will require remediation as a part of redevelopment of the site.
- Elevated concentrations of metals identified in the regional water table aquifer are potentially consistent with natural or ambient background conditions. However, an environmental audit may identify metals that are at least in part site derived and require remediation and or preparation of a clean up to the extent practicable (CUTEP) submission prior to conclusion of an environmental audit.

Based on the assessment undertaken to date, no unacceptable off-site risks to surrounding receptors have been confirmed and the identified soil and groundwater impacts are considered likely to be effectively managed through completion of a Section 53X Environmental Audit, subject to implementation of remediation and post-audit management measures. This includes the commercial/industrial properties on the east side of Bendix Drive, (where individual PSIs are yet to be completed), which were identified as being having used for commercial/industrial uses since at least 1984.

In addition to this, identified soil and groundwater impacts within the PMP printing site have not yet been delineated in full and the current density of soil investigation locations within the PMP Printing site does not meet that recommended by the Australian Standard AS4482 – 2005, *Guide to the sampling and investigation of potentially contaminated soil*. Therefore, additional assessment of the PMP printing site will be required prior to a Statement of Environmental Audit with conditions suitable for residential use being issued for the site.

Recommendations on Environmental Audit

As the site would meet the definition of 'potentially contaminated land' under the *Planning and Environment Act* an environmental audit would be required before a sensitive use (e.g. residential) was commenced. This includes the commercial/industrial properties on the east side of Bendix Drive, (where individual PSIs are yet to be completed), which were identified as being having used for commercial/industrial uses since at least 1984.

Based on the information reviewed, the site is likely to be considered suitable for a sensitive use provided further site assessment and remediation is undertaken as a part of environmental audit. As such, an Environmental Audit Overlay (EAO) should be imposed on the precinct to allow a planning scheme amendment.

The environmental audit can be undertaken after imposition of the EAO so that the conditions contained within the final Statement of Environmental Audit can be tailored to the proposed development (i.e. installation of a vapour barrier or active venting under basements). The conditions will therefore be able to address the development specific environmental risks and not require overly onerous conditions to be placed on the site that may unnecessarily restrict the proposed development.

Recommendations on Future Assessment and Remediation

Elevated concentrations of petroleum hydrocarbons and naphthalene in shallow soils as well as petroleum hydrocarbon derived LNAPL in perched water have been identified as likely requiring remediation as a part of the proposed redevelopment of the site. Remediation of these contaminants in soil is undertaken on multiple sites in Victoria each year and is commonly undertaken via either excavation and off-site disposal or through ex-situ bioremediation by composting the contaminated soil in biopiles to encourage beneficial microbial activity on the site. Multiple technologies also exist to remediate the LNAPL in perched water (including skimming, monitored natural attenuation, multi-phase extractions and soil vapour extraction), if it is not effectively remediated when surrounding soils are treated.

At this stage the environmental investigations undertaken at the site have not identified widespread contamination that is likely to be time prohibitive to remediate given the likely scale of the proposed redevelopment. However, assessment of per- and poly-fluoroalkyl substances (PFAS - identified as contaminants of concern) in soil and groundwater has not yet been undertaken and if present, is likely to require management and or remediation prior to completion of an environmental audit. Therefore, assessment of PFAS in soil and groundwater around and down-gradient of the identified potential source should be undertaken. This may be undertaken before or after application of an EAO during the environmental audit, but should be completed prior to site redevelopment.

The actual extent of soil and or groundwater remediation that will be required in order for a Statement of Environmental Audit consistent with the proposed future land use to be issued is dependent on the layout of the final development. Therefore, as the layout of the final development has not been finalised, a precinct wide remediation strategy plan is not recommended to be developed at this stage.

Contents

Figures

List of Acronyms

Acronym	Definition
ACM	Asbestos containing material
AHD	Australian Height Datum
AS	Australian Standard
ASLP	Australian Standard Leaching Procedure
ANZECC	Australian and New Zealand Environment and Conservation Council
BTEXN	Benzene, toluene, ethylbenzene, xylenes, naphthalene
BTEX	Benzene, toluene, ethylbenzene, xylenes
CUTEP	Clean up to the extent practicable
DSE	Department of Sustainability and Environment
EIL	Ecologically based investigation level
EPA	Environment Protection Authority (Victoria)
ESA	Environmental Site Assessment
ESL	Ecological screening level
GME	Groundwater Monitoring Event
GQRUZ	Groundwater Quality Restricted Use Zone
HIL	Health-based investigation level
HSL	Health screening level
IRWG	Industrial Waste Resource Guidelines
LNAPL	Light non-aqueous phase liquid
m AHD	Metres Australian Height Datum
m bgl	Metres below ground level
NAPL	Non-aqueous phase liquid
NATA	National Association of Testing Authorities
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
PAH	Polycyclic aromatic hydrocarbons
PID	Photo-ionisation detector
PSI	Preliminary site investigation
SEPP	State Environment Protection Policy
SEPP PMCL	State Environment Protection Policy (Prevention and Management of Contaminated Land)

Acronym	Definition
SEPP GoV	State Environment Protection Policy (Groundwaters of Victoria)
SEPP WoV	State Environment Protection Policy (Waters of Victoria)
TDS	Total dissolved solids
TPH	Total petroleum hydrocarbons
TRH	Total recoverable petroleum hydrocarbons
UPSS	Underground Petroleum Storage Systems
UST	Underground storage tank
VOC	Volatile organic compound
VPA	Victorian Planning Authority

1.0 Introduction and Objectives

Senversa completed an Environmental Site Assessment (ESA) at the PMP Printing Precinct: 209-211 Carinish Road, 31-49 Browns Road, 1455-1457 Centre Road and 11-57 Bendix Drive, Clayton, Victoria (the site).

The location, site layout, historical investigation locations and site boundary of this ESA are shown in **Figure 1**.

1.1 Project Background

It is understood that the Victorian Planning Authority (VPA) is facilitating the planning process for the PMP Printing Precinct. The Monash Industrial Land Use Strategy (2014) recommends that the PMP Printing precinct is rezoned to an appropriate residential zone subject to an environmental audit being undertaken to determine the extent of any contamination and any impact upon the commercial viability and likelihood of residential development occurring.

Senversa were engaged by the VPA to undertake an ESA, which would inform the requirements to obtain a Planning Scheme Amendment for a range of redevelopment scenarios including residential.

1.2 Objectives

The objectives of Senversa's ESA are to:

- Undertake a desktop assessment of available information on the likelihood and status of potential contamination at the site.
- Determine if any further investigation or remediation will be required.
- Advise if an Environmental Audit of the site will be required.

2.0 Site Description and Environmental Setting

2.1 Site Details

The following table summarises the relevant details that describe the site.

Item	Relevant Site Information
Address/Plan or Title	209-211 Carinish Road, Clayton, Victoria (Volume 10359 Folio 492) 31-49 Browns Road, Clayton, Victoria (Volume 10359 Folio 490) 11-15 Bendix Drive, Clayton / Lot 4 Plan LP128033 16-20 Bendix Drive, Clayton / Lot 5 Plan LP128033 21-25 Bendix Drive, Clayton / Lot 6 Plan LP128033 26-30 Bendix Drive, Clayton / Lot 7 Plan LP128033 31-35 Bendix Drive, Clayton / Lot 8 Plan LP128033 36-40 Bendix Drive, Clayton / Lot 9 Plan LP128033 41-45 Bendix Drive, Clayton / Lot 10 Plan LP128033 36-50 Bendix Drive, Clayton / Lot 11 Plan LP128033 51-55 Bendix Drive, Clayton / Lot 12 Plan LP128033 56 Bendix Drive, Clayton / Lot 6 Plan RP14881 56-57 Bendix Drive, Clayton / Lot 21 Plan RP14881 57 Bendix Drive, Clayton / Lot 6 Plan RP14881 1455 Centre Road / Lot 5 Plan LP21737 1455A Centre Road / Lot 1 Plan RP14881 1455B Centre Road / Lot 2 Plan RP14881 1455C Centre Road / Lot 3 Plan RP14881 1455D Centre Road / Lot 4 Plan RP14881 1457 Centre Road, Lot 13 Plan LP128033 1457B Centre Road, Lot 13 Plan LP128033
Site Area	8.203 ha (PMP Printing) 1.46 ha (Approximate total area of properties along Bendix Drv and Centre Rd)
Municipality	City of Monash
Current Land Use Zoning and Overlays	Industrial 1 Zone (IN1Z) Design and Development Overlay – Schedule 1 (DDO1) Areas of Aboriginal Cultural Heritage Sensitivity defined under the Aboriginal Heritage Regulations 2007 (within the eastern portions of 11-30 Bendix Drive and southeast corner of 31-49 Browns Road).
Current Site Use	PMP Limited administrative headquarters and printing operations (209-211 Carinish Road and 31-49 Browns Road). Roadworx – Traffic Management (11-15 Bendix Drive) ASE Stone – Engineered Stone Products (16/18 Bendix Drive) Agrotrade – Asian food importer (21-25 Bendix Drive) Diecut Engineering – Laser cutting service (26-30 Bendix Drive) Ceramic Tile Imports (31-37 Bendix Drive and 1455 Centre Road) Unknown commercial industrial (36-40 Bendix Drive) Metal Makers – Metal engineering workshop (41-45 Bendix Drive) Arkea Blinds and Curtains (46-50 Bendix Drive) Giant Express – International Courier (51-55 Bendix Drive) Australian Chinese Buddhist Research Centre (56 Bendix Drive) Suspected vacant commercial/industrial (57 Bendix Drive) Ace Workshop and Dyno – car servicing (1455B Centre Rd) MP Smash Repairs (1455B Centre Road) Stug Australia – Plastic engineering workshop (1457 Centre Road)
Surrounding Land Use	• **North:** Former Clayton Primary school, being redeveloped for residential use. • **South:** Railway line, Centre Road and industrial land. • **West:** Residential**.** • **East**: Residential, some commercial/industrial along Centre Road.

