

LanePiper

Geotechnical & Environmental Engineers
Hydrogeologists & Environmental Scientists

**PRELIMINARY
ENVIRONMENTAL SITE
ASSESSMENT**

**288 Malvern Road, Prahran,
Vic**

For

City of Stonnington

November 2008

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DOCUMENT CONTROL

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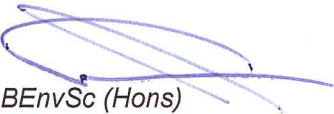

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PRELIMINARY ENVIRONMENTAL SITE ASSESSMENT

288 Malvern Road, Prahran, Vic

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LIST OF ABBREVIATIONS AND UNITS

Chemical Names

BTEX	Benzene, Toluene, Ethylbenzene & Xylenes (subset of MAH)
CHC	Chlorinated Hydrocarbons
MAH	Monocyclic Aromatic Hydrocarbons
OCP	OrganoChlorine Pesticides
OPP	OrganoPhosphate Pesticides
PAHs	Polycyclic Aromatic Hydrocarbons
PCBs	PolyChlorinated Biphenyls
SVOC	Semi-Volatile Organic Compounds
TDS	Total Dissolved Solids (salinity of water)
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbons
TRH	Total Recoverable Hydrocarbons (= TPH)
VOC	Volatile Organic Compounds

Technical Terms

AHD	Australian Height Datum
AMG	Australian Map Grid
ANZECC	Australian and New Zealand Environment and Conservation Council
AST	Aboveground Storage Tank
BDL	Below Detection Limit
COC	Chain of Custody
CoEA	Certificate of Environmental Audit
CoPC	Chemicals of Potential Concern
DNAPL	Dense Non-Aqueous Phase Liquid
DO	Dissolved Oxygen
EC	Electrical Conductivity
EILs	Environmental Investigation Levels
EPA	Environmental Protection Authority
ESA	Environmental Site Assessment
GCMS	Gas Chromatograph - Mass Spectrometer
GDB	Groundwater Database (Department of Natural Resources and Environment)
GME	Groundwater Monitoring Event
HILs	Health Investigation Levels
LNAPL	Light Non-Aqueous Phase Liquid

LOR	Limit of Reporting
N/A	Not Applicable
NAPL	Non-Aqueous Phase Liquid
NEPM	National Environmental Protection Measure
PID	Photo-ionisation detector (measures in ppm)
PQL	Practical Quantitation Limit
PSH	Phase Separated Hydrocarbon
QA	Quality Assurance
QC	Quality Control
RL	Reduced Level
RPD	Relative Percentage Difference
SoEA	Statement of Environmental Audit
TIT	Triple Interceptor Trap
UCL	Upper confidence Limit ("95% UCL of the mean" is a value for the mean concentration from sampling which has only a 5% chance of being greater than the true mean value.)
UST	Underground Storage Tank

Units

Ha	Hectares
m bgl	Metres Below Ground Level
mg/kg	Milligram per Kilogram (approximately equivalent to ppm)
mg/L	Milligram per Litre
mTOC	Metres below Top of Casing
ppb	Part per Billion
ppm	Parts per Million
µg/kg	Microgram per Kilogram (approximately equivalent to ppb)
µg/L	Microgram per Litre
µS/cm	Micro Siemens per Centimetre (Electrical Conductivity - Water)

PRELIMINARY ENVIRONMENTAL SITE ASSESSMENT

288 Malvern Road, Prahran, Vic

1 INTRODUCTION

1.1 Background

Lane Piper Pty Ltd (Lane Piper) was engaged by City of Stonnington, to conduct a Preliminary Environmental Site Assessment (PESA) at 288 Malvern Road, Prahran, Vic. The work was undertaken in accordance with the scope of work presented in our fee proposal (*Doc Ref. 208064Proposal01.1*) dated 11 April 2008. The details of this small (140 m²) site are shown in, Figures 1 and 2, Appendix A.

The site assessment was initially undertaken as a part of an Environmental Audit performed under the *Environmental Protection Act 1970* requested by City of Stonnington on 13 May 2008. Mr. Anthony Lane of Lane Piper was the Environmental Auditor appointed by the City of Stonnington. However the audit was terminated following council's receipt of preliminary advice from the Auditor of the contamination condition of the site and advising that the provision of a site assessment report should be sufficient to satisfy Councils' concerns. The relevant correspondence in relation to the audit is presented in Appendix H.

1.2 Proposed Development

The proposed use of the site is to change the current land use of commercial/residential into park land (i.e. Public open space). The development intends to incorporate the subject land into the adjacent Princess Gardens.

1.3 Objectives

The primary objectives of the PESA are to provide:

- An indication of whether contamination is likely to affect the future use or development of the site, and
- A preliminary opinion on the site suitability for the intended public open space (park land) use based on the information presented in this document.
- Provide an opinion about the need for an Environmental Audit under the Environment Protection Act 1970.

1.4 Scope of Assessment

Lane Piper carried out the following tasks in order to address the brief by City of Stonnington.

1. Defined the site boundaries based on title information and established a site base plan.
2. Site features including main buildings, services and other infrastructure.
3. Established the site topography, site drainage and the proximity of the site to the nearest surface water body.
4. Identified the location of any nearby sensitive environments such as wetland or streams.
5. Reviewed the regional geology to identify likely site soil type(s).
6. Reviewed the hydrogeology of the site and surrounding area to find evidence of groundwater occurrence in the area and its expected flow direction.
7. Reviewed the following publicly available documents on the site:
 - Historical property titles back to first private ownership;
 - The Land Data Property Report.
8. Identified any sites (this and nearby sites) on public registers such as:
 - The Priority (contaminated) site Register;
 - The City of Stonnington Planning Scheme; and
 - Statements and Certificates of Environmental Audit (Contaminated Land) SoEA/CoEA.
9. Reviewed the Energy Safe Australia register to identify any Cathodic protection systems on the site.
10. Reviewed historical aerial photos from the Department of Sustainability and Environment.
11. Inspected the site to identify the presence of any visible fuel storage tanks (above or below ground) on or adjacent to site boundary.
12. Identified events such as chemical or fuel spills or accidents or fires or visible indicators of potential past events.
13. Ascertain site soil type including evidence of site filling or subsidence.
14. Nature of imported filling (distribution and description of composition of material visible at the surface).
15. Soil investigation comprised of five (5) borehole sampling locations. Testing by a laboratory NATA accredited of selected soil samples for a broad range of analytes.
16. Organised laboratory analysis of field quality assurance / quality control (QA/QC) samples.
17. Preparation of this PESA report that documents the investigation results.

1.5 The Assessment Process and "Standards of Assessment"

There is a statutory and non-statutory process by which to arrive at an opinion on the suitability of site for use. The former involves an audit, which under section 4 of the *Environment Protection Act 1970* is defined 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".

An environmental site assessment is not an environmental audit conducted under the Environment Protection Act 1970. Such assessments are normally carried out by a competent environmental practitioner to undertake similar scope and standards to arrive at conclusion. The "industry standards" for undertaking a comprehensive ESA are those provided in the

(NEPM) National Environment Protection (*Assessment of Site Contamination*) Measure issued in December 1999 by the National Environment Protection Council (NEPC) and the *Potentially Contaminated Land* General Practice Notes issued by the Department of Sustainability and Environment in June 2005.

The NEPM also refers to the Standards Australia (1997) *Guide to the sampling and investigation of potentially contaminated soil Part 1: Non-volatile and semi-volatile compounds*. AS4482.1- 2005.

The Australian standard states that "A preliminary site investigation is the collection and assessment of information derived from records of its previous use (preliminary study) and site inspection, usually with limited sampling. Limited sampling should be carried out to:

- a) produce evidence through an investigation to indicate whether a site is potentially contaminated; and
- b) determine whether a detailed site investigation should be conducted."

The *Potentially Contaminated Land* General Practice Notes (2005) provide guidance for planners and applicants about:

- How to identify if land is potentially contaminated,
- The appropriate level of assessment of contamination for a planning scheme amendment or planning permit application,
- Appropriate conditions for planning permits, and/or
- Circumstances where the Environmental Audit Overlay (EAO) should be applied or removed.

This document defines potentially contaminated land as per the *Ministerial Direction No. 1 – Potentially Contaminated Land* and applies an Assessment Matrix, presented in Table 2 of the *Potentially Contaminated Land* General Practice Notes. This Assessment Matrix provides a method of determining the appropriate level of assessment based on proposed land use and current or historic land uses or activities carried out on the land.

'Necessary' levels of assessment depend on the statutory requirements and potential for contamination. Planning authorities (i.e. Municipal Councils) should consider whether additional information or advice from an expert is required in determining the level of assessment.

Two (2) forms of assessment are identified within the document:

1. Require an Environmental Audit: A statutory audit undertaken as per the *Environmental Protection Act 1970*, and
2. Require a Site Assessment: A preliminary review of the site history by a suitably qualified environmental professional.

The General Practice Notes further outline a 'General Duty' under Section 12(2)(b) and Section 60(1)(a)(iii) of the *Planning and Environmental Act 1987*, which can be enforced an Environmental Audit Overlay is removed by the Planning Authority.

1.6 Limitations

This report has been prepared for the client and their agents, for the limited purpose set outlined above in this report. There are limitations to the information contained within the report and it should be read carefully so that the client and their agents are aware of all inherent limitations arising from the methodology adopted for this report.

This report is not an Environmental Audit Report as defined in the *Environmental Protection Act 1970* nor an Environmental Assessment Report as defined in the *National Protection Measure (Site Assessment) 1999*.

An overview of environmental site assessments is included in Appendix K.

2 SITE DESCRIPTION & SETTING (DESKTOP SEACRCH)

2.1 Site Definition and Description

Table 2-1: Site Identification Details

Site Address	288 Malvern Road, Prahran, Vic
Site Area	140 m ²
Title Details	Preferred as Volume 06024 Folio 718
Municipality	City of Stonnington
Current Site Owner	City of Stonnington
Planning Zone	Mixed Use Zone (MUZ)
Planning Overlay	Environmental Audit Overlay (EAO) Special Building Overlay (SBO)

The site is located approximately 4 km south-south-east of the Melbourne CBD, near the corner of Malvern Road and Essex Street. The area surrounding the site comprises of mixed medium- to high-density residential, commercial and public open space land uses. Access to the property is from Malvern Road, west of Essex Street. The location of the site is shown in Figure 1, Appendix A.

2.2 Geographic Setting

The land surface is relatively flat with no significant topographical features. A majority of the site is covered by a predominately brick structure, however, the surface water over the outdoor southern end of the site is expected to drain via the stormwater network.

On a regional scale, surface drainage will tend due north toward the Yarra River, located approximately 1.5 km from the site.

2.3 Site Features & Infrastructures

The site comprises of a predominately brick 'Victorian' style double-storey residential/commercial premise. A small concreted area is located in the southern portion of the site, with an outdoor toilet facility.

The site features can be seen in Figure 2, Appendix A.

2.4 Land Use Zoning

The site is zoned as Mixed Use Zone (MUZ), according to the property reports, which were last updated on 14 November 2008 (Appendix G).

2.5 Surrounding Land Uses

The surrounding land uses are outlined in Table 2-2.

Table 2-2: Surrounding Land Uses

North	Malvern Road, followed by High-density residential apartments (Commission Housing). These are surrounded by limited open space areas.
West	Princess Gardens is directly adjacent to the site, followed by residential and commercial premises. A dry cleaners was identified approximately 150 m toward the intersection of Malvern Road and Bray Street.
East	A commercial premise is directly adjacent, followed by Essex Street and residential and commercial properties.
South	Bluestone laneway followed by Princess Gardens, residential premises and the Stonnington Recreational Pool located approximately 50 m south.

2.6 Site History Search

2.6.1 Environment Protection Authority Records

The EPA Priority (contaminated) site register was reviewed on 16 May 2008, to identify particulars relating to environmental protection affecting the site. The results indicate that the site is not listed on, and is not in the vicinity of a site listed on the Priority (contaminated) site register at the time of the search (Appendix G).

The EPA register of Statements and Certificates of Environmental Audit was reviewed on 27 May 2008. The search revealed a number of sites in close proximity to the site. The nearest sites issues with a SoEA, were located at 23 and 25 Mount Street, Prahran and 2 – 22 Clifton Street, Prahran, each site was located approximately 450 m south of the site.