2.2 Environmental Setting

The following table summarises the environmental setting of the site based on the environmental reports reviewed and observations from the site inspection and / or online sources.

Item	Relevant Site Information
Topography and Drainage	The site has a relatively flat topography with an elevation of between 54 to 62 m Australian Height Datum (AHD), sloping slightly from northwest to southeast, based on the published topographical contours map obtained from Land Channel (www.land.vic.gov.au). Regionally, the area is slightly undulating. Very few impermeable surfaces are currently present on the site or in the surrounding area and therefore it is likely that the majority of surface water that currently enters the site is captured by site-based storage or exits the site via municipal stormwater systems.
Nearest Surface Water Bodies	The nearest mapped surface water body is Mile Creek, which is observed as a highly modified, concreted drain, approximately 1.5 km southeast of the site boundary. Mile Creek drains, via Mordialloc Creek to Port Phillip Bay, located approximately 9 km southwest of the site.
Geology	A review of the Geological Society of Victoria "Ringwood" map sheet (1:63,500) and Melbourne 1:250,000 map sheet, shows that the site is underlain by Miocene to Pliocene aged Red Bluff Sandstone of the Brighton Group of sediments (fluvial: sand, gravel, silt). The Brighton Group formation was recently renamed as the Sandringham Sandstone. Some unnamed Pleistocene to Holocene swamp and lake deposits (Qm1), lake deposits and unnamed alluvium are present in the south-east corner of the site. The soil profile observed during investigation at the site generally consisted of surface basalt gravel and (clayey) sand fill material, underlain by natural sandy clay and clayey sands of the Sandringham Sandstone Formation.
Groundwater Bore Search	Senversa undertook a search of the Visualising Victoria's Groundwater online portal www.vvg.org.au on 10 October 2018 for bores within a 1 km radius of the site and identified 30 registered bores. Of these, five are registered for domestic and/or stock, twenty-two are registered for observation and/or investigation and the use of the remaining three is not known.
Hydrogeology	A review of the Visualising Victoria Groundwater (VVG) online portal and information available from surrounding Audits indicate that the shallowest aquifer at the site is within Tertiary aged Sandringham Sandstone sediments. Regional groundwater quality is expected to range 1,001 to 3,500 mg/L total dissolved solids (TDS) (considered Segment B within SEPP (GoV)). Regionally groundwater flow would be expected to be southeast towards Port Phillip Bay. Groundwater investigations at the site have indicated the presence of shallow perched groundwater within isolated portions of the site. Groundwater considered representative of the shallow aquifer was encountered in Sandringham Sandstone sediments at depths of between 1.110 and 6.175 m below ground level (bgl) (between 52 to 56 mAHD). Laboratory measured TDS ranged from 770 to 4,600 mg/L, with an average concentration of 2,652 mg/L. Previous investigations at the site have inferred the groundwater flow direction to be to the south.
EPA Priority Sites Register and Pollution Notices	The following EPA Priority Sites (last updated 31 August 2018) have been issued with Notices under Section 62A(1) of the *Environment Protection Act 1970* within 1 km of the site boundary: • Notice 90007862 - Former Industrial Site. Requires assessment and/or clean-up, 1555 - 1615 Centre Road, Clayton (~1 km southeast). • Notice 90009073 Former Industrial Site. Requires ongoing management, 1486 - 1550 Centre Road, Clayton (~1km north).
Environmental Audits	Seven EPA Environmental Audits have been undertaken for properties within 1 km of the site. These are summarised within the following **section 2.3**.
Groundwater Quality Restricted Use Zones (GQRUZ)	Two Groundwater Quality Restricted Use Zones (GQRUZs) have been declared within 1 km of the site boundary: 1408-1418 Centre Road, Clayton where restricted uses are drinking water, livestock water, irrigation, recreation and industrial water use (CARMs 72832-1). 21-25 Browns Road, Clayton where restricted uses are drinking water, irrigation and recreational water use (CARMs 48251-5).

2.3 Nearby Environmental Audit Reports

EPA Victoria publishes a list of properties for which a Certificate or Statement of Environmental Audit has been issued under Part IXD of the *Environment Protection Act*, 1970. Senversa reviewed this list on 10 October 2018 to gain an understanding of potential offsite sources of contamination and regional pollution and summarised the findings of the following audits undertaken for properties nearest to the site boundary.

Address	Distance and direction from site	EPA CARMS reference	Summary of Information
99-121 Carinish Road, Clayton	**700 m west**	**72787-1**	• History of industrial use including service station and generator manufacturer with underground storage tanks (USTs) formerly present at the site. • Proposed for redevelopment as commercial/high density residential. • Elevated concentrations of total recoverable hydrocarbons (TRH), polycyclic aromatic hydrocarbons (PAHs), trimethylbenzenes, cumene, xylene, naphthalene and metals were measured in soil. • Groundwater was encountered in the Sandringham Sandstone aquifer with salinity ranging 162 mg/L to 1,070 mg/L. • Groundwater was mildly acidic and groundwater flow was interpreted to be to the southeast. • Elevated concentrations of arsenic, copper and zinc in groundwater were attributed to background groundwater quality from diffuse sources. • Statement of Environmental Audit was issued. • Potential for ACM fragments, chemical contaminants (petroleum hydrocarbon fractions, PAHs, metals and/or inert waste inclusions) remaining in soil. • Risk from soil impacts is to be managed through an ongoing soil management plan.
1408-1418 Centre Road, 456, 456a and 456b Haughton Road, 20 Main Road and 22 Main Road, Clayton South	**100 m south**	**72832-1**	• Former site use was pharmaceutical manufacture, storage and distribution with market gardening prior to this. • Proposed for low to high density residential and public open space. • On-site sources of contamination included USTs, interceptor pits and sumps, and the storage and use of chemicals associated with pharmaceutical manufacturing and distribution. • Soil contamination at the site consisted of TRH, PAHs and metals. • USTs and other underground features/structures were excavated. • Groundwater was encountered within Sandringham Sandstone sediments with flow direction interpreted to be south and southwest with a salinity ranging 1,310 to 1,880 mg/L TDS. • Groundwater in the southwest portion of the site was considered polluted. • Groundwater pollution included site-derived TRH and ammonia from off-site sources. • Groundwater was considered to contain naturally low pH, and naturally elevated concentrations of aluminium, copper, iron, nickel and zinc. • Concentrations of iron and pH levels precluding beneficial uses of “Stock watering” and “Agriculture, parks and gardens” were considered to be naturally occurring within the Sandringham Sandstone aquifer, not pollution.

Address	Distance and direction from site	EPA CARMS reference	Summary of Information
			• A Certificate of Audit was issued for part of the site and a Statement for the remainder. • A Groundwater Quality Restricted Used Zone (GQRUZ) was declared for part of the site but did not extend off-site. The extent of the GQRUZ is provided in **Appendix A**.
21-25 Browns Road, Clayton	**150 m north**	**48251-1, 48251-2, 48251-3, 48251-4, 48251-5**	• Formerly site use included rubber manufacturing, automobile metal component fabrication and a storage and transport facility. • Audit of the site was completed in four stages. • Concentrations of TRH, benzene, toluene, ethylbenzene, xylene (BTEX), trichloroethylene (TCE) and perchloroethylene (PCE) in soil exceeded investigation levels. • Several USTs, a waste burial area, and interceptor traps were removed and validated. • Areas of soil identified as contaminated with hydrocarbons were remediated and validated. • Groundwater salinity ranged from 2,400 to 6,200 mg/L TDS and flow was interpreted to be to the southwest. • Groundwater at the site was contaminated with metals and chlorinated hydrocarbons (specifically tetrachloroethene, trichloroethene, cis 1,2-dichloroethene and vinyl chloride). • Elevated concentrations of heavy metals, including copper, arsenic, zinc and selenium exceeding maintenance of ecosystems criteria and variable pH as low as 4.27 were measured in groundwater. • Pump and treat and in-situ chemical oxidation (ISCO) remediation programs were undertaken. • CUTEP was granted and GQRUZ declared on and south of the site up to approximately 60 m north of the PMP sites northern boundary. A map showing the extent of the GQRUZ is provided in **Appendix A**.

3.0 Summary of Previous Environmental Assessment

3.1 Previous Environmental Site Assessment Reports Undertaken

Senversa was provided with and reviewed the following existing environmental reports for the site:

- *Carinish Road Underground Storage Tank Decommissioning*, Meinhardt Infrastructure and Environment, 29 June 2007 (Meinhardt, 2007).
- *Phase 1 Environmental Site Assessment: 209-211 Carinish Road and 41-49 Browns Road, Clayton, Victoria*, Atma Environmental, 21 May 2012 (Atma, 2012a).
- *Preliminary Phase 2 Environmental Site Assessment: PMP Limited (209-211 Carnish Road and 41-49 Browns Road, Clayton, VIC.)*, Atma Environmental, 22 May 2012 (Atma, 2012b).
- *Summary and Recommendations - 209-211 Carinish Road Land Parcel*, Atma Environmental, 25 May 2012 (Atma, 2012c).
- *Limited Phase 2 Environmental Site Assessment: 209-211 Carnish Road Clayton, Victoria*, Atma Environmental, 27 August 2012 (Atma, 2012d).
- *Underground Storage Tank Decommissioning at PMP Limited, Browns Rd, Clayton, Victoria*, Atma Environmental, 22 March 2013 (Atma, 2013a).
- *Due Diligence Assessment, 31-49 Browns Road, Clayton, Victoria*, Compass Environmental, 7 May 2013 (Compass, 2013).
- *Groundwater Monitoring Event: 209-211 Carnish Road, Clayton, Victoria*, Atma Environmental, 13 April 2013 (Atma, 2013b).
- *Groundwater Monitoring Event: 209-211 Carnish Road, Clayton, Victoria*, Atma Environmental, 20 April 2017 (Atma, 2017).

Reports considered relevant for this ESA are reviewed in more detail below.

3.2 Preliminary Site Investigation

Atma Environmental completed a preliminary site investigation (PSI) of 209-211 Carinish Road and 41-49 Browns Road, Clayton (the PMP Printing property) in March 2012. The scope of the PSI included review of a range of historic aerials, title information, site plans, as well as a site inspection and interviews with people knowledgeable of the site. Relevant findings of the investigation are summarised as follows:

- Land uses up to the early 1950s included market gardening and grazing.
- First known industrial use of the site was in the 1950s by a furniture manufacturer (209-211 Carinish Road) and Wilke and Co (predecessor company of PMP Print) (41-49 Browns Road).
- Wilke and Co appeared to have purchased the 209-211 Carinish Road by 1972.
- Three isopropanol underground storage tanks (USTs) were decommissioned in-situ in 2007 by removing product and filling with cement stabilised sand. No validation testing was undertaken as isopropanol was considered too readily degrade in soil and groundwater.
- A historical drainage plan from South East Water refers to a range of infrastructure including “Acid Wastes”, a “Settling Pit”, a “Neutralising Apparatus, “Silt Traps”, Triple Interceptor Traps and a “Settling and Solvent Interceptor Tank” ‘B’’
- At least two presses are known to have leaked oil.

While the PSI did not investigate the portion of the site including properties along Bendix Drive and Centre Road it is evident from the historic aerials obtained that the current commercial/industrial properties on Bendix Drive were constructed sometime between 1972 and 1984. This area appears to have been an agricultural property including a farmhouse and sheds prior to 1972.

3.3 Soil Investigations

The scope of soil investigations undertaken at the site to date has included sampling from a total of 62 locations:

- 40 x soil investigation locations at 31-49 Browns Road (BH1-BH22, B1-B12 and MW1-MW7).
- 22 x soil investigation locations at 209-211 Carinish Road (BH23-BH27 and MW8-MW12).

These were investigated during three separate phases of work as documented below, with the soil investigation locations and exceedances of adopted criteria protective of ecosystems, human health, vapour and Fill Material provided in **Figures 2 – 5** respectively.

Relevant Report	Summary of Investigation
Preliminary Phase 2 ESA (Atma 2012b)	36 x Targeted soil investigation locations sampled at (BH1-BH27, MW1-MW9)
Limited Phase 2 ESA (Atma 2012c)	15 x Additional soil investigation locations sampled at 209-211 Carinish Road (BH28-BH39 and MW10-MW12).
Due Diligence Assessment (Compass, 2013)	11 x Additional targeted soil investigation locations sampled at 31-49 Browns Road (B1-B9, B11, B12).

3.4 Groundwater Investigations

Twelve groundwater wells have been installed at the site. The scope of environmental investigations is summarised below, with the groundwater well locations provided in **Figure 1**.

Relevant Report	Summary of Investigation
Preliminary Phase 2 ESA (Atma 2012b)	9 x Groundwater wells were installed and sampled (MW1-MW9) 1 x Perched water sample was collected (PW-MW1)
Limited Phase 2 ESA (Atma 2012c)	3 x Additional groundwater wells were installed and sampled at 209-211 Carinish Road (MW10-MW12). 1 x Perched water sample was collected (BH34)
Due Diligence Assessment (Compass, 2013)	7 x Groundwater wells at 31-49 Browns Road were sampled (MW1-MW7).
Groundwater Monitoring Event (Atma, 2013b)	5 x Groundwater monitoring wells at 209-211 Carinish Road were sampled (MW8-MW12).
Groundwater Monitoring Event (Atma, 2017)	5 x Groundwater monitoring wells at 209-211 Carinish Road were sampled (MW8-MW12).

3.5 Decommissioning and Validation of Underground Storage Tanks

The decommissioning of underground storage tanks (USTs) documented at the site is limited to the following:

- In 2007 three 9,000 L Isopropanol tanks were decommissioned in-situ by draining residual product and filling tanks with stabilised sand. No validation sampling was undertaken (Meinhardt 2007).
- In 2013 two USTs were decommissioned in-situ by removing all product and filling with a concrete slurry. Removal was considered impractical due to the location of the tanks within the compressor room and adjacent a wall at the site (Atma 2013).

EPA Victoria Publication 888.1 (*Guidelines on the Design, Installation and Management Requirements for Underground Petroleum Storage Systems*) recommends the removal and environmental validation of disused USTs where practicable. Senversa considers it is likely that these five USTs (and others that may be present on the site) will be required to be decommissioned ex-situ prior an environmental audit being completed at the site.

3.6 Site Inspection

A site inspection was undertaken by Sam O'Connor of Senversa on 28 September 2019. Sam met with Phil Bel, the PMP Print Safety and Environmental Manager, and reviewed the current layout of the site and previously documented potential sources of contamination.

Key findings of the site inspection included:

- A flammable goods store was present within steel cabinets, outside, near the northeast corner of buildings on site.
- The trade waste area was observed to generally be in tidy condition. Senversa were informed that chemical impacted liquid wastes are collected within the larger bunded tank observed which is pumped out and disposed by licenced contractor. Only gumming solution is treated and discharged to sewer. Several intermediate bulk carriers (IBCs) containing contaminated water were also observed and staining was observed on the bitumen outside of the bund of the chemical waste tank.
- Staining was observed on concrete and bitumen outside the bund of Substation Number 6, near the northeast corner of the buildings on site.
- Oil was pooling on bitumen and coating an outside wall where a compressor bleed valve was draining on the eastern wall of the larger northern building.
- Some pavement scarring was observed which Senversa were informed was attributed to replacement of sections of firemain.
- The printing and binding areas inside the building appeared to be generally well maintained with concrete floors in good condition and little evidence of significant spills or staining.
- Chemical storage was generally within a designated area near the Lithoman press. Various inks, additives and lubricants were observed in 20 L buckets and containers, IBCs and 200 L drums. Most containers were stored on top of transportable bunds and the concrete floor was observed to be in good condition. There was no evidence of any significant losses of containment.
- A diesel back-up generator was observed within a raised concrete bund. This appeared to be fed by an internal, above ground, fuel tank.
- The properties along Bendix Drive and Carinish Road appeared to be used for a range of light industrial/commercial activities. While there were no obvious signs of underground fuel storage or potential contamination, two metal working businesses and an automotive repairer were observed which would be considered to have a "high potential" for contamination according to the *Potentially Contaminated Land General Practice Note* (DSE, 2005). In conjunction with this, there is the potential that the contamination identified on the PMP Printing site (see **Figure 4**) may have migrated beneath a portion of these properties.

A summary of photographs of the site is provided in **Appendix B**.

3.7 Potential Sources of Contamination and Contaminants of Interest

Based on the results of the PSI and review of the results of historical intrusive investigations, and through review of the following two documents:

- the Department of Sustainability and Environment General Practice Note "*Potential Contaminating Land Uses*" (June 2005); and
- Australian Standard, AS 4482.1—2005 *Guide to the investigation and sampling of sites with potentially contaminated soil. Part 1: Non-volatile and semi-volatile compounds*;

Senversa considers the following to represent potential sources of contamination and contaminants of interest for the site likely to require investigation under an environmental audit. Senversa notes that these have been targeted by the field investigations undertaken at site by Atma Environmental (2012b, 2012c) and Compass Environmental (2013). In some instances further works may be required to validate historic subsurface infrastructure (e.g. excavate to confirm backfill within location of historic pits and collect validation samples).

Senversa notes that the PSI and subsequent site investigations did not consider per- and poly-fluoroalkyl substances (PFAS) as potential contaminants. PFAS may be used in electroplating as a fume suppressant and there is potential that electroplating undertaken in the former Building 1X is a potential source.

Potential Source/Activity	Potential Contaminants	Photo ID
Isopropanol tanks decommissioned in-situ	Isopropanol	Photos 1 and 2
Fuel tank at northeast corner of emergency power house (decommissioning procedure unknown)	TRH, BTEX, PAHs, metals	-
Two USTs in the vicinity of the compressor room of Building 2 (decommissioned in-situ)	TRH, BTEX, PAHs, metals, solvents, isopropanol, pH	Photo 3 and 14
Various pits, tanks, electroplating, cyanide bath and other historic infrastructure within former plate-making/lino- typing department Building 1X	TRH, BTEX, PAHs, metals, solvents, isopropanol, cyanide, per- and poly-fluoroalkyl substances (PFAS)	-
Solvent Interceptor Tank (historic) near south wall of current bindery in Building 2	TRH, solvents, metals	-
Pump sumps (historic) in current bindery area of Building 2	TRH, BTEX, PAHs, metals, solvents, isopropanol, pH	-
Infilled depression near northern boundary	TRH, BTEX, PAHs, metals	-
Triple interceptor pits (e.g. east of pre-press and within north of building 2)	TRH, solvents, metals	Photo 4
C700 Press which leaked badly	TRH, BTEX, PAHs, metals	Photo 5

Senversa notes that the portion of the site including the properties along Bendix Drive and Centre Road has not been investigated as part of the PSI or subsequent investigations. Should an environmental audit be undertaken across the entire site, further detailed investigation of the historical use of each of the commercial properties will likely be required and may identify additional potential sources of contamination and contaminants of interest.