2.6.2 Energy Safe Australia Records

A search of the cathodic protection register was conducted by Energy Safe Australia on 19 May 2008. Cathodic protection systems are often a component of underground fuel tank systems. The search did not identify any cathodic protection systems at the site (Appendix G).

2.6.3 Certificates of Title

A search of the records held by the Department of Sustainability and Environment (DSE) was conducted by Lane Piper to gain an appreciation of the historical ownership of the site. The current and historical certificates of title are presented in Appendix F.

2.6.4 Site History – Sands and McDougall

Sands and McDougall records suggest that the site was predominately residential until 1889. At this point, the site was occupied by a doctor, and the neighbouring properties were a Knitted Goods manufacturer and wood yard. The Knitted Goods Manufacturer remained until at least 1974.

Between 1891 and 1955, the premises was occupied a printing firm (Fox). During this period the site was briefly operated (less than one year) as a real estate agent in 1924. After this period the site was occupied by a blind and furniture dealer at least until the last record of the Sands and McDougall in 1974.

Neighbouring, 290 Malvern Rd, Prahran was briefly a frock manufacturer and from the early 1950s was occupied by Prahran Metals, a metals and disposal dealer.

Since the late 1970s, the area has been significantly redeveloped. Little Chapel street was developed from the merging of two streets (Clarence and Arcade Streets). About 1986, the recreational area, currently known as Princess Gardens was developed. The skateboard ramp adjacent to the site was opened around 1993.

The most recently use of the site was a commercial skateboard shop. It is unknown what specific period the site was used for this use, however it would coincide with the development of the neighbouring skateboard infrastructure.

The site was vacated in 2008. The Sand and McDougall historical search conducted by the Royal Historical Society of Victoria is presented in Appendix G.

2.6.5 Aerial Photographs

A search of relevant historical aerial photographs was conducted by reviewing the Aerial Photography Register; held by the Department of Sustainability and Environment. Five (5) series of aerial photographs from 1945, 1963, 1975, 1979 and 1987 were selected to be examined as part of an assessment of development and land use activities onsite and in the surrounding area. Copies of the reviewed aerial photographs are presented in Appendix D.

2.6.6 Summary of Historical Activities

Historical activities occurring at the site are summarised in Table 2-3.

Table 2-3: Site Ownership and Land Use History

Date	Source	Description of History
13 February 1903	Parent Historical Title	Proprietor – Elizabeth Ann Prince Yates of Malvern Road, Prahran was the proprietor of the site.
8 November 1929	Parent Historical Title	Proprietor – James Kendry Jackson of 305 Malvern Road, South Yarra was the proprietor by transfer of the site.
23 December 1942	Historical Title	Proprietor – Catherine Elizabeth Jackson of 2 Sydney Street, Armadale was the proprietor (widow).
December 1945	Aerial Photograph	Black & White, Elevation: 3109 m (10200 ft): A residential structure covers the entire site. Adjacent to the western boundary, larger residential type housing was evident, followed by a park or open space area which appears dry. Immediately to the east, the corner of Essex St and Malvern Rd, appears vacant. To the south, residential type structures were apparent. The surrounding area comprised dense residential,

Date	Source	Description of History
		commercial and industrial land uses.
21 April 1958	Historical Title	Harry Demsky (Merchant) and Rachael Demsky (Married Women) of 294 Malvern Road, Prahran was the proprietor of the site.
April 1963	Aerial Photograph	<p>Black & White, Elevation: 1554 m (5100 ft): The structure noted in 1945 appears to still remain the same. The buildings to the west still remain, however directly to the east, a building has appeared. The park or open space to the west appears to be less dry than noted in 1945.</p> <p>Significant development can be noted to the south and north of the site, compared to 1945. On the northern side of Malvern Rd, directly north of the site, construction operations have appeared. To the south, a large structure was evident which appears to be an outdoor pool.</p>
November 1975	Aerial Photograph	<p>Black & White, Elevation: 1524 m (5000 ft): The structure noted in previous aerial photos appears to still remain the same. Directly adjacent to the west boundary the building still remains, however the park or open space has been expanded, associated with the absence of a nearby building. Directly to the east, a building has appeared covered the entire neighbouring site. The park or open space to the west appears to be less dry than noted in all previous aerial photos.</p> <p>The development noted in 1963 appears to have been completed. The large structures to the north of the site are multi-level, high density residential buildings. In the surrounding area larger buildings have appeared, particularly in the south-west, replacing small residential housing. Residential housing however still remains predominant.</p>
29 June 1977	Historical Title	Proprietor – Helen Gross of 1 Bellaire Court, Toorak, Eva Layton of 9 Rotorua Street, South Caulfield (Married Women) and David Demsky (Architect) of 34 Billson Street, East Brighton were the proprietors of the site.
January 1979	Aerial Photograph	<p>Black & White, Elevation: 1554 m (5100 ft): The site appears to be unchanged since 1975. The adjacent buildings appear to be relatively unchanged. Directly to the south of the site, the residential structures evident in all previous aerial photos are absent. This land was then vacant.</p> <p>The surrounding area appears not to be notably different. The landscape appears to be drier compared to previous photographs.</p>
January 1987	Aerial Photograph	Colour, Elevation: 1554 m (5100 ft): The building covering the site appears to remain unchanged. The adjacent eastern building remains unchanged. Adjacent to the western boundary of the site, the building noted in previous aerial photos was absent. This area appears to

Date	Source	Description of History
		<p>be partially vacant. The structure on this site appears to be the present day 'half-pipe' skating facility. To the south, adjacent to the site, a concrete structure has appeared, and similarly appears to be another present day skating structure.</p> <p>The surrounding land area appears to be continually changing with development, however residential and commercial land uses appear to be predominant.</p>
18 March 1987	Historical Title	Proprietor – Michael Leslie Gross and Tamara Lisa Gross of 1 Bellaire Court, Toorak were the proprietors of the site.
3 September 1987	Historical Title	Proprietor – The Mayor Councillors and Citizens of the City of Prahran are the proprietors of the site.
26 October 1995	Historical Title	Proprietor – Irini Dictos Nicolades of 702 Malvern Road, Prahran East was the proprietor of the site.
10 July 2007	Historical Title	Proprietor – Stonnington City Council is now the proprietor of the site.
2008	Aerial Photography (Google Earth)	<p>Colour, Elevation: 250 m (820 ft): The structure on the site remains unchanged. The immediate surroundings to the site appear to relatively unchanged since 1987.</p> <p>The land condition of the area has remained similar to 1987 aerial photographs.</p>

2.7 Hydrogeology

The Melbourne 1:63,360 Geological Survey Map of Victoria, indicates the site overlies the Tertiary aged Brighton Group, comprising of sand, red-brown, yellow and white, well bedded to cross-bedded, silty sand and minor gravel. The Brighton Group typically comprises of an upper silty sand layer to a depth of between 0.5 – 1.0m, then sandy clay, often becoming sandier with depth containing ironstone bands known as ferruginous sandstone, and layers of sand, sandy clay, siltstone, ironstone and occasional gravel. At depth, the Tertiary basalt may be encountered and often contains a confined aquifer.