4.0 Regulatory Framework for Assessment

The following sections outline the regulatory framework under which contamination of land and groundwater is assessed and managed in Victoria. Relevant objectives and/or investigation levels are specified which have been adopted for initial assessment of whether pollution is present at the site.

4.1 Soil

4.1.1 Regulatory Framework

The *State Environment Protection Policy (Prevention and Management of Contamination of Land) 2002* (SEPP (PMCL)) sets out the regulatory framework for the prevention and management of contaminated land within the State of Victoria. The intent of this framework is to maintain and maximise, to the extent practicable, the quality of the land environment in Victoria, in order to protect its existing and potential beneficial uses. The SEPP (PMCL) was declared in June 2002 in accordance with Section 16 of the *Environment Protection Act, 1970*, and EPA Victoria is responsible for its implementation.

The SEPP (PMCL) identifies a range of land use categories and relevant protected beneficial uses for each of these categories, as well as indicators (chemical or other characteristics) and objectives for these indicators to determine whether the level of an indicator may pose an unacceptable risk to (i.e. precludes) protected beneficial uses. A state of pollution exists where the concentration of a physical, chemical, biological or radiological characteristic (indicator) does not meet the relevant soil quality objective for that indicator and therefore precludes a protected beneficial use for a relevant land use category.

The protected beneficial uses of land at the site, and the soil quality objectives specified in the SEPP (PMCL) for each protected beneficial use of land, are discussed in the following sections.

4.1.2 Protected Beneficial Uses of Land

The site use is currently industrial and is being considered for a range of redevelopment scenarios including residential. For the purposes of a conservative assessment Senversa has adopted the beneficial uses relevant to mixed (high and low density) residential with public open space. These are as follows:

- Maintenance of modified ecosystems.
- Human health.
- Buildings and structures.
- Aesthetics.
- Production of food and fibre.

4.1.3 Soil Quality Objectives

Senversa compared all soil analytical results received to date against the following soil quality objectives (also commonly referred to as investigation levels) for the protected beneficial uses of land:

- Default EILs and ESLs from the National Environmental Protection (Assessment of Site Contamination) Amendment Measure, 2013 (NEPM) (for maintenance of modified ecosystems and production of food and fibre).
- Health Investigation Levels (HILs) and Health Screening Levels (HILs) from the NEPM (for human health).
- Screening levels within Tables 6.4.2(C) and 6.5.2(C) of Australian Standard 2159–2009 Piling Design and Installation (for buildings and structures).

Potential impacts to the beneficial use of aesthetics were considered based on subjective observations. Senversa noted the following material differences between the adopted residential screening levels compared to those used by Atma Environmental and Compass Environmental:

Relevant Report	Adopted Screening Level (mg/kg)		
	Atma Environmental	**Compass Environmental**	**Senversa**
Mercury - EIL (Maintenance of Ecosystems)	1	1	200[1]
Mercury – HIL A (Human health, production of food and fibre)	15	15	40[2]
Manganese- EIL (Maintenance of Ecosystems)	n/a	500	n/a[3]
Arsenic- EIL (Maintenance of Ecosystems)	20	20	100[4]

[1] Generic EIL for inorganic mercury within NEPC 2013.

[2] Conservative screening criteria for non-elemental mercury based on NEPC 2013.

[3] No ecological investigation/screening level for manganese within NEPC 2013.

[4] EIL from NEPC 2013 for aged arsenic (contamination present in soil for at least two years).

4.2 Groundwater

4.2.1 Regulatory Framework

The *State Environment Protection Policy (Groundwaters of Victoria), 1997* (SEPP (GoV)) sets out the regulatory framework for the protection of groundwater in Victoria. The goal of the policy is:

> *"to maintain and where necessary improve groundwater quality sufficient to protect existing and potential beneficial uses of groundwaters throughout Victoria"*

The SEPP (GoV) defines a range of protected beneficial uses for defined segments of the groundwater environment, based on groundwater salinity (as TDS). The SEPP (GoV) also specifies indicators (chemical or other characteristics) and objectives to determine whether the level of an indicator may pose an unacceptable risk (i.e. potentially precludes) protected beneficial uses. Groundwater is considered polluted where one or more of the following situations exists:

- The groundwater quality objectives for any protected beneficial use are exceeded.
- There is otherwise a detriment to a beneficial use (e.g. the presence of odours in water used for irrigation or recreation use).
- Non-aqueous phase liquid (NAPL) is present.

Where groundwater has been polluted it must be cleaned up such that the protection of beneficial uses is restored, or if this is not possible, groundwater must be cleaned up to the extent practicable.

4.2.2 Relevant Groundwater Segment

A review of groundwater assessment undertaken at site indicates that:

- Regional groundwater salinity, inferred from the Visualising Victoria's Groundwater online portal and available reports for nearby sites, is expected to range 1,001 to 3,500 mg/L total dissolved solids (TDS).
- Groundwater salinity measured beneath the site ranges 770 to 4,600 mg/L TDS, with an average concentration of 2,652 mg/L.

Based on average TDS and consistent with Audits completed for nearby sites, the underlying groundwater is therefore considered to be Segment B (as defined in the SEPP (GoV)). The TDS concentrations less than 1,000 mg/L are considered likely to have been influenced by localised recharge of freshwater and not indicative of the water table aquifer beneath the site.

4.2.3 Protected Beneficial Uses of Groundwater

The SEPP (GoV) requires that Segment B groundwater is protected for the following beneficial uses:

- Maintenance of ecosystems.
- Potable mineral water supply.
- Agriculture, parks and gardens.
- Stock watering.
- Industrial water use.
- Primary contact recreation.
- Buildings and structures.

4.2.4 Groundwater Quality Objectives

Following review of the groundwater analytical results presented within the Atma Environmental and Compass Environmental reports Senversa considers that the adopted screening levels are suitable for an initial assessment of whether beneficial uses at the site have been impacted.

5.0 Assessment of Investigation Results

5.1 Soil

The results of soil investigations undertaken at the site are summarised as follows:

- Concentrations of nickel, copper, zinc, naphthalene and total recoverable hydrocarbons (TRH) exceed National Environmental Protection (Assessment of Site Contamination) Amendment Measure ('NEPM) Ecological Investigation Levels (EILs) and Ecological Screening Levels for residential with public open space.
- The nickel concentration measured at one location exceeded the NEPM health investigation level (HIL) for standard residential.
- TRH concentrations were measured which exceeded NEPM health screening levels (HSL A) for direct contact and Ecological Screening Levels (ESLs) for residential with public open space.
- Concentrations of TRH and naphthalene exceeded HSLs for vapor intrusion.
- Concentrations of mercury, arsenic and manganese have been reported to exceed a NEPM (1999) screening levels. Comparison against the NEPM (2013) EIL/HIL-A screening criteria adopted by Senversa indicates no exceedances however.

The following table summarises impacts to beneficial uses of land relevant to mixed density residential land use with public open space.

Beneficial Use	Beneficial Use Potentially Precluded (Y/N)	Contamination Issue	Impact on Beneficial Use
Maintenance of Ecosystems (Urban Residential/ Public Open Space)	Y	Copper, nickel, zinc, naphthalene, TRH	In the context of the future development, level and extent of impacts identified, the risk to the protected beneficial use is considered negligible provided no direct access to soils are proposed. However, if soft landscaping / ornamental garden areas are proposed, this potential could be managed by placement of a suitable thickness of clean fill beneath finished surface levels (typically 500 mm).
Human Health	Y	TRH, Nickel	Concentrations of semi-volatile TRH and nickel exceed the HIL A/HSL A for direct contact in the vicinity of the C700 Press. The vertical extent has been delineated (< 1 m bgl). Further lateral delineation followed by excavation and/or capping may be required to prevent risk of direct contact.
Buildings & Structures	N	-	Available pH results (6.7 – 11 pH units) and sulphate results (<10 to 160 mg/kg), when compared to Table 6.4.2(C) and 6.5.2(C) within Australian Standard (AS2159) Piling – Design and Installation (2009), indicate the soils to be non-aggressive to reinforced concrete structures and steel piles and unlikely to preclude the protected beneficial use of buildings and structures.
Aesthetics	Y	Brick, coke, clinker, metal, glass, hydrocarbon odours, staining	Some soils present at the site are likely to be considered aesthetically displeasing if used in areas which are likely to be unpaved and used for garden beds, open space, etc.

Senversa has presented the location of impacts exceeding NEPM EILs and ESLs relevant to the beneficial use of maintenance of ecosystems within the attached **Figure 2**.

Exceedances of health-based criteria adopted from the NEPM relevant to residential development with potential open space (HIL/HSL-A) are presented within the attached **Figure 3**.

5.2 Groundwater

Concentrations of metals (nickel, copper, zinc, lead, aluminium, iron, selenium and silver) and inorganics (sodium, chloride, ammonia, nitrate and bicarbonate) have been measured in exceedance of one or more beneficial uses. Low pH (4.1) has also been measured, below the minimum guideline value for protection of beneficial uses. Beneficial uses are assessed within the table below.

Audits for nearby sites indicate that acidic groundwater conditions with elevated concentrations of metals are typical of the Sandringham Sandstone aquifer in this area. The measured exceedances of beneficial use criteria therefore do not necessarily indicate pollution.

Protected Beneficial Use	Beneficial Use Potentially Precluded	Beneficial Use Likely to be Realised (Y/N)	Impact on Beneficial Use
Maintenance of ecosystems – 95% fresh water	Unlikely – Likely to dissipate at point of discharge	n/a	While concentrations of metals and inorganics exceeded adopted maintenance of ecosystems (95% fresh water) guideline values these only apply at the point of discharge. There is no likely point of discharge in the vicinity of the site. The nearest surface water body is Five Mile Creek which would be considered highly modified (straightened and concreted to facilitate drainage) and where groundwater is unlikely to discharge.
Potable mineral water supply	Not relevant	N	This beneficial use is not considered relevant at the site as it is not located in the vicinity of a known mineral water spring (as identified by the Victorian Mineral Water Committee and mapped at http://www.vvg.org.au/) and groundwater does not have mineral water characteristics (e.g. carbon dioxide and other soluble matter in sufficient concentration to cause effervescence or impart a distinctive taste) as defined in SEPP (GoV). As such this beneficial use is not considered relevant.
Agriculture, parks and gardens	Y	N	Concentrations of metals and inorganics exceed the adopted ANZECC/ARMCANZ (2000) long term values (LTV) for *Irrigation and General Water Use.* Given the typically low recharge of the aquifer and the residential, commercial and industrial surrounds it is considered unlikely that groundwater would be extracted for irrigation at, or in the vicinity of the site.
Stock watering	Y	N	Laboratory measured total dissolved solids concentrations in groundwater exceed the ANZECC 2000 stock watering guideline value. Measured TDS is considered to be regional background typical of the Sandringham Sandstone aquifer.
Industrial Water Use	Likely	N	ANZECC 2000 provides no specific guidance for industrial water use as the requirements are so varied. No industrial use of groundwater has been identified at or near the site. Future use is considered unlikely given the known low/variable groundwater yield within the aquifer and availability of a reticulated water supply.
Primary contact recreation	Y	N	Concentrations of metals, inorganics and TDS exceed criteria adopted from ANZECC 2000 and NHMRC 2011. Given the typically low recharge of the aquifer and availability of a reticulated water supply it is considered unlikely this beneficial use would ever be realised at or near the site.
Buildings and Structures	Unlikely	Y	Laboratory measure concentrations of chloride and sulphate are indicative of non-aggressive to mild conditions for concrete and steel piles. Laboratory measured pH was variable representing non-aggressive to severe conditions for exposed piles. Given the shallow depth to groundwater this should be considered in the design of building foundations proposed for the site.

5.3 Perched Water

Perched water was reported to have been encountered during drilling of MW1, MW7 and BH34. Samples were collected from both MW1 and BH34. The latter, located in the vicinity of the C700 press, was reported to have a strong hydrocarbon odour and non-aqueous phase liquid (NAPL) and a measured TRH C10-C16 concentration of 450 mg/L. The thickness of the observed NAPL layer was not recorded during sampling.

5.4 Potential Vapour Intrusion

Senversa compared all soil analytical results against the following conservative screening criteria for vapour intrusion within the NEPM:

- HSL-A for low density residential development on sandy soils.
- HSL-B for high density residential development on sandy soils.

Screening levels were selected based on the depth of the impact as per Table 1A(3) in Schedule B(1) of the NEPM.

Screening levels for TRH and naphthalene were exceeded within some soils sampled indicating a potential vapour intrusion risk within residential buildings if constructed over some areas of the site. Locations where vapour intrusion screening levels are exceeded are presented on the attached **Figure 4**.

There is no risk of vapour intrusion from groundwater beneath the site, even based on the most conservative screening criteria available within the NEPM.

5.5 Preliminary In-situ Soil Hazard Categorisation

The soil analysis results were compared to the Industrial Waste Resource Guidelines for waste categorisation (IWRG621) for the purposes of assessing the likely hazard categorisation of any soils which may require disposal or reuse.

Exceedances of the “Fill Material” upper limits are prevalent due to high pH and concentrations of nickel. Concentrations of TRH, zinc and copper also exceed the “Fill Material” upper limits in several locations. There are also isolated exceedances due to concentrations of PAHs, arsenic, tin and mercury. Concentrations of TRG measured in the vicinity of the C700 Press indicate this soil is likely to be considered “Category B” contaminated soil.

Locations exceeding the IWRG621 “Fill Material” upper limits are shown on the attached **Figure 5**.

6.0 Potential Receptors and Exposure Pathways

6.1 Potential Receptors and Exposure Pathways

In consideration of a mixed residential development with public open space an initial qualitative review of potential human receptors and exposure pathways is presented in the following table.

Potential Source	Potential Pathway	Potential Receptor	Potential Management
Contaminants in soil at concentrations which present a potential health risk	Direct contact during activities such as gardening, etc	Residents or members of public on site. Construction and maintenance workers undertaking excavation works.	Excavation of soil hot spots. Installation of barriers (e.g. permanent hardstand or 0.5 metres of fill soil with marker layer)
Concentrations of volatile contaminants in soil	Exposure to hazardous vapours	Occupiers of enclosed indoor spaces overlying contaminated soils.	Excavation of soil hot spots. Installation of vapour membranes and/or passive ventilation. Planning development so that areas with high risk of potential vapour intrusion are used as public open space
Elevated concentrations of metals and inorganics in soil	Vegetation grown in affected soil.	Vegetation grown in affected soil.	Excavation of soil hot spots. Installation of barriers (e.g. permanent hardstand or 0.5 metres of fill soil with marker layer) Consult professional landscaper as to appropriate species likely to be tolerant of elevated concentrations.

7.0 Conclusions and Recommendations

7.1 Summary of Soil and Groundwater Contamination Issues

Based on review of the available environmental assessment reports, Senversa makes the following conclusions with respect to the assessment and future management of soil and groundwater conditions in the context of the proposed redevelopment:

- Elevated concentrations of petroleum hydrocarbons, naphthalene and metals are present within shallow soils in multiple locations within the PMP printing site.
- Petroleum hydrocarbon concentrations in soils west of Bendix Drive and in the centre of the main northern portion of the PMP printing site exceed health screening levels for direct contact and / or vapour intrusion and would likely require remediation / management in any future redevelopment scenarios.
- Perched water (shallow water above the regional water table) was identified within three separate areas of the site, with light non-aqueous phase liquid (LNAPL) present on the perched water west of Bendix Drive. The LNAPL will require remediation as a part of redevelopment of the site.
- Elevated concentrations of metals identified in the regional water table aquifer are potentially consistent with natural or ambient background conditions. However, an environmental audit may identify metals that are at least in part site derived and require remediation and or preparation of a clean up to the extent practicable (CUTEP) submission prior to conclusion of an environmental audit.

Based on the assessment undertaken to date, no unacceptable off-site risks to surrounding receptors have been confirmed and the identified soil and groundwater impacts are considered likely to be effectively managed through completion of a Section 53X Environmental Audit, subject to implementation of remediation and post-audit management measures. This includes the commercial/industrial properties on the east side of Bendix Drive, (where individual PSIs are yet to be completed), which were identified as being having used for commercial/industrial uses since at least 1984.

In addition to this, identified soil and groundwater impacts within the PMP printing site have not yet been delineated in full and the current density of soil investigation locations within the PMP Printing site does not meet that recommended by the Australian Standard AS4482 – 2005, *Guide to the sampling and investigation of potentially contaminated soil*. Therefore, additional assessment of the PMP printing site will be required prior to a Statement of Environmental Audit with conditions suitable for residential use being issued for the site.

7.2 Recommendations on Environmental Audit

As the site would meet the definition of 'potentially contaminated land' under the *Planning and Environment Act* an environmental audit would be required before a sensitive use (e.g. residential) was commenced. This includes the commercial/industrial properties on the east side of Bendix Drive, (where individual PSIs are yet to be completed), which were identified as having been used for commercial/industrial uses since at least 1984.

Based on the information reviewed, the site is likely to be considered suitable for a sensitive use provided further site assessment and remediation is undertaken as a part of environmental audit. As such, an Environmental Audit Overlay (EAO) should be imposed on the precinct to allow a planning scheme amendment.

The environmental audit can be undertaken after imposition of the EAO so that the conditions contained within the final Statement of Environmental Audit can be tailored to the proposed development (i.e. installation of a vapour barrier or active venting under basements). The conditions will therefore be able to address the development specific environmental risks and not require overly onerous conditions to be placed on the site that may unnecessarily restrict the proposed development.

7.3 Recommendations on Future Assessment and Remediation

Elevated concentrations of petroleum hydrocarbons and naphthalene in shallow soils as well as petroleum hydrocarbon derived LNAPL in perched water have been identified as likely requiring remediation as a part of the proposed redevelopment of the site. Remediation of these contaminants in soil is undertaken on multiple sites in Victoria each year and is commonly undertaken via either excavation and off-site disposal or through ex-situ bioremediation by composting the contaminated soil in biopiles to encourage beneficial microbial activity on the site. Multiple technologies also exist to remediate the LNAPL in perched water (including skimming, monitored natural attenuation, multi-phase extractions and soil vapour extraction), if it is not effectively remediated when surrounding soils are treated.