2.7.1 Groundwater Occurrence & Flow Systems

Groundwater is likely to occur in the Brighton Group aquifer system. The Brighton Group aquifer system comprises fine grained sediments of clay, silt and fine sand, resulting in low hydraulic conductivity (Leonard, 1992). Toward the base of the upper terrestrial sediments, coarser sand and gravel horizons yield greater hydraulic conductivities (Leonard, 1992; Birch, 2003).

Based on the surrounding groundwater bore details, the Brighton Group water table is expected to occur at a depth less than 10 m below ground level at the site. Groundwater flow would be expected to flow south-west to Albert Park Lake and Port Phillip Bay, located approximately 1.75 km and 3 km respectively. No on-site investigation of groundwater was conducted to confirm groundwater flow direction.

2.7.2 Groundwater Quality

The desktop review has identified the quality of groundwater in the aquifer as variable in the region. Based on the Groundwater Resources, Department of Primary Industries, Bore Location Report (1:250,000 map), the aquifer is likely to have a salinity range of 1,001 to 3,500 mg/L TDS.

SEPP *Groundwaters of Victoria* lists the protected beneficial uses ascribed to groundwater of this quality to those contained in Segment B. These are:

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

2.7.3 Groundwater Resource Development

A search of the Department of Sustainability and Environment's (DSE) online database, identified nine (9) bores within 1 km of the site.

The bores have recorded uses of monitoring and observation. There were no details on the groundwater chemistry for the bores.

Table 2-4 summarises the details of groundwater bores near the site.

Table 2-4: Nearby Registered Groundwater Bores

Distance from site	Bore ID	Easting	Northing	Total Depth(m)	Date Drilled	Bore Use
430 m NW	133697	323352	5809428	7.5	25/01/1999	Monitoring
430 m NW	133698	323352	5809428	7.5	25/01/1999	Monitoring
430 m NW	133701	323352	5809428	7	21/05/1999	Monitoring
430 m NW	133699	323352	5809428	7.5	25/01/1999	Monitoring
430 m NW	133700	323352	5809428	7.5	25/01/1999	Monitoring
560 m SW	123490	323181	5809091	2.44	11/10/1966	Observation
480 m S	133655	323627	5808771	7.5	3/09/1998	Monitoring
480 m S	133656	323627	5808771	7.5	3/09/1998	Monitoring
480 m S	133657	323627	5808771	7.5	3/09/1998	Monitoring

It should also be noted, that groundwater may be utilised by persons with unregistered bores not appearing on the database.

3 SITE INVESTIGATIONS & OBSERVATIONS

3.1 Previous Site Assessments

No previous environmental site assessments or related documents were available to Lane Piper at the time of writing this PESA.

3.2 Site Inspection

The site was inspected by Mr Anthony Lane and Mr Alex Sexton of Lane Piper on 18 June 2008, prior to commencement of the soil investigation. The following observations were recorded:

1. Access to the site is only possible from Malvern Road.
2. The premises' is currently vacant. Power and water services still operate as of the date of inspection. Other services such as gas are present on the site.
3. The site surface is principally covered by the current building, with concrete covering the small backyard area.
4. Inside and outside the building, there was no access to soil. A floating wooden floor was observed.
5. The building is predominately made of brick, with a corrugated iron fence at the southern end of the site. The site is directly adjacent to a commercial building and a skateboard ramp.
6. The site is relatively flat and surface water generally drains into the stormwater network on the site or into the lane way behind the site.
7. No obvious signs of chemical based contamination, including staining or odours were observed on the site.
8. No evidence of above ground or underground fuel storage tanks on the site.
9. No visual evidence of asbestos on site.

As part of the site inspection, an informal discussion with Mr Peter Angwin, the Property Coordinator for the SCC, was carried out by Mr Anthony Lane and Mr Alex Sexton of Lane Piper on 18 June 2008. The discussion involved the following issues:

10. The currently operating services at the site (i.e. electricity) will be turned off to allow for initial soil sampling.
11. Access to soil will be gained through the flooring inside the building and through the concrete slab in the backyard.
12. The site is currently vacant, however squatters have been present at the site.
13. The second storey was previously used as a residence.

3.3 Site Activities & Potential Contaminants of Concern

The PESA has identified contaminants of potential concern which are summarised in Table 3-1.

Table 3-1: Site Activities and Potential Contaminants of Concern

Site Activity/Use/Event	Potential Contaminants of Concern	Comments
On Site Sources		
Buildings imported fill for construction and operations	Range organic and inorganic parameters	Extensive fill maybe beneath the site flooring.
Printing Firm	Acids, alkalise, solvents, chromium	The site was used as a printing firm between 1891 and 1955.
Off Site Sources		
Metals Disposer and Dealer	Various metals	The neighbouring site was Prahran Metals from the early 1950s.
Dry Cleaning	VOCs	A dry cleaners was identified approximately 150 m west of the site on Malvern Rd.
Wood Yard	Range organic and inorganic parameters	The neighbouring site was used as a wood yard in the early 20 th Century.

4 FIELDWORK

4.1 Soil Investigation Program

Prior to any soil investigation being completed, LanePiper had Mr. Peter Angwin of the City of Stonnington have the power authority disconnect the electrical power to the property on 11 July 2008.

4.1.1 Sample Methodology

Fieldwork was conducted on 23 July 2008. A total of five (5) test locations, identified as locations HA1 to HA5, were conducted as boreholes using a hand auger due to site access restrictions. The boreholes were dug to depths of between 0.9 m and 1.4 m below ground level. Locations are shown in Figure 2, Appendix A.