At this stage the environmental investigations undertaken at the site have not identified wide spread contamination that is likely to be time prohibitive to remediate given the likely scale of the proposed redevelopment. However, assessment of per- and poly-fluoroalkyl substances (PFAS - identified as contaminants of concern) in soil and groundwater has not yet been undertaken and if present, is likely to require management and or remediation prior to completion of an environmental audit. Therefore, assessment of PFAS in soil and groundwater around and down-gradient of the identified potential source should be undertaken. This may be undertaken following application of an EAO but should be completed prior to site redevelopment.

The actual extent of soil and or groundwater remediation that will be required in order for a Statement of Environmental Audit consistent with the proposed future land use to be issued will be highly dependent on the layout of the final development. Therefore, as the layout of the final development has not been finalised, a precinct wide remediation strategy plan is not recommended to be developed at this stage.

8.0 Principles and Limitations of Investigation

8.1 Inherent Uncertainties and Limitations

The investigation works herein are intended to develop and present sound, scientifically valid data concerning actual site conditions. Senversa does not seek or purport to provide legal or business advice.

The following principles are an integral part of site contamination assessment practices and are intended to be referred to in resolving any ambiguity or exercising such discretion as is accorded the user or site assessor.

Area	Field Observations and Analytical Results
Elimination of Uncertainty	Some uncertainty is inherent in all site investigations. Furthermore, any sample, either surface or subsurface, taken for chemical testing may or may not be representative of a larger population or area. Professional judgment and interpretation are inherent in the process, and even when exercised in accordance with objective scientific principles, uncertainty is inevitable. Additional assessment beyond that which was reasonably undertaken may reduce the uncertainty.
Failure to Detect	Even when site investigation work is executed competently and in accordance with the appropriate Australian guidance, such as the National Environmental Protection (Assessment of Site Contamination) Amendment Measure ('the NEPM'), it must be recognised that certain conditions present especially difficult target analyte detection problems. Such conditions may include, but are not limited to, complex geological settings, unusual or generally poorly understood behaviour and fate characteristics of certain substances, complex, discontinuous, random, or heterogeneous distributions of existing target analytes, physical impediments to investigation imposed by the location of services, structures and other man-made objects, and the inherent limitations of assessment technologies.
Limitations of Information	The effectiveness of any site investigation may be compromised by limitations or defects in the information used to define the objectives and scope of the investigation, including inability to obtain information concerning historic site uses or prior site assessment activities despite the efforts of the user and assessor to obtain such information.
Chemical Analysis Error	Chemical testing methods have inherent uncertainties and limitations. Senversa routinely seeks to require the laboratory to report any potential or actual problems experienced, or non-routine events which may have occurred during the testing, so that such problems can be considered in evaluating the data.
Level of Assessment	The investigation herein should not be considered to be an exhaustive assessment of environmental conditions on a property. There is a point at which the effort of information obtained and the time required to obtain it outweigh the benefit of the information gained and, in the context of private transactions and contractual responsibilities, may become a material detriment to the orderly conduct of business. If the presence of target analytes is confirmed on a property, the extent of further assessment is a function of the degree of confidence required and the degree of uncertainty acceptable in relation to the objectives of the assessment.
Comparison with Subsequent Inquiry	The justification and adequacy of the investigation findings in light of the findings of a subsequent inquiry should be evaluated based on the reasonableness of judgments made at the time and under the circumstances in which they were made.
Data Useability	Investigation data generally only represent the site conditions at the time the data were generated. Therefore, the usability of data collected as part of this investigation may have a finite lifetime depending on the application and use being made of the data. In all respects, a future reader of this report should evaluate whether previously generated data are appropriate for any subsequent use beyond the original purpose for which they were collected or are otherwise subject to lifetime limits imposed by other laws, regulations or regulatory policies.
Nature of Advice	The investigation works herein are intended to develop and present sound, scientifically valid data concerning actual site conditions. Senversa does not seek or purport to provide legal or business advice.

8.2 Project Specific Uncertainties

Specific uncertainties and limitations noted for this investigation are as follows:

- The assessment is based on a review of reports by other consultants and therefore the statements and findings of this report depend upon the accuracy of information provided. Senversa has not undertaken intrusive assessment of the soil or groundwater at the site to assess the accuracy of the previous environmental assessments undertaken.
- The scope of work performed as part of this assessment may not be appropriate to satisfy the needs of any other person. Any other person's use of, or reliance on, the findings, conclusions, recommendations or any other material presented herein, is at that person's sole risk.
- The decision to require an environmental audit at the site is a requirement of the Responsible Authority.

9.0 References

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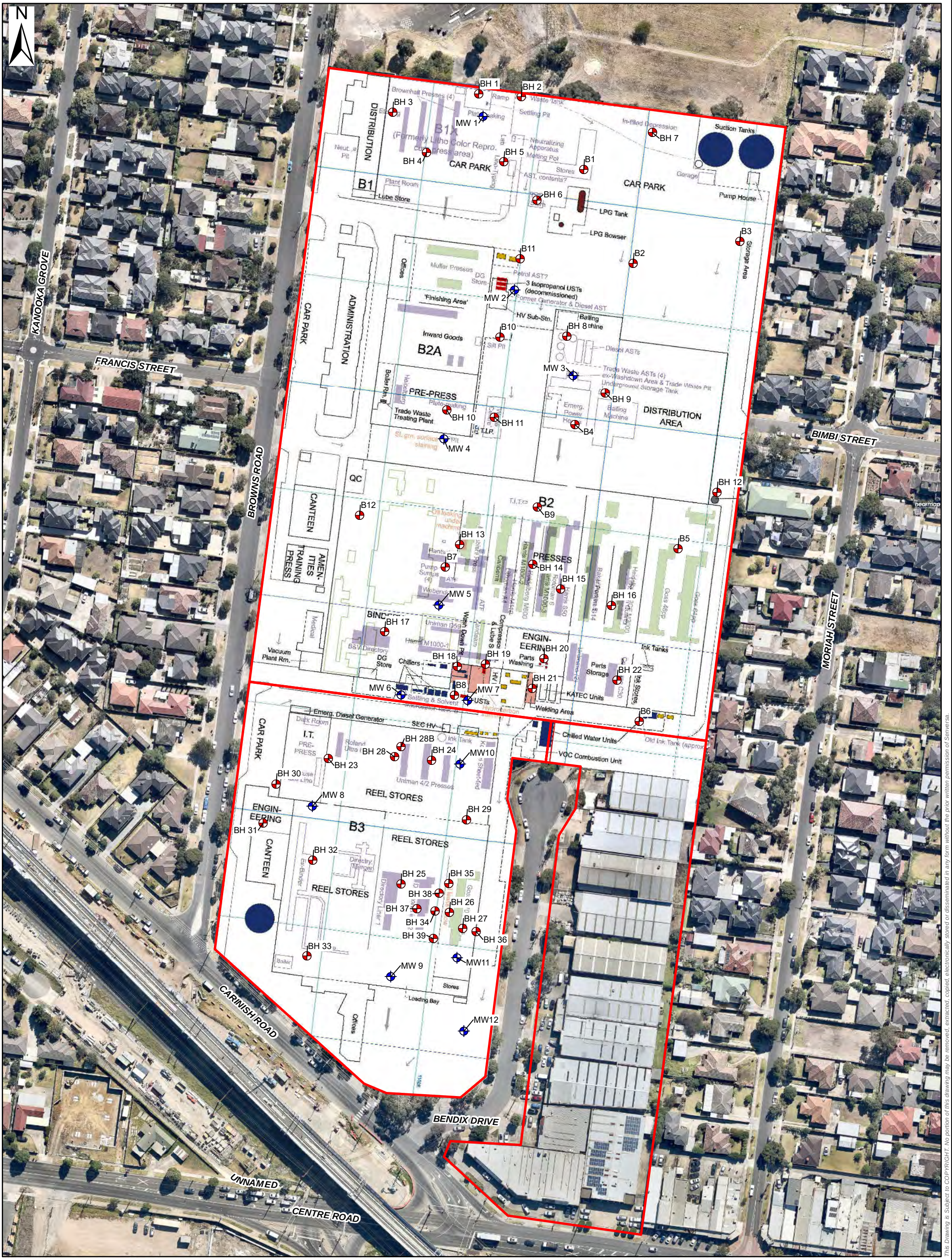
Figures



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senversa
Address: Level 6, 15 William Street Melbourne VIC 3000
Phone: (03) 9606 0070
Website: www.senversa.com.au