Soil samples were collected from near surface (0.01 – 0.1 m), then half a metre depth (0.5 m). If indications of potential contamination were observed, such as fill, buried rubbish, odorous soils and soil staining, then soil sampling continued to natural or non impacted soils or refusal on rock, to assess the nature and extent of potential contamination. Soil samples were field screened for volatile organic contamination using a photo-ionisation detector (PID). The calibration certificate is provided in Appendix I.

The fieldwork was undertaken by an experienced environmental scientist who logged the soil profile and collected the samples. Lane Piper protocols were used to avoid cross contamination. The records of the soils encountered, the samples collected including depths and related observations are presented in the test pit and borehole records (Appendix C).

Soil sampling was carried out in general accordance with AS4482.1 (2005), samples were collected into sterile jars and packed in chilled transport containers for delivery to the laboratory.

4.1.2 Grid Based Sampling Rational

During the site inspection and soil sampling program, no visual or olfactory evidence of wide spread contamination was observed. It is noted that the site history and interview with the representative from City of Stonnington, indicates there has been no industrial or significant chemical based operations on the site. However, it is expected that the upper soils would have been levelled with potentially contaminated fill which may have been brought on-site.

Given that the near-surface soils in this area were expected to consist of natural soils or fill, this Limited Environmental Site Assessment, applied the minimum sample density recommended by the Australian Standard AS4482.1 *“Guide to Sampling and Investigation of Potentially Contaminated Soil, Part 1: Non-Volatile and Semi-Volatile Compounds”* (2005). A sample density of one (1) per 0.01 hectares was adopted, equating to five (5) grid based locations across the site.

4.1.3 Targeted Sampling Program Rational

Two (2) grid samples dually acted as target samples, with boreholes located in the concreted area located in the southern portion of the site. These locations were identified as potentially being contaminated during the site history search or site inspection. Rationale for location selection is listed below.

- Two (2) boreholes (HA4 and HA5) were undertaken within the concreted area located in the southern portion of the site. Concrete was cored through to allow access to the underlying soils. The profile consisted predominately of fill, comprising of silty sands, asphalt, gravel and brick, to a depth of 1.1 m bgl and 1.15 m bgl.
- There were no obvious signs of signs of contamination, including odours or soil staining evident from these targeted sample locations, with the exception of solid inert waste and a slight organic odour noted within borehole HA5 (0.4 – 0.5 m bgl).

4.1.4 Soil Sample Storage and Transport

Sample jars were provided by the primary laboratory. All samples were stored in insulated transport containers containing ice and delivered to the designated laboratories under Chain of Custody documentation. All samples were labelled with an indelible marker pen on water resistant labels attached to the sample jars.

4.1.5 Laboratory Testing – Soil

Nine (9) samples collected within fill and two (2) collected from natural soils were selected for laboratory testing. The analysis program was based on general screening for potential contamination, visual & olfactory observations and the site history review. The selected samples were tested for a broad range of inorganic and organic parameters.

The primary laboratory was MGT Environmental Consulting in Oakleigh, Melbourne, and the secondary laboratory (quality control) was ALS in Clayton, Melbourne. Both laboratories are NATA-accredited for the parameters tested. The laboratory testing program is presented in Table 4-1.

Table 4-1: Laboratory Testing Program

Location	Samples	Analysis
HA1	HA1/0.1	Metals (Ag, As, Be, Cd, Cr (Total), Co, Cu, Hg, Pb, Mo, Ni, Sb, Se, Sn, Vn, Zn), PAHs, pH
	HA1/0.4	Metals (Ag, As, Be, Cd, Cr (Total), Co, Cu, Hg, Pb, Mo, Ni, Sb, Se, Sn, Vn, Zn), TRH, BTEX, VOCs, pH
HA2	HA2/0.1	Metals (Ag, As, Be, Cd, Cr (Total), Co, Cu, Hg, Pb, Mo, Ni, Sb, Se, Sn, Vn, Zn), PAHs, pH
	HA2/0.45	Metals (Ag, As, Be, Cd, Cr (Total), Co, Cu, Hg, Pb, Mo, Ni, Sb, Se, Sn, Vn, Zn), PAHs, pH
	HA2/0.9	Metals (Ag, As, Be, Cd, Cr (Total), Co, Cu, Hg, Pb, Mo, Ni, Sb, Se, Sn, Vn, Zn), pH
HA3	HA3/0.4	Metals (Ag, As, Be, Cd, Cr (Total), Co, Cu, Hg, Pb, Mo, Ni, Sb, Se, Sn, Vn, Zn), PAHs, pH
HA4	HA4/0.25	NEPM Screen ¹
	HA4/0.6	Metals (Ag, As, Be, Cd, Cr (Total), Co, Cu, Hg, Pb, Mo, Ni, Sb, Se, Sn, Vn, Zn), pH
HA5	HA5/0.4	NEPM Screen ¹
	HA5/0.9	Metals (Ag, As, Be, Cd, Cr (Total), Co, Cu, Hg, Pb, Mo, Ni, Sb, Se, Sn, Vn, Zn), PAHs, pH
	HA5/1.3	Metals (Ag, As, Be, Cd, Cr (Total), Co, Cu, Hg, Pb, Mo, Ni, Sb, Se, Sn, Vn, Zn), pH

Location	Samples	Analysis
Analytical Screen Definitions		
1. NEPM Soil Screen comprises: NO ₃ , Total S, P, SO ₄ , Metals Cr ⁶⁺ (As, Cd, Cr, Cu, Pb, Hg, Mo, Ni, Sn, Se, Ag, Zn), CN, TRH, OCP, PAH, PCB, Phenols, SVOC (inc. Phthalates, Semi Vol CHC), VOC (inc. MAH, Vol CHC, Hal Vol)		

Soil sampling was conducted by Lane Piper using standard, documented procedures. Copies of the NATA stamped laboratory reports and Chain of Custody documentation are included in Appendix E. Tabulated laboratory results are presented in Appendix B.

The quality control/ quality assurance (QA/QC) of the soil sampling program is discussed in section 4.2.

4.2 Quality Control / Quality Assurance

This section reviews the Quality Assurance (QA) and Quality Control (QC) documentation for the soil and groundwater sampling and analysis programs. QA encompasses the actions, procedures, checks and decisions undertaken to ensure sample integrity and representativeness, and the reliability and accuracy of analysis results. The QA documentation also includes an indication of the Data Quality Objectives sought in relation to each significant action, test or process involved in the assessment.