Legend

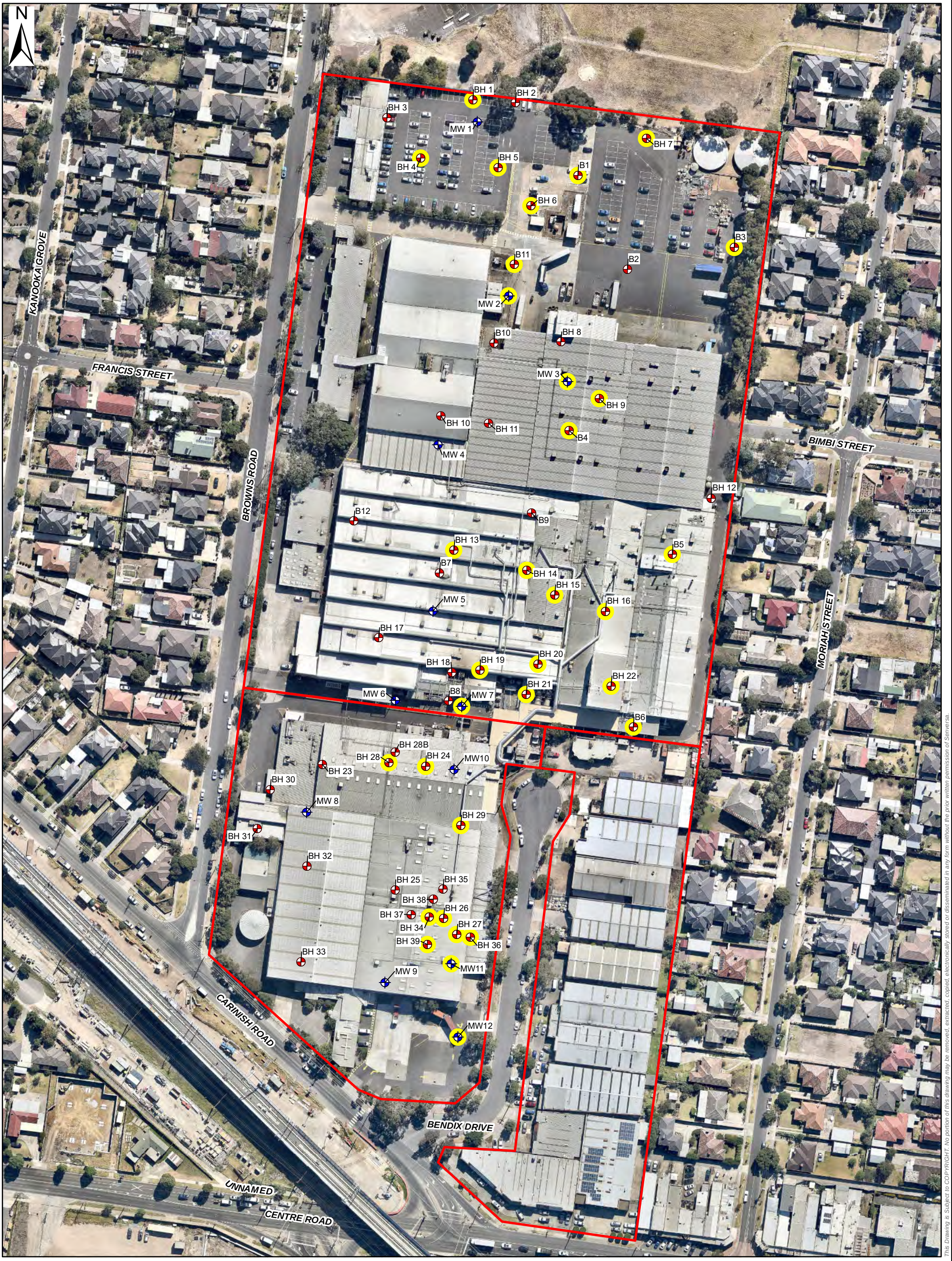
- Site Boundary
- Groundwater Monitoring Well
- Historical Soil Sample Locations

Aerial imagery sourced from Nearmap Pty Ltd
Site Features - Atma Environmental, Figures 2 & 5, P1 ESA, 19/03/2012
Sample locations and analytical results sourced from historical environmental assessments undertaken by ATMA Environmental (2012b & 2012c) and Compass Environmental (2013)

Designed:	S. O'Connor	Date:	16/10/2018
Drawn:	M. Byrne	Revision:	0
Checked:	.	Scale:	1:1,600 (A3)
File:	M16739_02_F001_Investigation Locs		

0 10 20 40 60 80 Metres
Datum GDA 1994, Projection MGA Zone 55

Figure No: 1
Title: Site Layout and Investigation Locations
Project: Environmental Site Assessment PMP Precinct – 209-211 Carinish Road, 31-49 Browns Road, 1455-1457 Centre Road and 11-57 Bendix Drive, Clayton, VIC
Location:
Client: Victorian Planning Authority



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Legend

- Site Boundary
- Groundwater Monitoring Well
- Historical Soil Sample Locations
- Exceedance of NEPC (2013) generic EIL - Urban Residential and Public Open Space (without derivation of site-specific values)

Aerial imagery sourced from Nearmap Pty Ltd
Sample locations and analytical results sourced from historical environmental assessments undertaken by ATMA Environmental (2012b & 2012c) and Compass Environmental (2013)

Designed:	S. O'Connor	Date:	16/10/2018
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File:	M16739_02_F002_Exceedence Eco		

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Datum GDA 1994, Projection MGA Zone 55

Figure No: 2

Title: Exceedences of Ecological Investigation Levels

Project: Environmental Site Assessment PMP Precinct – 209-211 Carinish Road, 31-49 Browns Road, 1455-1457 Centre Road and 11-57 Bendix Drive, Clayton, VIC

Location:

Client: Victorian Planning Authority

Location ID	Analyte	Depth (m bgl)	Result (mg/kg)
BH26	TRH (C10 - C16)	0.5	14000
	TRH (C16 - C34)	0.5	11000

Location ID	Analyte	Depth (m bgl)	Result (mg/kg)
BH27	TRH (C10 - C16)	0.1	3400
	TRH (C16 - C34)	0.1	29000
	TRH (C34 - C40)	0.1	11000

Location ID	Analyte	Depth (m bgl)	Result (mg/kg)
BH39	Nickel	0.1	460

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Legend

- Site Boundary
- Groundwater Monitoring Well
- Historical Soil Sample Locations

Aerial imagery sourced from Nearmap Pty Ltd
Concentrations exceeding NEPC (2013) HIL A/HSL A for direct contact
Sample locations and analytical results sourced from historical environmental assessments undertaken by ATMA Environmental (2012b & 2012c) and Compass Environmental (2013)

Designed:	S. O'Connor	Date:	16/10/2018
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Checked:	.	Scale:	1:1,600 (A3)
File:	M16739_02_F003_Exceedence HIL		

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Datum GDA 1994, Projection MGA Zone 55

Figure No: 3

Title: Exceedences of Health Investigation Levels

Project: Environmental Site Assessment PMP Precinct – 209-211 Carinish Road, 31-49 Browns Road, 1455-1457 Centre Road and 11-57 Bendix Drive, Clayton, VIC

Location:

Client: Victorian Planning Authority

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senversa
Address: Level 6, 15 William Street, Melbourne VIC 3000
Phone: (03) 9606 0070
Website: www.senversa.com.au

Legend

- Site Boundary
- Groundwater Monitoring Well
- Historical Soil Sample Locations
- Concentrations exceed NEPC (2013) HSL A and HSL B for vapour intrusion from soil
- Concentrations exceed NEPC (2013) HSL A and HSL B for vapour intrusion from soil (Exceedance extends > 1 m bgl)

Aerial imagery sourced from Nearmap Pty Ltd
Sample locations and analytical results sourced from historical environmental assessments undertaken by ATMA Environmental (2012b & 2012c) and Compass Environmental (2013)

Designed:	S. O'Connor	Date:	16/10/2018
Drawn:	M. Byrne	Revision:	0
Checked:	.	Scale:	1:1,600 (A3)
File:	M16739_02_F004_Exceedence HSL Vapour Int		

0 10 20 40 60 80 Metres
Datum GDA 1994, Projection MGA Zone 55

Figure No: 4

Title: Exceedences of Health Screening Levels for Vapour Intrusion From Soil

Project: Environmental Site Assessment PMP Precinct – 209-211 Carinish Road, 31-49 Browns Road, 1455-1457 Centre Road and 11-57 Bendix Drive, Clayton, VIC

Location:

Client: Victorian Planning Authority

Path: Y:\16_GIS\01_Jobs\3.VIC_Jobs\M16739_VPA_PMP PRINTING_PSI\MXDs\1. Working MXDs\M16739_02_F005_Exceedence IWRG Fill.mxd

senversa
Address: Level 6, 15 William Street Melbourne VIC 3000
Phone: (03) 9606 0070
Website: www.senversa.com.au

Legend

- Site Boundary
- Groundwater Monitoring Well
- Historical Soil Sample Locations
- Exceeds IWRG fill material upper limits
- TRH concentrations exceeds IWRG Category C upper limits

Aerial imagery sourced from Nearmap Pty Ltd
Sample locations and analytical results sourced from historical environmental assessments undertaken by ATMA Environmental (2012b & 2012c) and Compass Environmental (2013)

Designed:	S. O'Connor	Date:	16/10/2018
Drawn:	M. Byrne	Revision:	0
Checked:	.	Scale:	1:1,600 (A3)
File:	M16739_02_F005_Exceedence IWRG Fill		

0 10 20 40 60 80 Metres
Datum GDA 1994, Projection MGA Zone 55

Figure No: 5

Title: Exceedances of IWRG "Fill Material" Upper Limits

Project: Environmental Site Assessment
PMP Precinct – 209-211 Carinish Road, 31-49 Browns Road, 1455-1457 Centre Road and 11-57 Bendix Drive, Clayton, VIC

Location:

Client: Victorian Planning Authority

Appendix A: Nearby Groundwater Quality Restricted Use Zones

Groundwater zone with restricted uses

CLAYTON SOUTH

This zone has been cleaned up to the relevant environmental standards (section 53X environmental audit) but is still subject to restricted groundwater uses.