QC activities measure the effectiveness of the QA procedures by undertaking testing, and then comparing results to previously established objectives. QC work will include the internal laboratory testing as well as results of QC samples and rinsate blanks and duplicates. The quality of the information and/or data is deemed satisfactory when the QC results demonstrate that agreed objectives have been met.

Tabulations of Relative Percentage Differences (RPDs), calculated for QC duplicate pairs (internal and external), is presented with Summary Results Tables, Appendix B.

Table 4-2: Review of QA/QC

QA/QC Aspects	Evidence & Evaluation
QA Documentation	
Project Quality Plan/Work Plan and Data Quality Objectives	A Work Plan and Health & Safety Plan were prepared prior to the environmental site assessment. A quality control program was implemented during the assessment. The Data Quality Objectives were expressed in terms of the purpose of the assessment and relevant assessment criteria.
Data Representativeness	
Holding Times	Holding times for the primary laboratory were all in conformance with Table 4 in AS4482.1-2005.
Background samples	No offsite soil samples were collected.
Verification of field procedures	Soil bores were sampled using a hand auger, soil samples were carefully selected to be representative of the required location. Samples were taken directly from the head auger, using nitrile gloves.

QA/QC Aspects	Evidence & Evaluation
	Sampling equipment was routinely decontaminated or disposed of between bores, as appropriate.
Data Precision & Accuracy	
QC Testing – Blind replicates	One (1) soil sample was a blind replicate sample. The discrete primary and blind duplicate results were compared. The sampling frequency of blind duplicate samples is appropriate and in accordance with AS 4482.1. None exceeded the RPD acceptance of 50%. The RPD calculations are presented in Appendix B.
QC Testing – Field splits	One (1) soil sample was a split replicate samples. The discrete primary and split duplicate results were compared. The sampling frequency of blind duplicate samples is appropriate and in accordance with AS 4482.1. Only chromium (total) slightly exceeded the RPD acceptance of 50%. The RPD calculations are presented in Appendix B. Exceedences of RPD criteria may occur in soil samples due to the heterogeneity inherent in such mediums.
Trip Blanks	One (1) trip blank was collected. All analytes tested reported below the LOR.
Laboratory Internal QC	Evidence of the laboratories internal QC testing is present and complete. Both MGT (Primary lab), ALS (Secondary lab) performed internal QC with adequate testing and satisfactory results for matrix spikes, method blanks and laboratory duplicates.
Laboratory Method Detection Limit	Laboratory reports indicate the method detection limits were lower than the respective assessment criteria.
NATA endorsement of laboratory reports	Laboratory reports were stamped with the NATA endorsement stamp and signature.
Calibration of Field Equipment	All field equipment was calibrated. Calibration certificates are attached in Appendix I.
Decontamination and Equipment Blanks	One (1) rinsate blank was collected for the soil sampling round. The rinsate blank was tested and all analytes reported below the LOR.
Data Comparability	
Standard Procedures	Fieldwork procedures are documented in the report and are comparable for each phase of assessment.
Qualified Personnel	The staff involved in managing and reviewing the project and those involved in fieldwork are qualified personnel.
Volatile Losses	All soil samples were screens for VOCs using a MiniRae PID sensor.
Sample Integrity	Field Chain of Custody (COC) documentation is

QA/QC Aspects	Evidence & Evaluation
	presented in Appendix E. Soil COCs were completed with full and demonstrable delivery of samples. Laboratory holding times were not exceeded.
Data Completeness	
Validity of Data Set	The data quality review indicates no significant systematic errors in the data collection process for soil and therefore, the data set used as the basis for the soil assessment is considered valid and complete.

5 CONTAMINATION ASSESSMENT CRITERIA

5.1 Soil Assessment Criteria

Table 2 of the *SEPP Prevention and Management of Contamination of Land* (2002), specifies the “Indicators and Objectives” to be applied to the assessment of land contamination. These objectives refer to the (NEPM) National Environment Protection (*Assessment of Site Contamination*) Measure issued in December 1999, by the National Environment Protection Council (NEPC).

The NEPM presents guidelines for soil and groundwater in the assessment of site contamination and specifies *Investigation Levels* at which further assessment of human or ecological risks or management of contamination is required. The human health levels are referred to as HILs, and the ecological levels as EILs.

The NEPM-EILs are equivalent to the ANZECC B criteria, with the following exceptions:

- The NEPM-EIL includes criteria for two additional metals (barium and vanadium) and specifies methyl mercury separately from total mercury;
- ANZECC B specifies criteria for antimony and tin, not included in NEPM;
- The criteria for chromium, copper and lead in the NEPM-EIL are higher than the more conservative ANZECC B levels, and;
- The NEPM also specifies separate criteria for Chromium III and Chromium VI.

The initial screening levels for determining the “contamination status of land” are generally the most conservative of these levels, which are the EILs, with the exception of lead where HIL ‘A’ is lower than the EIL. Where these levels do not offer a value for a particular parameter, alternate and equivalent sources of investigation levels are used including:

- ANZECC B (1992);
- Environmental Quality Objectives in the Netherlands (1994) (referred to as Dutch criteria); and
- NSW EPA Guidelines for Assessing Service Station Sites (1994).

“Investigation levels” are not intended to be interpreted as “maximum permissible levels”, “clean up levels” or “safe levels”, rather, they are levels at which further investigation or assessment should be undertaken to provide assurance that unacceptable contamination does not occur. Subsequent assessment on a site-specific basis often results in higher levels being acceptable. However, since the “investigation levels” are generally set at conservatively low levels, they are often taken to be the acceptable levels.

The SEPP Prevention and Management of Contamination of Land (Table 2) specifies the NEPM EILs and HILs as objectives to be met unless a site-specific assessment of risk yields alternative values.

The proposed development of the site described in section 1.2 is for an area of Public Open Space. The land use(s) associated with this development would be:

- Recreation/Open Space

Therefore the beneficial uses and assessment criteria commensurate with these uses are:

- NEPM EIL
- NEPM HIL-E

Whilst the above criteria were the primary criteria used, they have been supplemented with criteria from other jurisdictions where the above criteria do not specify allowable concentrations for a particular analyte. In addition, the data was also assessed against NEPM HIL-A to provide a complete assessment of the site.

The following sections provide a summary of those results that exceed NEPM criteria or equivalent.

5.1.1 Nutrient Load Adopted Criteria

Given the historical site use and close proximity to park land, nutrients were tested for to investigate potential contamination. The testing program included nitrate (NO₃), phosphate (Total), sulphate and sulphur (SO₄). The NSW Department of Conservation and Land Management, issued guidance on the concentrations of nutrients that may have a negative impact on farming practices, in *“What Do All the Numbers Mean? A Guide for the interpretation of Soil Test Results”* 1992 (NSW Soil Test Guide, 1992).

The nutrient guidelines adopted in this circumstance are used as an Ecological Investigation Level, and there is no current guidance in relation to HIL for these parameters. The NSW Soil Test Guide, 1992 states to avoid poor crop performance (or plant growth), ammonia and nitrate values should range between 8 mg/kg to 30 mg/kg and that TKN should ideally fall below 5,000 mg/kg, The criterion for phosphorus is the NEPM EIL of 2,000 mg/kg.

6 DISCUSSION OF LABORATORY RESULTS – SOIL

The analytical testing program was restricted to fill and natural soils of depths between 0.1 m bgl and 1.3 m bgl. A number of analytes were identified above the detection limit. No analytes exceeded the adopted assessment criteria described in section 5, with the exception of benzo(a)pyrene. Table 6-1 presents the key findings of the soil analytical program.

Table 6-1: Summary of Analytical Findings – Soil

Analytes	Adopted Criteria		Min. Conc. (mg/kg)	Max. Conc. (mg/kg)	No. Below LOR	No. Below Adopted Criteria	No. Above Adopted Criteria
	NEPM EIL (mg/kg)	NEPM HIL E (mg/kg)					
Metals							
Arsenic	20	200	<2	4.4	9	12	0
Chromium (Total)	-	-	<5	38	7	-	-
Cobalt	-	200	<5	9.9	8	12	0
Copper	100	2,000	<5	8.9	8	12	0
Lead	600	600	<5	110	2	12	0
Mercury	1	30	<0.1	0.2	8	12	0
Nickel	60	600	<5	26	5	12	0
Zinc	200	14,000	<5	140	1	12	0
Organics							
Benzo(a)pyrene	-	2	<0.1	2.8	5	6	1
PAH (Total)	-	40	<0.1	31	2	7	0

The majority of the soil investigation results were below the laboratory detection limit and all were below the NEPM EIL and HIL E adopted criteria except for benzo(a)pyrene.

6.1 Protection of Ecosystems – Land

The site contains no natural unmodified ecosystems. The intended land use of the site is likely to be recreational open space (i.e. Park land). Therefore, the soil and fill remaining on the site may reasonably be expected to sustain the "modified ecosystems" and "highly modified ecosystems" found in urban gardens in compliance with the *SEPP Prevention and Management of Contamination of Land* (2002). The soil must sustain plants including ornamental flowers, shrubs, lawn and possibly small trees in such gardens, as well the soil in-fauna.

The concentrations of metals above the laboratory detection limit were all below the background concentration ranges for each metal listed in the NEPM 1999. The levels may be attributed as naturally occurring on the site, although some use of metals may be a result of past activities. Further analysis of other individual samples from the investigation, and relating metals may provide analytical support for this conclusion.

The satisfactory level of contaminants in the soils remaining on-site indicates off-site ecological impacts are not likely. However, appropriate erosion controls from runoff or dust is essential to prevent erosion of these soils during demolition and any construction works.

6.2 Protection of Human Health

6.2.1 Soil Results – Inorganics

The test results for the inorganics analysed from samples the site are less than the adopted criteria (NEPM EIL and HIL 'E').

6.2.2 Soil Results - Organics

The test results for the organics analysed from samples the site are less than the adopted criteria (NEPM HIL 'E'), with the exception of benzo(a)pyrene. Benzo(a)pyrene was noted to slightly exceed the adopted HIL criteria (2 mg/kg) at sample location HA4/0.25 with a concentration of 2.8 mg/kg. The sample was collected within fill which extended to a depth of 1.15 m bgl, which was underlying a concrete slab of 0.15 m thickness.

By referring to the NEPM, analyte concentrations are allowed to exceed the HIL criteria at individual locations, providing the average concentration is less than the HIL, the standard deviation (SD) is less than 50% of the HIL value and each individual location is less than 250% of the HIL value. By applying these guidelines, benzo(a)pyrene does not exceed the criteria.

Table 6-2 presents a statistical summary of the analytical results concerning benzo(a)pyrene.

Table 6-2: Statistical Summary for Remaining On-site Soils

Parameter	Guideline	Analyte (mg/kg)
	NEPM HIL E criterion	Benzo(a)pyrene
Fill Material		
Mean		0.6
Standard Deviation (SD)		1.0
Minimum		<0.1
Maximum		2.8
Count		7

6.2.3 Asbestos

An Asbestos Audit was conducted of the building by Bureau Veritas HSE Pty Ltd in September 2007 at the site (Appendix J). Asbestos containing material in the form of cement sheet was located within the outdoor toilet structure. The Asbestos Audit report provides a number of recommendations to manage the presence of asbestos on-site and for off-site disposal.

A subsequent site inspection was conducted by Mark Paholski of Bureau Veritas HSE Pty Ltd on 23 July 2008 during fieldworks to inspect for the presence/absence of asbestos containing

materials within the crawl space beneath the flooring. No asbestos materials were identified within the crawl space.

6.2.4 Conclusions for Human Health

Based on the outcomes from the soil laboratory testing results, there is negligible risk to human health from soil at the site.

6.3 Protection of Buildings and Structures

This assessment did not identify any soil characteristics that are likely to affect buildings or structures at the site.

Acid sulphate soils were not suspected at this site due to the geological and physiological characteristics of the site. Therefore, testing was not performed for acid generation and neutralisation.

The pH of the surface soils at the site ranged from a minimum of 8.3 to a maximum of 9.2. Soil of this pH is not likely to present a corrosion hazard to buildings and structures.

6.4 Protection of Aesthetics

Aesthetics, especially odour is an important criterion to consider. The objective for “Aesthetics” in the *SEPP Prevention and Management of Contamination of Land (2002)* is that “contamination must not cause the land to be offensive to the senses of human beings”.