Environmental audit site

1408 - 1418 CENTRE RD CLAYTON SOUTH VIC 3169

Restrictions on use

Drinking water
Livestock water supply
Irrigation of crops (including domestic gardens) and parks
Water used for recreational purposes (e.g. swimming)
Water used for industrial purposes

Site history

Chemical manufacturing/storage/blending

Legend

- Environmental audit site
- Groundwater zone with restricted uses
- Properties
- 452 Unit/house/building number
- Primary road

For more information contact 1300 EPA VIC

N

0 25 50 Metres

EPA CARMS ID: 72832-1
EPA IBIS ID: 7001239
Map generated on: 16 Oct 2018

This map may also contain data from: Vicmap

Groundwater zone with restricted uses

CLAYTON

This zone has been cleaned up to the relevant environmental standards (section 53X environmental audit) but is still subject to restricted groundwater uses.

Environmental audit site

21 - 25 BROWNS RD CLAYTON VIC 3168

Restrictions on use

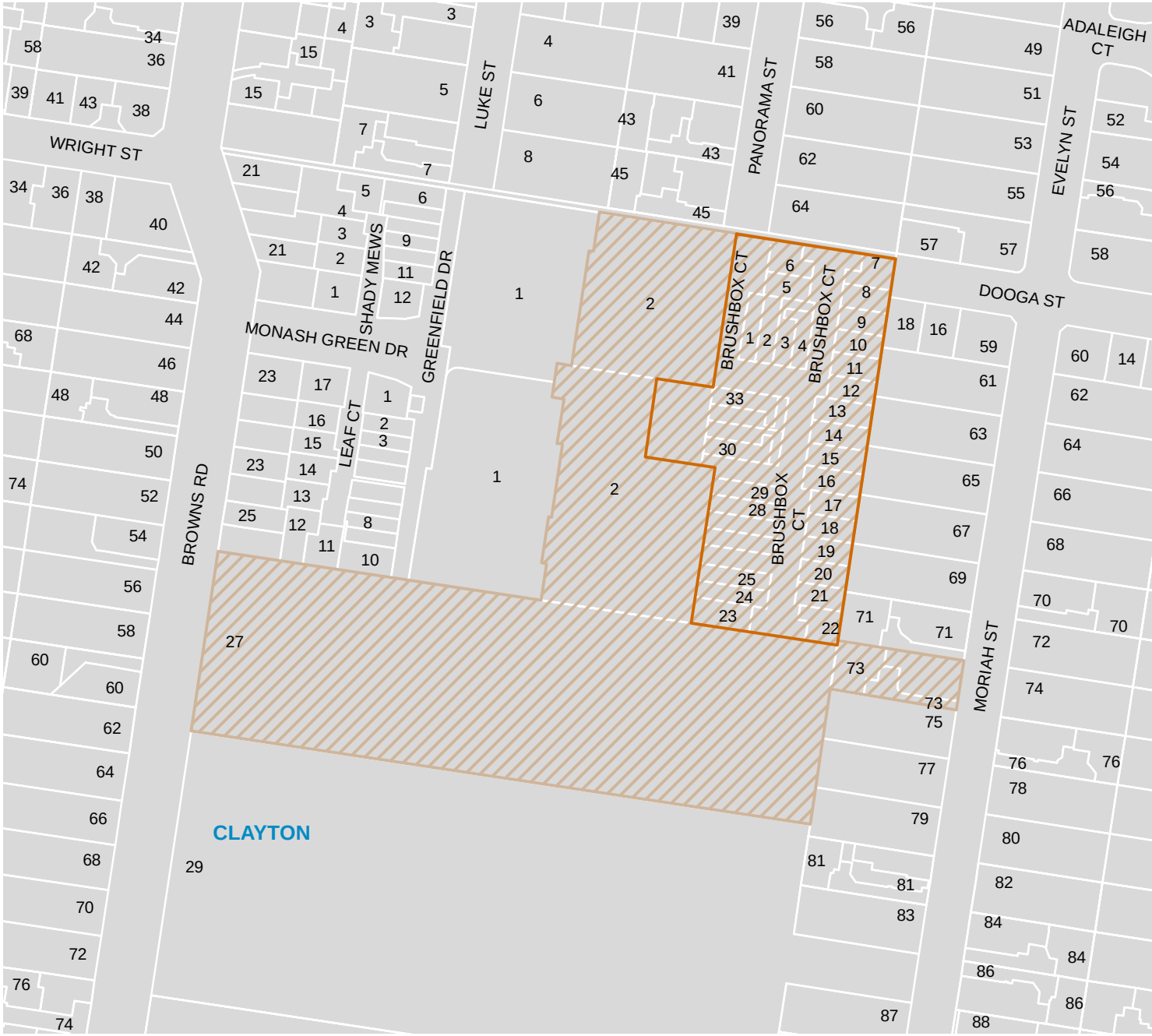
Drinking water
Irrigation of crops (including domestic gardens) and parks
Water used for recreational purposes (e.g. swimming)

Site history

Manufacturing - general

Legend

- Environmental audit site
- Groundwater zone with restricted uses
- Properties
- 452 Unit/house/building number
- Primary road



For more information contact 1300 EPA VIC

Disclaimer: The map represents an approximate estimation of an area where groundwater quality has been impacted by human activities. It does not provide information on the naturally occurring quality of groundwater, which can also have restrictions on its use. The environmental audit boundary and groundwater zone are based on land parcel boundaries at the time of mapping. Subsequent changes to land parcel boundaries do not change the location of the zone.

N

0 25 50 Metres

EPA CARMS ID: 48251-5
EPA IBIS ID: 7000113
Map generated on: 16 Oct 2018

This map may also contain data from: Vicmap

Appendix B: Site Inspection Photographs

Photo 1. Transformer building constructed in former isopropanol UST location (photo from Atma, 2012a).

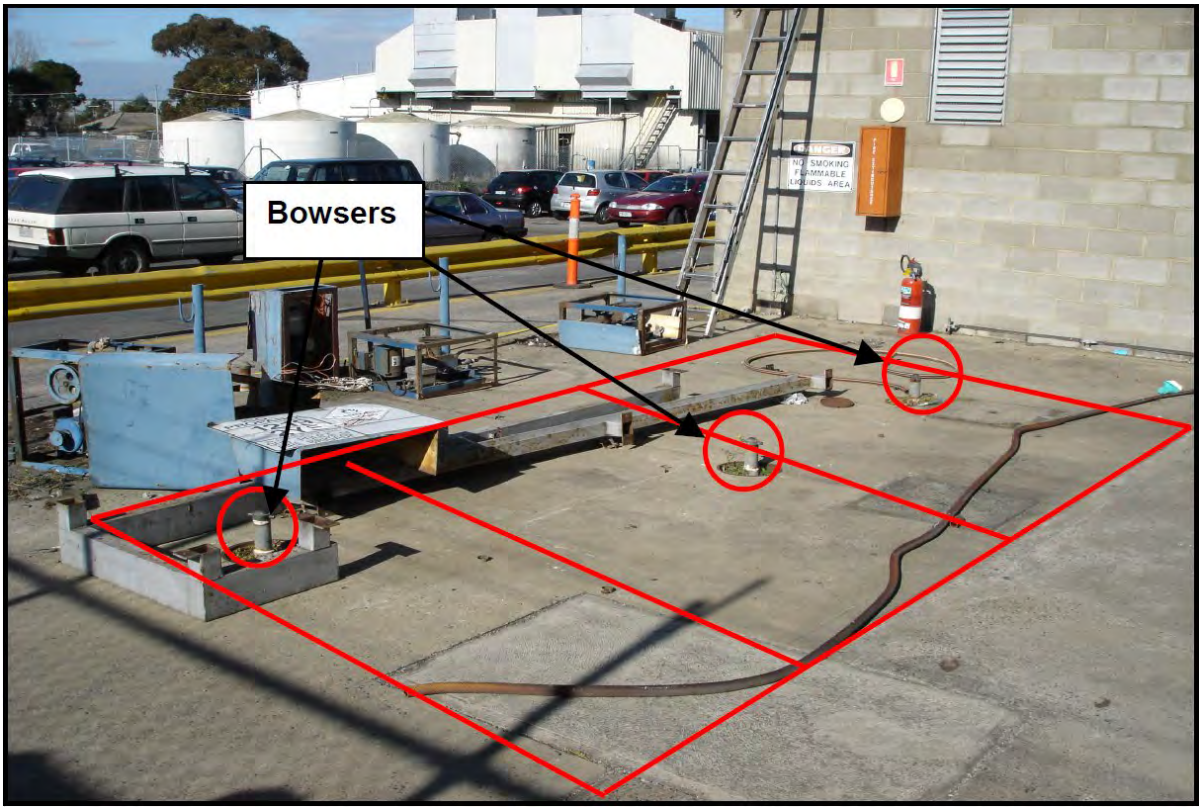


Photo 2. Appearance of isopropanol UST area prior to decommissioning (from Meinhardt, 2007).

Photo 3. Decommissioning of UST within compressor house (photo from Atma, 2013).

Photo 4. Triple Interceptor Trap east of pre-press (photo from Atma, 2012a).

Photo 5. Leaking C700 Press (photo from Atma, 2012a).

Photo 6. Flammable goods storage northeast of the main buildings.

Photo 7. Trade waste ASTs, treatment and discharge area.

Photo 8. Staining on ground outside trade waste bund.

Photo 9. Staining on outside of transformer bund.

Photo 10. Oil on ground and wall on east side of main site building from compressor bleed valve.

Photo 11. Chemical storage in Litho press area.

Photo 12. Chemical storage in Litho press area.

Photo 13. Diesel back-up generator.

Photo 14. Fill points of decommissioned USTs south of compressor house.

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