Aesthetically unacceptable materials were identified at the site as follows:

Solid Inert Waste: beneath the floor surface (crawl space) and concrete surface in the southern portion of the site, fill consisting of fine to medium grained silty sands, concrete, asphalt, crushed rock, brick and glass.

Fill was noted to be to a maximum depth of 1.15 m bgl and pockets of other fill could occur in areas slightly beneath the soil surface and underlying other parts of the current surface. This would be expected to be of a scale that would be readily manageable during preparation of the site for its intended use.

6.5 Production of Food, Flora and Fibre

The *SEPP Prevention and Management of Contamination of Land (2002)* indicates that contamination of land must neither adversely affect produce quality or yield, nor affect the level of an indicator in food, flora and fibre.

Based on the outcomes from the soil laboratory testing results, the remaining on-site soil results across the site are below the adopted Health and Ecological Investigation Levels, however, the presence of fill and associated elevated concentrations of PAHs and exceedence of benzo(a)pyrene of HIL E criterion, precludes this beneficial use.

6.6 Off-Site Disposal

The investigation of the soil has revealed that one (1) sample location has reported analytes exceeding the maximum concentration permissible for the soil to be disposed of off-site as “Fill

Material” in accordance with EPA Publication 448.3 – *Classification of Wastes*. By noting the maximum recorded concentrations for the contaminants of concern the fill on-site would be classified as Category C (Contaminated Soil).

The statistical method applied is recommended to use ten (10) or more samples as part of the dataset, however for this analysis only seven (7) samples were available to be incorporated for the contaminants of concern. A reduced number of samples can significantly skew the statistical analysis, providing an inaccurate estimate. Therefore, with additional sampling, the classification of potential surplus fill to be disposed of off-site could significantly altered the level of contaminated soil classification, possibly to a lower level of classification (i.e. Fill Material).

Table 6-3 presents analytical results that exceed the maximum concentrations permissible for off-site disposal.

Table 6-3: Contaminant Concentrations of Soil Samples that Exceed the Criteria for Off-Site Disposal

Sample ID	Guideline	Analyte (mg/kg)	
		<i>Benzo(a)pyrene</i>	<i>PAH (Total)</i>
	<i>EPA 448.3 Fill Material</i>	1	20
	<i>EPA 448.3 Category C</i>	5	100
HA4/0.25		2.8	31

7 SUMMARY OF FINDINGS AND RECOMMENDATIONS

7.1 Conclusions

The findings of this preliminary ESA are summarised below:

1. The site appears to have been used historically for residential and low risk commercial land uses. More recently, commercial land uses have been predominant, however they do not indicate any significant sources that would result in significant contamination on-site.
2. The soil profile at the site comprises of up to 1.15 m of fill overlying a stiff silty clay soil. The fill appears to consist of silty sand soil, concrete, asphalt, brick and glass fragments, and crushed rock aggregates.
3. Soil testing undertaken identified slightly elevated levels of some metals and PAHs predominantly in a surface fill layer. There was no evidence of the petroleum-based chemicals often associated with printing industries. These results were observed to be below the adopted Health Investigation Level (HIL E) criteria, with the exception of one analytical result for a PAH [Benzo(a)pyrene].
4. An assessment of asbestos was undertaken of the building in September 2007 by Bureau Veritas HSE Pty Ltd. They also inspected the under-floor crawl space in July 2008 as part of the current assessment. This indicated no evidence of asbestos containing materials visible on the surface of the fill at the site.
5. In accordance with environmental regulations and EPA guidelines, the contamination levels in the fill and soil on-site would not be detrimental to use of the land at his site for public open space.
6. No groundwater investigation was proposed for the site assessment and has not been undertaken at this stage. The work to-date suggests that there are no on-site sources of groundwater contamination within the area of investigation.

7.2 Recommendations

Based on the results of the PESA and the proposed use of the area for public open space, it is recommended that:

1. If surplus fill is required to be disposed of off-site, it should be scraped from the site surface, stockpiled and classified in accordance with EPA Publication 448.3 – *Classification of Wastes*, and EPA Publication 1178 *Soils Sampling Guidelines (Off-site Management and Acceptance to Landfill)*.
2. Excess excavated fill and soil is properly stockpiled and stored on-site to prevent its erosion and transport from the site by stormwater run-off, leaching or wind-blown dust, until appropriately incorporated into the site conceptual development plan or disposed of off-site.

8 REFERENCES

General References

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17. Environmental Protection Agency Victoria (2007) *EPA Publication 1178 Soil Sampling Guideline (Off-Site Management and Acceptance to Landfill)*, November 2007.

Site Specific References

18. Bureau Veritas (2007), Asbestos Report, 288 Malvern Road, Prahran, for City of Stonnington.

Appendix A

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Figures

Figure 1: Site Locality

Figure 2: Sampling Plan

Appendix B

6 Pages

Tables

Table 1: Soil Sampling Analytical Results

Table 2: Field Duplicate (Blinds and Splits) RPDs

Table 3: Field Blanks (Rinsate and Trip)

Appendix C

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Bore Logs

HA1

HA2

HA3

HA4

HA5

Appendix D

6 Pages

Historical Aerial Photographs

Aerial Photograph – 1945

Aerial Photograph – 1963

Aerial Photograph – 1974

Aerial Photograph – 1979

Aerial Photograph – 1987

Aerial Photograph – 2007

Appendix E

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Laboratory Report and COCs

MGT Report – 231061

ALS Report – EM0806010

Appendix F

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Title Information

Basic Property Report

Planning Property Report

Current Certificate of Title

Historic Certificates of Title

Appendix G

4 Pages

Public Records

EPA Priority (Contaminated) Site Register

Energy Safe Australia

Royal Historical Society of Victoria – Sands and McDougal

Appendix H

8 Pages

Environmental Audit Termination Correspondence

City of Stonnington – 288 Malvern Road, Prahran – Site Assessment and Redevelopment – Update (Council Report)

Termination Correspondence (Email)

Auditor Advice on Site Contamination – 288 Malvern Road, Prahran, Vic (Doc Ref. 208064Letter01.3)

Appendix I Field Sheets

Calibration Certificates

Appendix J

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Assessors Report

**Bureau Veritas (2007) Asbestos Audit – 288 Malvern Road, Prahran,
September 2007**

Appendix K 1 Page

About Site Environmental Assessment Reports